NEW YORK STATE | Department of Health | Wadsworth Center

New York State Biomonitoring Program for Trace Elements

Event #1, 2024

Trace Elements in Whole Blood, Urine, and Serum

April, 2024

Wadsworth Center
NEW YORK STATE DEPARTMENT OF HEALTH
Trace Elements Laboratory

NEW YORK STATE | Department of Health | Wadsworth Center

Event #1, 2024:
Trace Elements in Whole Blood, Urine, and Serum

4/29/2024

Dear Laboratory Director,

This report summarizes performance for the first biomonitoring proficiency test (PT) event of 2024 for Trace Elements in Whole Blood, Urine, and Serum. One of the key goals of this PT program is to achieve harmonization of biomonitoring data for trace elements.

Target Value Assignment and Performance Evaluation:
For these PT materials, target values have been assigned for a limited number of trace elements that are gradable under criteria set by the NYS DOH Biomonitoring PT program. See assay-specific narratives for details. Data for additional trace elements are reported and are included here in order to characterize the PT materials more completely. Participant data and descriptive statistics are provided for educational purposes. No target value or acceptable range is implied.

Where the data permit, robust statistics were used to assign target values based on Algorithm A as defined by ISO 13528:2005E *Statistical methods for use in proficiency testing by inter-laboratory comparisons* [1]. Acceptable ranges for the graded elements are based on consensus criteria and/or those set by the NYS DOH's PT program. For example, some are fixed based on US regulatory guidelines (Pb, Cd) while for other elements the criteria are based on a consensus of the Network of PT scheme organizers for trace elements in occupational and environmental laboratory medicine [2]. Quality specifications are element and matrix specific; full details are provided under each element specific narrative.

A confidential, three-digit code number assigned by PT program staff identifies all laboratory participants.

Samples for the next PT event (Event #2, 2024) will be shipped May 15, 2024. Comments about this report may be directed to trel@health.ny.gov.

Sincerely,

Patrick J. Parsons, PhD
Chief, Inorganic and Nuclear Chemistry,
Division of Environmental Sciences
Wadsworth Center

Kayla Mehigan
Coordinator, Biomonitoring PT Program,
Division of Environmental Sciences
Wadsworth Center

NEW YORK STATE | Department of Health | Wadsworth Center

Event #1, 2024

Trace Elements in Whole Blood

Wadsworth Center
NEW YORK STATE DEPARTMENT OF HEALTH
Trace Elements Laboratory

NEW YORK STATE | Department of Health | Wadsworth Center

Event #1, 2024:
Trace Elements in Whole Blood

PT Materials

Human whole blood was purchased from Zen-Bio, Inc. and preserved with K_2EDTA. The company certifies that this material was "non-reactive" for HBsAg, HBV DNA, HIV-1,2 Ab, HIV-1 RNA, HCV Ab, HCV RNA, and STS. Units of whole blood were filtered into polypropylene containers through cheesecloth to remove particulates and supplemented with arsenic (As), cadmium (Cd), cobalt (Co), chromium (Cr), mercury (Hg), manganese (Mn), lead (Pb), barium (Ba), beryllium (Be), copper (Cu), molybdenum (Mo), nickel (Ni), platinum (Pt), antimony (Sb), selenium (Se), tin (Sn), titanium (Ti), thallium (Tl), uranium (U), vanadium (V), tungsten (W), and zinc (Zn). Whole blood samples were homogenized overnight prior to aliquoting 2-mL into polypropylene vials. PT samples were stored at -80°C until the week of the PT event, when they were thawed at 4°C prior to circulation to laboratories

Graded Elements

Seven elements in whole blood are formally graded: As, Cd, Co, Cr, Hg, Mn, and Pb. Target values for the graded elements are assigned to these pools based on (a) the robust mean calculated from data reported by all laboratories, or (b) if a robust mean is not possible, the arithmetic mean after outlier deletion.

Additional Elements

An additional 25 elements were reported by at least one participant: Ag, Al, Ba, Be, Bi, Cs, Cu, I, Li, Mg, Mo, Ni, Pt, Sb, Se, Sn, Sr, Te, Th, Ti, Tl, U, V, W, and Zn. These data are included here to provide a more complete characterization of the PT materials. All results reported by participant laboratories are tabulated and organized by lab code. The PT data are graphed for visual comparison purposes for all elements where at least five laboratories reported a value greater than the LOD. A statistical summary table is provided for samples where at least two comparable values were reported as above the LOD.

The summary statistics for the additional elements are provided for educational purposes only, i.e., no acceptable response is implied. However, it is expected that each laboratory would wish to investigate a potential source of bias if warranted by these data. Future events might result in additional elements becoming graded if a consensus can be reached regarding desired quality specifications.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

Whole Blood As (µg/L)					
	BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Target (Arithmetic Mean ($\bar{x}$))	0.94	2.14	4.76	8.1	0.44
Upper Limit	6.94	8.14	10.76	14.1	6.44
Lower Limit	0.00	0.00	0.00	2.1	0.00
Arithmetic SD (s)	0.06	0.09	0.24	0.4	0.09
Arithmetic RSD (%)	6.4	4.2	5.0	4.9	20
Number of Sample Measurements (N)	7	6	6	7	7

The acceptable range is based on quality specifications:
±6 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±6 µg/L at concentrations less than or equal to 30 µg/L. These quality specifications were established by New York State Department of Health's Wadsworth Center, the PT Program organizer.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

Whole Blood As (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
	Target	**0.94**	**2.14**	**4.76**	**8.1**	**0.44**
103	ICP-MS/MS	0.914	2.15	4.97	8.66	0.514
110	ICP-MS/MS	0.968	2.22	4.91	8.34	0.491
147	ICP-MS	0.948	2.18	4.53	8.01	0.533
247	ICP-MS/MS	0.837	1.98	4.41	7.49	0.384
264	ICP-MS	1.01	*1.67	*3.60	7.76	0.29
293	DRC/CC-ICP-MS	0.89	2.2	4.95	8.38	0.4
597	ICP-MS/MS	0.993	2.12	4.78	8.25	0.495

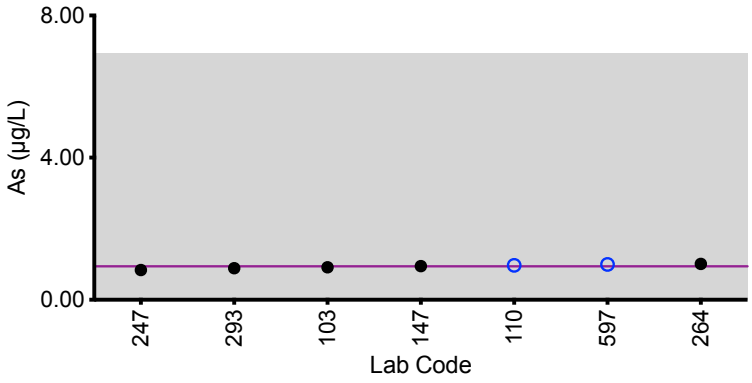
Based on the grading criteria for As in Whole Blood, 100% of results were satisfactory, with 0 of the 7 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

NEW YORK STATE | Department of Health | Wadsworth Center

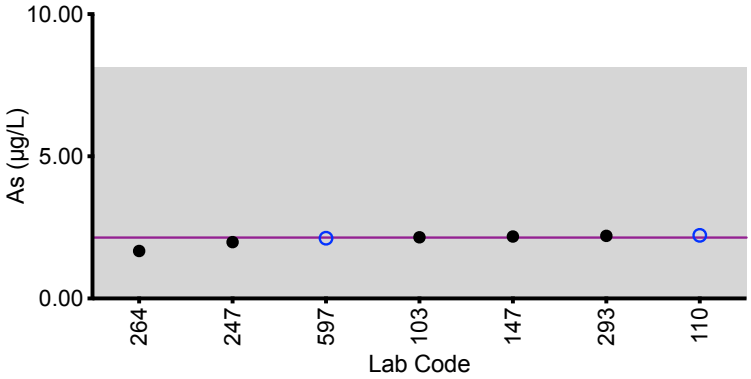
Results for Event #1, 2024: Summary Figures

Whole Blood As

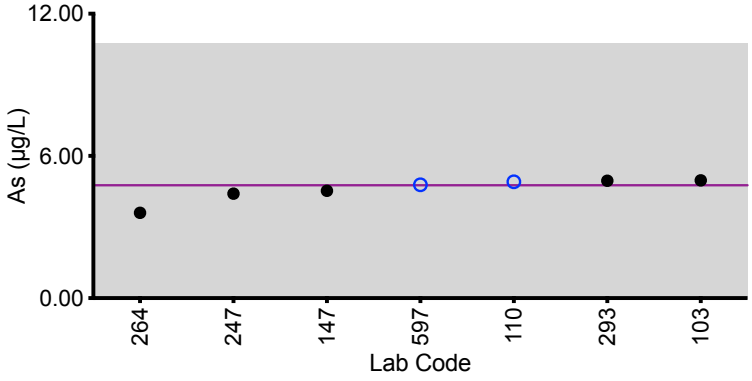
BE24-01



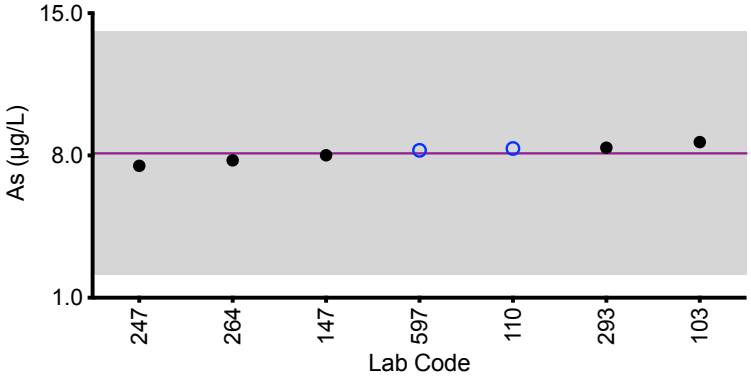
BE24-02



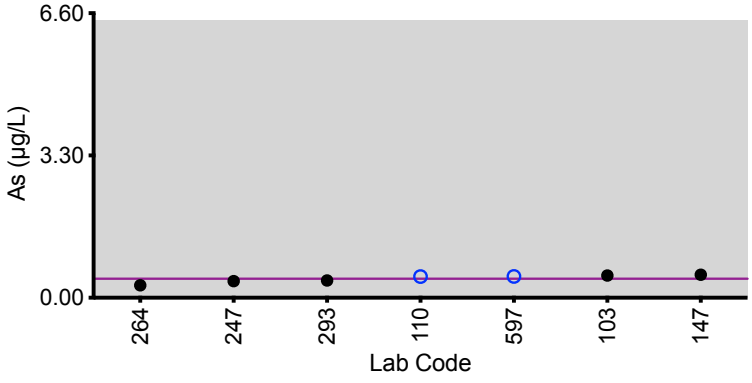
BE24-03



BE24-04



BE24-05



Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the arithmetic mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±6 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±6 µg/L at concentrations less than or equal to 30 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

Whole Blood Cd (µg/L)					
	BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Target (Robust Mean (x*))	0.81	2.48	0.26	0.491	1.56
Upper Limit	1.81	3.48	1.26	1.491	2.56
Lower Limit	0.00	1.48	0.00	0.000	0.56
Robust SD (s*)	0.07	0.09	0.02	0.022	0.09
Robust RSD (%)	8.6	3.6	7.3	4.5	5.8
Number of Sample Measurements (N)	11	12	8	10	12
Standard Uncertainty (*u*)	0.02	0.03	NA	0.009	0.03

The acceptable range is based on quality specifications:
±1 µg/L or ±15% around the target value, whichever is greater; thus, it is fixed at ±1 µg/L at concentrations less than or equal to 6.7 µg/L. These quality specifications are based on those used by US OSHA for occupational exposure.

An arithmetic mean, SD, RSD and n are provided for sample BE24-03.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

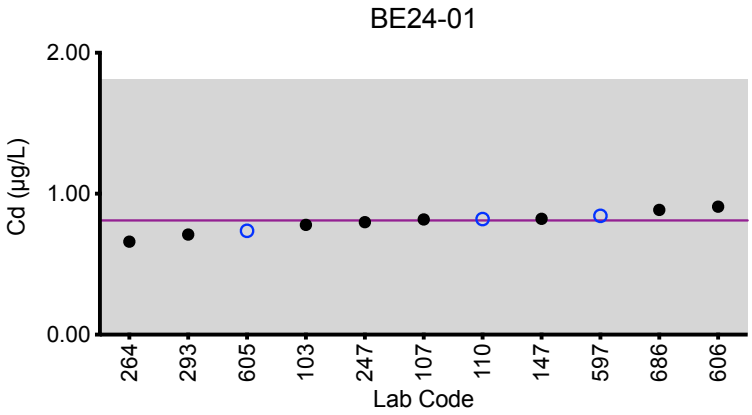
Whole Blood Cd (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
	Target	**0.81**	**2.48**	**0.26**	**0.491**	**1.56**
103	ICP-MS/MS	0.779	2.53	0.278	0.492	1.55
107	ICP-MS/MS	0.817	2.51	0.282	0.487	1.56
110	ICP-MS/MS	0.82	2.52	0.26	0.49	1.59
116	ICP-MS/MS	<1.50	3.03	<1.50	<1.50	1.61
147	ICP-MS	0.822	2.48	0.258	0.487	1.54
247	ICP-MS/MS	0.798	2.15	0.230	0.415	1.30
264	ICP-MS	0.66	2.23	0.28	0.53	1.46
293	DRC/CC-ICP-MS	0.71	2.18	0.240	0.4	1.38
597	ICP-MS/MS	0.843	2.43	0.256	0.487	1.58
605	ICP-MS	0.737	2.47	<0.500	<0.500	1.64
606	ICP-MS/MS	0.908	2.92	<0.500	0.730	1.73
686	ICP-MS	0.885	2.51	<0.500	0.510	1.66

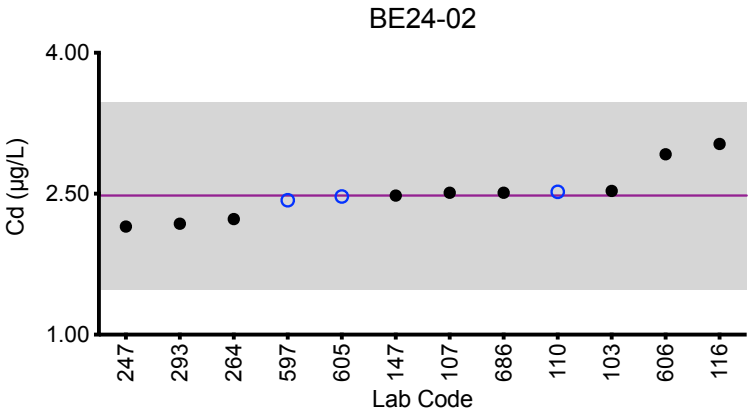
Based on the grading criteria for Cd in Whole Blood, 100% of results were satisfactory, with 0 of the 12 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

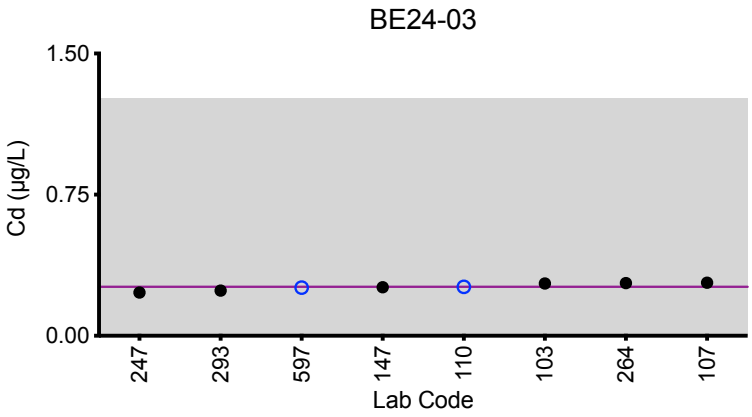
NEW YORK STATE | Department of Health | Wadsworth Center

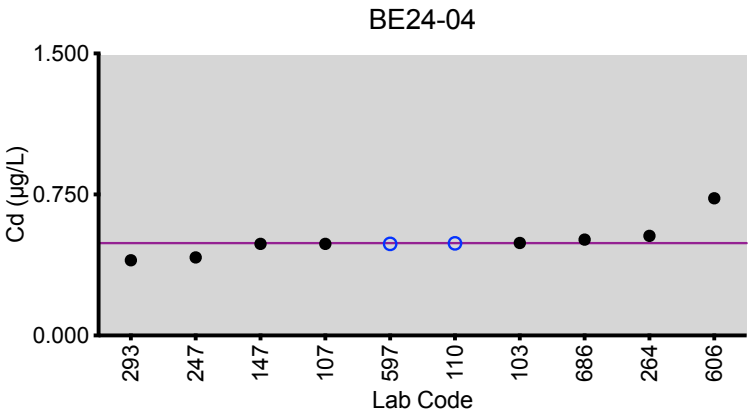
Results for Event #1, 2024: Summary Figures

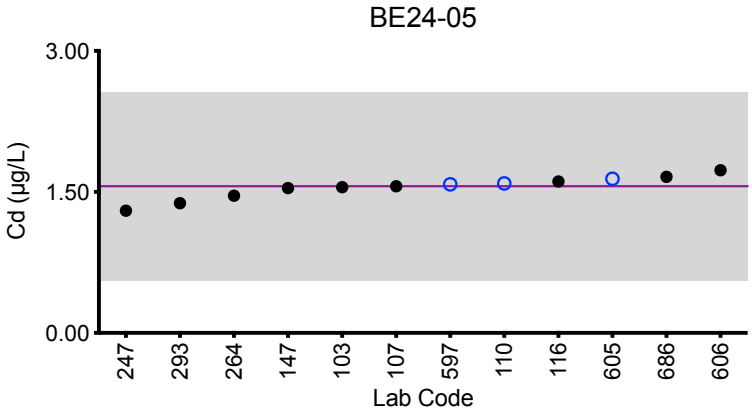
Whole Blood Cd











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the robust mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±1 µg/L or ±15% around the target value, whichever is greater; thus, it is fixed at ±1 µg/L at concentrations less than or equal to 6.7 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

Whole Blood Co (µg/L)					
	BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Target (Arithmetic Mean ($\bar{x}$))	0.88	11.0	91.6	5.35	2.42
Upper Limit	2.38	13.2	109.9	6.85	3.92
Lower Limit	0.00	8.8	73.3	3.85	0.92
Arithmetic SD (s)	0.06	0.3	3.0	0.12	0.07
Arithmetic RSD (%)	6.8	2.8	3.3	2.2	2.9
Number of Sample Measurements (N)	8	8	8	8	8

The acceptable range is based on quality specifications:
±1.5 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±1.5 µg/L at concentrations less than or equal to 7.5 µg/L. These quality specifications were established based on discussions with the US FDA, and represent a consensus from a network of Trace Element PT program organizers

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

Whole Blood Co (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
	Target	**0.88**	**11.0**	**91.6**	**5.35**	**2.42**
103	ICP-MS/MS	0.809	10.8	96.0	5.37	2.45
110	ICP-MS/MS	0.9	11.4	94.3	5.5	2.5
147	ICP-MS	0.935	11.3	92.0	5.45	2.45
247	ICP-MS/MS	0.880	10.9	87.5	5.17	2.35
255	ICP-MS	0.84	11	94	5.3	2.5
264	ICP-MS	0.99	10.92	90.90	5.48	2.42
293	DRC/CC-ICP-MS	0.82	10.89	89.27	5.28	2.38
597	ICP-MS/MS	0.847	10.4	89.0	5.23	2.32

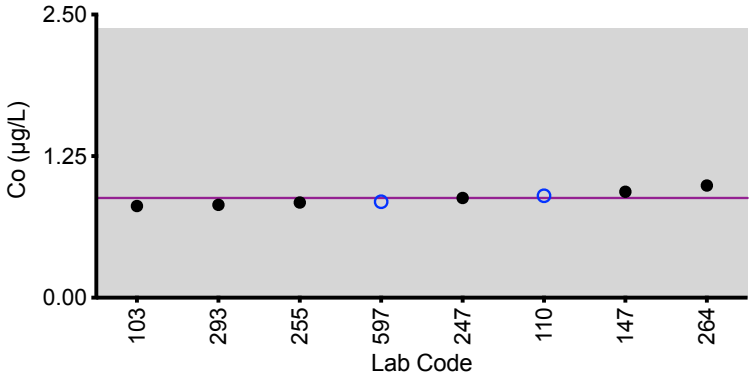
Based on the grading criteria for Co in Whole Blood, 100% of results were satisfactory, with 0 of the 8 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

NEW YORK STATE | Department of Health | Wadsworth Center

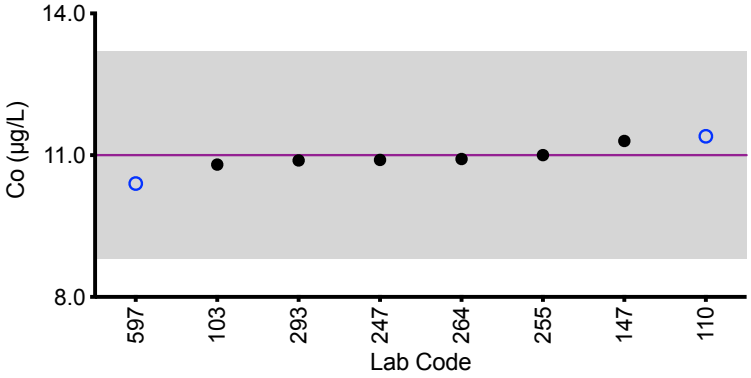
Results for Event #1, 2024: Summary Figures

Whole Blood Co

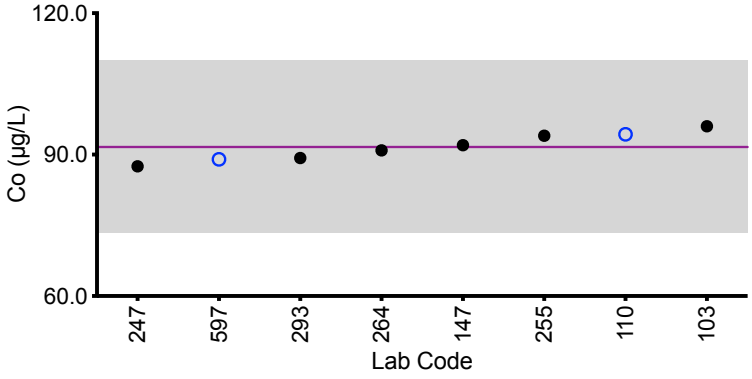
BE24-01



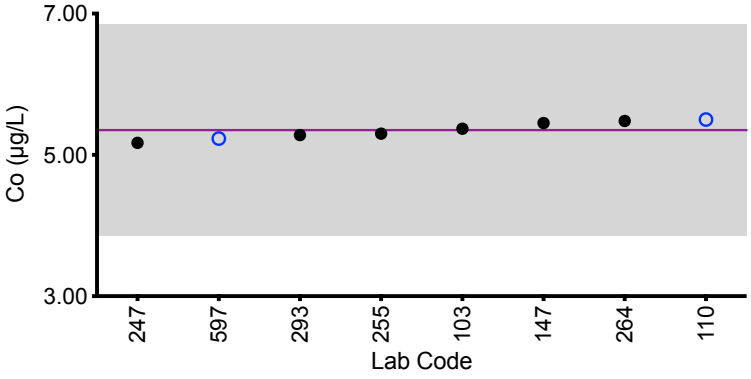
BE24-02



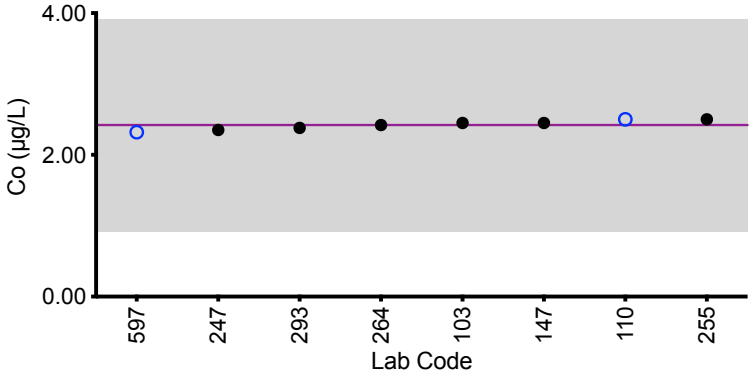
BE24-03



BE24-04



BE24-05



Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the arithmetic mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±1.5 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±1.5 µg/L at concentrations less than or equal to 7.5 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

Whole Blood Cr (µg/L)					
	BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Target (Arithmetic Mean ($\bar{x}$))	2.43	1.00	5.79	1.17	3.68
Upper Limit	4.43	3.00	7.79	3.17	5.68
Lower Limit	0.43	0.00	3.79	0.00	1.68
Arithmetic SD (s)	0.19	0.16	0.18	0.25	0.25
Arithmetic RSD (%)	7.8	16	3.1	21	6.8
Number of Sample Measurements (N)	7	7	8	7	8

The acceptable range is based on quality specifications:
±2 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±2 µg/L at concentrations less than or equal to 10 µg/L. These quality specifications were established based on discussions with the US FDA, and represent a consensus from a network of Trace Element PT program organizers

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

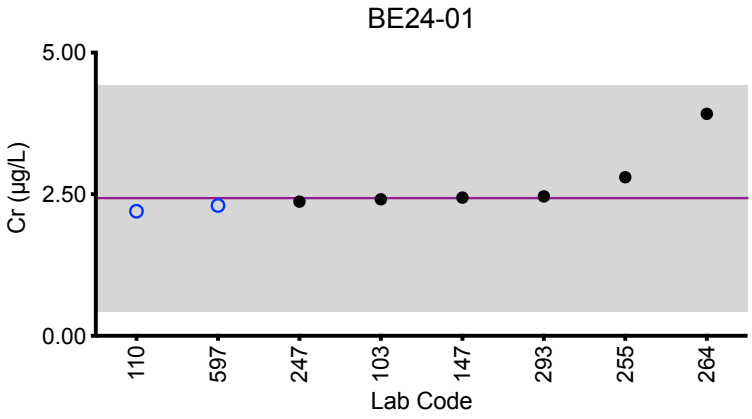
Whole Blood Cr (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
	Target	**2.43**	**1.00**	**5.79**	**1.17**	**3.68**
103	ICP-MS/MS	2.41	<1.50	5.70	<1.50	3.71
110	ICP-MS/MS	2.2	0.8	5.6	1.0	3.7
147	DRC/CC-ICP-MS	2.44	0.839	5.61	1.44	3.55
247	ICP-MS/MS	2.37	1.16	5.73	1.31	3.62
255	ICP-MS	2.8	1.2	6	1.2	4.1
264	ICP-MS	*3.92	1.05	6.08	0.70	3.26
293	DRC/CC-ICP-MS	2.46	1.10	5.89	1.36	3.88
597	ICP-MS/MS	2.30	0.871	5.71	1.21	3.59

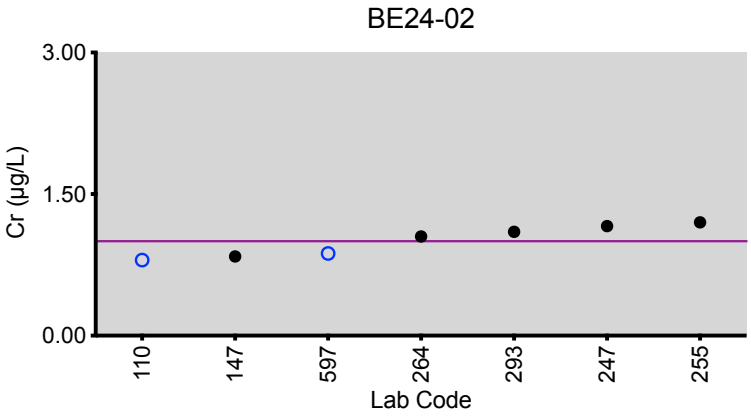
Based on the grading criteria for Cr in Whole Blood, 100% of results were satisfactory, with 0 of the 8 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

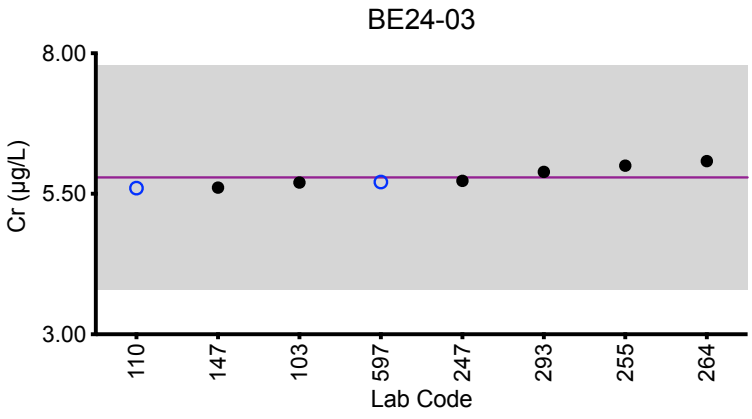
NEW YORK STATE | Department of Health | Wadsworth Center

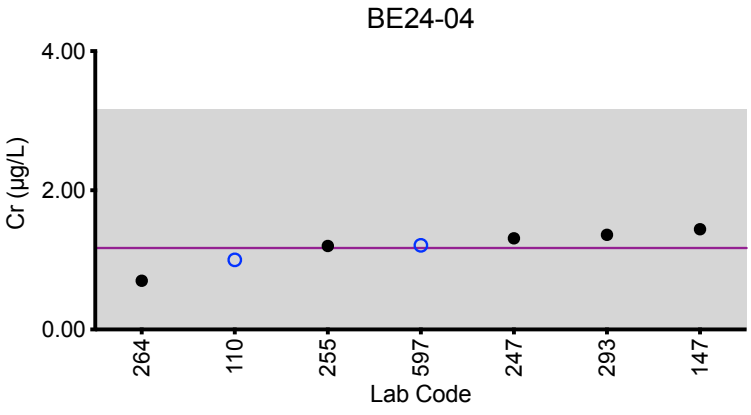
Results for Event #1, 2024: Summary Figures

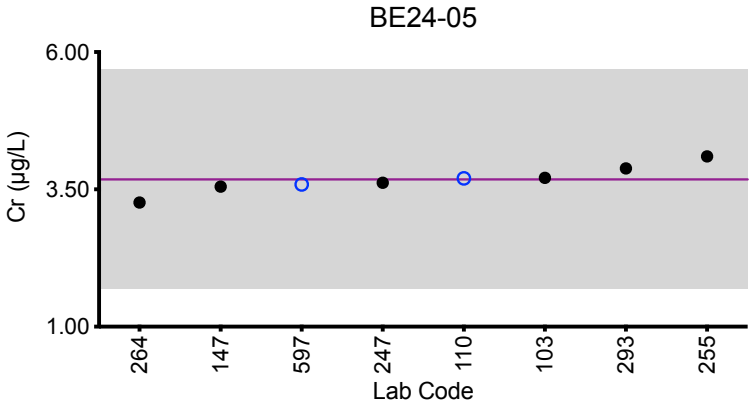
Whole Blood Cr











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the arithmetic mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±2 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±2 µg/L at concentrations less than or equal to 10 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

Whole Blood Hg (µg/L)					
	BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Target (Robust Mean (x*))	2.11	0.55	2.89	6.2	0.96
Upper Limit	5.11	3.55	5.89	9.2	3.96
Lower Limit	0.00	0.00	0.00	3.2	0.00
Robust SD (s*)	0.21	0.04	0.16	0.5	0.10
Robust RSD (%)	10	6.6	5.5	8.1	10
Number of Sample Measurements (N)	13	12	13	13	12
Standard Uncertainty (*u*)	0.07	0.01	0.05	0.2	0.03

The acceptable range is based on quality specifications:
±3 µg/L or ±30% around the target value, whichever is greater; thus, it is fixed at ±3 µg/L at concentrations less than or equal to 10 µg/L. These quality specifications were established by New York State Department of Health's Wadsworth Center, the PT Program organizer.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

Whole Blood Hg (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
	Target	**2.11**	**0.55**	**2.89**	**6.2**	**0.96**
103	ICP-MS/MS	2.00	0.584	2.81	6.08	1.29
107	ICP-MS/MS	2.08	0.56	3.00	6.21	1.00
110	ICP-MS/MS	2.15	0.54	2.91	6.36	0.97
116	ICP-MS/MS	2.76	<1.50	3.28	7.15	<1.50
147	ICP-MS	2.14	0.518	2.89	6.30	0.867
247	ICP-MS/MS	1.97	0.558	2.70	5.95	0.901
264	ICP-MS	0.67	0.75	3.88	7.23	1.23
293	DRC/CC-ICP-MS	1.6	0.50	2.5	5.33	0.80
391	CV-AAS	3.3	0.18	2.9	7.34	0.66
597	ICP-MS/MS	1.99	0.545	2.63	5.62	0.923
605	ICP-MS	2.12	0.595	2.81	5.90	1.00
606	ICP-MS/MS	2.32	0.534	2.99	6.05	1.01
686	ICP-MS	2.14	0.536	2.90	6.27	0.959

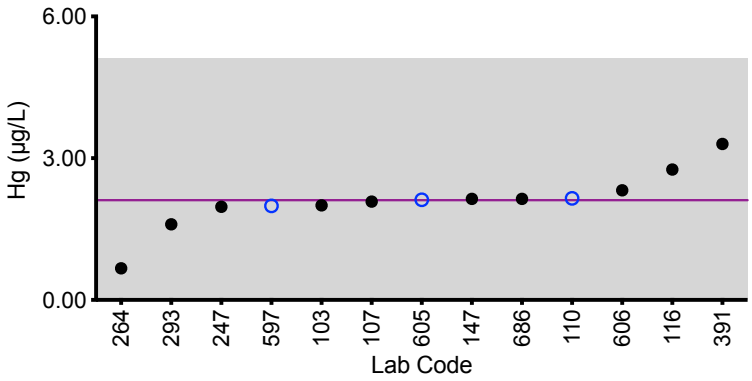
Based on the grading criteria for Hg in Whole Blood, 100% of results were satisfactory, with 0 of the 13 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

NEW YORK STATE | Department of Health | Wadsworth Center

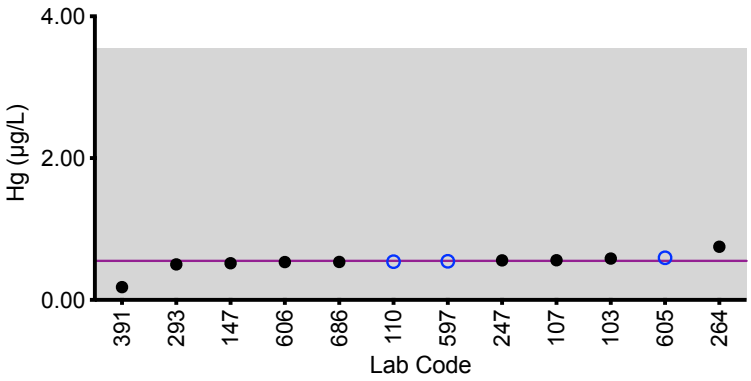
Results for Event #1, 2024: Summary Figures

Whole Blood Hg

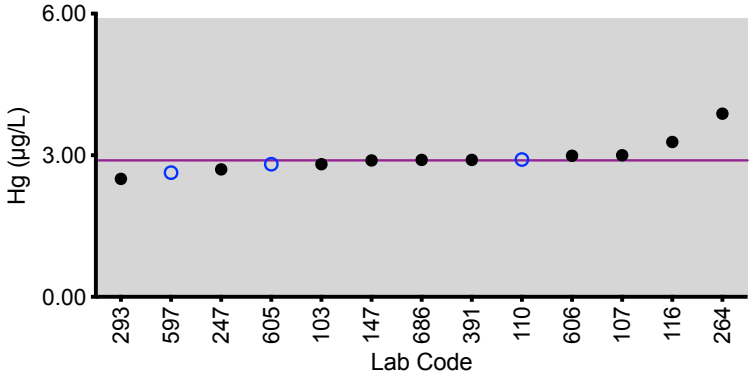
BE24-01



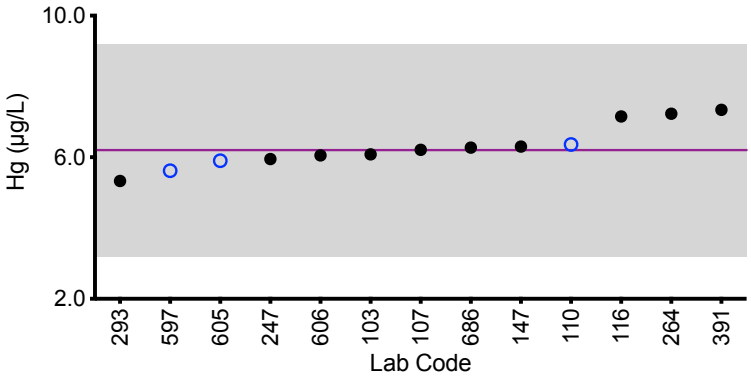
BE24-02



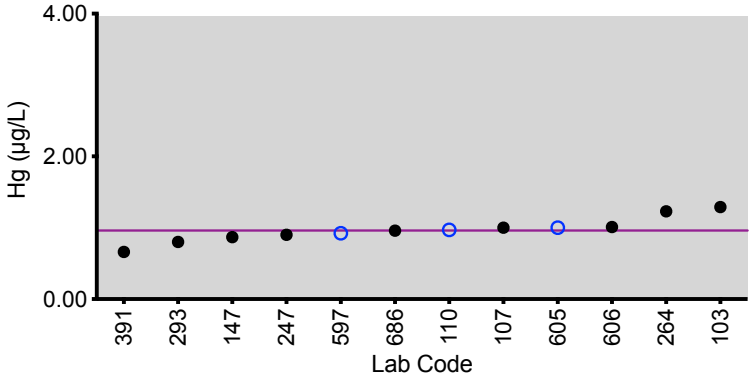
BE24-03



BE24-04



BE24-05



Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the robust mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±3 µg/L or ±30% around the target value, whichever is greater; thus, it is fixed at ±3 µg/L at concentrations less than or equal to 10 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

Whole Blood Mn (µg/L)					
	BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Target (Arithmetic Mean ($\bar{x}$))	14.6	24.0	18.8	5.9	14.1
Upper Limit	17.6	28.1	22.0	8.9	17.1
Lower Limit	11.6	19.9	15.6	2.9	11.1
Arithmetic SD (s)	2.0	1.8	1.0	0.5	1.7
Arithmetic RSD (%)	14	7.5	5.3	8.5	12
Number of Sample Measurements (N)	9	9	9	8	9

The acceptable range is based on quality specifications:
±3 µg/L or ±17% around the target value, whichever is greater; thus, it is fixed at ±3 µg/L at concentrations less than or equal to 17.7 µg/L. These quality specifications were recently proposed by a network of Trace Element PT program organizers (Praamsma M, et al. An assessment of clinical laboratory performance for the determination of manganese in blood and urine. Clinical Chemistry Laboratory Medicine 2016; 54(12): 1931-1938)

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

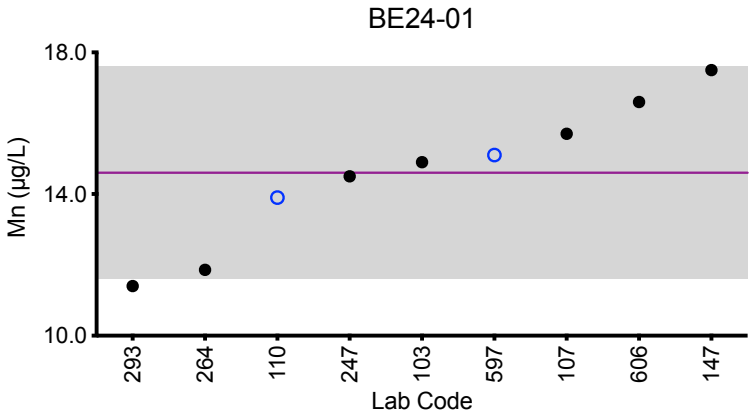
Whole Blood Mn (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
	Target	**14.6**	**24.0**	**18.8**	**5.9**	**14.1**
103	ICP-MS/MS	14.9	24.3	18.3	6.13	14.2
107	ICP-MS/MS	15.7	25.30	19.4	5.95	14.8
110	ICP-MS/MS	13.9	23.7	18.8	5.7	13.3
147	ICP-MS	17.5	25.4	19.3	*8.94 ↑	16.9
247	ICP-MS/MS	14.5	23.2	17.6	5.46	13.3
264	ICP-MS	11.86	22.80	19.98	6.65	12.92
293	DRC/CC-ICP-MS	11.4 ↓	20.87	17.1	5.1	11.37
597	ICP-MS/MS	15.1	23.4	18.9	5.84	13.5
606	ICP-MS/MS	16.6	27.0	19.9	6.60	16.3

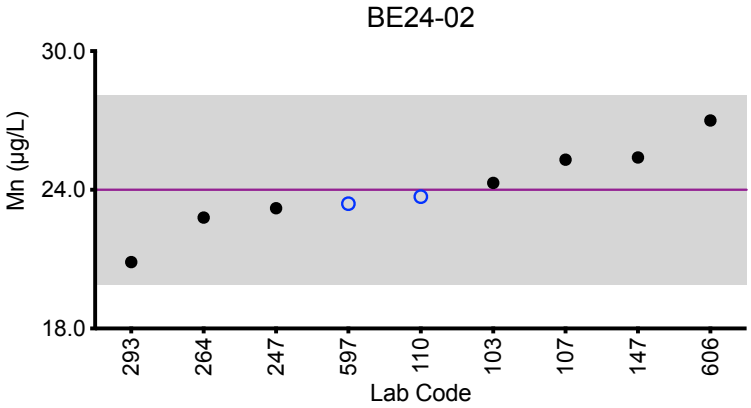
Based on the grading criteria for Mn in Whole Blood, 96% of results were satisfactory, with 0 of the 9 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

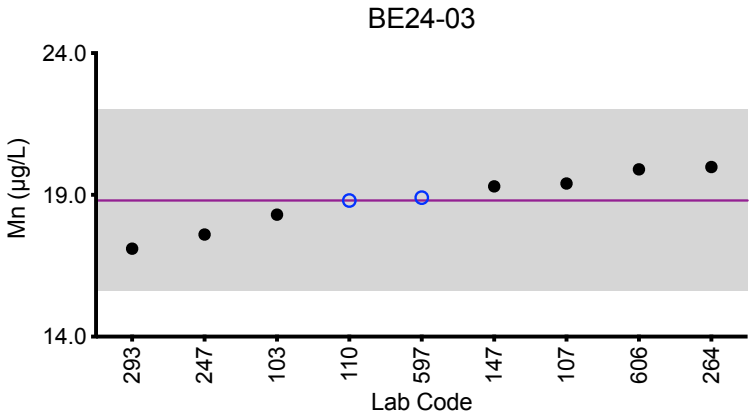
NEW YORK STATE | Department of Health | Wadsworth Center

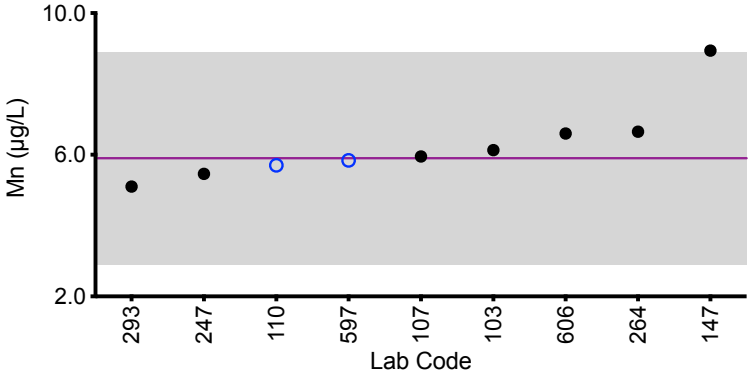
Results for Event #1, 2024: Summary Figures

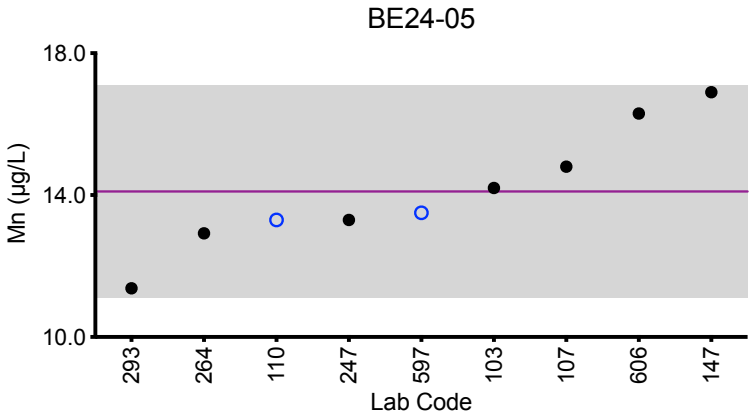
Whole Blood Mn











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the arithmetic mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±3 µg/L or ±17% around the target value, whichever is greater; thus, it is fixed at ±3 µg/L at concentrations less than or equal to 17.7 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

Whole Blood Pb (µg/dL)					
	BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Target (Robust Mean (x*))	8.9	3.03	1.17	0.95	2.05
Upper Limit	10.9	5.03	3.17	2.95	4.05
Lower Limit	6.9	1.03	0.00	0.00	0.05
Robust SD (s*)	0.6	0.23	0.07	0.05	0.14
Robust RSD (%)	6.7	7.6	6.0	5.3	6.8
Number of Sample Measurements (N)	14	13	12	10	12
Standard Uncertainty (*u*)	0.2	0.08	0.03	0.02	0.05

The acceptable range is based on quality specifications:
±2 µg/dL or ±10% around the target value, whichever is greater; thus, it is fixed at ±2 µg/dL at concentrations less than or equal to 20 µg/dL. These quality specifications are recommended by the Clinical Laboratory Standards Institute (CLSI, C40-A2) and have been proposed for use in proficiency testing programs approved under CLIA by the Centers for Medicare and Medicaid Services (CMS) in the USA. (https://clsi.org/standards/products/clinical-chemistry-and-toxicology/documents/c40/)

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

Whole Blood Pb (µg/dL)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
	Target	**8.9**	**3.03**	**1.17**	**0.95**	**2.05**
103	ICP-MS/MS	8.74	2.98	1.15	0.960	2.03
107	ICP-MS/MS	9.27	3.09	1.26	0.992	2.13
110	ICP-MS/MS	9.18	3.06	1.23	0.96	2.12
116	ICP-MS/MS	11.9 ↑	3.95	<3.0	<3.0	<3.0
147	ICP-MS	8.49	2.87	1.11	0.928	2.00
247	ICP-MS/MS	8.57	2.87	1.11	0.901	1.90
264	ICP-MS	8.48	2.93	1.15	0.92	2.00
293	DRC/CC-ICP-MS	8.06	2.69	1.03	0.8	1.86
343	ASV-LeadCare	6.7 ↓	<3.3	<3.3	<3.3	<3.3
391	ETAAS-Z	9.41	3.45	1.59	1.7	2.79
597	ICP-MS/MS	8.67	2.79	1.13	0.925	1.92
605	ICP-MS	8.91	3.02	1.16	<1.00	2.04
606	ICP-MS/MS	9.54	3.21	1.20	1.01	2.21
686	ICP-MS	9.22	3.13	1.21	<1.00	2.14

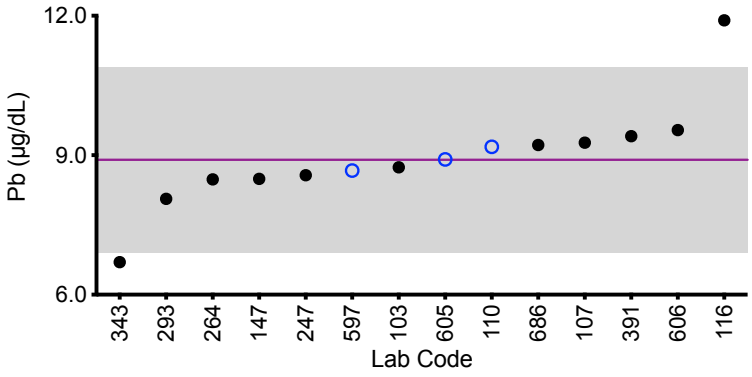
Based on the grading criteria for Pb in Whole Blood, 97% of results were satisfactory, with 0 of the 14 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

NEW YORK STATE | Department of Health | Wadsworth Center

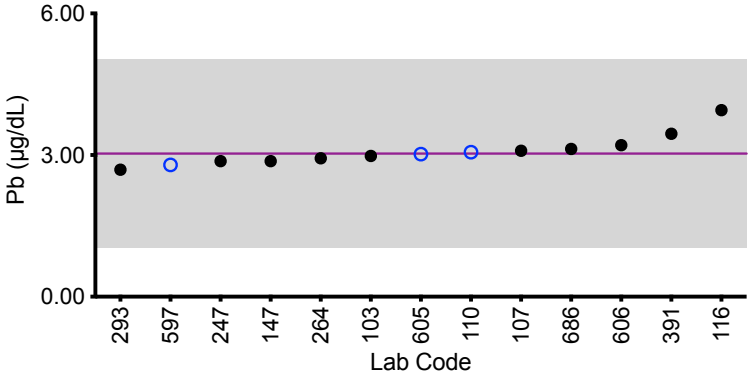
Results for Event #1, 2024: Summary Figures

Whole Blood Pb

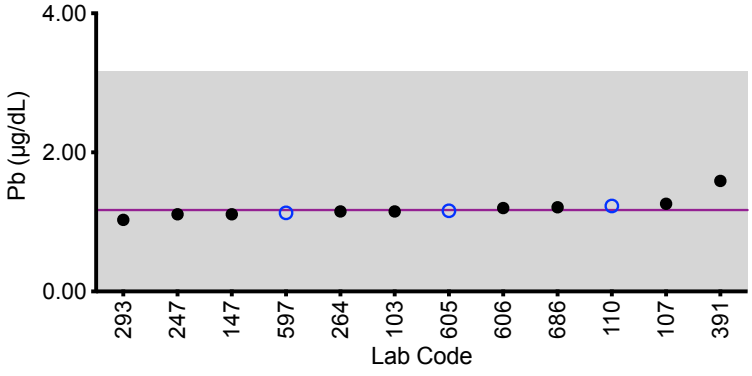
BE24-01



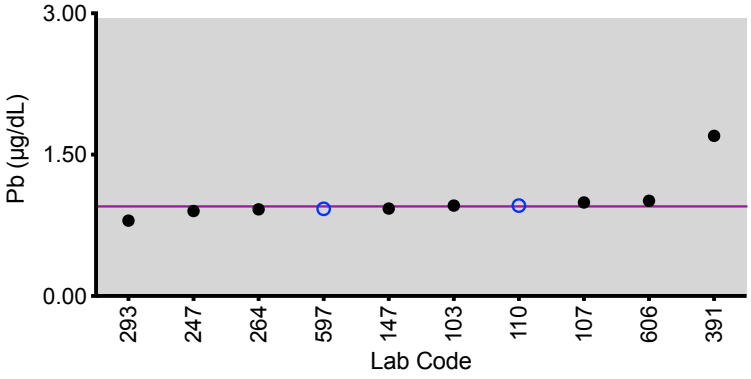
BE24-02



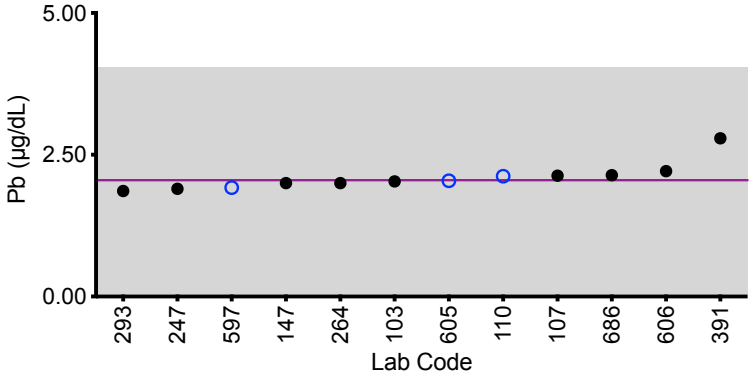
BE24-03



BE24-04



BE24-05



Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the robust mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±2 µg/dL or ±10% around the target value, whichever is greater; thus, it is fixed at ±2 µg/dL at concentrations less than or equal to 20 µg/dL.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

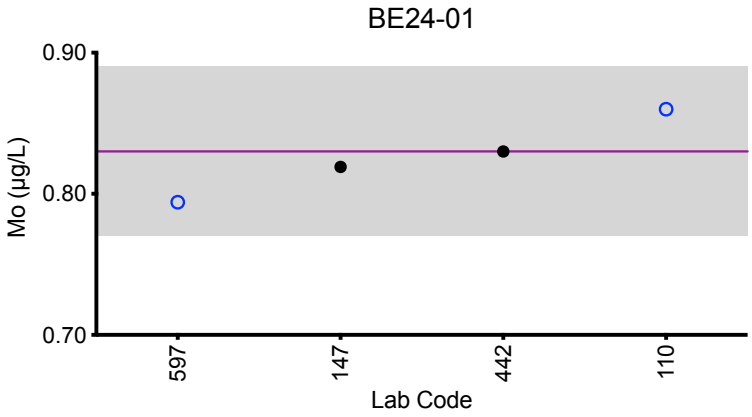
Whole Blood Mo (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
103	ICP-MS/MS	<1.50	<1.50	<1.50	5.29	<1.50
110	ICP-MS/MS	0.86	1.39	0.63	5.08	0.43
147	ICP-MS	0.819	1.51	0.656	5.28	0.459
442	DRC/CC-ICP-MS	0.830	1.44	0.598	5.24	0.428
597	ICP-MS/MS	0.794	1.34	0.657	5.13	0.384
Summary Statistics						
		BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Arithmetic Mean ($\bar{x}$)		0.83	1.42	0.64	5.20	0.43
Arithmetic SD (s)		0.03	0.07	0.03	0.09	0.03
Arithmetic RSD (%)		3.3	4.9	4.4	1.7	7.3
Number of Sample Measurements (N)		4	4	4	5	4

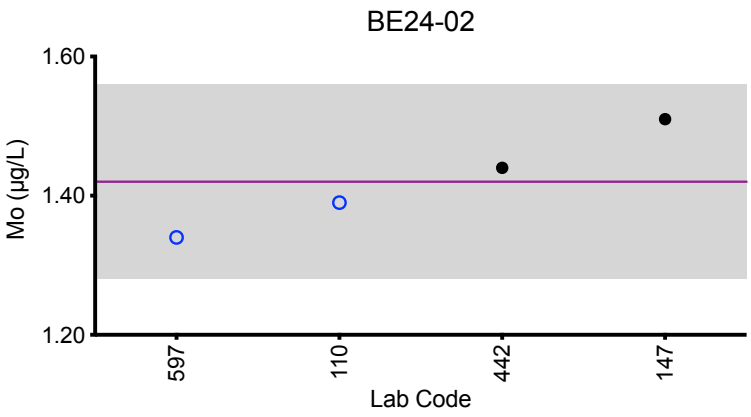
*Denotes a statistical Outlier.

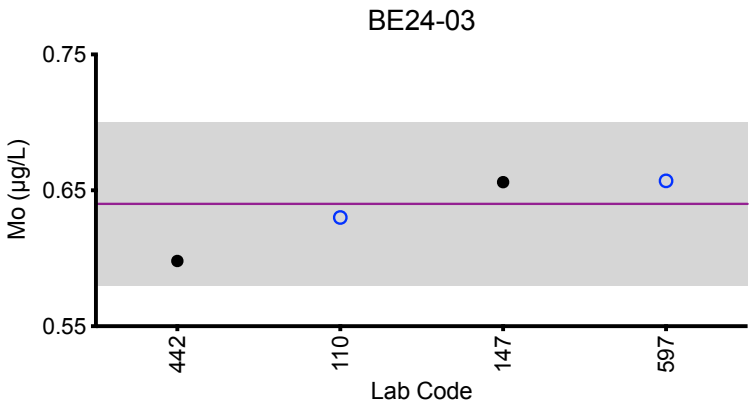
NEW YORK STATE | Department of Health | Wadsworth Center

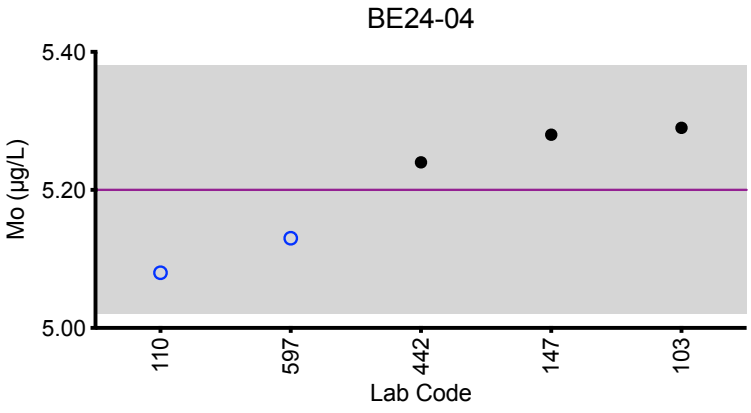
Results for Event #1, 2024: Summary Figures

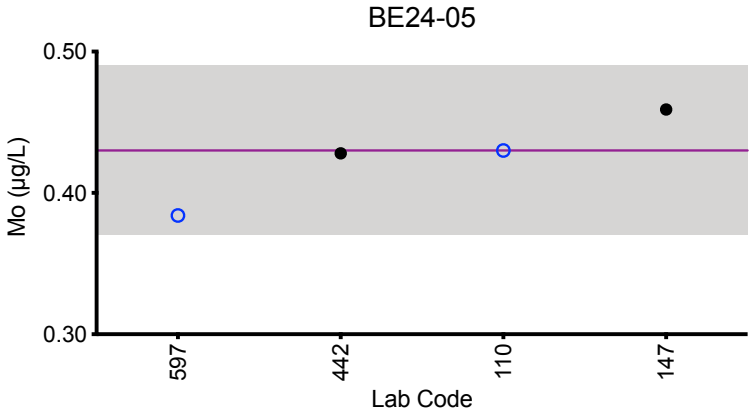
Whole Blood Mo











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood Sb (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
103	ICP-MS/MS	0.388	*1.57	0.529	3.58	0.777
110	ICP-MS/MS	0.61	2.52	0.84	5.25	1.15
147	ICP-MS	0.617	2.41	0.768	4.87	1.07
264	ICP-MS	0.52	2.09	0.73	4.53	0.94
293	DRC/CC-ICP-MS	0.6	2.4	0.8	5.4	1.1
442	DRC/CC-ICP-MS	0.368	2.22	0.514	4.73	0.778
597	ICP-MS/MS	0.606	2.38	0.832	5.15	1.12

Summary Statistics

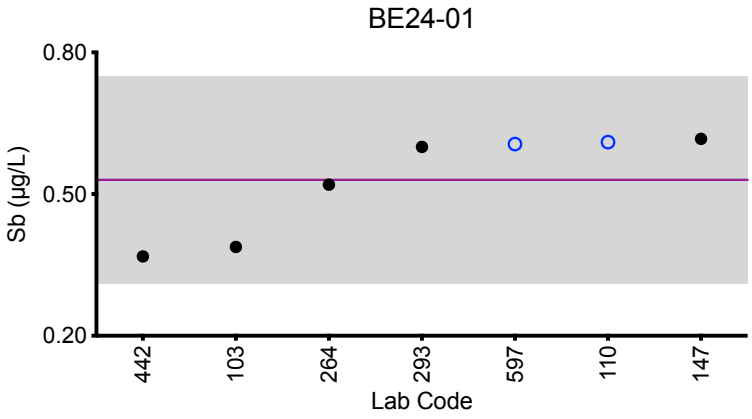
	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
Arithmetic Mean ($\bar{x}$)	0.53	2.34	0.72	4.8	0.99
Arithmetic SD (s)	0.11	0.15	0.14	0.6	0.16
Arithmetic RSD (%)	21	6.4	19	13	16
Number of Sample Measurements (N)	7	6	7	7	7

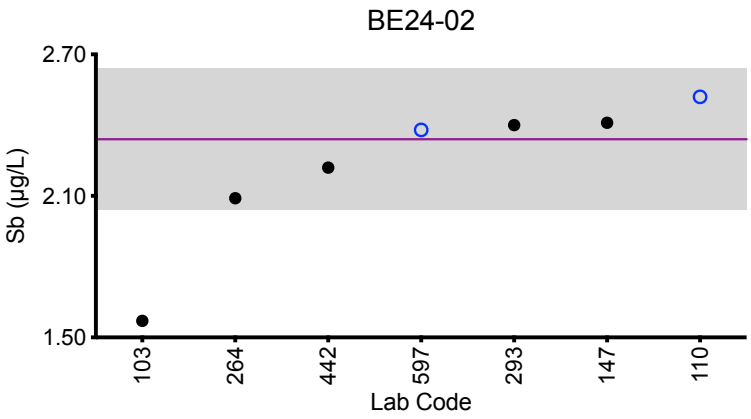
*Denotes a statistical Outlier.

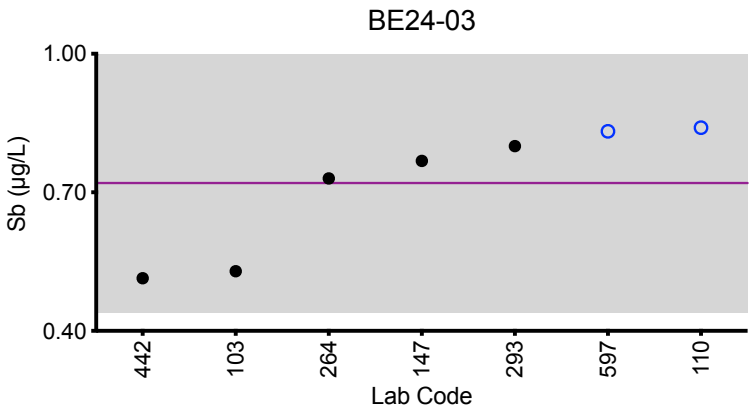
NEW YORK STATE | Department of Health | Wadsworth Center

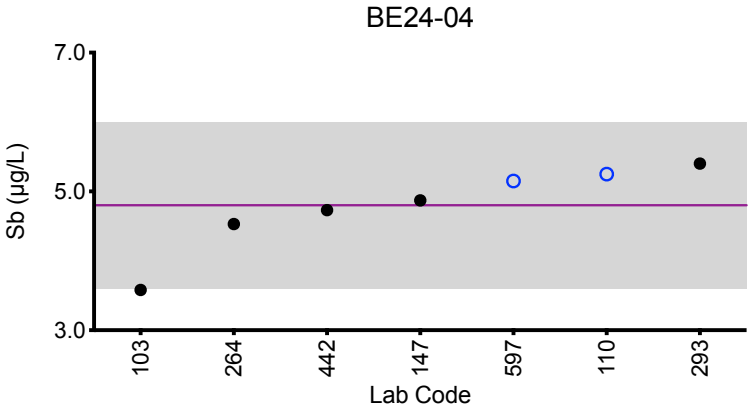
Results for Event #1, 2024: Summary Figures

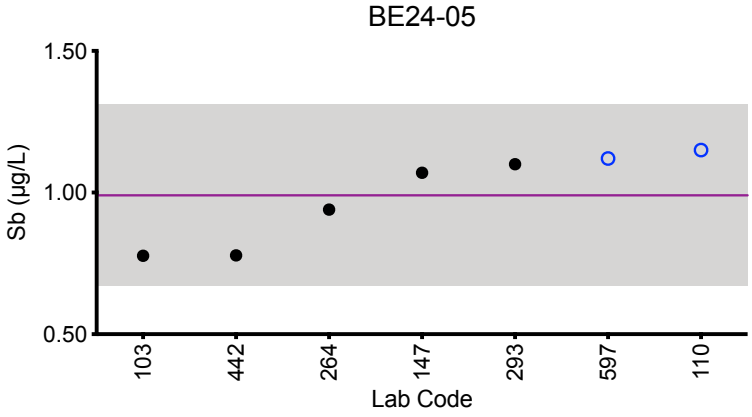
Whole Blood Sb











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood Se (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
103	ICP-MS/MS	162	234	186	292	138
107	ICP-MS/MS	167	238	200	293	138
110	ICP-MS/MS	175	248	193	291	144
147	ICP-MS	176	230	185	287	141
247	ICP-MS/MS	161	237	191	298	128
264	ICP-MS	155.6	216.2	196.2	292.6	145.7
597	ICP-MS/MS	178	239	194	297	142

Summary Statistics

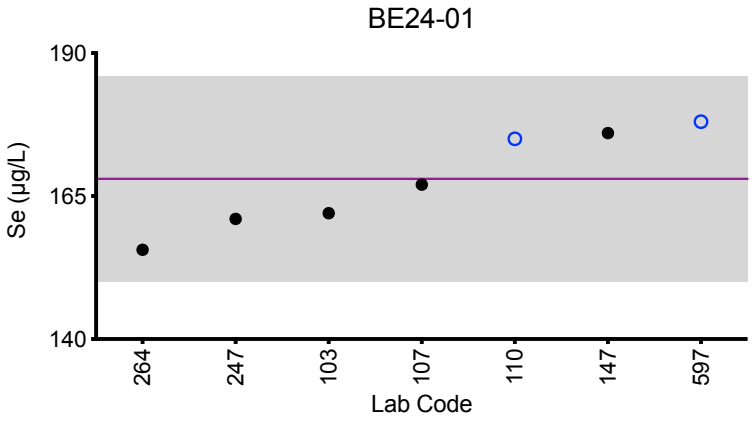
	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
Arithmetic Mean ($\bar{x}$)	168	235	192	293	140
Arithmetic SD (s)	9	10	5	4	6
Arithmetic RSD (%)	5.4	4.3	2.6	1.3	4.3
Number of Sample Measurements (N)	7	7	7	7	7

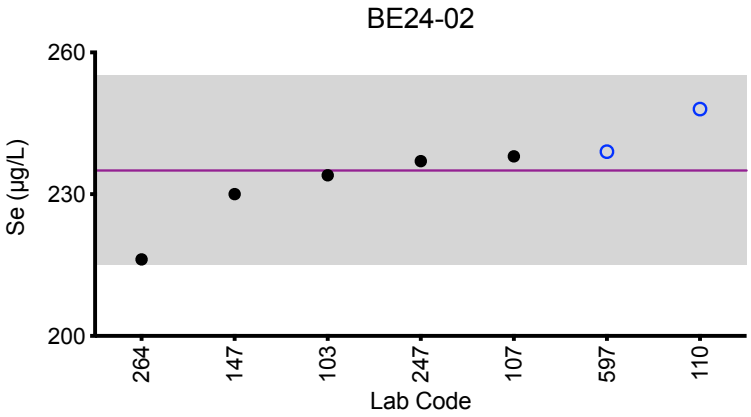
*Denotes a statistical Outlier.

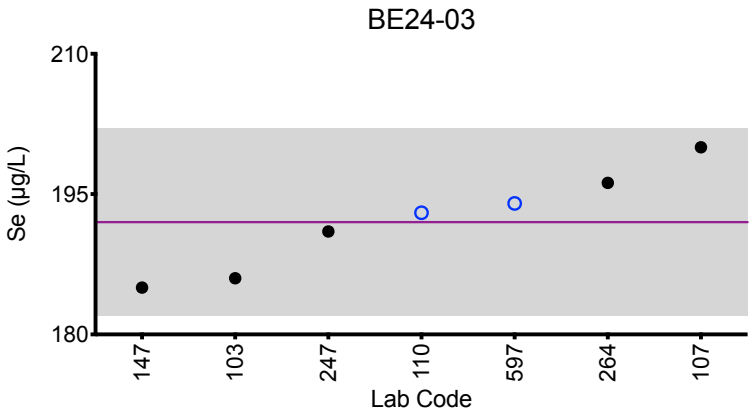
NEW YORK STATE | Department of Health | Wadsworth Center

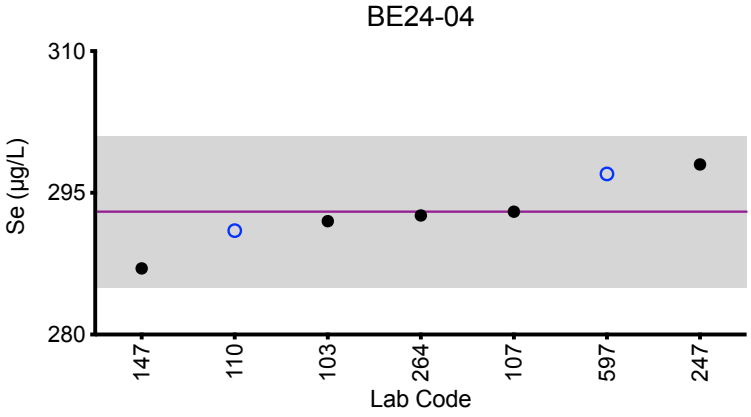
Results for Event #1, 2024: Summary Figures

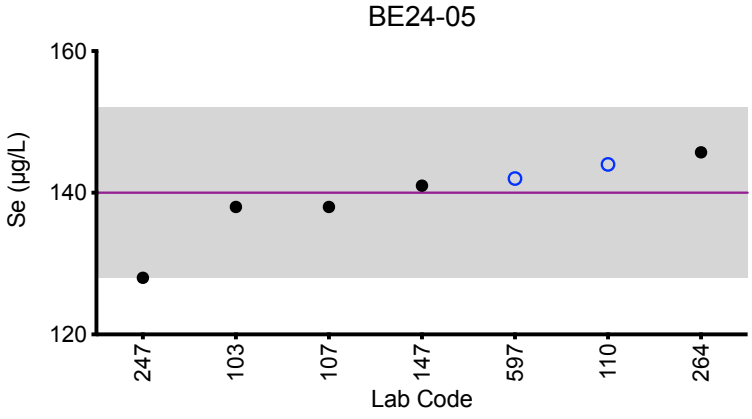
Whole Blood Se











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood Tl (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
103	ICP-MS/MS	0.169	0.694	0.222	1.08	0.414
110	ICP-MS/MS	0.169	0.698	0.242	1.12	0.401
147	ICP-MS	0.151	0.663	0.225	1.08	0.391
264	ICP-MS	0.17	0.67	0.24	1.08	0.39
293	DRC/CC-ICP-MS	0.16	0.65	0.220	1.00	0.37
597	ICP-MS/MS	0.174	0.662	0.233	1.11	0.383

Summary Statistics

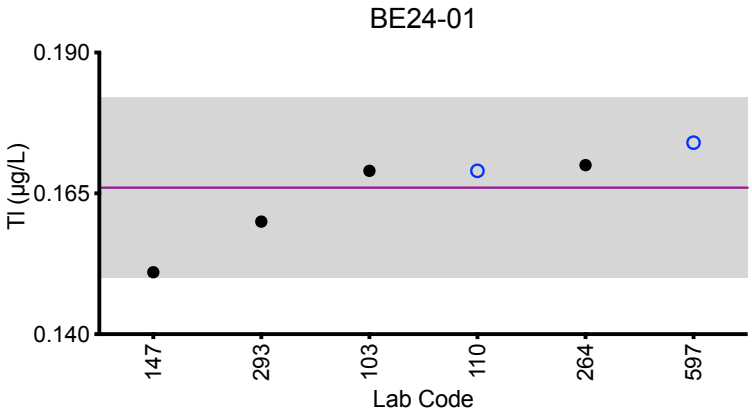
	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
Arithmetic Mean ($\bar{x}$)	0.166	0.673	0.230	1.08	0.392
Arithmetic SD (s)	0.008	0.019	0.009	0.04	0.015
Arithmetic RSD (%)	4.8	2.8	3.9	3.7	3.8
Number of Sample Measurements (N)	6	6	6	6	6

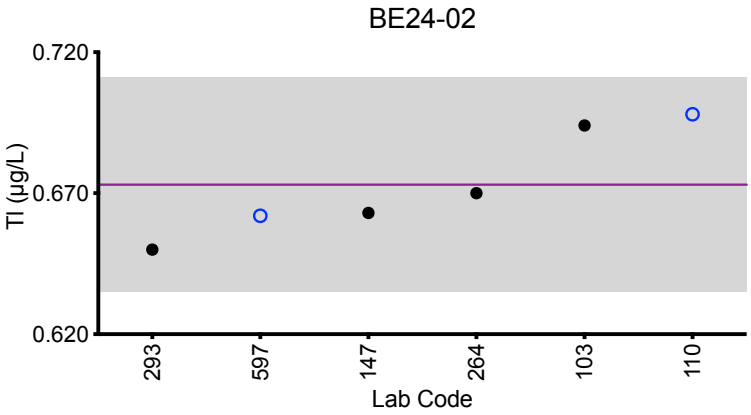
*Denotes a statistical Outlier.

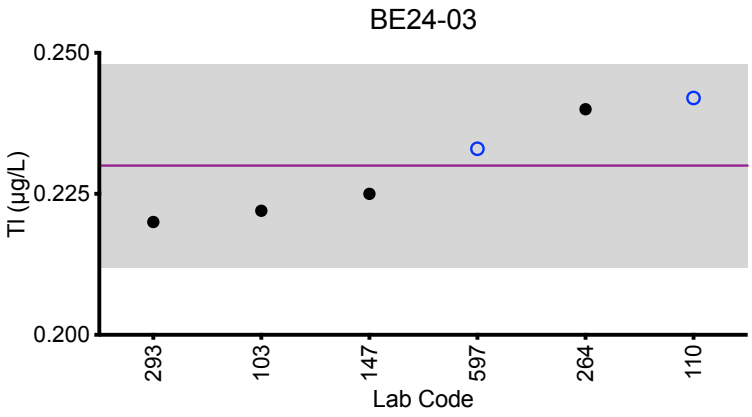
NEW YORK STATE | Department of Health | Wadsworth Center

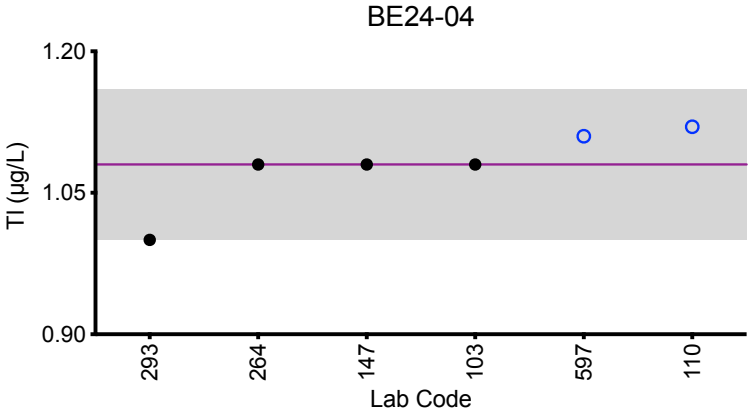
Results for Event #1, 2024: Summary Figures

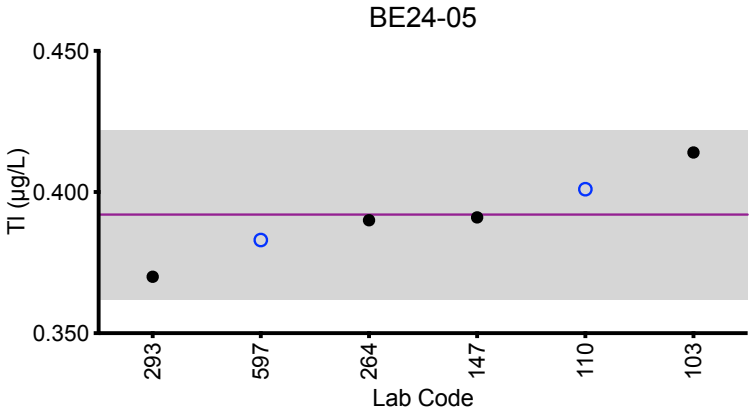
Whole Blood Tl











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood Al (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
147	ICP-MS	9.13	8.53	14.6	8.45	9.39
597	ICP-MS/MS	5.99	5.69	10.6	6.98	7.63
Summary Statistics						
		BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Arithmetic Mean ($\bar{x}$)		7.6	7.1	13	7.7	8.5
Arithmetic SD (s)		2.2	2.0	3	1.0	1.2
Arithmetic RSD (%)		25	28	23	13	14
Number of Sample Measurements (N)		2	2	2	2	2

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood Ba (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
110	ICP-MS/MS	5.90	4.30	1.89	6.84	3.86
147	ICP-MS	5.63	4.18	1.70	6.53	3.78
597	ICP-MS/MS	6.36	4.45	1.95	6.99	3.71
Summary Statistics						
		BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Arithmetic Mean ($\bar{x}$)		6.0	4.31	1.85	6.79	3.78
Arithmetic SD (s)		0.4	0.14	0.13	0.23	0.08
Arithmetic RSD (%)		6.7	3.2	7.1	3.4	2.1
Number of Sample Measurements (N)		3	3	3	3	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood Be (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
110	ICP-MS/MS	0.79	2.67	1.54	0.56	1.07
147	ICP-MS	<0.991	2.67	1.44	<0.991	0.991
597	ICP-MS/MS	0.677	2.22	1.44	0.427	0.837
Summary Statistics						
		BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Arithmetic Mean ($\bar{x}$)		0.73	2.5	1.47	0.49	0.97
Arithmetic SD (s)		0.08	0.3	0.06	0.09	0.12
Arithmetic RSD (%)		11	12	4.1	18	12
Number of Sample Measurements (N)		2	3	3	2	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood Cs (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
110	ICP-MS/MS	1.28	1.27	1.16	1.16	2.60
147	ICP-MS	1.16	1.17	1.09	1.09	2.48
597	ICP-MS/MS	1.25	1.24	1.15	1.17	2.47

Summary Statistics

	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
Arithmetic Mean ($\bar{x}$)	1.23	1.23	1.13	1.14	2.52
Arithmetic SD (s)	0.06	0.05	0.04	0.04	0.07
Arithmetic RSD (%)	4.9	4.1	3.5	3.5	2.8
Number of Sample Measurements (N)	3	3	3	3	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood Cu (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
110	ICP-MS/MS	1030	1270	896	1510	828
147	ICP-MS	1062	1257	871	1511	835
247	ICP-MS/MS	989	1217	881	1491	816
597	ICP-MS/MS	979	1170	857	1480	796

Summary Statistics

	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
Arithmetic Mean ($\bar{x}$)	1020	1230	876	1498	819
Arithmetic SD (s)	40	50	16	15	17
Arithmetic RSD (%)	3.9	4.1	1.8	1.0	2.1
Number of Sample Measurements (N)	4	4	4	4	4

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood Ni (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
103	ICP-MS/MS	<1.50	5.14	38.4	4.11	3.77
110	ICP-MS/MS	*4.13	5.58	40.4	6.92	6.47
147	ICP-MS	0.975	5.23	38.4	4.41	3.88
597	ICP-MS/MS	1.32	5.01	37.6	4.54	4.03
Summary Statistics						
		BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Arithmetic Mean ($\bar{x}$)		1.1	5.2	38.7	5.0	4.5
Arithmetic SD (s)		0.2	0.2	1.2	1.3	1.3
Arithmetic RSD (%)		18	4.6	3.1	26	29
Number of Sample Measurements (N)		2	4	4	4	4

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood Sn (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
110	ICP-MS/MS	0.13	2.53	0.46	0.82	4.17
147	ICP-MS	<0.285	2.42	0.432	0.754	3.91
597	ICP-MS/MS	0.172	2.37	0.455	0.845	3.96
Summary Statistics						
		BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Arithmetic Mean ($\bar{x}$)		0.15	2.44	0.449	0.81	4.01
Arithmetic SD (s)		0.03	0.08	0.015	0.05	0.14
Arithmetic RSD (%)		20	3.3	3.3	6.2	3.5
Number of Sample Measurements (N)		2	3	3	3	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood Sr (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
103	ICP-MS/MS	33.0	33.2	20.0	21.9	31.5
110	ICP-MS/MS	35.7	35.9	21.4	22.5	33.0
147	ICP-MS	36.8	35.0	21.3	22.9	34.0
597	ICP-MS/MS	34.9	32.8	20.1	22.1	31.0
Summary Statistics						
		BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Arithmetic Mean ($\bar{x}$)		35.1	34.2	20.7	22.4	32.4
Arithmetic SD (s)		1.6	1.5	0.8	0.4	1.4
Arithmetic RSD (%)		4.6	4.4	3.9	1.8	4.3
Number of Sample Measurements (N)		4	4	4	4	4

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood Ti (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
200	DRC/CC-ICP-MS	5.5	3.1	10.3	2.8	3.8
442	ICP-MS/MS	4.71	1.96	8.30	*1.18	2.60
597	ICP-MS/MS	6.24	3.61	9.59	2.97	4.01
Summary Statistics						
		BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Arithmetic Mean ($\bar{x}$)		5.5	2.9	9.4	2.9	3.5
Arithmetic SD (s)		0.8	0.8	1.0	0.1	0.8
Arithmetic RSD (%)		15	28	11	4.2	23
Number of Sample Measurements (N)		3	3	3	2	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood U (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
103	ICP-MS/MS	0.0880	<0.0500	0.286	0.155	0.0822
110	ICP-MS/MS	0.0862	0.0499	0.310	0.167	0.0834
147	ICP-MS	0.0835	0.0440	0.276	0.159	0.0781
597	ICP-MS/MS	0.0773	0.0450	0.278	0.157	0.0763

Summary Statistics

	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
Arithmetic Mean ($\bar{x}$)	0.084	0.046	0.287	0.160	0.080
Arithmetic SD (s)	0.005	0.003	0.016	0.005	0.003
Arithmetic RSD (%)	5.6	6.5	5.6	3.1	3.8
Number of Sample Measurements (N)	4	3	4	4	4

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood V (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
110	ICP-MS/MS	0.48	3.66	0.26	0.65	1.90
147	DRC/CC-ICP-MS	0.469	4.09	0.272	0.738	2.13
597	ICP-MS/MS	0.461	3.24	0.238	0.607	1.68

Summary Statistics

	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
Arithmetic Mean ($\bar{x}$)	0.470	3.7	0.26	0.67	1.9
Arithmetic SD (s)	0.010	0.4	0.02	0.07	0.2
Arithmetic RSD (%)	2.1	11	6.6	10	12
Number of Sample Measurements (N)	3	3	3	3	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood W (µg/L)						
Lab Code	**Method**	**BE24-01**	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
110	ICP-MS/MS	1.25	0.45	0.76	2.12	0.23
200	ICP-MS	1.45	0.50	0.85	2.45	0.26
597	ICP-MS/MS	1.27	0.417	0.733	2.08	0.220
Summary Statistics						
		BE24-01	**BE24-02**	**BE24-03**	**BE24-04**	**BE24-05**
Arithmetic Mean ($\bar{x}$)		1.32	0.46	0.78	2.22	0.24
Arithmetic SD (s)		0.11	0.04	0.06	0.20	0.02
Arithmetic RSD (%)		8.3	8.7	7.7	9.2	8.9
Number of Sample Measurements (N)		3	3	3	3	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Whole Blood Zn (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
110	ICP-MS/MS	6400	4800	8670	5270	5950
147	ICP-MS	7045	4966	8791	5490	6099
247	ICP-MS/MS	6153	4154	8217	4572	5064
597	ICP-MS/MS	6130	4430	8270	5100	5630

Summary Statistics

	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
Arithmetic Mean ($\bar{x}$)	6400	4600	8490	5100	5700
Arithmetic SD (s)	400	400	290	400	500
Arithmetic RSD (%)	6.3	8.7	3.4	7.8	8.8
Number of Sample Measurements (N)	4	4	4	4	4

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Additional Elements in Whole Blood

Whole Blood Ag (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
147	ICP-MS	<0.151	<0.151	<0.151	<0.151	<0.151

Whole Blood Bi (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
147	ICP-MS	<0.0334	<0.0334	<0.0334	<0.0334	<0.0334
597	ICP-MS/MS	<0.0197	<0.0197	<0.0197	<0.0197	<0.0197

Whole Blood I (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
147	ICP-MS	41.9	37.3	31.8	32.2	23.0

Whole Blood Li (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
147	ICP-MS	0.876	0.752	0.397	0.421	1.08

Whole Blood Mg (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
597	ICP-MS/MS	31800	30800	32000	31300	32300

Whole Blood Pt (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
293	DRC/CC-ICP-MS	0.26	0.49	0.81	0.13	1.50

Whole Blood Te (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
110	ICP-MS/MS	<0.007	<0.007	0.009	<0.007	<0.007
147	ICP-MS	0.0776	<0.0561	<0.0561	<0.0561	<0.0561

Whole Blood Th (µg/L)

Lab Code	Method	BE24-01	BE24-02	BE24-03	BE24-04	BE24-05
147	ICP-MS	<0.0255	<0.0255	<0.0255	<0.0255	<0.0255
597	ICP-MS/MS	0.0127	0.00843	0.00745	0.00584	0.00696

NEW YORK STATE | Department of Health | Wadsworth Center

Event #1, 2024

Trace Elements in Urine

Wadsworth Center
NEW YORK STATE DEPARTMENT OF HEALTH
Trace Elements Laboratory

NEW YORK STATE | Department of Health | Wadsworth Center

Event #1, 2024:
Trace Elements in Urine

PT Materials

Urine was collected from volunteer donors into polyethylene containers and stored at 4°C. Following collection, urine was acidified to 1% (v/v) with nitric acid and mixed with a sulfamic acid solution (stock solution contained 200 mg/mL sulfamic acid and 10% (v/v) Triton-X 100) to a final concentration of 1% (v/v) to stabilize Hg. Urine was stored frozen at -80°C pending further preparation. The urine was thawed at room temperature and precipitated salts removed by centrifugation. Urine supernatants were combined into five separate pools. Each urine pool was supplemented with arsenic (As), barium (Ba), beryllium (Be), cadmium (Cd), cobalt (Co),chromium (Cr), mercury (Hg), manganese (Mn), lead (Pb), thallium (Tl), uranium (U), aluminum (Al), cesium (Cs), copper (Cu), molybdenum (Mo), nickel (Ni), platinum (Pt), antimony (Sb) selenium (Se), tin (Sn), strontium (Sr), tellurium (Te), titanium (Ti), vanadium (V), tungsten (W), and zinc (Zn). PT samples were stored at -80°C until the week of the PT event, when they were thawed at 4°C prior to circulation to laboratories for analysis.

Graded Elements

Eleven elements in urine are formally graded: As, Ba, Be, Cd, Co, Cr, Hg, Mn, Pb, Tl, and U. Target values for the graded elements are assigned to these pools based on (a) the robust mean calculated from data reported by all laboratories, or (b) if a robust mean is not possible, the arithmetic mean after outlier deletion.

Additional Elements

An additional 23 elements were reported by at least one participant: Ag, Al, Bi, Cs, Cu, Fe, I, Li, Mg, Mo, Ni, Pt, Rb, Sb, Se, Sn, Sr, Te, Th, Ti, V, W, and Zn. These data are included here to provide a more complete characterization of the PT materials. All results reported by participant laboratories are tabulated and organized by lab code. The PT data are graphed for visual comparison purposes for all elements where at least five laboratories reported a value greater than the LOD. A statistical summary table is provided for samples where at least two comparable values were reported as above the LOD.

The summary statistics for the additional elements are provided for educational purposes only, i.e., no acceptable response is implied. However, it is expected that each laboratory would wish to investigate a potential source of bias if warranted by these data. Future events might result in additional elements becoming graded if a consensus can be reached regarding desired quality specifications.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

	Urine As (µg/L)				
	UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Target (Robust Mean (x*))	26.6	3.81	38.0	43.8	9.3
Upper Limit	32.6	9.81	45.6	52.6	15.3
Lower Limit	20.6	0.00	30.4	35.0	3.3
Robust SD (s*)	1.2	0.27	2.0	2.4	0.6
Robust RSD (%)	4.5	7.1	5.3	5.5	6.5
Number of Sample Measurements (N)	14	13	14	14	14
Standard Uncertainty (*u*)	0.4	0.09	0.7	0.8	0.2

The acceptable range is based on quality specifications:
±6 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±6 µg/L at concentrations less than or equal to 30 µg/L. These quality specifications are based on the same criteria used by the US Centers for Disease Control Prevention (CDC) for public health labs participating in the Laboratory Response Network (LRN) PT program for Toxic Metals.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

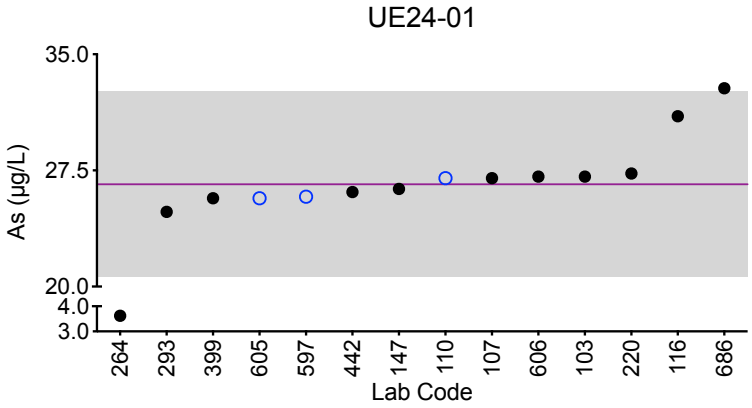
Urine As (µg/L)						
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
	Target	**26.6**	**3.81**	**38.0**	**43.8**	**9.3**
103	ICP-MS/MS	27.1	3.77	39.6	46.2	9.51
107	DRC/CC-ICP-MS	27.0	4.06	36.8	42.8	8.94
110	ICP-MS/MS	27.0	3.92	37.5	42.5	9.00
116	ICP-MS/MS	31.0	7.24	45.9 ↑	49.3	14.3
147	ICP-MS	26.3	3.99	36.6	41.5	9.41
220	DRC/CC-ICP-MS	27.3	3.76	39.0	44.6	10.3
264	ICP-MS	3.62 ↓	4.94	42.64	48.74	10.07
293	DRC/CC-ICP-MS	24.82	3.42	35.21	39.97	8.5
399	DRC/CC-ICP-MS	25.7	3.70	37.7	43.8	9.02
442	ICP-MS/MS	26.1	3.58	36.7	43.6	9.17
597	ICP-MS/MS	25.8	3.51	36.3	42.1	8.66
605	ICP-MS	25.7	3.74	36.3	42.2	8.75
606	ICP-MS/MS	27.1	3.73	38.4	43.8	8.97
686	DRC/CC-ICP-MS	32.8 ↑	<6.00	41.8	45.8	9.76

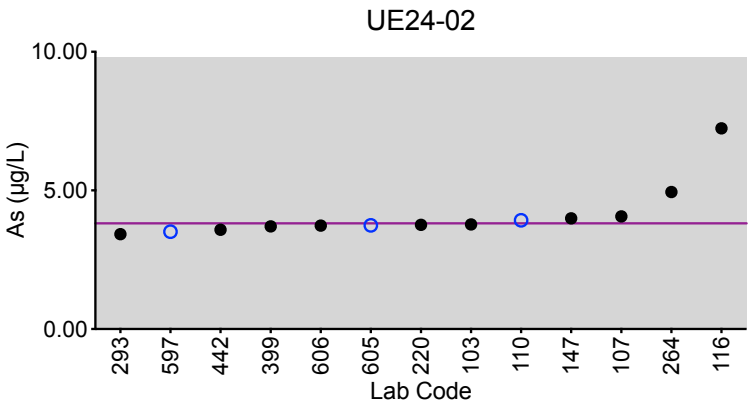
Based on the grading criteria for As in Urine, 96% of results were satisfactory, with 0 of the 14 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

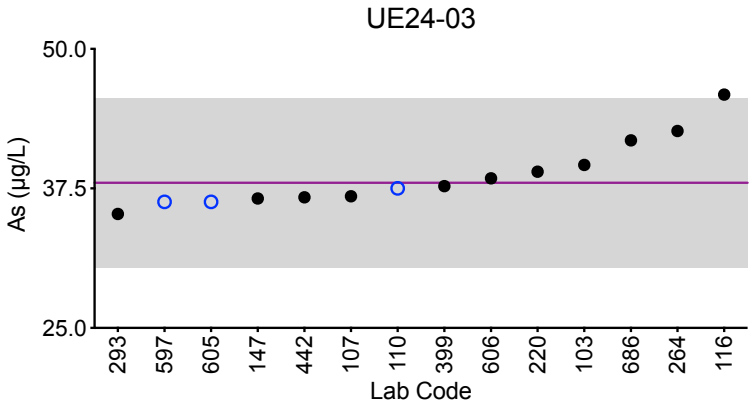
NEW YORK STATE | Department of Health | Wadsworth Center

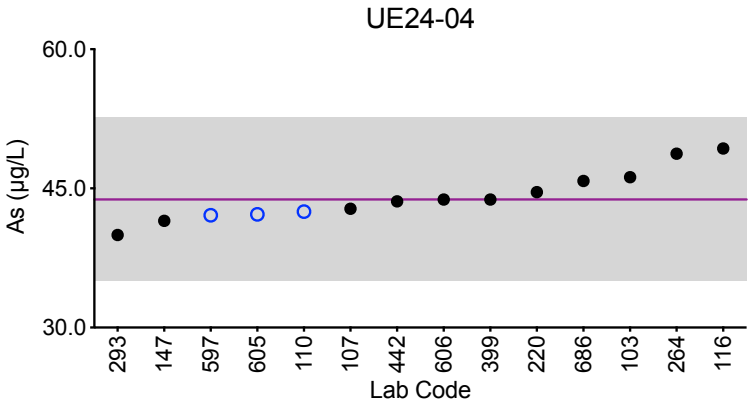
Results for Event #1, 2024: Summary Figures

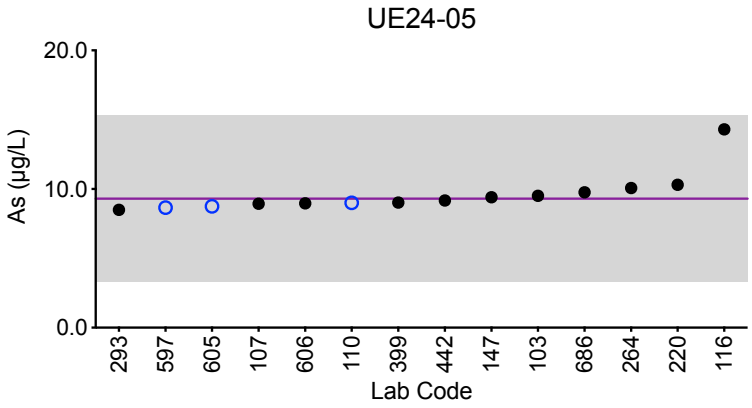
Urine As











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the robust mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±6 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±6 µg/L at concentrations less than or equal to 30 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Summary Statistics

	Urine Ba (µg/L)				
	UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Target (Robust Mean (x*))	2.47	7.14	2.28	0.47	4.18
Upper Limit	3.47	8.57	3.28	1.47	5.18
Lower Limit	1.47	5.71	1.28	0.00	3.18
Robust SD (s*)	0.11	0.16	0.12	0.05	0.11
Robust RSD (%)	4.5	2.2	5.3	11	2.6
Number of Sample Measurements (N)	11	11	11	7	11
Standard Uncertainty (*u*)	0.04	0.06	0.04	NA	0.04

The acceptable range is based on quality specifications:
±1 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±1 µg/L at concentrations less than or equal to 5 µg/L. These quality specifications are based on the same criteria used by the US Centers for Disease Control Prevention (CDC) for public health labs participating in the Laboratory Response Network (LRN) PT program for Toxic Metals.

An arithmetic mean, SD, RSD and n are provided for sample UE24-04.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

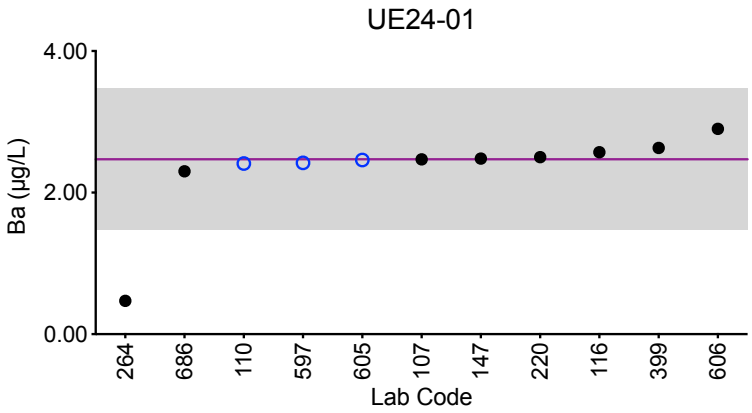
		Urine Ba (µg/L)				
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
	Target	**2.47**	**7.14**	**2.28**	**0.47**	**4.18**
107	ICP-MS	2.47	7.12	2.30	0.436	4.18
110	ICP-MS/MS	2.41	6.92	2.22	0.419	4.05
116	ICP-MS/MS	2.57	7.35	2.41	<0.600	4.24
147	ICP-MS	2.48	7.18	2.34	0.433	4.24
220	ICP-MS	2.50	7.13	2.43	0.53	4.92
264	ICP-MS	0.47 ↓	7.26	2.19	0.45	4.00
399	ICP-MS/MS	2.63	7.68	2.39	*0.712	4.21
597	ICP-MS/MS	2.42	7.05	2.32	0.49	4.17
605	ICP-MS	2.46	7.04	2.18	<0.600	4.17
606	ICP-MS/MS	2.90	7.21	2.20	0.544	4.35
686	ICP-MS	2.30	6.84	2.14	<0.600	3.92

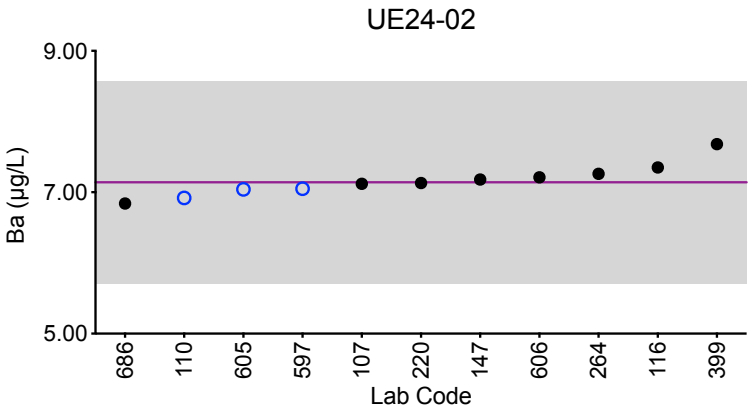
Based on the grading criteria for Ba in Urine, 98% of results were satisfactory, with 0 of the 11 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

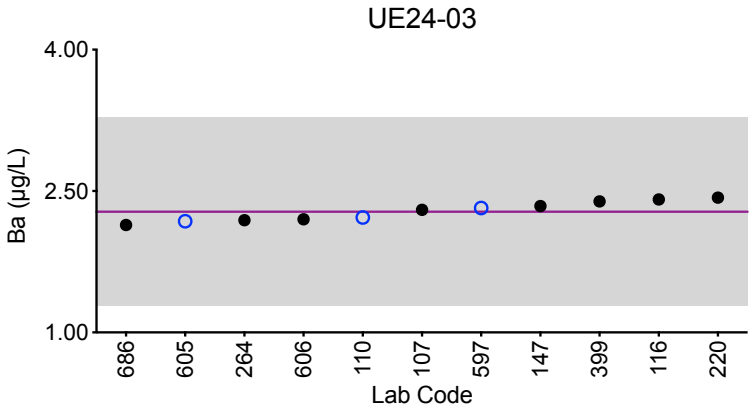
NEW YORK STATE | Department of Health | Wadsworth Center

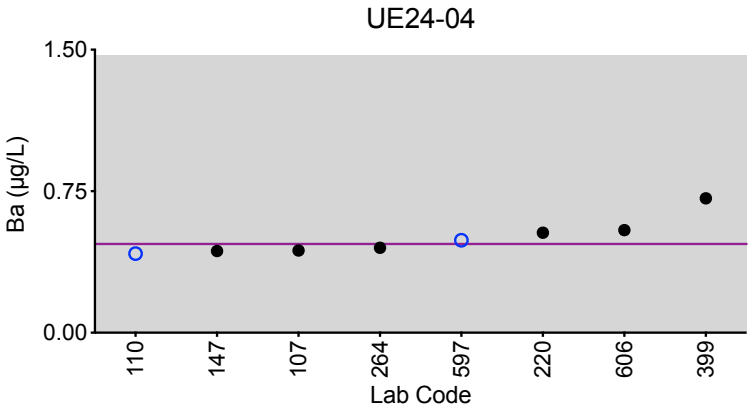
Results for Event #1, 2024: Summary Figures

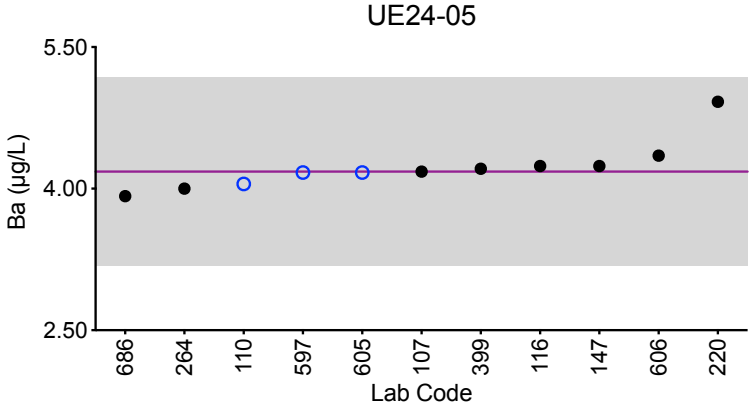
Urine Ba











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the robust mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±1 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±1 µg/L at concentrations less than or equal to 5 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

	Urine Be (µg/L)				
	UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Target (Robust Mean (x*))	0.490	0.16	1.59	0.230	0.91
Upper Limit	1.490	1.16	2.59	1.230	1.91
Lower Limit	0.000	0.00	0.59	0.000	0.00
Robust SD (s*)	0.018	0.01	0.04	0.004	0.03
Robust RSD (%)	3.7	4.7	2.3	1.6	2.8
Number of Sample Measurements (N)	11	8	11	9	11
Standard Uncertainty (*u*)	0.007	NA	0.01	NA	0.01

The acceptable range is based on quality specifications:
±1 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±1 µg/L at concentrations less than or equal to 5 µg/L. These quality specifications are based on the same criteria used by the US Centers for Disease Control Prevention (CDC) for public health labs participating in the Laboratory Response Network (LRN) PT program for Toxic Metals.

An arithmetic mean, SD, RSD and n are provided for sample UE24-02 and UE24-04.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

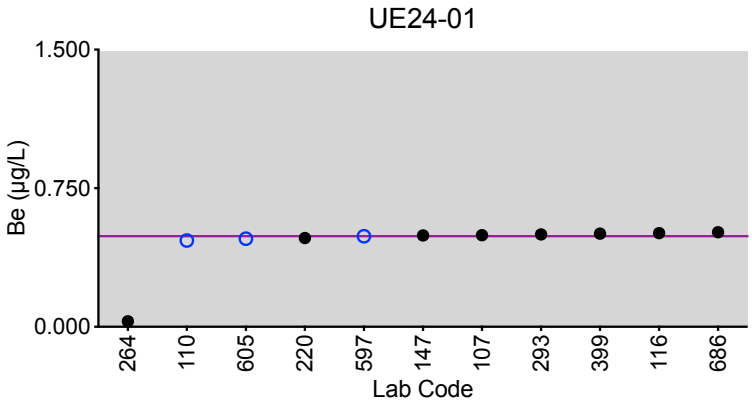
		Urine Be (µg/L)				
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
	Target	**0.490**	**0.16**	**1.59**	**0.230**	**0.91**
107	ICP-MS	0.496	0.155	1.59	0.225	0.896
110	ICP-MS/MS	0.467	0.157	1.57	0.226	0.906
116	ICP-MS/MS	0.507	<0.300	1.53	<0.300	0.895
147	ICP-MS	0.494	<0.225	1.71	0.230	0.948
220	ICP-MS	0.48	0.17	1.59	0.23	0.91
264	ICP-MS	0.03	0.15	1.61	0.23	0.92
293	ICP-MS	0.5	0.15	1.56	0.23	0.88
399	ICP-MS/MS	0.504	0.152	1.51	0.232	0.859
597	ICP-MS/MS	0.490	0.162	1.60	0.225	0.990
605	ICP-MS	0.477	0.149	1.60	0.236	0.896
686	ICP-MS	0.512	<0.300	1.64	<0.300	0.947

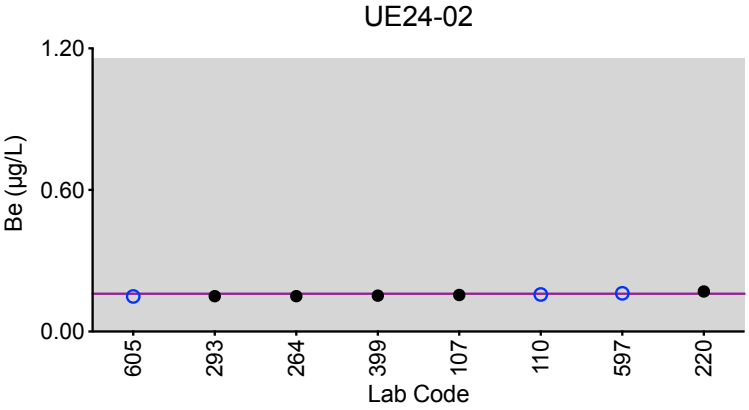
Based on the grading criteria for Be in Urine, 100% of results were satisfactory, with 0 of the 11 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

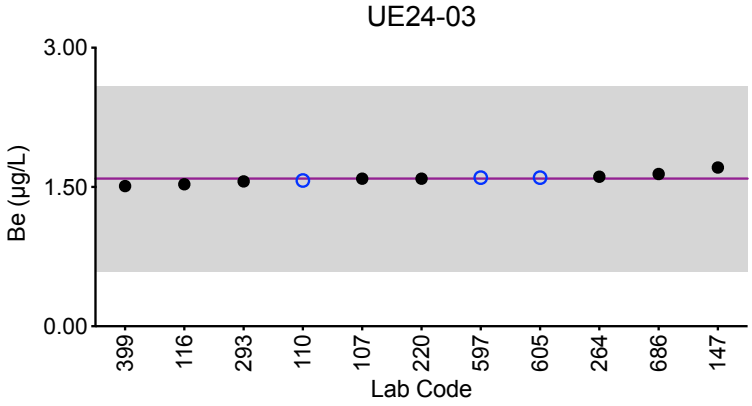
NEW YORK STATE | Department of Health | Wadsworth Center

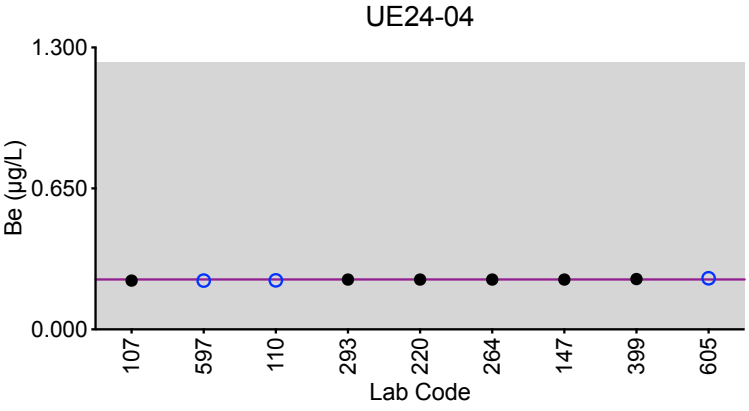
Results for Event #1, 2024: Summary Figures

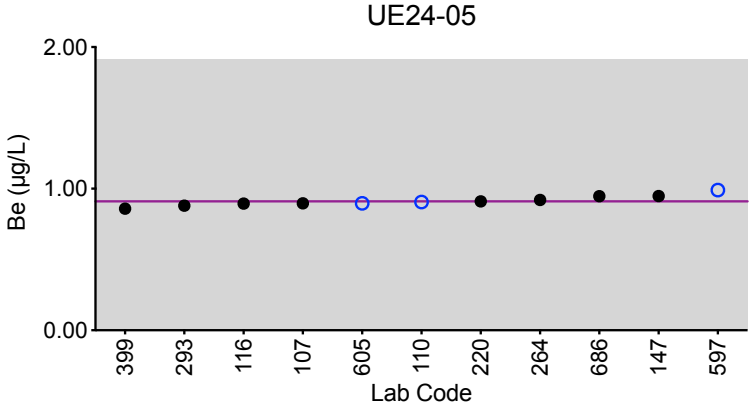
Urine Be











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the robust mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±1 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±1 µg/L at concentrations less than or equal to 5 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Summary Statistics

	Urine Cd (µg/L)				
	UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Target (Robust Mean (x*))	0.75	0.545	2.44	1.05	0.30
Upper Limit	1.75	1.545	3.44	2.05	1.30
Lower Limit	0.00	0.000	1.44	0.05	0.00
Robust SD (s*)	0.03	0.027	0.10	0.03	0.03
Robust RSD (%)	4.0	5.0	4.1	3.1	11
Number of Sample Measurements (N)	14	14	15	14	15
Standard Uncertainty (*u*)	0.01	0.009	0.03	0.01	0.01

The acceptable range is based on quality specifications:
±1 µg/L or ±15% around the target value, whichever is greater; thus, it is fixed at ±1 µg/L at concentrations less than or equal to 6.6 µg/L. These quality specifications are based on the same criteria used by the US Centers for Disease Control Prevention (CDC) for public health labs participating in the Laboratory Response Network (LRN) PT program for Toxic Metals.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

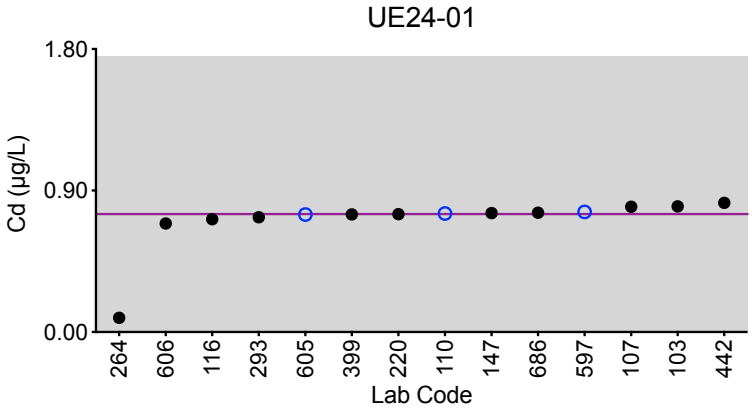
		Urine Cd (µg/L)				
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
	Target	**0.75**	**0.545**	**2.44**	**1.05**	**0.30**
103	ICP-MS/MS	0.799	0.556	2.49	1.06	0.292
107	DRC/CC-ICP-MS	0.797	0.518	2.34	1.01	0.279
110	ICP-MS/MS	0.754	0.522	2.39	1.03	0.315
116	ICP-MS/MS	0.718	0.578	2.40	1.05	0.285
147	ICP-MS	0.756	0.579	2.53	1.09	0.252
220	ICP-MS	0.75	0.55	2.43	1.03	0.35
264	ICP-MS	0.09	0.62	2.90	1.27	0.42
293	DRC/CC-ICP-MS	0.73	0.48	2.3	0.95	0.26
324	ICP-MS	<1	<1	2.464	<1	1.077
399	DRC/CC-ICP-MS	0.748	0.551	2.38	1.03	0.289
442	ICP-MS/MS	0.822	0.559	2.81	1.19	0.337
597	ICP-MS/MS	0.764	0.532	2.42	1.05	0.290
605	ICP-MS	0.747	0.532	2.39	1.03	0.297
606	ICP-MS/MS	0.690	0.525	2.35	1.07	0.339
686	ICP-MS	0.759	0.541	2.51	1.06	0.303

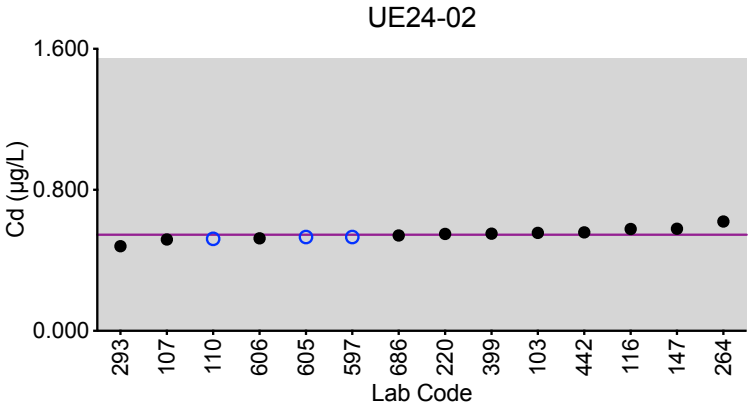
Based on the grading criteria for Cd in Urine, 100% of results were satisfactory, with 0 of the 15 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

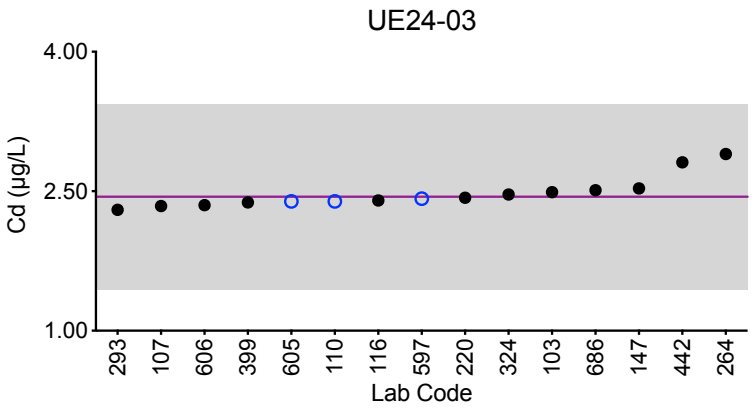
NEW YORK STATE | Department of Health | Wadsworth Center

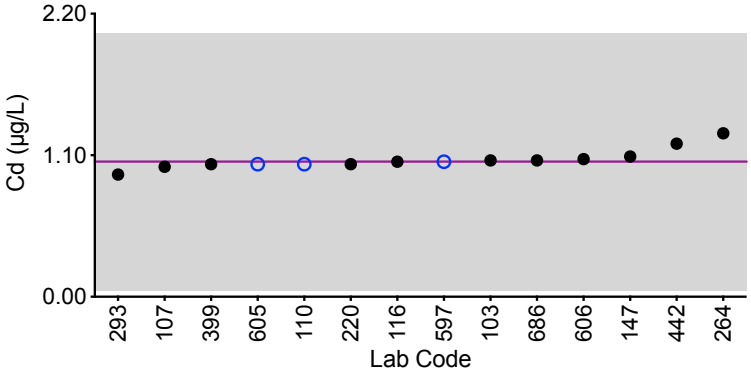
Results for Event #1, 2024: Summary Figures

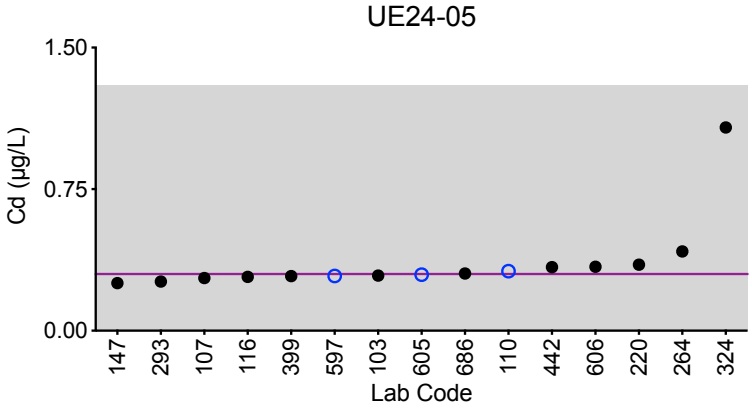
Urine Cd











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the robust mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±1 µg/L or ±15% around the target value, whichever is greater; thus, it is fixed at ±1 µg/L at concentrations less than or equal to 6.6 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

	Urine Co (µg/L)				
	UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Target (Robust Mean (x*))	0.89	2.84	0.45	4.80	3.29
Upper Limit	2.39	4.34	1.95	6.30	4.79
Lower Limit	0.00	1.34	0.00	3.30	1.79
Robust SD (s*)	0.06	0.06	0.03	0.15	0.09
Robust RSD (%)	6.7	2.1	6.7	3.1	2.7
Number of Sample Measurements (N)	12	12	11	12	12
Standard Uncertainty (*u*)	0.02	0.02	0.01	0.05	0.03

The acceptable range is based on quality specifications:
±1.5 µg/L or ±15% around the target value, whichever is greater; thus, it is fixed at ±1.5 µg/L at concentrations less than or equal to 10 µg/L. These quality specifications were established based on discussions with the US FDA, and represent a consensus from a network of Trace Element PT program organizers

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

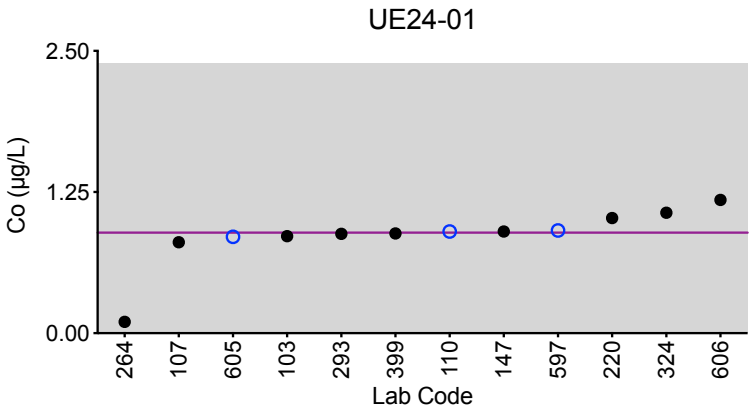
Urine Co (µg/L)						
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
	Target	**0.89**	**2.84**	**0.45**	**4.80**	**3.29**
103	ICP-MS/MS	0.859	2.87	0.431	4.91	3.32
107	DRC/CC-ICP-MS	0.805	2.78	0.418	4.61	3.22
110	ICP-MS/MS	0.900	2.75	0.443	4.71	3.23
147	ICP-MS	0.900	2.83	0.438	4.74	3.26
220	ICP-MS	1.02	2.94	0.50	4.83	3.31
264	ICP-MS	0.10	3.20	0.48	5.33	3.55
293	DRC/CC-ICP-MS	0.88	2.79	0.42	4.87	3.24
324	ICP-MS	1.067	2.814	<1	3.210 ↓	4.603
399	DRC/CC-ICP-MS	0.883	2.87	0.440	4.88	3.30
597	ICP-MS/MS	0.909	2.83	0.457	4.72	3.21
605	ICP-MS	0.853	2.83	0.416	4.76	3.18
606	ICP-MS/MS	1.18	3.08	0.618	4.99	3.51

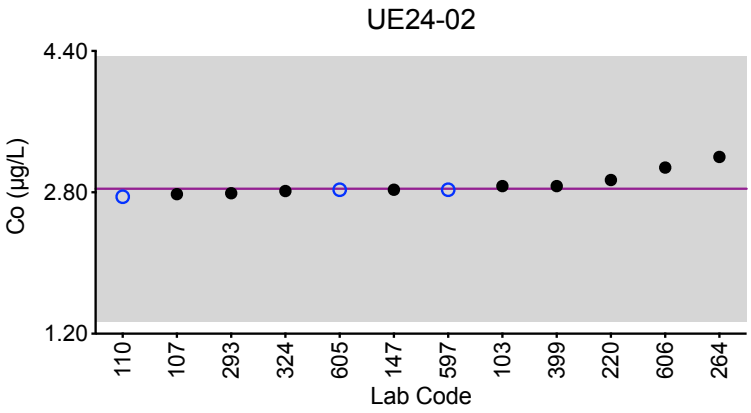
Based on the grading criteria for Co in Urine, 98% of results were satisfactory, with 0 of the 12 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

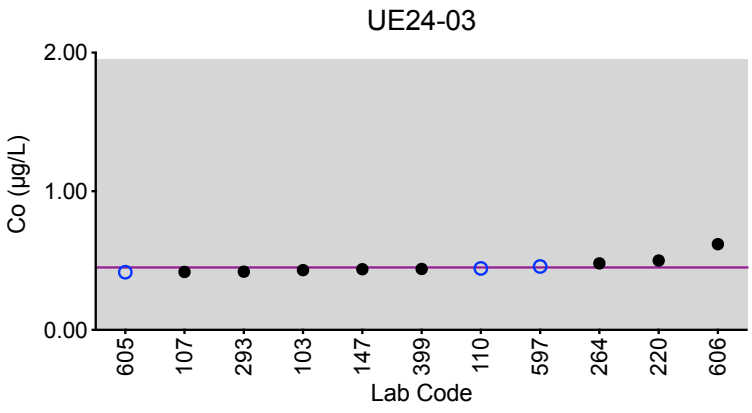
NEW YORK STATE | Department of Health | Wadsworth Center

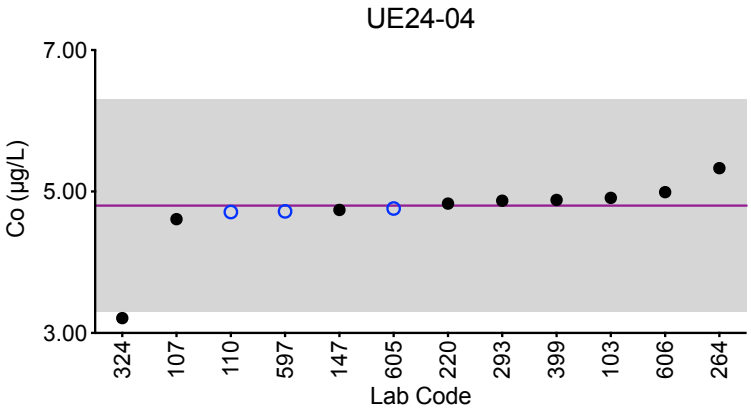
Results for Event #1, 2024: Summary Figures

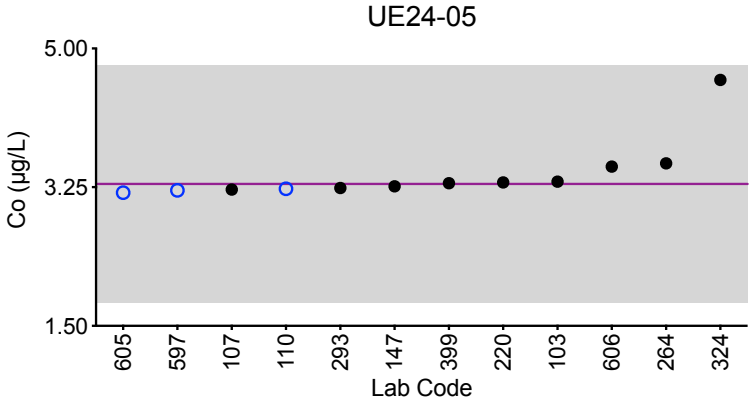
Urine Co











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = assigned target value based on the robust mean of all laboratories.
Gray area = acceptable range based on quality specifications:
±1.5 µg/L or ±15% around the target value, whichever is greater; thus, it is fixed at ±1.5 µg/L at concentrations less than or equal to 10 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

	Urine Cr (µg/L)				
	UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Target (Robust Mean (x*))	2.00	3.31	0.63	4.89	2.63
Upper Limit	5.00	6.31	3.63	7.89	5.63
Lower Limit	0.00	0.31	0.00	1.89	0.00
Robust SD (s*)	0.16	0.16	0.08	0.19	0.14
Robust RSD (%)	8.1	4.8	16	3.9	5.3
Number of Sample Measurements (N)	10	10	7	10	10
Standard Uncertainty (*u*)	0.06	0.06	NA	0.07	0.05

The acceptable range is based on quality specifications:
±3 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±3 µg/L at concentrations less than or equal to 15 µg/L. These quality specifications were established based on discussions with the US FDA, and represent a consensus from a network of Trace Element PT program organizers

An arithmetic mean, SD, RSD and n are provided for sample UE24-03.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

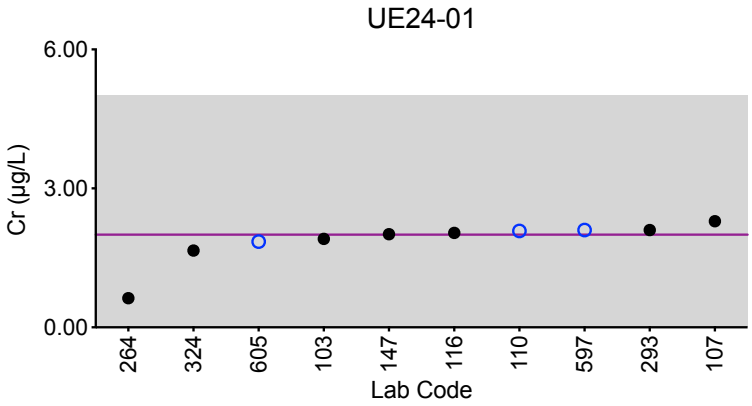
		Urine Cr (µg/L)				
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
	Target	**2.00**	**3.31**	**0.63**	**4.89**	**2.63**
103	ICP-MS/MS	1.91	3.22	*2.52	4.85	2.55
107	DRC/CC-ICP-MS	2.29	3.21	0.39	4.79	2.49
110	ICP-MS/MS	2.08	3.34	0.49	4.83	2.58
116	ICP-MS/MS	2.04	3.51	0.579	5.06	2.88
147	DRC/CC-ICP-MS	2.01	3.20	0.463	4.73	2.49
264	ICP-MS	0.63	4.90	*1.45	6.19	3.58
293	DRC/CC-ICP-MS	2.1	3.38	0.5	5.06	2.63
324	ICP-MS	1.658	2.629	<1	2.354	3.955
597	ICP-MS/MS	2.10	3.32	0.646	4.93	2.63
605	ICP-MS	1.85	3.32	0.485	4.91	2.58

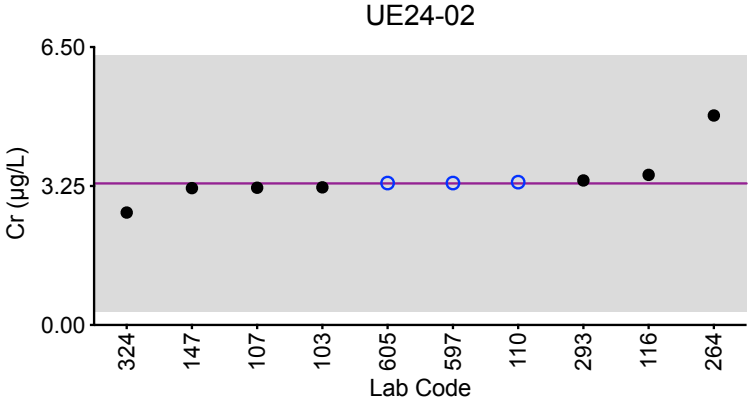
Based on the grading criteria for Cr in Urine, 100% of results were satisfactory, with 0 of the 10 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

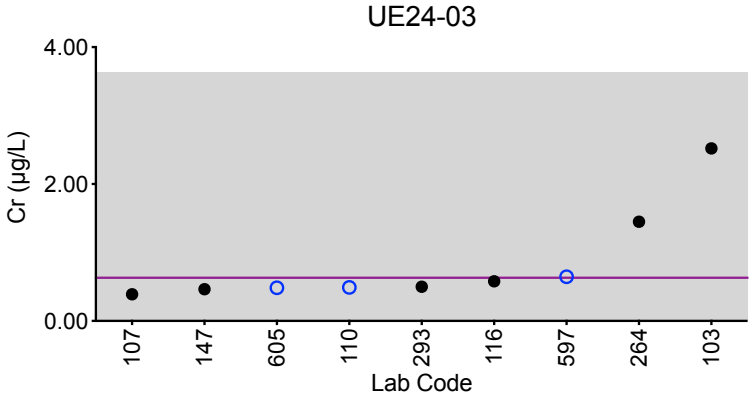
NEW YORK STATE | Department of Health | Wadsworth Center

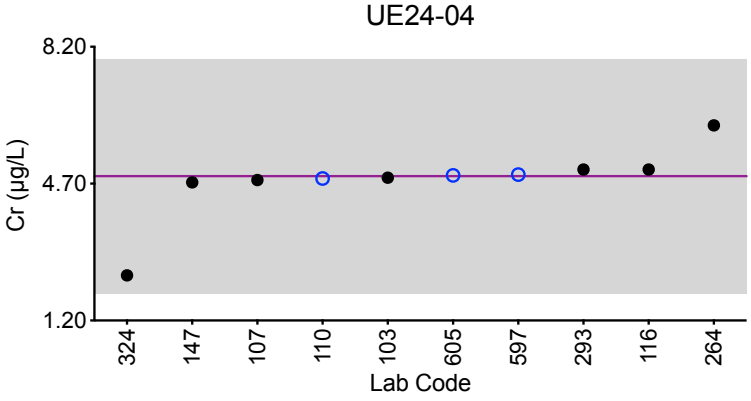
Results for Event #1, 2024: Summary Figures

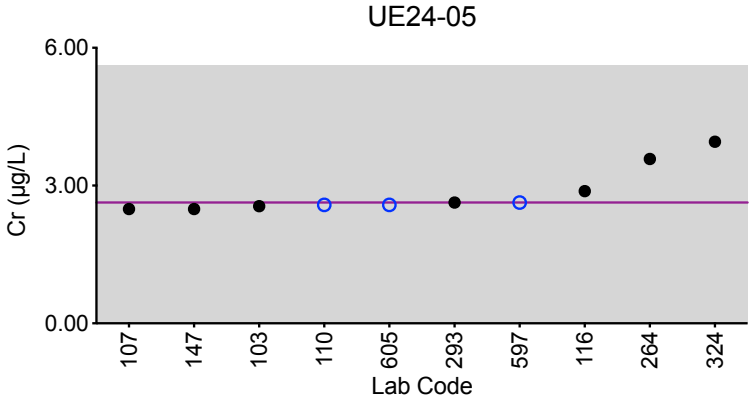
Urine Cr











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the robust mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±3 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±3 µg/L at concentrations less than or equal to 15 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

	Urine Hg (µg/L)				
	UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Target (Robust Mean (x*))	6.4	0.49	15.2	0.96	4.02
Upper Limit	9.4	3.49	19.8	3.96	7.02
Lower Limit	3.4	0.00	10.6	0.00	1.02
Robust SD (s*)	0.9	0.09	1.5	0.10	0.22
Robust RSD (%)	14	18	9.9	10	5.5
Number of Sample Measurements (N)	12	8	12	10	12
Standard Uncertainty (*u*)	0.3	NA	0.5	0.04	0.08

The acceptable range is based on quality specifications:
±3 µg/L or ±30% around the target value, whichever is greater; thus, it is fixed at ±3 µg/L at concentrations less than or equal to 10 µg/L. These quality specifications were established by New York State Department of Health's Wadsworth Center, the PT Program organizer.

An arithmetic mean, SD, RSD and n are provided for sample UE24-02.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

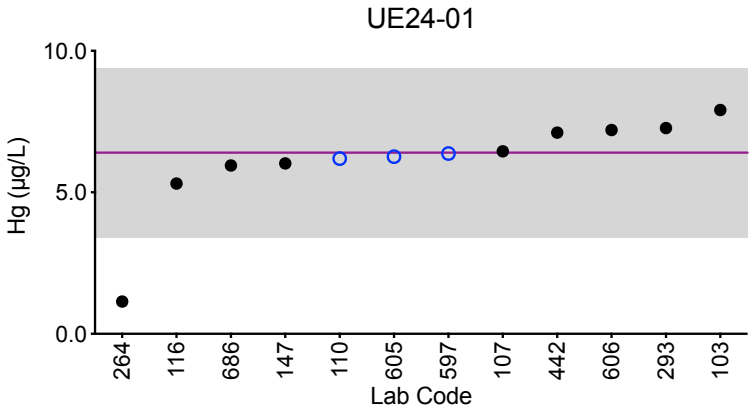
		Urine Hg (µg/L)				
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
	Target	**6.4**	**0.49**	**15.2**	**0.96**	**4.02**
103	ICP-MS/MS	7.91	0.579	15.5	0.996	4.13
107	DRC/CC-ICP-MS	6.45	0.43	14.0	0.91	3.89
110	ICP-MS	6.19	0.356	15.0	0.877	3.91
116	ICP-MS/MS	5.31	<0.300	11.8	0.753	3.30
147	ICP-MS	6.02	0.454	15.3	0.926	4.09
264	ICP-MS	1.14 ↓	0.64	17.36	1.06	4.85
293	DRC/CC-ICP-MS	7.27	0.51	14.17	1	3.91
442	ICP-MS/MS	7.11	0.506	15.9	0.999	3.99
597	ICP-MS/MS	6.37	0.464	13.4	0.892	3.59
605	ICP-MS	6.26	<1.00	15.7	<1.00	4.12
606	ICP-MS/MS	7.20	<1.00	18.1	1.15	4.35
686	ICP-MS	5.95	<1.00	15.5	<1.00	4.09

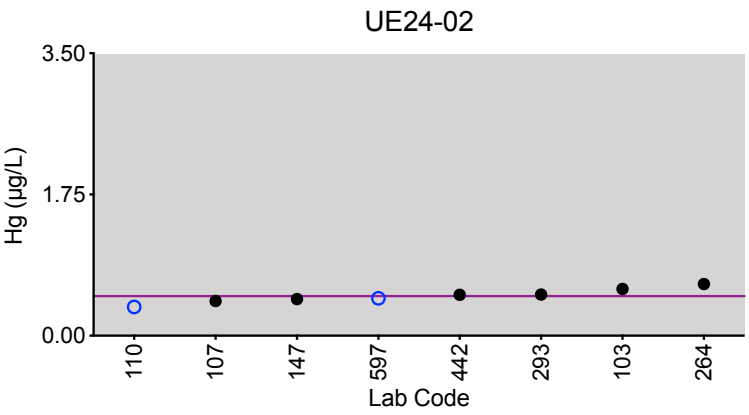
Based on the grading criteria for Hg in Urine, 98% of results were satisfactory, with 0 of the 12 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

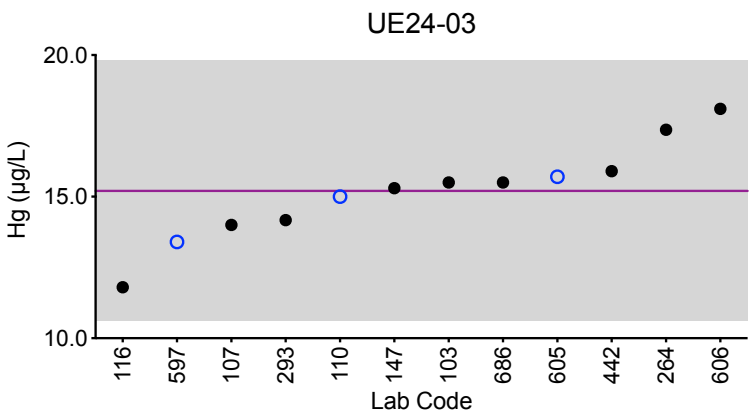
NEW YORK STATE | Department of Health | Wadsworth Center

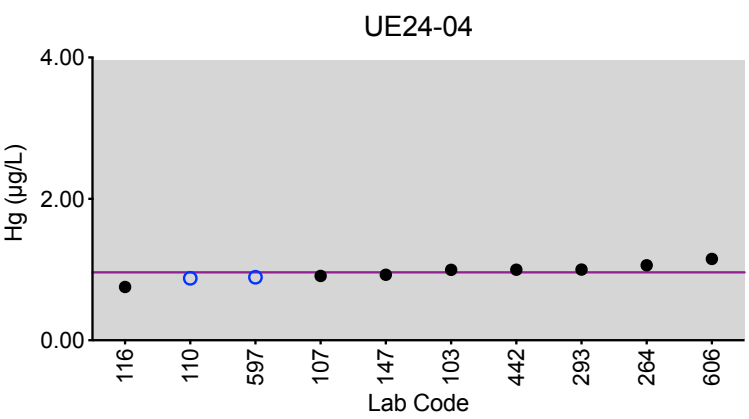
Results for Event #1, 2024: Summary Figures

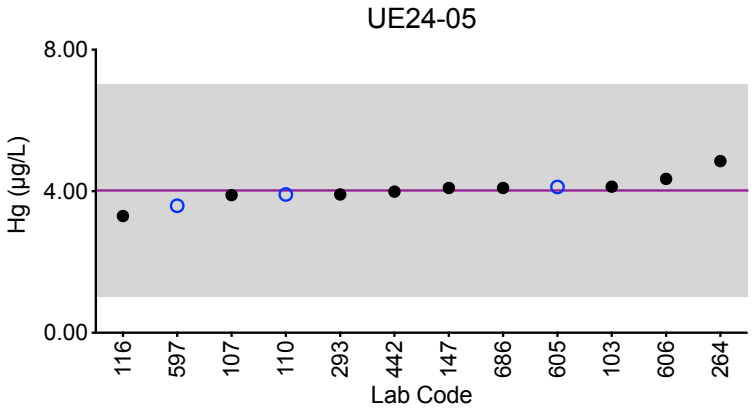
Urine Hg











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the robust mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±3 µg/L or ±30% around the target value, whichever is greater; thus, it is fixed at ±3 µg/L at concentrations less than or equal to 10 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

	Urine Mn (µg/L)				
	UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Target (Robust Mean (x*))	3.32	0.55	9.97	1.00	6.8
Upper Limit	4.15	1.10	12.46	1.55	8.5
Lower Limit	2.49	0.00	7.48	0.45	5.1
Robust SD (s*)	0.14	0.07	0.38	0.13	0.3
Robust RSD (%)	4.2	13	3.8	13	4.9
Number of Sample Measurements (N)	12	11	12	12	12
Standard Uncertainty (*u*)	0.05	0.03	0.09	0.05	0.1

The acceptable range is based on quality specifications:
±0.55 µg/L or ±25% around the target value, whichever is greater; thus, it is fixed at ±0.55 µg/L at concentrations less than or equal to 2.2 µg/L. Quality specifications for Mn are consistent with those used by other External Quality Assessment Schemes for trace elements. (Praamsma M, et al. An assessment of clinical laboratory performance for the determination of manganese in blood and urine. Clinical Chemistry and Laboratory Medicine.2016; 54(12): 1921-1928).

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

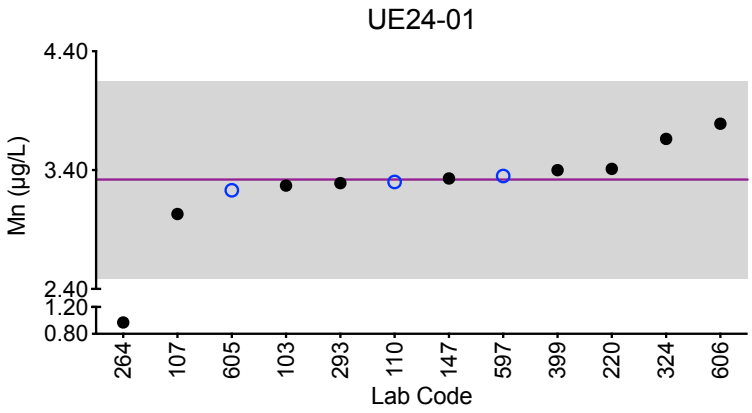
		Urine Mn (µg/L)				
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
	Target	**3.32**	**0.55**	**9.97**	**1.00**	**6.8**
103	ICP-MS/MS	3.27	0.502	10.4	0.972	7.16
107	DRC/CC-ICP-MS	3.03	0.530	9.57	0.798	6.58
110	ICP-MS/MS	3.30	0.58	9.91	0.90	6.99
147	DRC/CC-ICP-MS	3.33	0.535	9.27	1.05	6.44
220	DRC/CC-ICP-MS	3.41	0.47	9.76	0.89	6.75
264	ICP-MS	0.97 ↓	0.56	11.33	1.10	7.64
293	DRC/CC-ICP-MS	3.29	0.71	9.9	0.93	6.61
324	ICP-MS	3.663	<1	10.083	6.905 ↑	1.058 ↓
399	DRC/CC-ICP-MS	3.40	1.03	9.83	1.05	6.85
597	ICP-MS/MS	3.35	0.532	10.2	1.01	6.82
605	ICP-MS	3.23	0.471	9.75	0.903	6.62
606	ICP-MS/MS	3.79	0.771	10.4	1.16	7.09

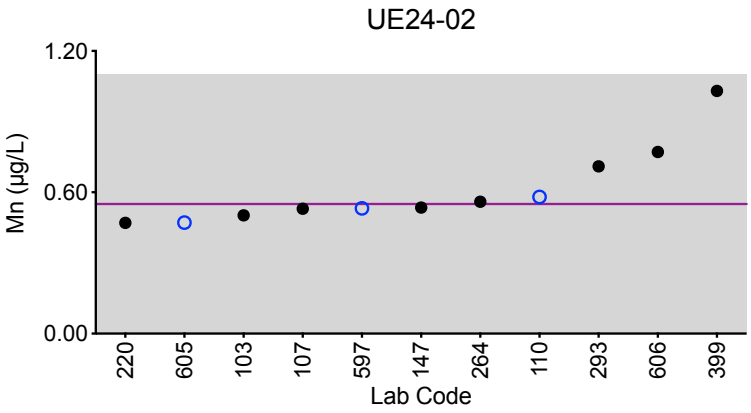
Based on the grading criteria for Mn in Urine, 95% of results were satisfactory, with 1 of the 12 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

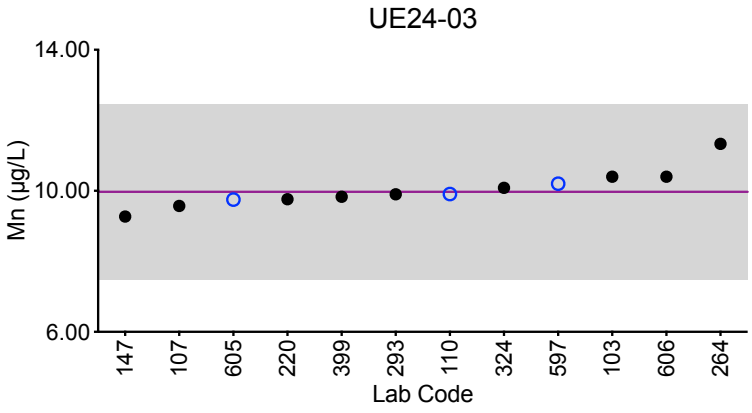
NEW YORK STATE | Department of Health | Wadsworth Center

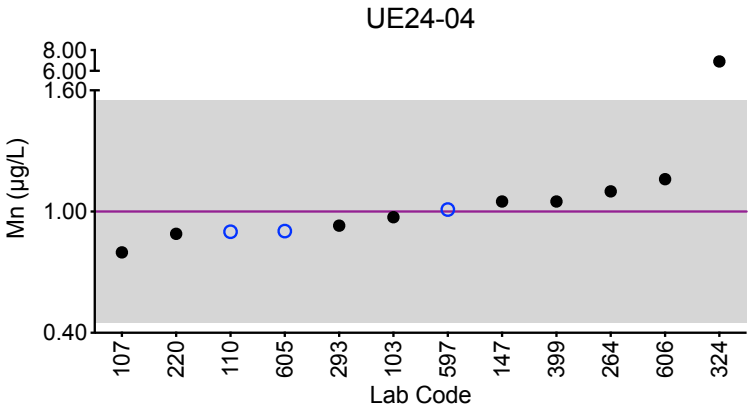
Results for Event #1, 2024: Summary Figures

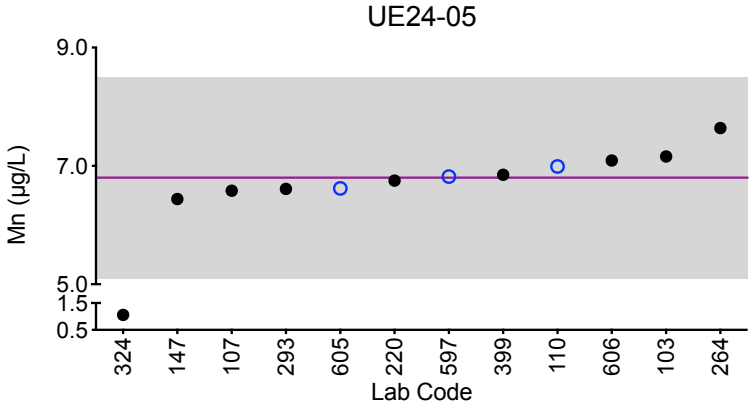
Urine Mn











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the robust mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±0.55 µg/L or ±25% around the target value, whichever is greater; thus, it is fixed at ±0.55 µg/L at concentrations less than or equal to 2.2 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

	Urine Pb (µg/L)				
	UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Target (Robust Mean (x*))	0.632	3.41	1.33	0.86	8.61
Upper Limit	1.632	4.41	2.33	1.86	10.33
Lower Limit	0.000	2.41	0.33	0.00	6.89
Robust SD (s*)	0.024	0.13	0.07	0.08	0.29
Robust RSD (%)	3.8	3.8	5.3	9.3	3.4
Number of Sample Measurements (N)	13	15	15	15	14
Standard Uncertainty (*u*)	0.008	0.04	0.02	0.02	0.09

The acceptable range is based on quality specifications:
±1 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±1 µg/L at concentrations less than or equal to 5 µg/L. These quality specifications are based on the same criteria used by the US Centers for Disease Control Prevention (CDC) for public health labs participating in the Laboratory Response Network (LRN) PT program for Toxic Metals.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

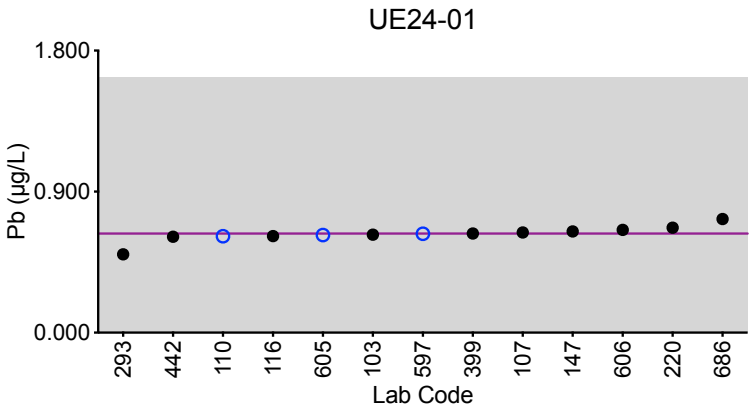
		Urine Pb (µg/L)				
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
	Target	**0.632**	**3.41**	**1.33**	**0.86**	**8.61**
103	ICP-MS/MS	0.625	3.44	1.34	0.866	8.73
107	ICP-MS	0.639	3.4	1.35	0.841	8.70
110	ICP-MS/MS	0.615	3.27	1.29	0.827	8.29
116	ICP-MS/MS	0.616	3.26	1.22	0.781	8.49
147	ICP-MS	0.646	3.47	1.34	0.853	8.75
220	ICP-MS	0.67	3.49	1.40	0.90	8.88
264	ICP-MS	<0.01	3.41	1.23	0.69	9.75
293	DRC/CC-ICP-MS	0.5	3.04	1.28	0.67	8.05
324	ICP-MS	<1	3.355	1.314	7.871 ↑	<1 ↓
399	ICP-MS/MS	0.633	3.91	1.31	0.835	8.17
442	ICP-MS/MS	0.612	3.65	1.43	0.907	8.82
597	ICP-MS/MS	0.631	3.37	1.36	0.99	8.52
605	ICP-MS	0.623	3.40	1.40	0.849	8.45
606	ICP-MS/MS	0.656	3.31	1.33	0.868	8.56
686	ICP-MS	0.725	3.52	1.42	0.950	8.87

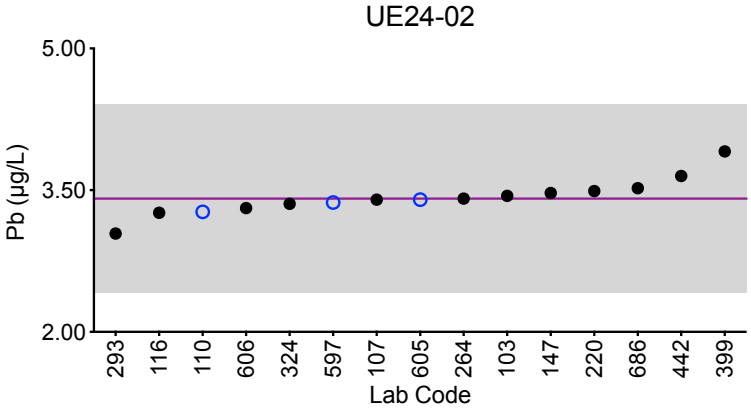
Based on the grading criteria for Pb in Urine, 97% of results were satisfactory, with 1 of the 15 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

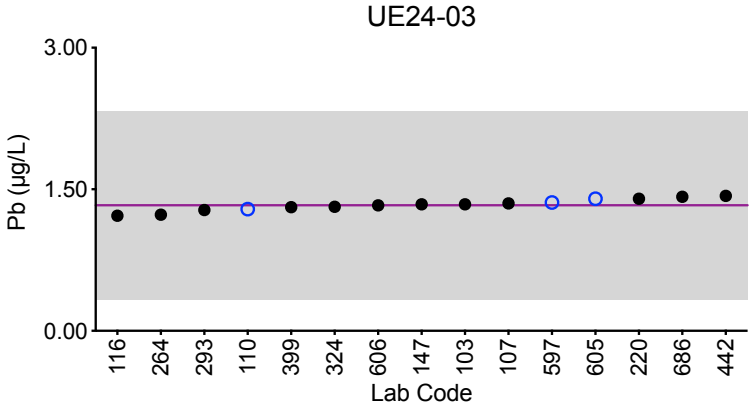
NEW YORK STATE | Department of Health | Wadsworth Center

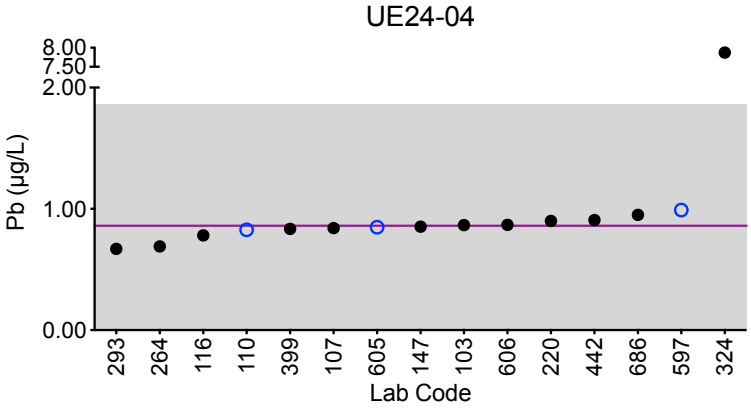
Results for Event #1, 2024: Summary Figures

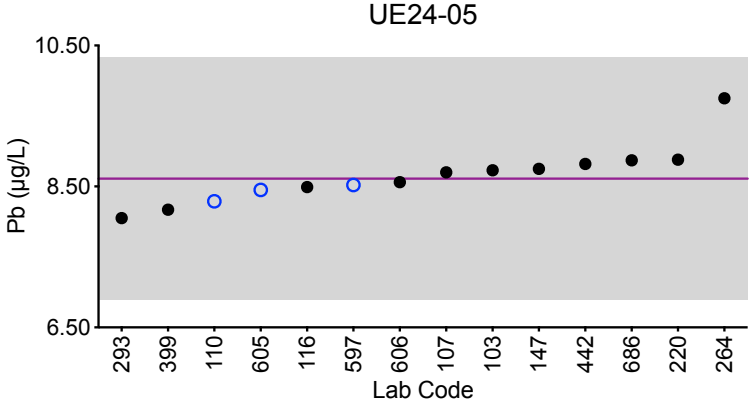
Urine Pb











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the robust mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±1 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±1 µg/L at concentrations less than or equal to 5 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

Urine Tl (µg/L)					
	UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Target (Robust Mean (x*))	0.353	0.445	1.31	0.110	0.85
Upper Limit	0.553	0.645	1.57	0.310	1.05
Lower Limit	0.153	0.245	1.05	0.000	0.65
Robust SD (s*)	0.018	0.016	0.04	0.004	0.03
Robust RSD (%)	5.1	3.6	3.1	3.2	3.5
Number of Sample Measurements (N)	12	12	12	11	12
Standard Uncertainty (*u*)	0.007	0.006	0.02	0.001	0.01

The acceptable range is based on quality specifications:
±0.2 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±0.2 µg/L at concentrations less than or equal to 1 µg/L. These quality specifications are based on the same criteria used by the US Centers for Disease Control Prevention (CDC) for public health labs participating in the Laboratory Response Network (LRN) PT program for Toxic Metals.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

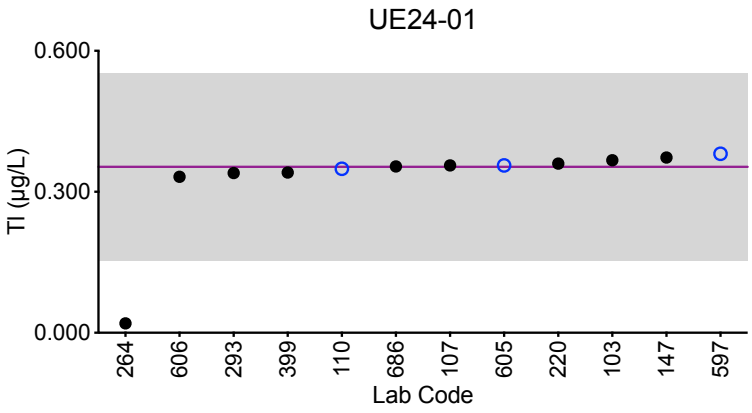
Urine Tl (µg/L)						
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
	Target	**0.353**	**0.445**	**1.31**	**0.110**	**0.85**
103	ICP-MS/MS	0.367	0.461	1.31	0.106	0.851
107	ICP-MS	0.356	0.435	1.31	0.108	0.847
110	ICP-MS/MS	0.349	0.442	1.28	0.106	0.825
147	ICP-MS	0.373	0.478	1.41	0.117	0.909
220	ICP-MS	0.36	0.44	1.33	0.11	0.85
264	ICP-MS	0.02 ↓	0.47	1.42	0.13	0.90
293	DRC/CC-ICP-MS	0.34	0.43	1.28	0.11	0.82
399	ICP-MS/MS	0.341	0.420	1.26	0.110	0.799
597	ICP-MS/MS	0.381	0.455	1.32	0.133	0.859
605	ICP-MS	0.356	0.448	1.32	0.109	0.828
606	ICP-MS/MS	0.332	0.434	1.26	0.111	0.831
686	ICP-MS	0.354	0.442	1.32	<0.120	0.856

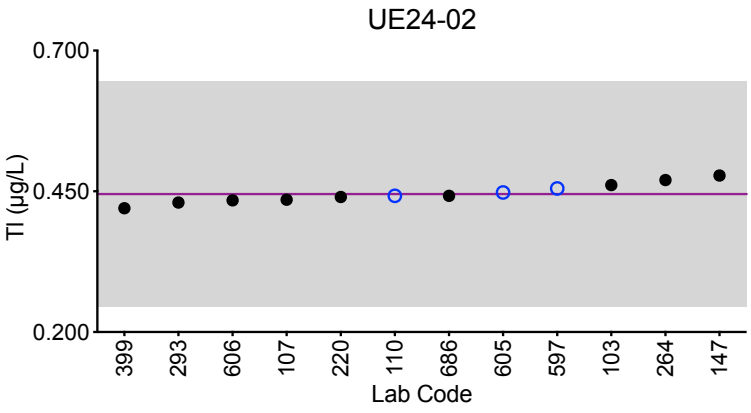
Based on the grading criteria for Tl in Urine, 98% of results were satisfactory, with 0 of the 12 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

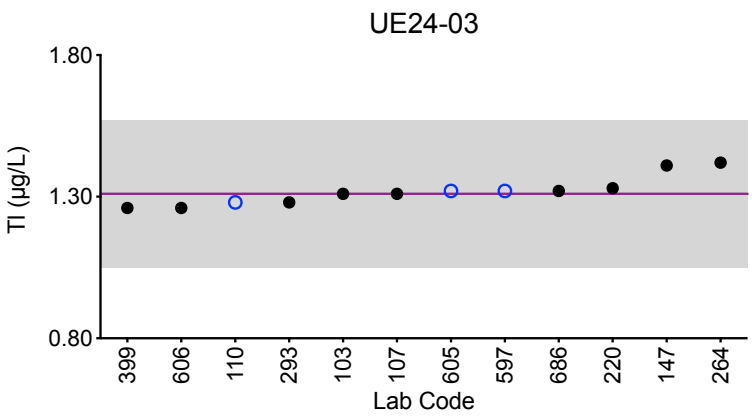
NEW YORK STATE | Department of Health | Wadsworth Center

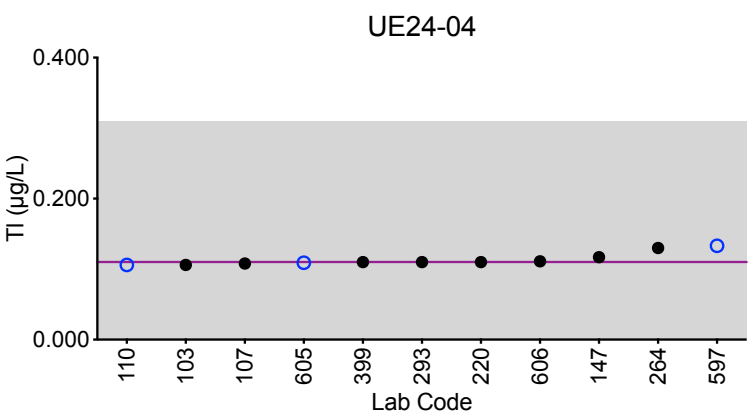
Results for Event #1, 2024: Summary Figures

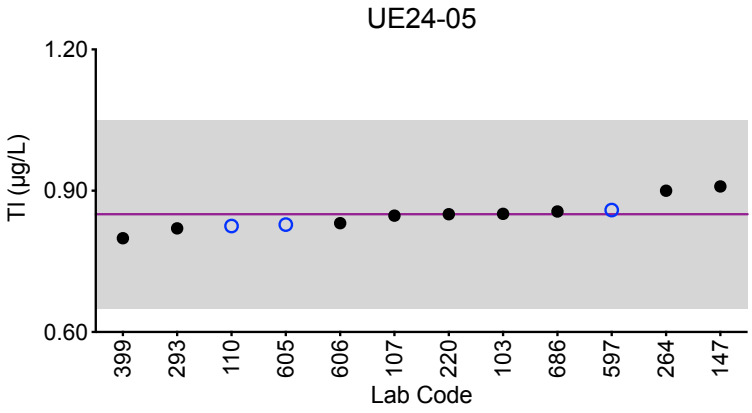
Urine Tl











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the robust mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±0.2 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±0.2 µg/L at concentrations less than or equal to 1 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

	Urine U (µg/L)				
	UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Target (Robust Mean (x*))	0.0578	0.157	0.101	0.0129	0.0100
Upper Limit	0.0878	0.188	0.131	0.0429	0.0400
Lower Limit	0.0278	0.126	0.071	0.0000	0.0000
Robust SD (s*)	0.0017	0.004	0.004	0.0021	0.0014
Robust RSD (%)	2.9	2.5	4.4	16	14
Number of Sample Measurements (N)	12	13	13	10	10
Standard Uncertainty (*u*)	0.0006	0.002	0.002	0.0008	0.0005

The acceptable range is based on quality specifications:
±0.03 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±0.03 µg/L at concentrations less than or equal to 0.15 µg/L. These quality specifications are based on the same criteria used by the US Centers for Disease Control Prevention (CDC) for public health labs participating in the Laboratory Response Network (LRN) PT program for Toxic Metals.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

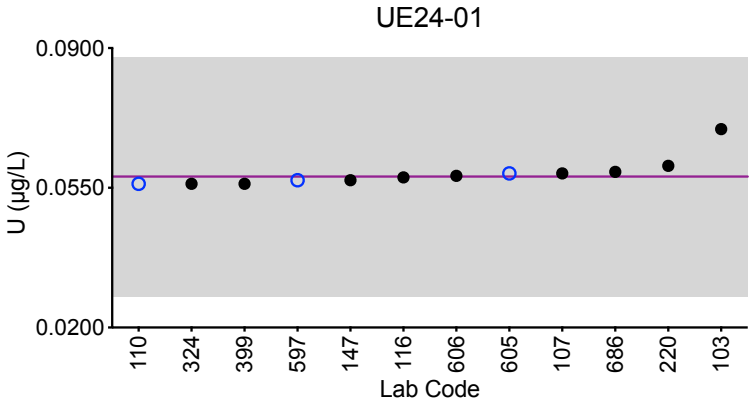
		Urine U (µg/L)				
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
	Target	**0.0578**	**0.157**	**0.101**	**0.0129**	**0.0100**
103	ICP-MS/MS	0.0697	0.167	0.104	<0.0200	<0.0200
107	ICP-MS	0.0586	0.159	0.101	0.0126	0.0105
110	ICP-MS/MS	0.056	0.153	0.098	0.013	0.010
116	ICP-MS/MS	0.0576	0.160	0.106	<0.0150	<0.0150
147	ICP-MS	0.0569	0.154	0.0948	0.0118	0.00985
220	ICP-MS	0.0605	0.162	0.102	0.0158	0.0127
264	ICP-MS	<0.01 ↓	0.18	0.10	0.008	0.003
324	ICP-MS	0.056	0.154	0.097	0.012	0.009
399	ICP-MS/MS	0.056	0.156	0.096	0.017	0.011
597	ICP-MS/MS	0.0569	0.153	0.105	0.0144	0.00940
605	ICP-MS	0.0586	0.154	0.103	0.0128	0.0111
606	ICP-MS/MS	0.058	0.154	0.106	0.011	0.009
686	ICP-MS	0.0590	0.160	0.0972	<0.0150	<0.0150

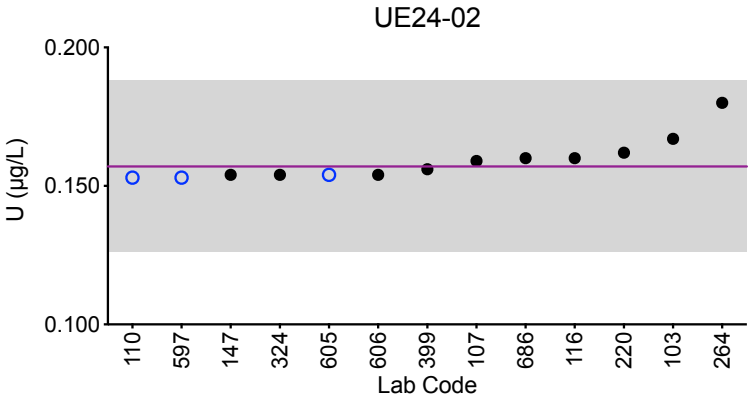
Based on the grading criteria for U in Urine, 98% of results were satisfactory, with 0 of the 13 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

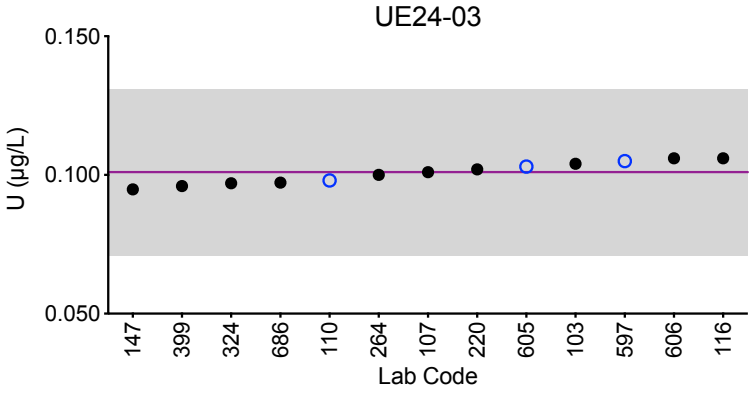
NEW YORK STATE | Department of Health | Wadsworth Center

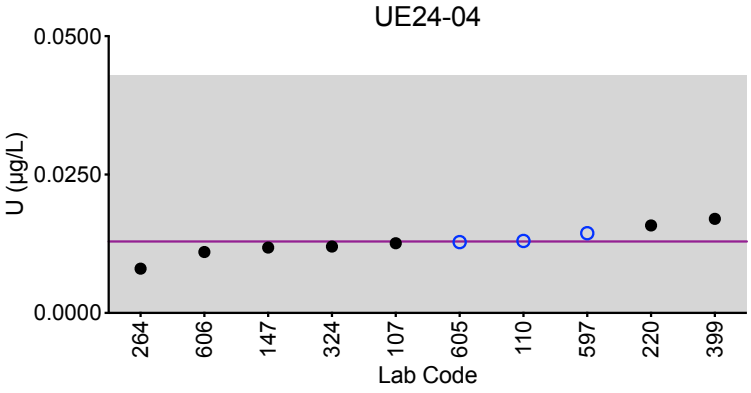
Results for Event #1, 2024: Summary Figures

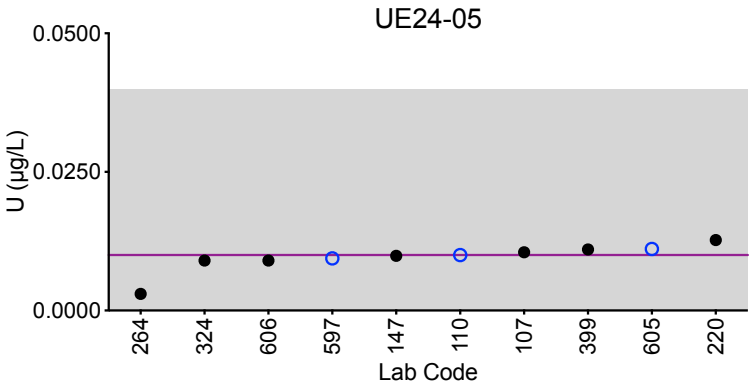
Urine U











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the robust mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±0.03 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±0.03 µg/L at concentrations less than or equal to 0.15 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine Al (µg/L)						
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
147	ICP-MS	22.6	<13.8	27.8	<13.8	16.0
264	ICP-MS	*4.75	12.47	33.26	15.90	19.73
293	DRC/CC-ICP-MS	23.47	8.36	30.49	11.6	17.81
324	ICP-MS	23.214	9.492	23.891	14.932	13.636
597	ICP-MS/MS	22.2	9.79	30.4	13.0	16.0

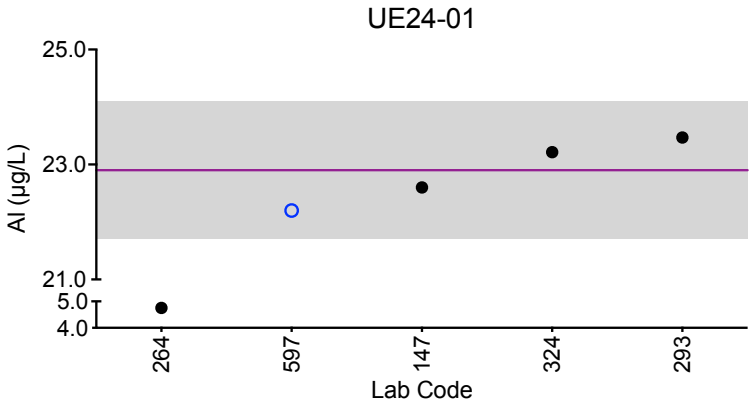
Summary Statistics					
	UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Arithmetic Mean ($\bar{x}$)	22.9	10.0	29	13.9	16.6
Arithmetic SD (s)	0.6	1.7	4	1.9	2.3
Arithmetic RSD (%)	2.6	17	14	14	14
Number of Sample Measurements (N)	4	4	5	4	5

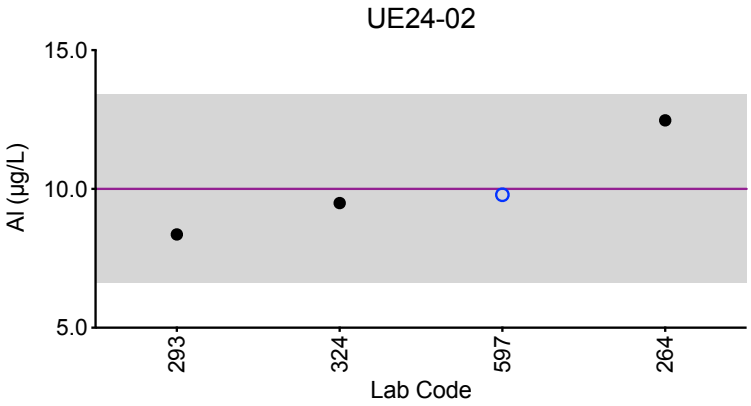
*Denotes a statistical Outlier.

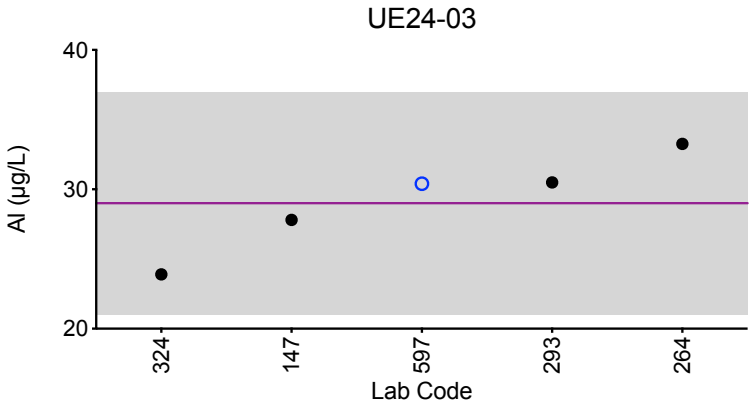
NEW YORK STATE | Department of Health | Wadsworth Center

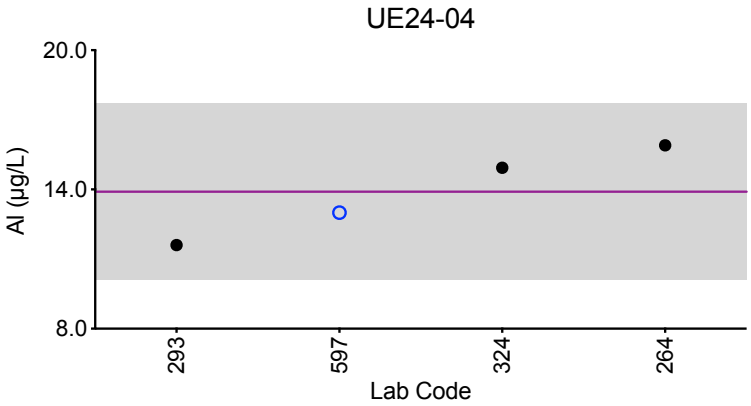
Results for Event #1, 2024: Summary Figures

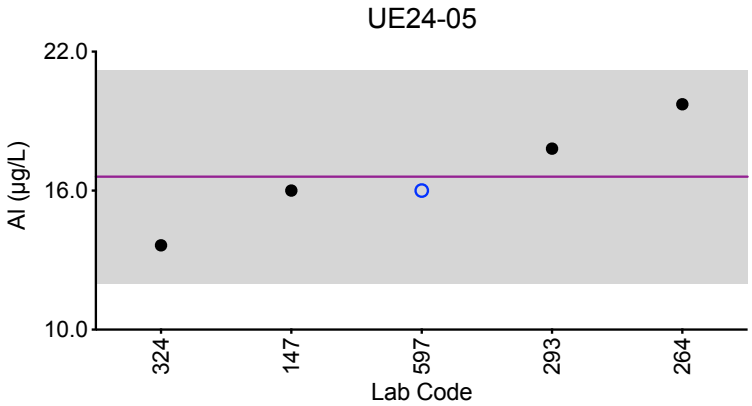
Urine Al











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine Cs (µg/L)

Lab Code	Method	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
107	ICP-MS	2.89	4.81	10.5	1.29	2.37
110	ICP-MS/MS	2.60	4.22	9.03	1.16	2.04
147	ICP-MS	2.87	4.77	10.3	1.30	2.37
220	ICP-MS	2.88	4.72	10.0	1.37	2.32
264	ICP-MS	*0.17	4.72	9.75	1.23	2.19
399	ICP-MS/MS	2.87	4.67	10.1	1.31	2.27
597	ICP-MS/MS	2.80	4.49	9.83	1.25	2.20
605	ICP-MS	2.87	4.69	9.89	1.27	2.20
606	ICP-MS/MS	3.11	5.00	10.4	1.36	2.36

Summary Statistics

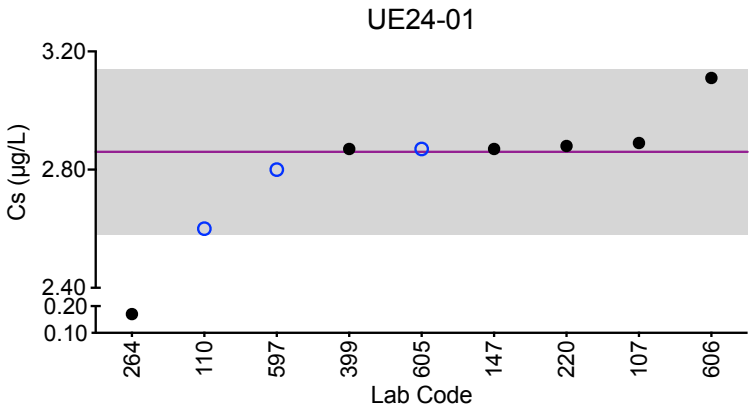
	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
Arithmetic Mean ($\bar{x}$)	2.86	4.68	9.98	1.28	2.26
Arithmetic SD (s)	0.14	0.22	0.44	0.06	0.11
Arithmetic RSD (%)	4.9	4.7	4.4	4.7	4.9
Number of Sample Measurements (N)	8	9	9	9	9

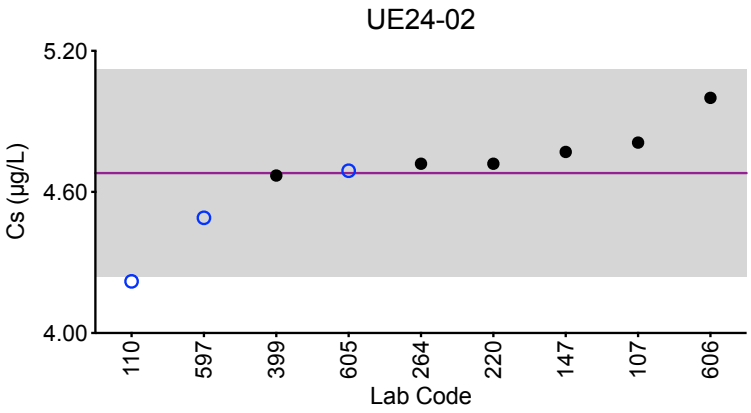
*Denotes a statistical Outlier.

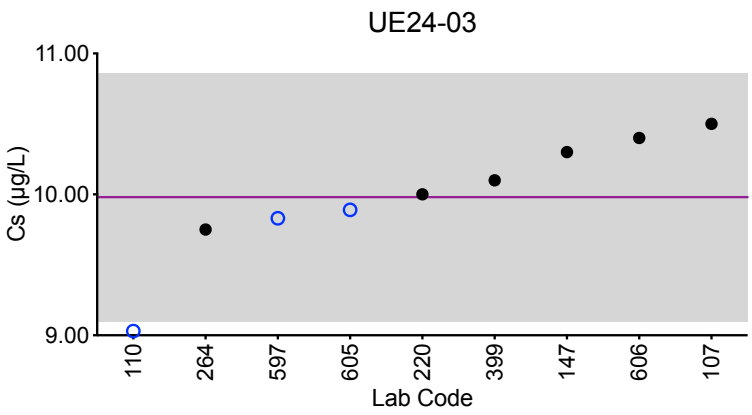
NEW YORK STATE | Department of Health | Wadsworth Center

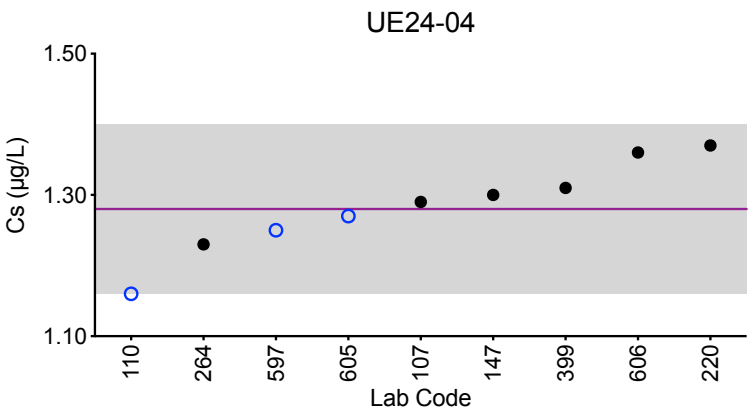
Results for Event #1, 2024: Summary Figures

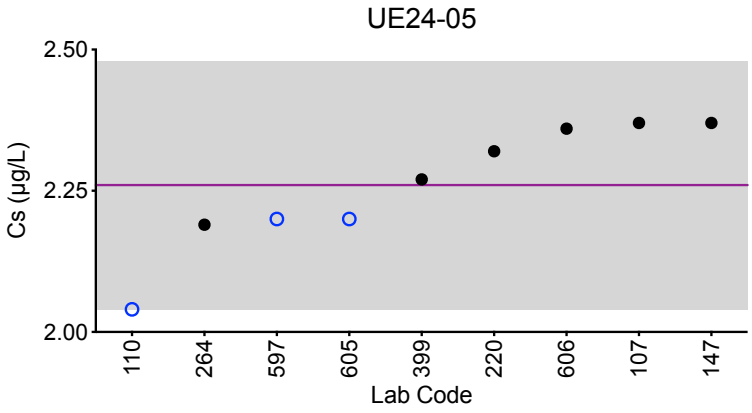
Urine Cs











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine Cu (µg/L)

Lab Code	Method	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
110	ICP-MS/MS	5.44	19.6	78.9	58.5	11.9
116	ICP-MS/MS	6.32	21.1	84.7	61.6	12.2
147	ICP-MS	*21.4	31.1	93.7	69.8	19.1
264	ICP-MS	2.61	26.74	103.28	75.16	15.80
293	DRC/CC-ICP-MS	6.36	20.34	82.64	60.39	11.44
324	ICP-MS	6.512	21.983	85.874	*13.52	*63.156
597	ICP-MS/MS	6.57	21.3	85.5	62.3	12.3

Summary Statistics

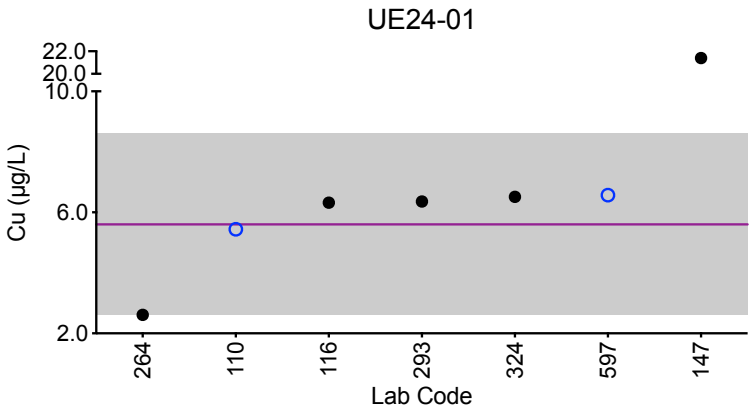
	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
Arithmetic Mean ($\bar{x}$)	5.6	23	88	65	13.8
Arithmetic SD (s)	1.5	4	8	6	3.0
Arithmetic RSD (%)	27	17	9.1	9.2	22
Number of Sample Measurements (N)	6	7	7	6	6

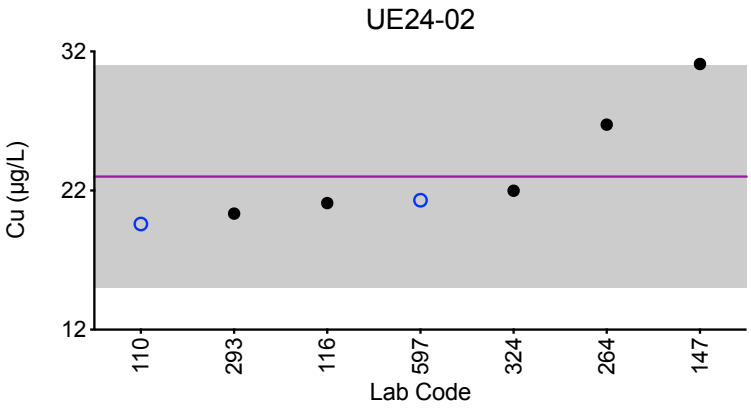
*Denotes a statistical Outlier.

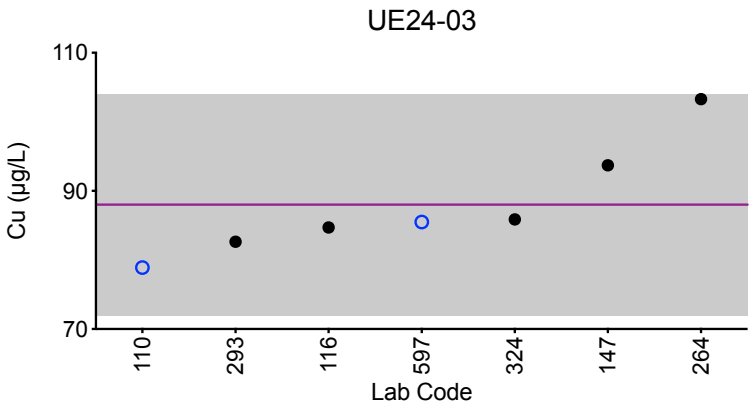
NEW YORK STATE | Department of Health | Wadsworth Center

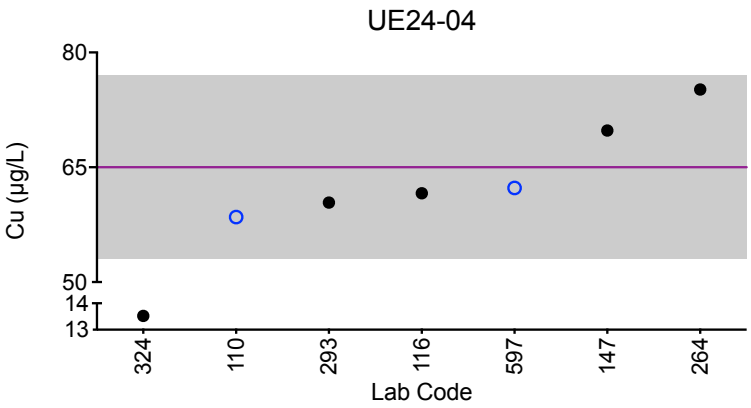
Results for Event #1, 2024: Summary Figures

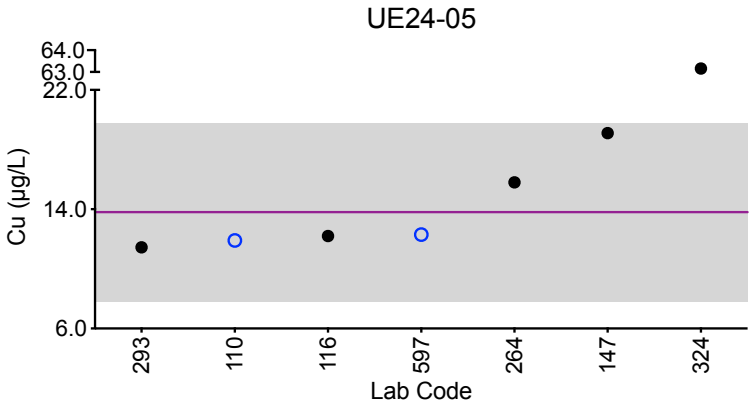
Urine Cu











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine Mo (µg/L)

Lab Code	Method	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
103	ICP-MS/MS	33.5	24.5	78.1	33.6	47.0
107	ICP-MS	33.3	23.8	74.6	32.3	45.5
110	ICP-MS/MS	32.1	23.4	73.8	32.4	45.2
147	ICP-MS	33.5	24.3	75.7	33.0	47.0
220	ICP-MS	29.7	24.2	76.8	33.1	45.9
293	DRC/CC-ICP-MS	33.7	23.98	73.63	32.36	44.62
324	ICP-MS	33.995	24.878	77.072	47.359	34.483
399	ICP-MS/MS	32.3	23.9	75.2	32.6	45.4
597	ICP-MS/MS	32.0	23.4	73.9	32.0	44.1
605	ICP-MS	32.6	23.7	74.3	32.1	44.1
606	ICP-MS/MS	34.2	25.6	79.8	34.8	48.4

Summary Statistics

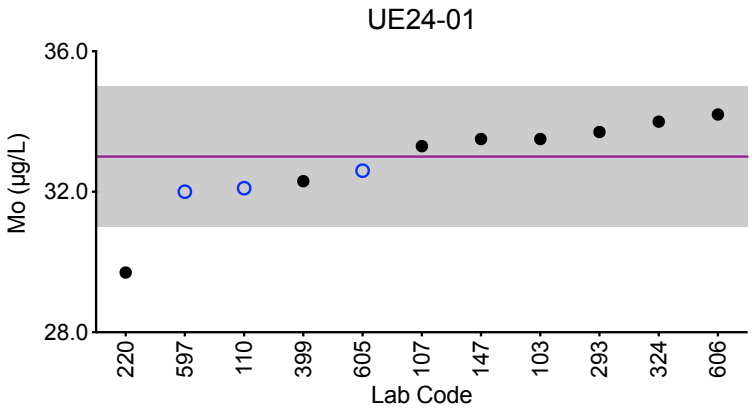
	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
Robust Mean (x*)	33.0	24.1	75.6	32.8	45.4
Robust SD (s*)	1.0	0.5	2.0	0.7	1.7
Robust RSD (%)	3.0	2.1	2.6	2.1	3.7
Number of Sample Measurements (N)	11	11	11	11	11
Standard Uncertainty (*u*)	0.4	0.2	0.7	0.3	0.6

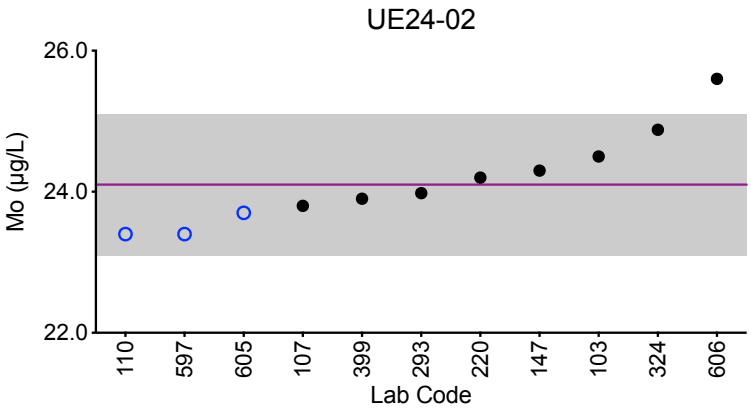
*Denotes a statistical Outlier.

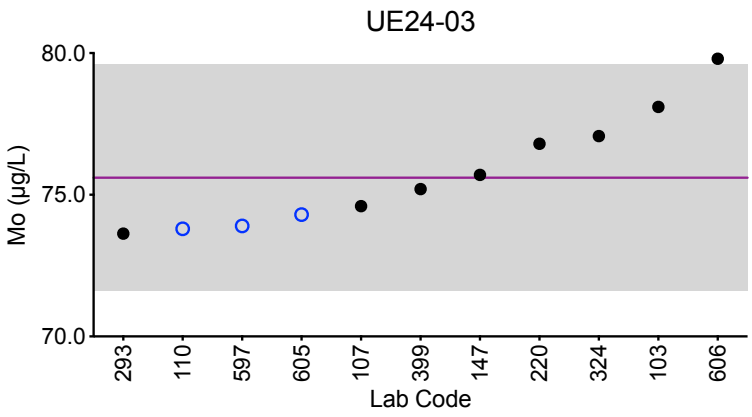
NEW YORK STATE | Department of Health | Wadsworth Center

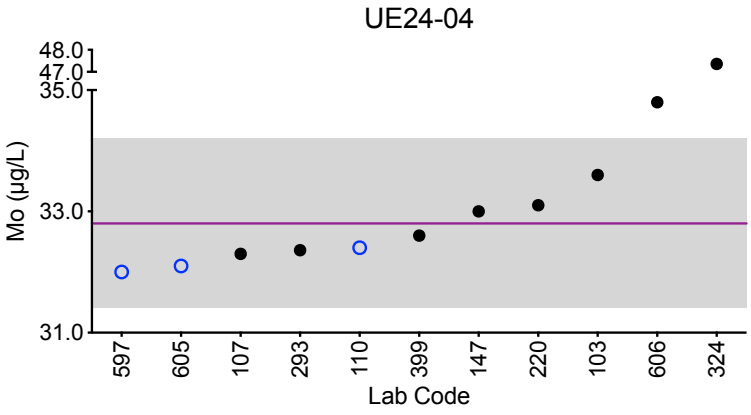
Results for Event #1, 2024: Summary Figures

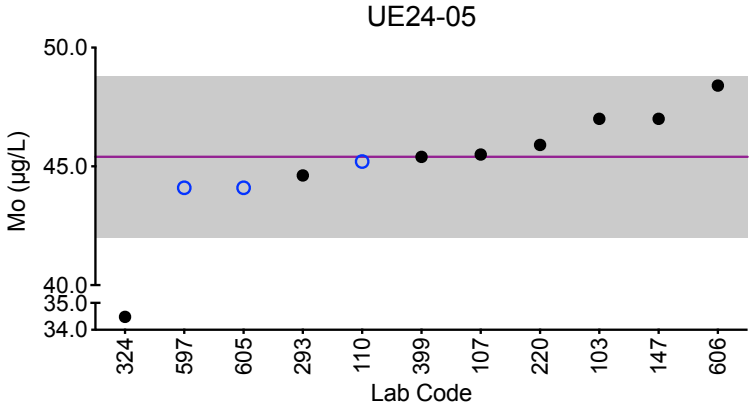
Urine Mo











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = robust mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine Ni (µg/L)

Lab Code	Method	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
103	ICP-MS/MS	3.20	4.45	1.80	7.77	1.08
107	DRC/CC-ICP-MS	3.51	4.88	1.89	7.82	1.13
110	ICP-MS/MS	3.46	4.41	1.91	7.59	1.16
147	ICP-MS	2.93	4.60	1.86	7.92	1.01
264	ICP-MS	1.78	6.28	3.19	9.76	2.20
293	DRC/CC-ICP-MS	3.37	4.13	1.72	7.46	1.05
324	ICP-MS	4.606	4.956	2.319	1.651	7.621
442	DRC/CC-ICP-MS	3.31	4.52	1.79	7.8	1.02
597	ICP-MS/MS	3.20	4.35	1.93	7.79	1.14
605	ICP-MS	3.40	4.95	1.91	8.47	1.16

Summary Statistics

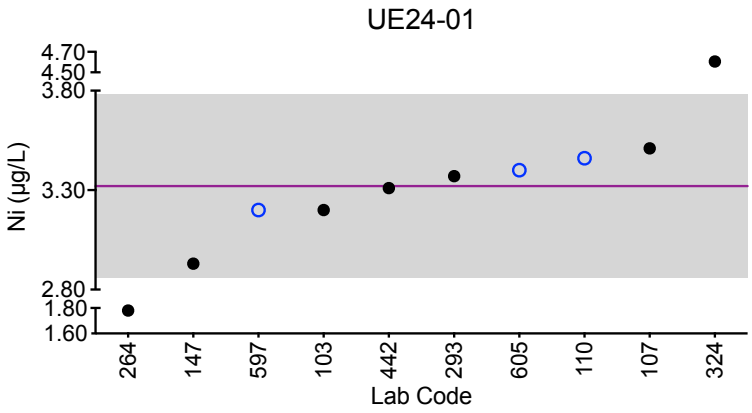
	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
Robust Mean (x*)	3.32	4.64	1.89	7.79	1.13
Robust SD (s*)	0.23	0.37	0.12	0.29	0.11
Robust RSD (%)	6.9	8.0	6.3	3.7	9.7
Number of Sample Measurements (N)	10	10	10	10	10
Standard Uncertainty (*u*)	0.09	0.09	0.05	0.09	0.04

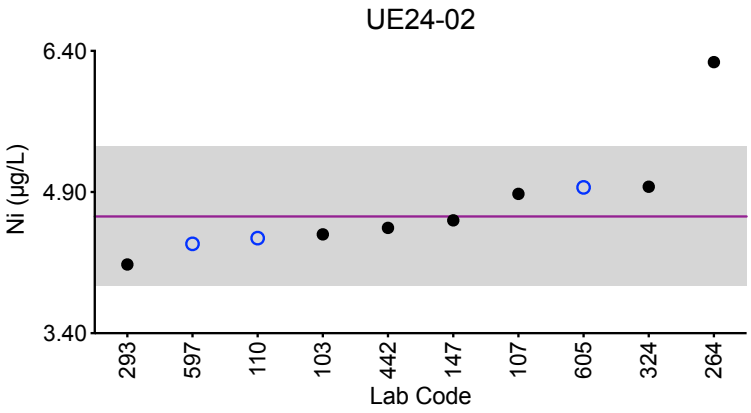
*Denotes a statistical Outlier.

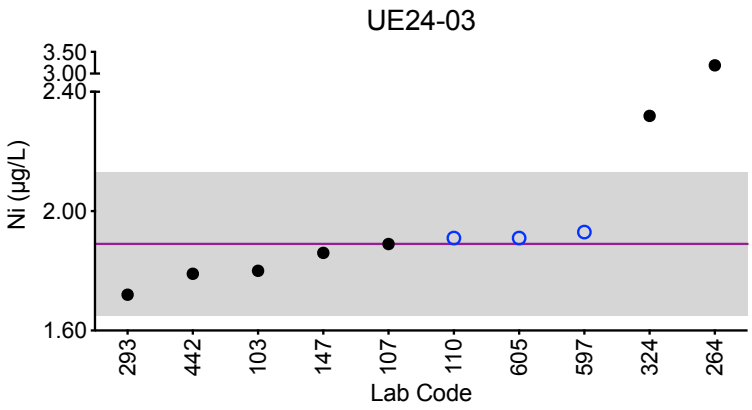
NEW YORK STATE | Department of Health | Wadsworth Center

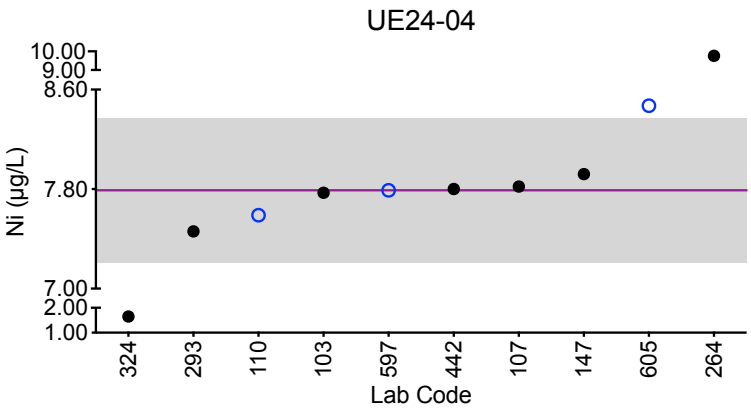
Results for Event #1, 2024: Summary Figures

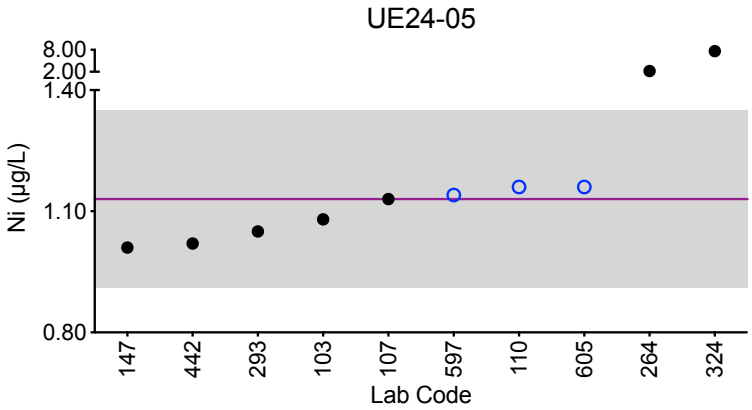
Urine Ni











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = robust mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine Pt (µg/L)

Lab Code	Method	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
107	ICP-MS	0.362	1.46	0.258	3.02	0.726
110	ICP-MS/MS	0.372	1.43	0.255	3.22	0.725
220	ICP-MS	0.38	1.48	0.26	3.36	0.74
264	ICP-MS	0.39	*1.73	*0.32	*4.22	*1.05
293	DRC/CC-ICP-MS	0.37	1.35	0.25	3.13	0.67
399	ICP-MS/MS	0.354	1.41	0.241	3.10	0.695
605	ICP-MS	0.332	1.44	0.237	3.00	0.646

Summary Statistics

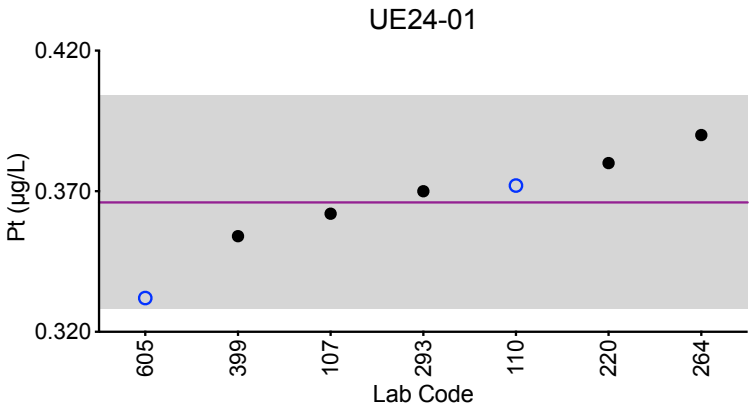
	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
Arithmetic Mean ($\bar{x}$)	0.366	1.43	0.250	3.14	0.70
Arithmetic SD (s)	0.019	0.05	0.009	0.13	0.04
Arithmetic RSD (%)	5.2	3.5	3.6	4.1	5.7
Number of Sample Measurements (N)	7	6	6	6	6

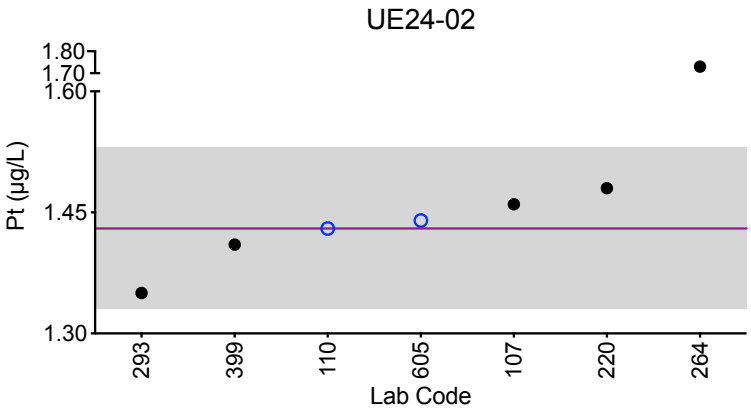
*Denotes a statistical Outlier.

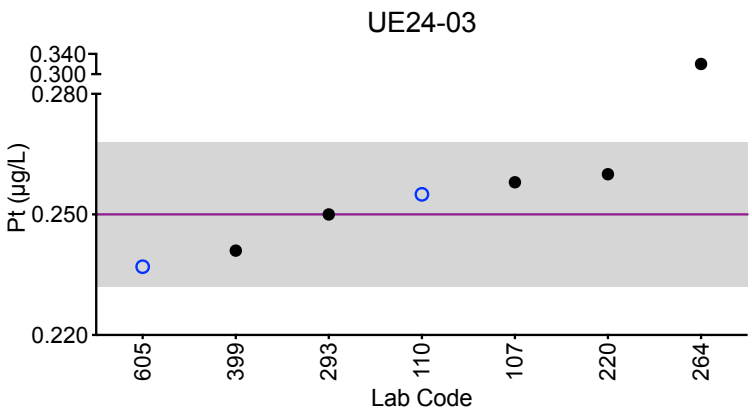
NEW YORK STATE | Department of Health | Wadsworth Center

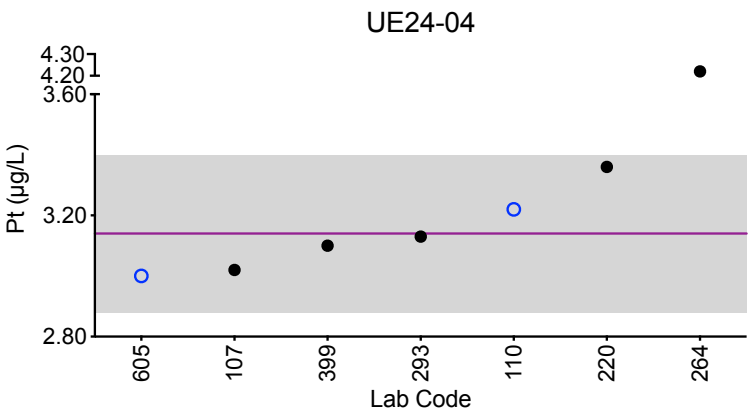
Results for Event #1, 2024: Summary Figures

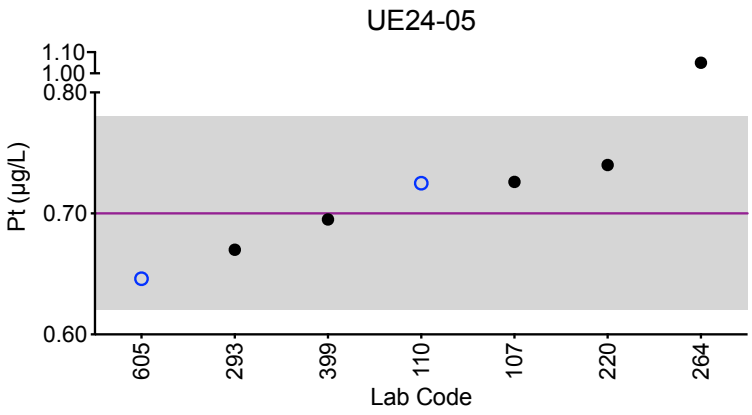
Urine Pt











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine Sb (µg/L)

Lab Code	Method	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
103	ICP-MS/MS	0.484	2.00	0.355	1.00	0.715
107	ICP-MS	0.518	2.14	0.354	0.983	0.748
110	ICP-MS/MS	0.549	2.10	0.414	0.946	0.672
147	ICP-MS	0.524	2.20	0.359	1.09	0.722
220	ICP-MS	0.53	2.12	0.37	1.01	0.73
264	ICP-MS	<0.01	1.69	0.20	0.71	0.51
293	DRC/CC-ICP-MS	0.55	2.39	0.38	1.05	0.69
324	ICP-MS	<1	1.995	<1	<1	<1
399	ICP-MS/MS	0.482	2.07	0.321	0.945	0.688
597	ICP-MS/MS	0.503	1.97	0.341	0.936	0.700
605	ICP-MS	<0.800	2.15	<0.800	0.984	<0.800
606	ICP-MS/MS	0.567	2.31	0.320	1.05	0.710

Summary Statistics

	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
Robust Mean (x*)	0.52	2.11	0.35	0.99	0.70
Robust SD (s*)	0.03	0.15	0.03	0.06	0.03
Robust RSD (%)	5.7	7.1	9.1	6.1	4.0
Number of Sample Measurements (N)	9	12	10	11	10
Standard Uncertainty (*u*)	NA	0.05	0.01	0.02	0.01

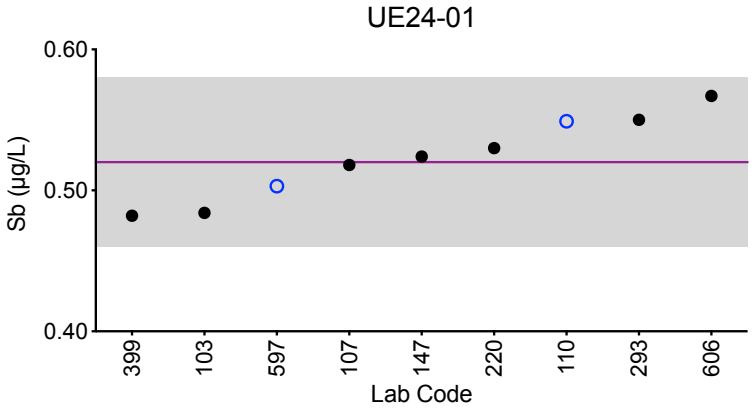
*Denotes a statistical Outlier.

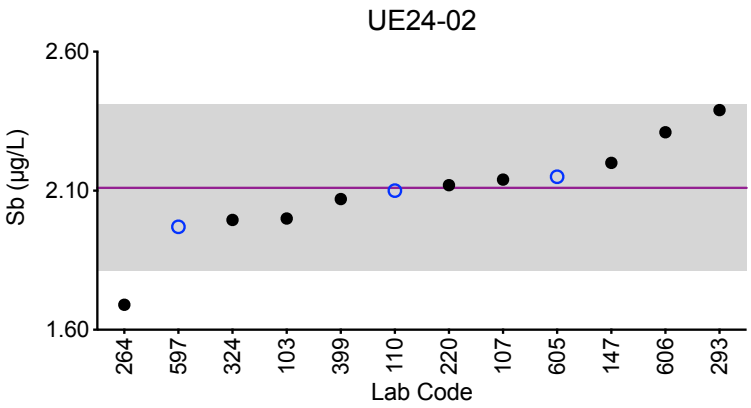
An arithmetic mean, SD, RSD and n are provided for sample UE24-01.

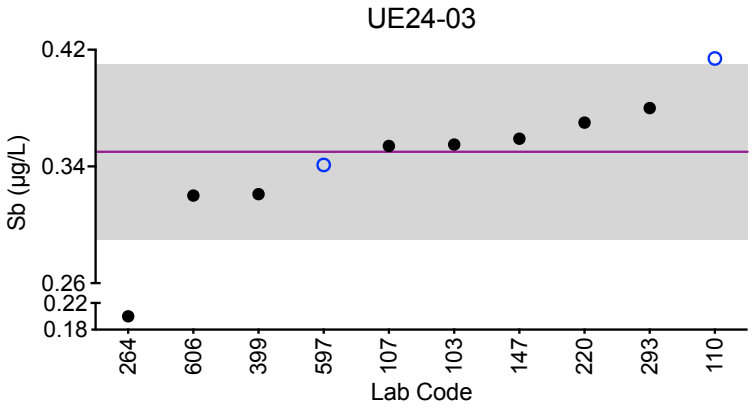
NEW YORK STATE | Department of Health | Wadsworth Center

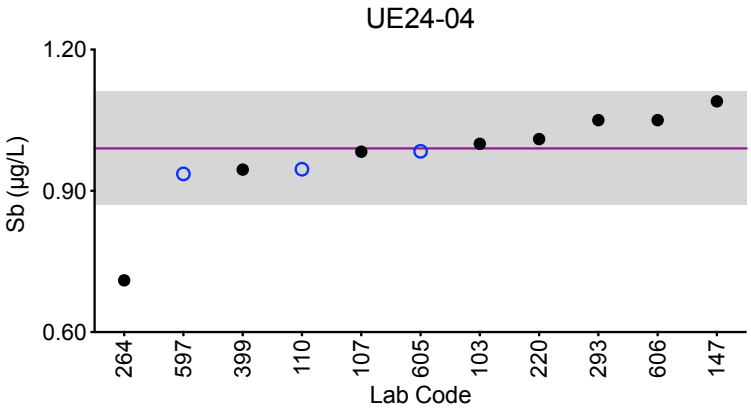
Results for Event #1, 2024: Summary Figures

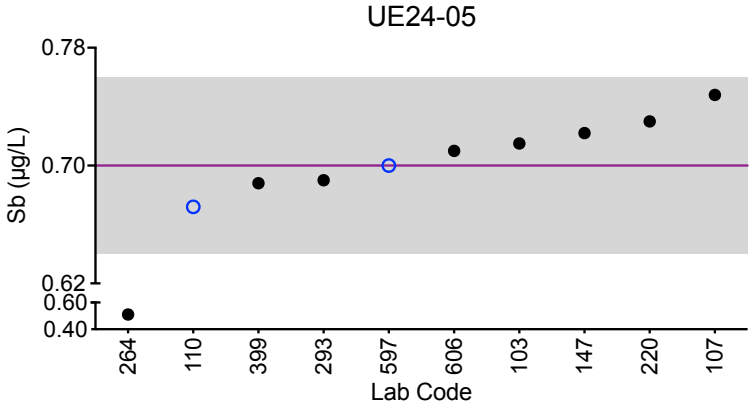
Urine Sb











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = robust mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine Se (µg/L)

Lab Code	Method	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
103	ICP-MS/MS	138	55.9	234	82.8	15.7
110	ICP-MS/MS	138	50.4	210	74.9	14.1
147	ICP-MS	*157	59.8	252	84.7	17.9
293	DRC/CC-ICP-MS	138.23	53.71	230.65	78.99	15.01
597	ICP-MS/MS	143	55	235	81.2	16.4

Summary Statistics

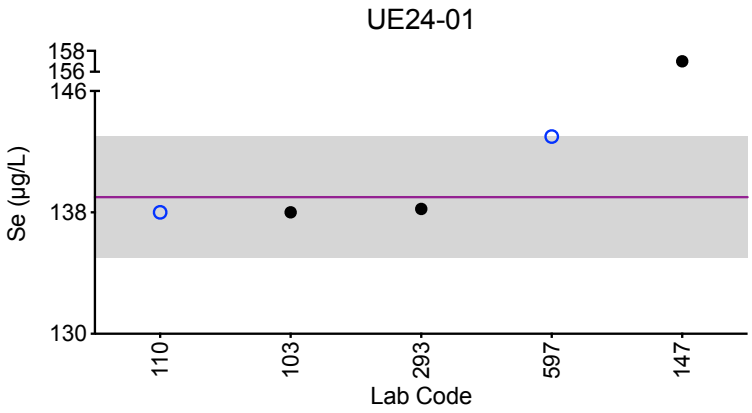
	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
Arithmetic Mean ($\bar{x}$)	139	55.0	232	81	15.8
Arithmetic SD (s)	2	3.4	15	4	1.4
Arithmetic RSD (%)	1.8	5.5	6.5	4.9	8.9
Number of Sample Measurements (N)	4	5	5	5	5

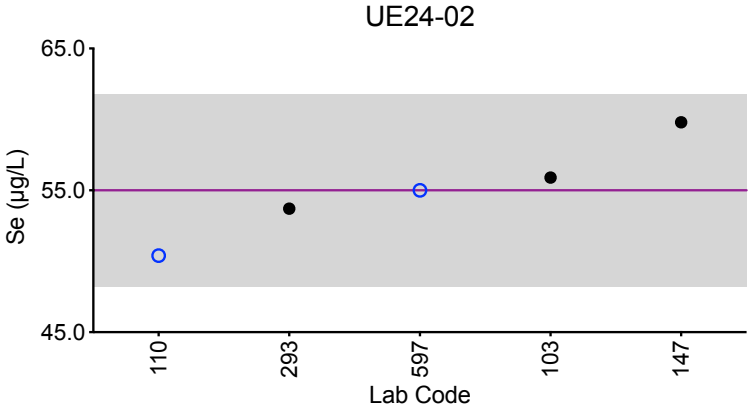
*Denotes a statistical Outlier.

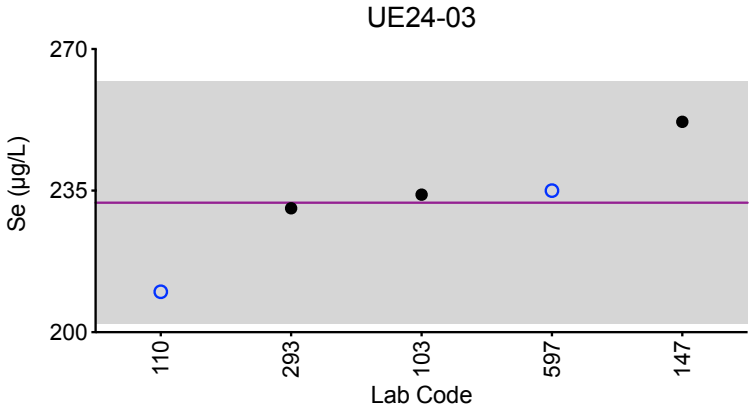
NEW YORK STATE | Department of Health | Wadsworth Center

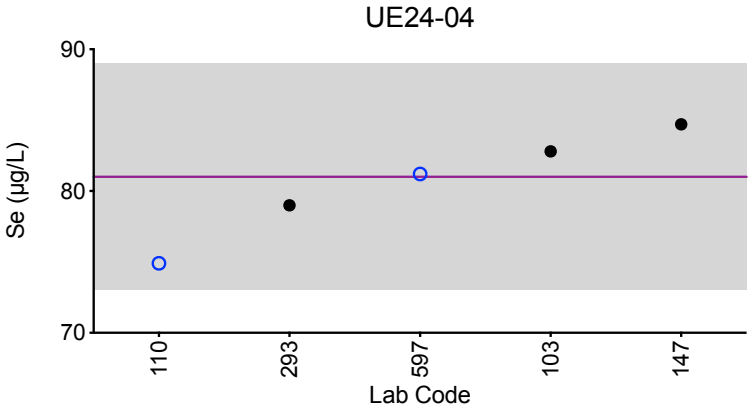
Results for Event #1, 2024: Summary Figures

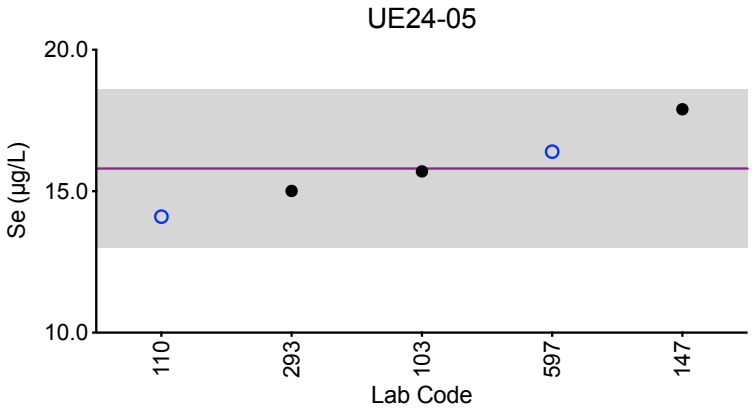
Urine Se











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine Sn (µg/L)

Lab Code	Method	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
107	ICP-MS	5.79	1.82	6.18	2.70	0.74
110	ICP-MS/MS	4.25	1.98	5.14	2.47	0.90
147	ICP-MS	6.60	1.77	6.63	3.01	0.610
220	ICP-MS	6.44	2.42	6.77	3.38	1.57
264	ICP-MS	*0.30	1.27	4.37	2.25	0.83
324	ICP-MS	5.704	1.700	6.014	<1	*2.656
399	ICP-MS/MS	7.60	1.68	7.58	3.30	0.584
597	ICP-MS/MS	4.71	1.53	5.19	2.17	0.58
605	ICP-MS	7.60	1.56	7.27	2.98	<0.900

Summary Statistics

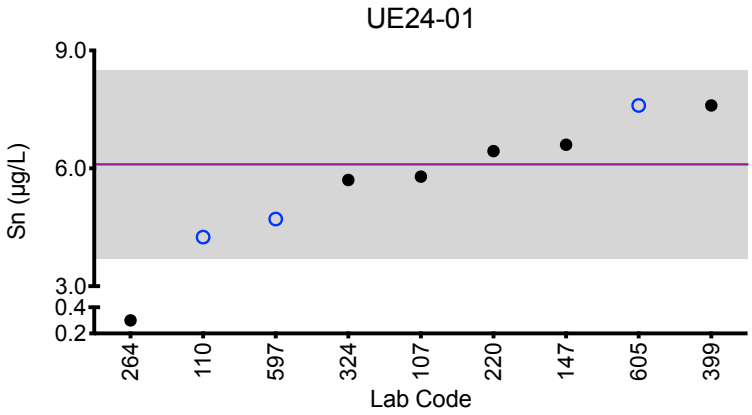
	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
Arithmetic Mean ($\bar{x}$)	6.1	1.7	6.1	2.8	0.8
Arithmetic SD (s)	1.2	0.3	1.1	0.5	0.3
Arithmetic RSD (%)	20	18	17	17	42
Number of Sample Measurements (N)	8	9	9	8	7

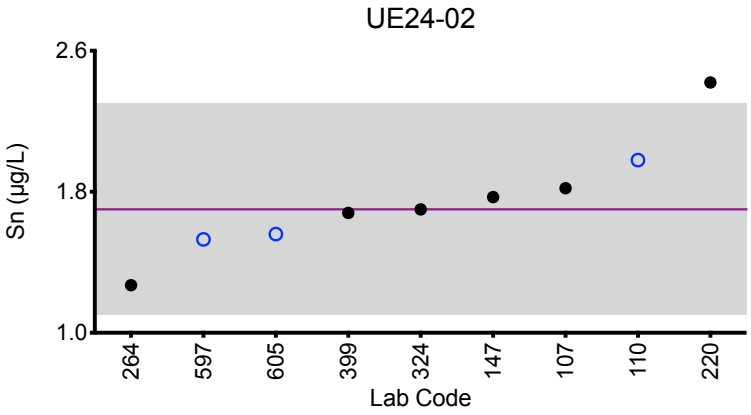
*Denotes a statistical Outlier.

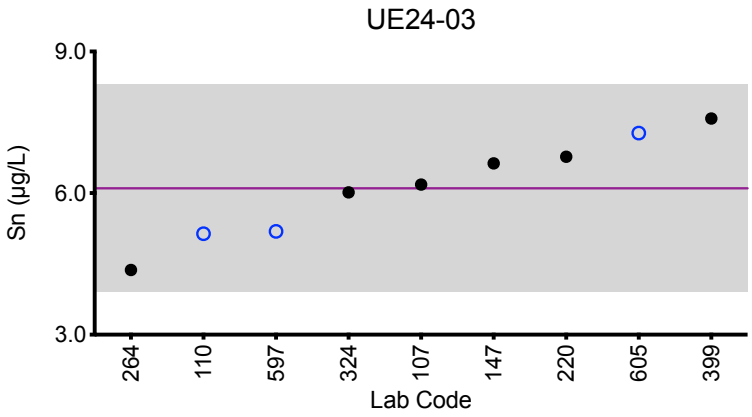
NEW YORK STATE | Department of Health | Wadsworth Center

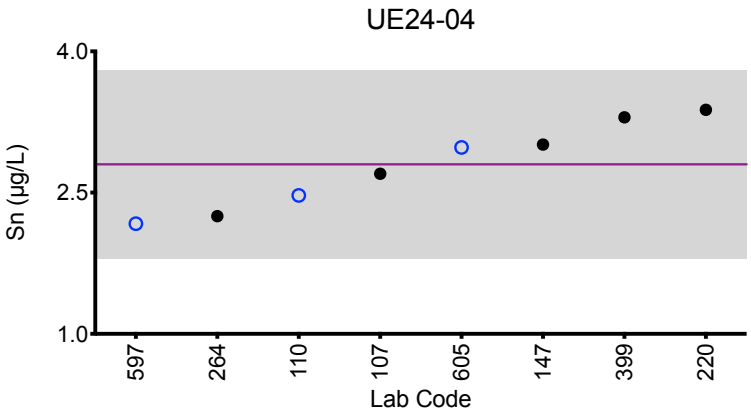
Results for Event #1, 2024: Summary Figures

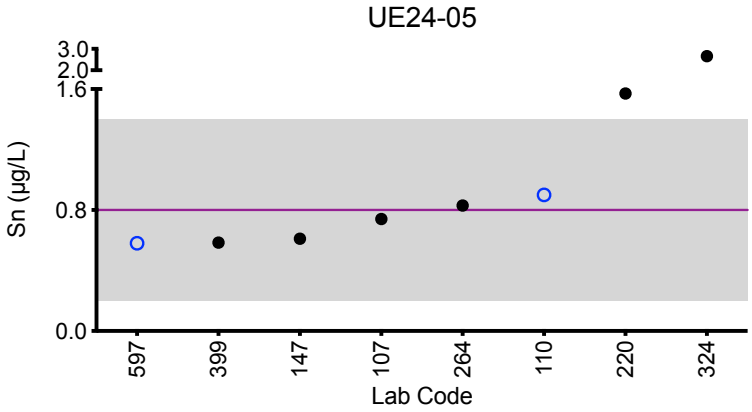
Urine Sn











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

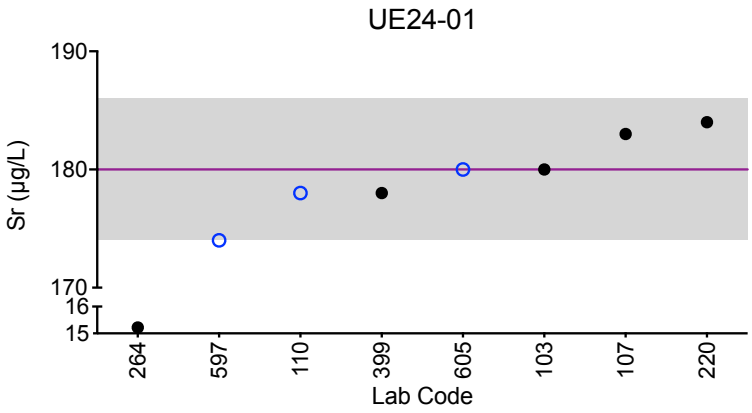
Urine Sr (µg/L)						
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
103	ICP-MS/MS	180	88.3	212	149	29.1
107	ICP-MS	183	85.4	207	142	27.2
110	ICP-MS/MS	178	82.8	209	147	27.3
220	ICP-MS	184	89.4	210	148	29.5
264	ICP-MS	*15.22	82.67	195.11	138.14	27.19
399	DRC/CC-ICP-MS	178	83.1	203	145	27.0
597	ICP-MS/MS	174	85.1	203	141	27.7
605	ICP-MS	180	87.2	206	146	27.7
Summary Statistics						
		UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Arithmetic Mean ($\bar{x}$)		180	85.5	206	145	27.8
Arithmetic SD (s)		3	2.6	5	4	0.9
Arithmetic RSD (%)		1.9	2.6	2.4	2.6	3.2
Number of Sample Measurements (N)		7	8	8	8	8

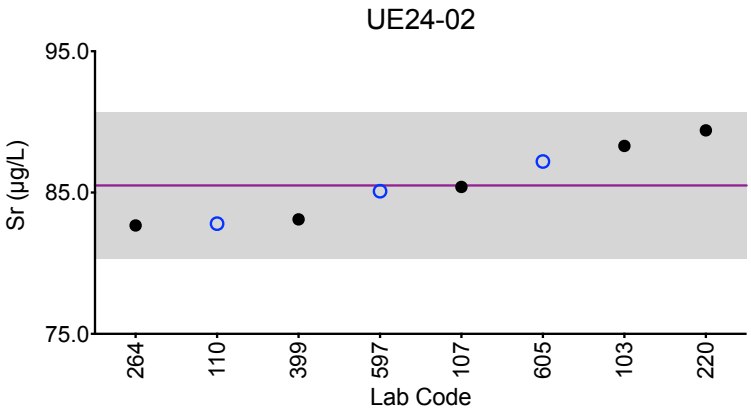
*Denotes a statistical Outlier.

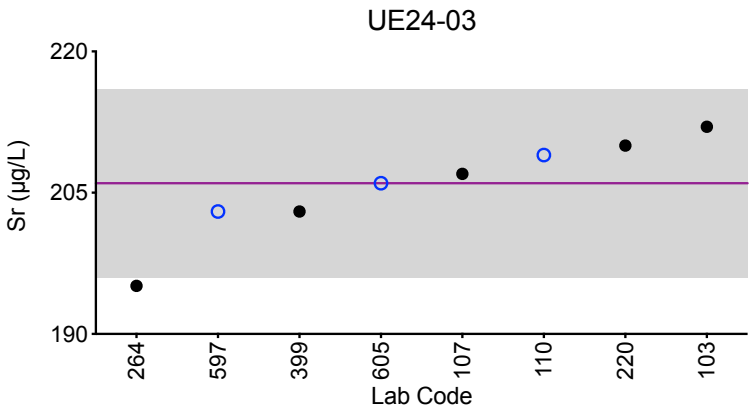
NEW YORK STATE | Department of Health | Wadsworth Center

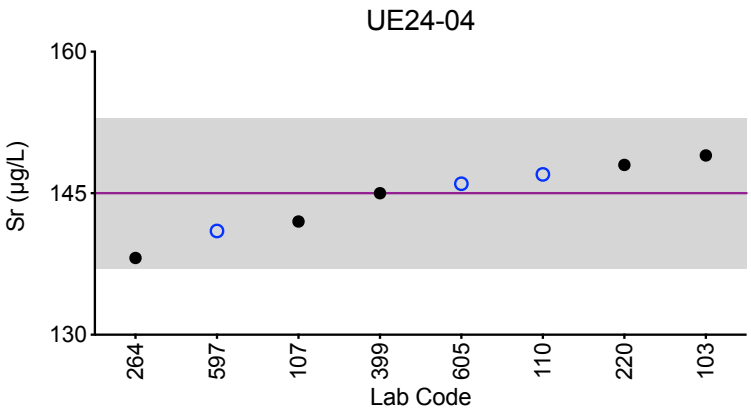
Results for Event #1, 2024: Summary Figures

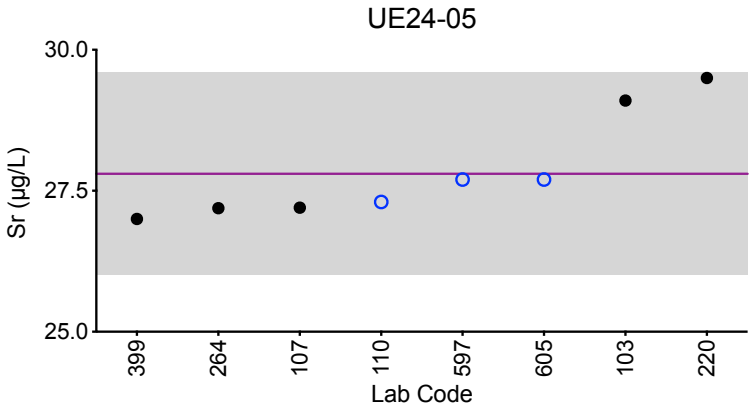
Urine Sr











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine V (µg/L)

Lab Code	Method	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
110	ICP-MS/MS	0.84	2.30	0.31	4.85	1.19
116	ICP-MS/MS	0.898	2.34	0.324	4.87	1.24
147	DRC/CC-ICP-MS	0.831	2.20	0.289	4.78	1.18
293	DRC/CC-ICP-MS	1.02	2.47	*0.4	5.01	1.25
597	ICP-MS/MS	0.824	2.23	0.314	4.78	1.14
605	ICP-MS	0.876	2.33	0.330	4.84	1.20

Summary Statistics

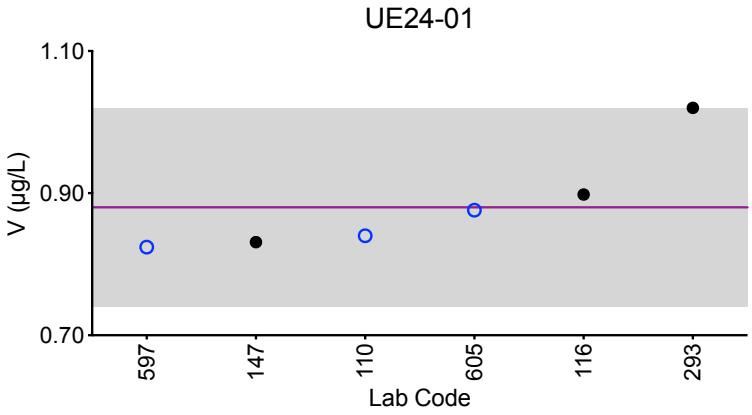
	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
Arithmetic Mean ($\bar{x}$)	0.88	2.31	0.313	4.86	1.20
Arithmetic SD (s)	0.07	0.10	0.016	0.08	0.04
Arithmetic RSD (%)	8.3	4.3	5.1	1.6	3.3
Number of Sample Measurements (N)	6	6	5	6	6

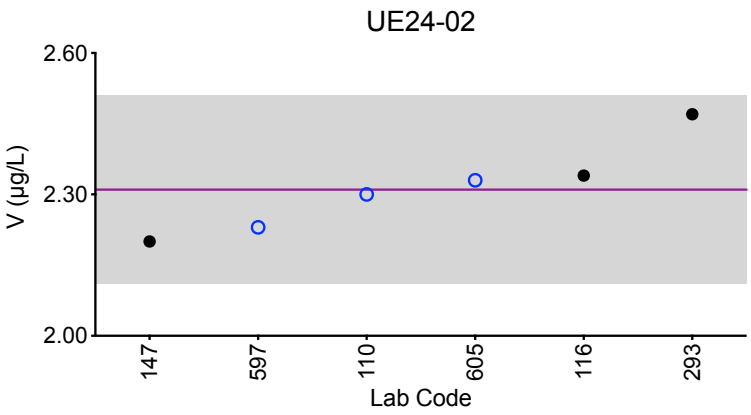
*Denotes a statistical Outlier.

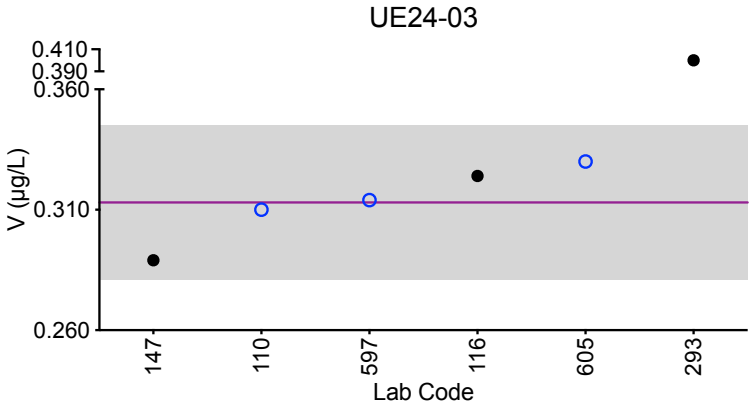
NEW YORK STATE | Department of Health | Wadsworth Center

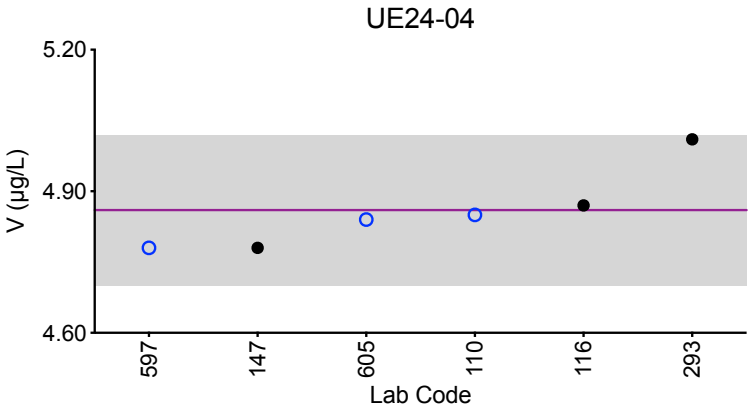
Results for Event #1, 2024: Summary Figures

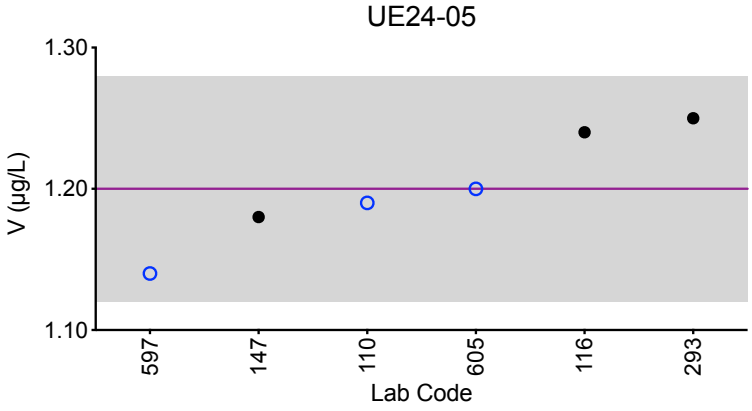
Urine V











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine W (µg/L)

Lab Code	Method	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
107	ICP-MS	0.480	1.21	2.28	0.264	0.750
110	ICP-MS/MS	0.479	1.24	2.24	<0.29	0.769
147	ICP-MS	0.476	1.19	2.25	0.267	0.756
200	ICP-MS	*0.66	1.56	2.68	0.28	0.66
220	ICP-MS	0.47	1.23	2.35	0.28	0.77
264	ICP-MS	<0.01	1.06	2.32	<0.01	0.46
324	ICP-MS	<1	1.198	2.276	<1	<1
399	ICP-MS/MS	0.485	1.26	2.34	0.288	0.789
597	ICP-MS/MS	0.506	1.25	2.43	0.296	0.766
605	ICP-MS	0.477	1.22	2.29	0.261	0.768
606	ICP-MS/MS	0.514	1.23	2.28	0.296	0.763

Summary Statistics

	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
Robust Mean (x*)	0.49	1.23	2.31	0.28	0.762
Robust SD (s*)	0.02	0.03	0.06	0.01	0.012
Robust RSD (%)	3.2	2.7	2.6	5.0	1.6
Number of Sample Measurements (N)	8	11	11	8	10
Standard Uncertainty (*u*)	NA	0.01	0.02	NA	0.005

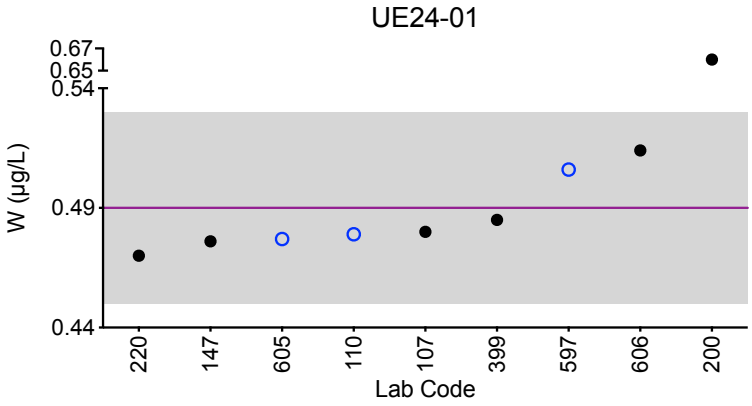
*Denotes a statistical Outlier.

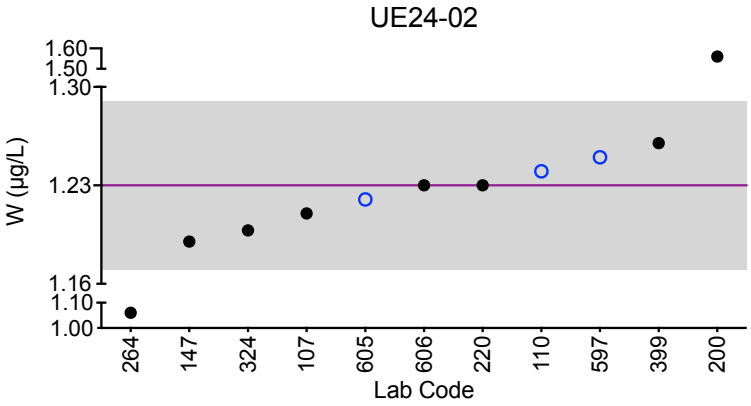
An arithmetic mean, SD, RSD and n are provided for sample UE24-01 and UE24-04.

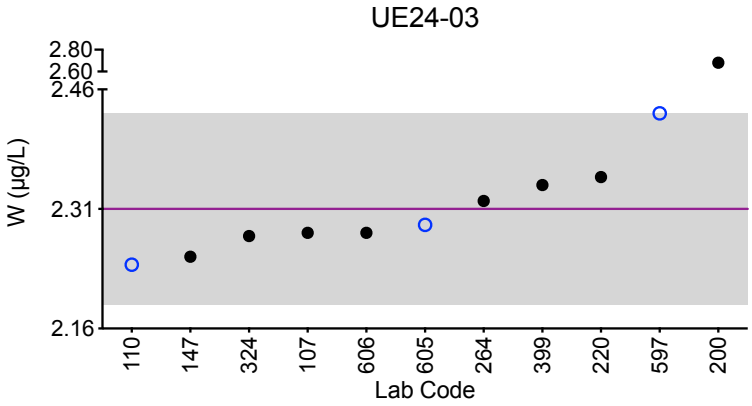
NEW YORK STATE | Department of Health | Wadsworth Center

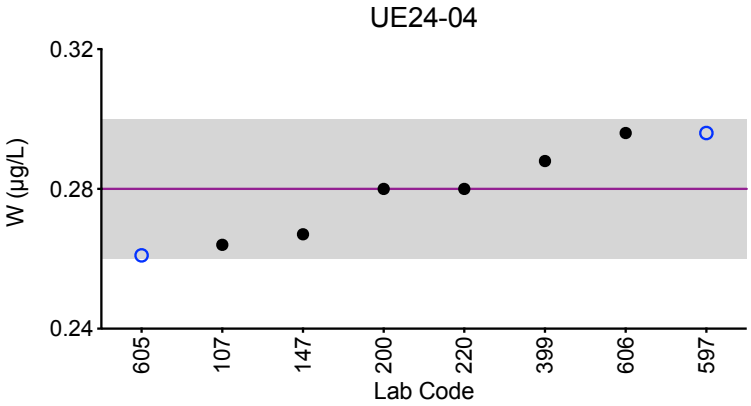
Results for Event #1, 2024: Summary Figures

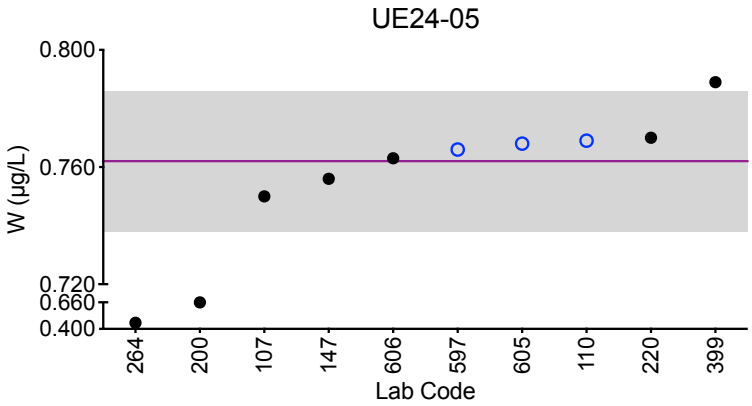
Urine W











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = robust mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine Zn (µg/L)

Lab Code	Method	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
110	ICP-MS/MS	420	217	647	107	413
147	ICP-MS	427	224	684	105	428
264	ICP-MS	*41.35	269.83	*800.33	134.14	510.12
293	DRC/CC-ICP-MS	429.41	226.8	666.01	123.53	434.64
324	ICP-MS	458.419	236.615	687.431	*445.625	*123.877
597	ICP-MS/MS	453	239	695	119	441

Summary Statistics

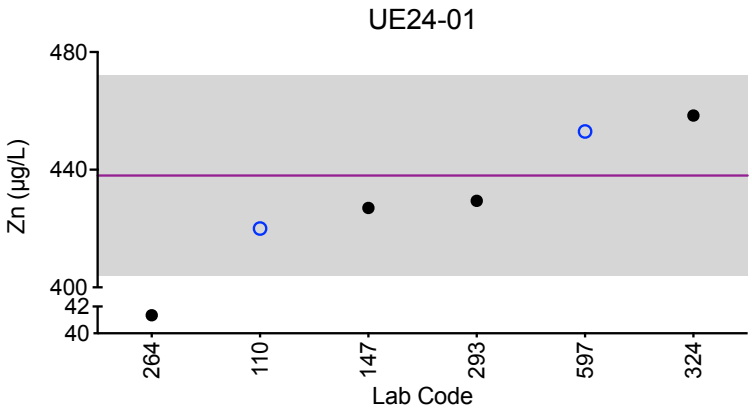
	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
Arithmetic Mean ($\bar{x}$)	438	236	676	118	450
Arithmetic SD (s)	17	19	19	12	40
Arithmetic RSD (%)	3.9	8.1	2.8	10	8.9
Number of Sample Measurements (N)	5	6	5	5	5

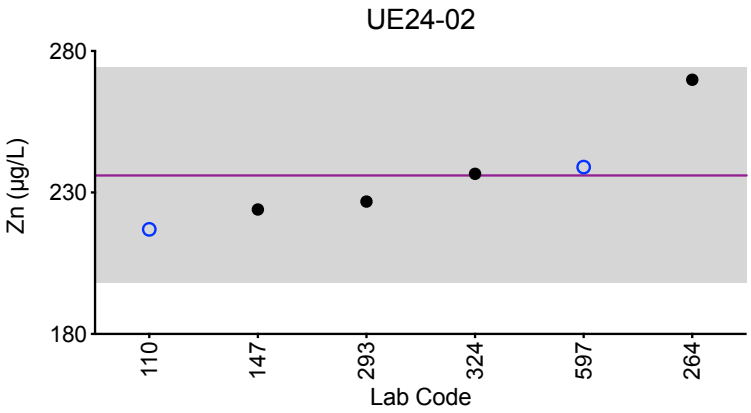
*Denotes a statistical Outlier.

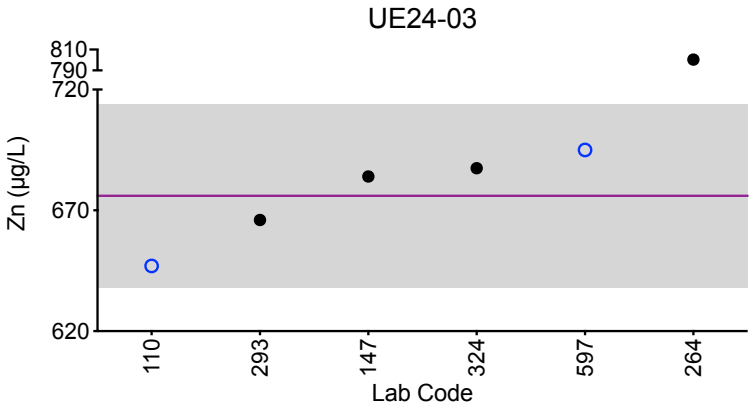
NEW YORK STATE | Department of Health | Wadsworth Center

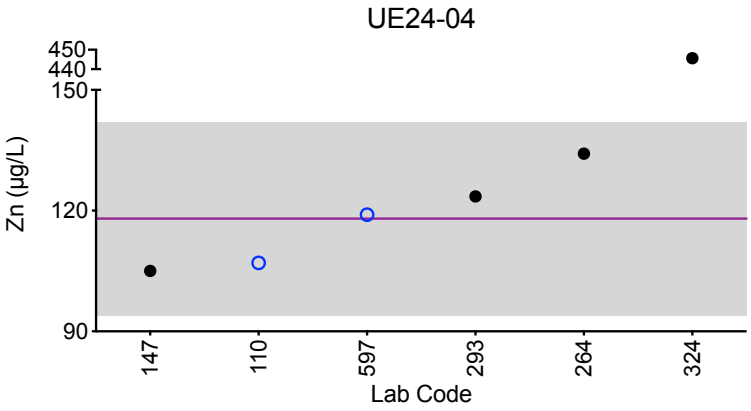
Results for Event #1, 2024: Summary Figures

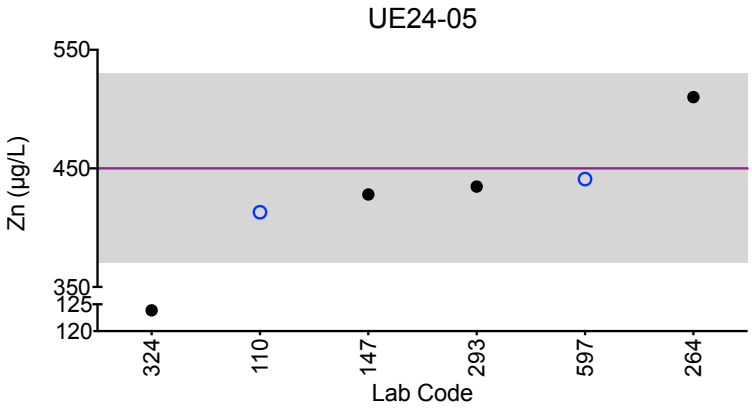
Urine Zn











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine I (µg/L)

Lab Code	Method	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
110	ICP-MS	373	255	175	54.2	53.2
147	ICP-MS	347	234	169	46.8	48.8
597	ICP-MS/MS	369	251	170	50.7	52.0

Summary Statistics

	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
Arithmetic Mean ($\bar{x}$)	363	247	171	51	51.3
Arithmetic SD (s)	14	11	3	4	2.3
Arithmetic RSD (%)	3.9	4.5	1.8	7.8	4.5
Number of Sample Measurements (N)	3	3	3	3	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine Li (µg/L)

Lab Code	Method	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
110	ICP-MS/MS	18.9	11.2	10.2	16.5	15.9
147	ICP-MS	20.6	11.1	11.1	18.0	18.1
597	ICP-MS/MS	20.9	11.5	10.3	16.2	16.4

Summary Statistics

	UE24-01	UE24-02	UE24-03	UE24-04	UE24-05
Arithmetic Mean ($\bar{x}$)	20.1	11.3	10.5	16.9	16.8
Arithmetic SD (s)	1.1	0.2	0.5	1.0	1.2
Arithmetic RSD (%)	5.5	1.9	4.8	5.9	7.1
Number of Sample Measurements (N)	3	3	3	3	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine Te (µg/L)						
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
110	ICP-MS/MS	0.173	1.21	0.588	0.648	2.76
147	ICP-MS	0.174	1.22	0.590	0.614	2.71
Summary Statistics						
		UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Arithmetic Mean ($\bar{x}$)		0.1735	1.215	0.589	0.63	2.73
Arithmetic SD (s)		0.0007	0.007	0.001	0.02	0.04
Arithmetic RSD (%)		0.41	0.58	0.24	3.2	1.5
Number of Sample Measurements (N)		2	2	2	2	2

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Urine Ti (µg/L)						
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
442	ICP-MS/MS	1.14	1.92	2.33	5.14	3.11
597	ICP-MS/MS	4.64	3.67	3.68	5.91	4.09
Summary Statistics						
		UE24-01	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
Arithmetic Mean ($\bar{x}$)		NA	NA	3.0	5.5	3.6
Arithmetic SD (s)		NA	NA	1.0	0.5	0.7
Arithmetic RSD (%)		NA	NA	33	9.1	19
Number of Sample Measurements (N)		NA	NA	2	2	2

*Denotes a statistical Outlier.

Statistical data was not calculated for UE24-01 and UE24-02 based on a lack of consensus among participating labs.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Additional Elements in Urine

Urine Ag (µg/L)						
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
147	ICP-MS	<0.151	<0.151	<0.151	<0.151	<0.151

Urine Bi (µg/L)						
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
147	ICP-MS	<0.0794	<0.0794	<0.0794	<0.0794	<0.0794
264	ICP-MS	<0.01	<0.01	<0.01	<0.01	<0.01
597	ICP-MS/MS	<0.0210	<0.0210	<0.0210	<0.0210	<0.0210

Urine Fe (µg/L)						
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
324	ICP-MS	28.277	10.069	10.789	4.450	3.141

Urine Mg (µg/L)						
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
597	ICP-MS/MS	66100	45500	32900	37100	37300

Urine Th (µg/L)						
Lab Code	**Method**	**UE24-01**	**UE24-02**	**UE24-03**	**UE24-04**	**UE24-05**
147	ICP-MS	<0.102	<0.102	<0.102	<0.102	<0.102
597	ICP-MS/MS	0.0089	<0.00744	<0.00744	<0.00744	<0.00744

NEW YORK STATE | Department of Health | Wadsworth Center

Event #1, 2024

Trace Elements in Serum

Wadsworth Center
NEW YORK STATE DEPARTMENT OF HEALTH
Trace Elements Laboratory

NEW YORK STATE | Department of Health | Wadsworth Center

Event #1, 2024:
Trace Elements in Serum

PT Materials

Test materials were prepared from human serum obtained from Zen-Bio, Inc. The company certifies that these materials were tested by FDA approved methods and found to be negative for HIV 1Ž2 and HIV-1 RNA, and non-reactive to HBsAg, HCV3 and STS. Units of serum were filtered into polypropylene containers through cheesecloth to remove particulates and supplemented with aluminum (Al), cobalt (Co), chromium (Cr), copper (Cu), selenium (Se), zinc, (Zn), arsenic (As), beryllium (Be), cadmium (Cd), mercury (Hg), manganese (Mn), molybdenum (Mo), nickel (Ni), lead (Pb), platinum (Pt), antimony (Sb), tin (Sn), strontium (Sr), titanium (Ti), thallium (Tl), uranium (U), vanadium (V) and tungsten (W). PT samples were stored at -80°C until the week of the PT event, when they were thawed at 4°C prior to circulation to laboratories for analysis.

Graded Elements

Six elements in serum are formally graded: Al, Co, Cr, Cu, Se, and Zn. Target values for the graded elements are assigned to these pools based on (a) the robust mean calculated from data reported by all laboratories, or (b) if a robust mean is not possible, the arithmetic mean after outlier deletion.

Additional Elements

An additional 26 were reported by at least one participant: As, Ba, Be, Bi, Cd, Cs, Fe, Hg, I, Li, Mg, Mn, Mo, Ni, Pb, Pt, Sb, Sn, Sr, Te, Th, Ti, Tl, U, V, and W. These data are included here to provide a more complete characterization of the PT materials. All results reported by participant laboratories are tabulated and organized by lab code. The PT data are graphed for visual comparison purposes for all elements where at least five laboratories reported a value greater than the LOD. A statistical summary table is provided for samples where at least two comparable values were reported as above the LOD.

The summary statistics for the additional elements are provided for educational purposes only, i.e., no acceptable response is implied. However, it is expected that each laboratory would wish to investigate a potential source of bias if warranted by these data. Future events might result in additional elements becoming graded if a consensus can be reached regarding desired quality specifications.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

	Serum Al (µg/L)				
	SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Target (Arithmetic Mean ($\bar{x}$))	22	75	127	44.0	40
Upper Limit	27	90	152	52.8	48
Lower Limit	17	60	102	35.2	32
Arithmetic SD (s)	4	5	8	3.1	8
Arithmetic RSD (%)	18	6.7	6.3	7.1	19
Number of Sample Measurements (N)	6	6	6	6	6

The acceptable range is based on quality specifications:
±5 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±5 µg/L at concentrations less than or equal to 25 µg/L. These quality specifications were established by New York State Department of Health's Wadsworth Center, the PT Program organizer.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

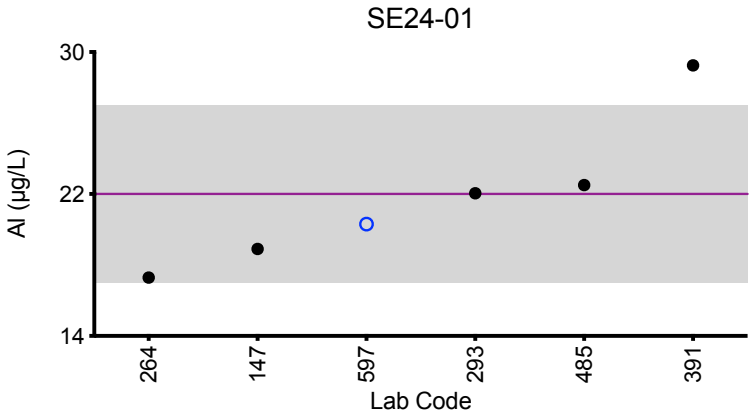
		Serum Al (µg/L)				
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
	Target	**22**	**75**	**127**	**44.0**	**40**
147	ICP-MS	18.9	74.7	118	42.2	37.2
264	ICP-MS	17.29	68.98	119.37	41.69	32.69
293	DRC/CC-ICP-MS	22.04	79.57	133.87	46.24	52.15 ↑
391	ETAAS-Z	29.25 ↑	78.1	134	48.95	45.44
485	HR-ICP-MS	22.50	79.2	135	44.5	39.2
597	ICP-MS/MS	20.3	68.2	120	40.7	33.5

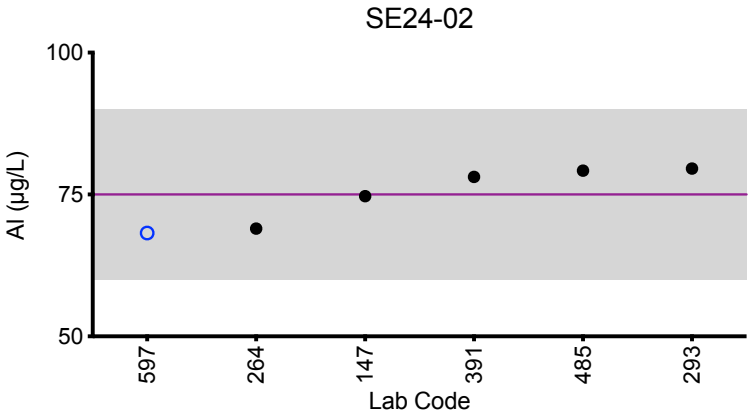
Based on the grading criteria for Al in Serum, 93% of results were satisfactory, with 0 of the 6 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

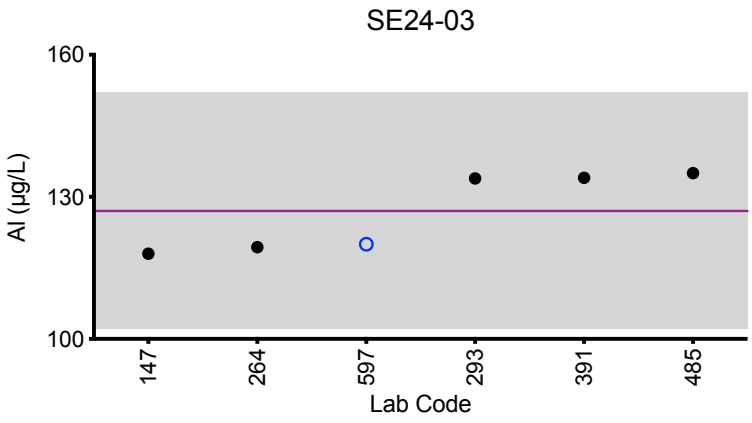
NEW YORK STATE | Department of Health | Wadsworth Center

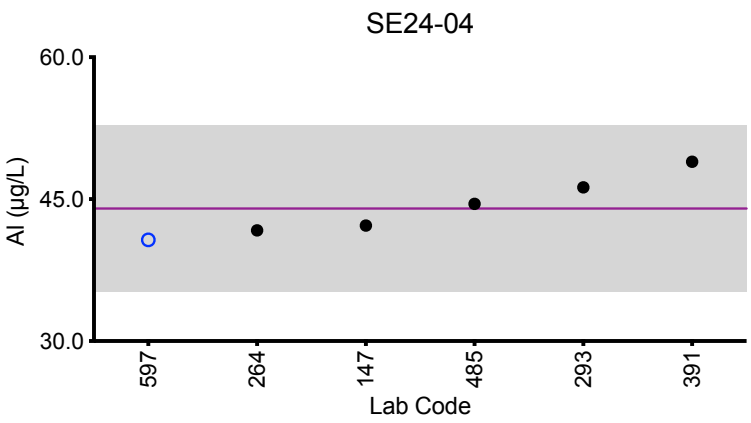
Results for Event #1, 2024: Summary Figures

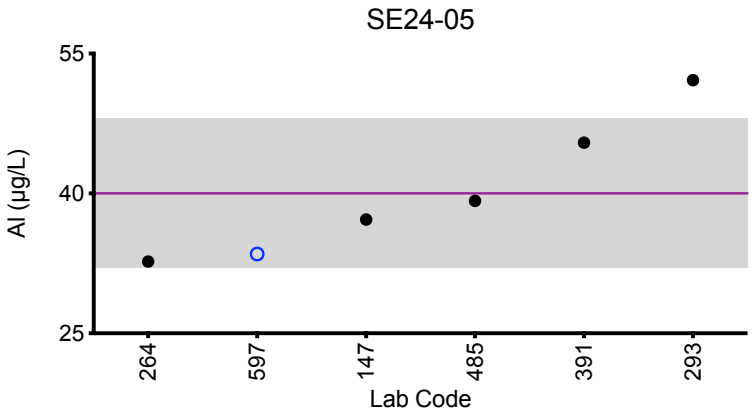
Serum Al











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the arithmetic mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±5 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±5 µg/L at concentrations less than or equal to 25 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

	Serum Co (µg/L)				
	SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Target (Arithmetic Mean ($\bar{x}$))	4.19	0.90	2.98	4.79	0.59
Upper Limit	5.69	2.40	4.48	6.29	2.09
Lower Limit	2.69	0.00	1.48	3.29	0.00
Arithmetic SD (s)	0.17	0.05	0.10	0.20	0.03
Arithmetic RSD (%)	4.1	5.6	3.4	4.2	5.5
Number of Sample Measurements (N)	7	7	7	7	7

The acceptable range is based on quality specifications:
±1.5 µg/L or ±15% around the target value, whichever is greater; thus, it is fixed at ±1.5 µg/L at concentrations less than or equal to 10 µg/L. These quality specifications were established based on discussions with the US FDA, and represent a consensus from a network of Trace Element PT program organizers

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

Serum Co (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
	Target	**4.19**	**0.90**	**2.98**	**4.79**	**0.59**
103	ICP-MS/MS	4.29	0.890	3.00	4.73	0.604
110	ICP-MS/MS	4.32	0.90	3.02	4.80	0.58
147	DRC/CC-ICP-MS	3.89	0.816	2.84	4.60	0.542
264	ICP-MS	4.39	0.91	2.90	4.57	0.65
293	DRC/CC-ICP-MS	4.2	0.91	3.02	4.88	0.58
485	HR-ICP-MS	4.08	0.973	3.15	5.17	0.607
597	ICP-MS/MS	4.19	0.933	2.96	4.77	0.601

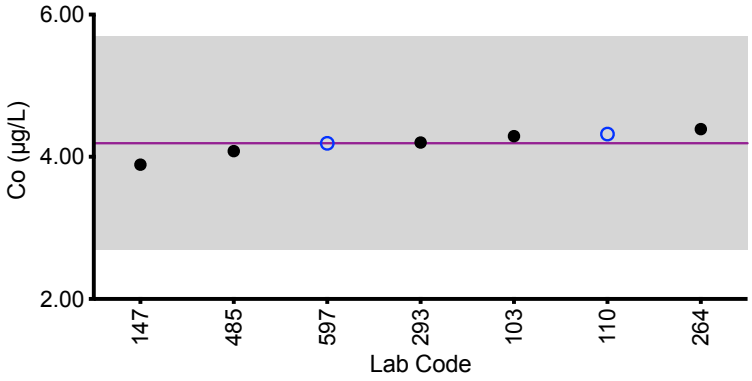
Based on the grading criteria for Co in Serum, 100% of results were satisfactory, with 0 of the 7 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

NEW YORK STATE | Department of Health | Wadsworth Center

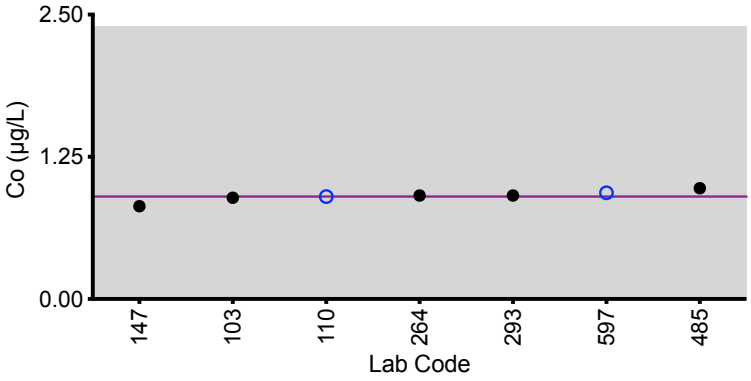
Results for Event #1, 2024: Summary Figures

Serum Co

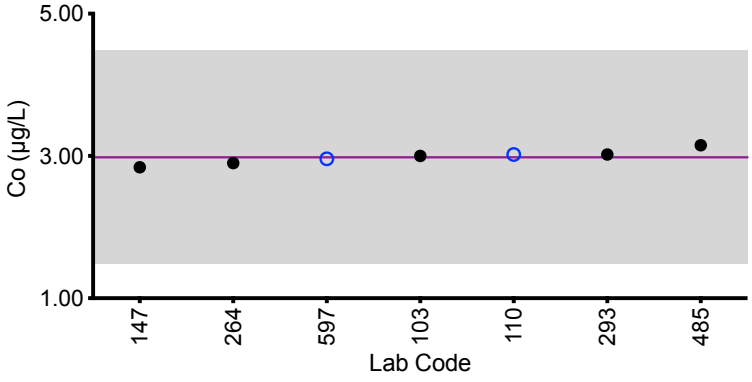
SE24-01



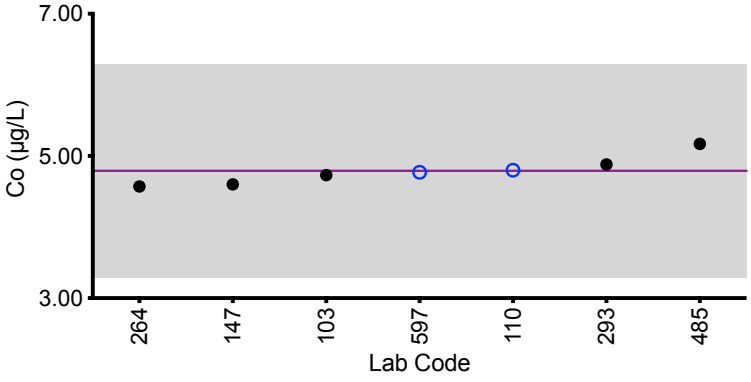
SE24-02



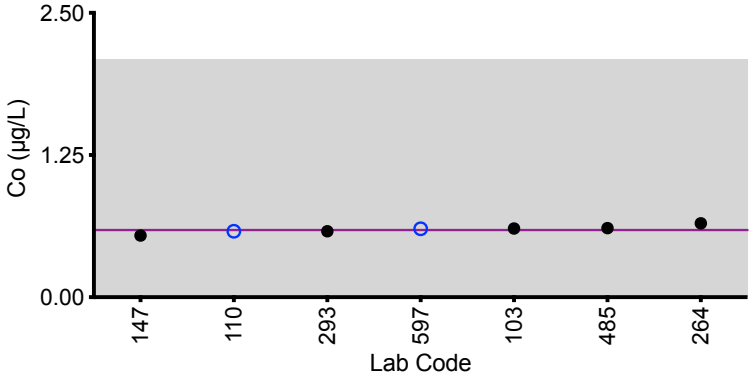
SE24-03



SE24-04



SE24-05



Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the arithmetic mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±1.5 µg/L or ±15% around the target value, whichever is greater; thus, it is fixed at ±1.5 µg/L at concentrations less than or equal to 10 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Summary Statistics

	Serum Cr (µg/L)				
	SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Target (Arithmetic Mean ($\bar{x}$))	1.22	0.30	3.41	4.21	0.20
Upper Limit	3.22	2.30	5.41	6.21	2.20
Lower Limit	0.00	0.00	1.41	2.21	0.00
Arithmetic SD (s)	0.09	0.07	0.29	0.35	0.05
Arithmetic RSD (%)	7.4	23	8.5	8.3	25
Number of Sample Measurements (N)	6	5	7	7	5

The acceptable range is based on quality specifications:
±2 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±2 µg/L at concentrations less than or equal to 10 µg/L. These quality specifications were established based on discussions with the US FDA, and represent a consensus from a network of Trace Element PT program organizers

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

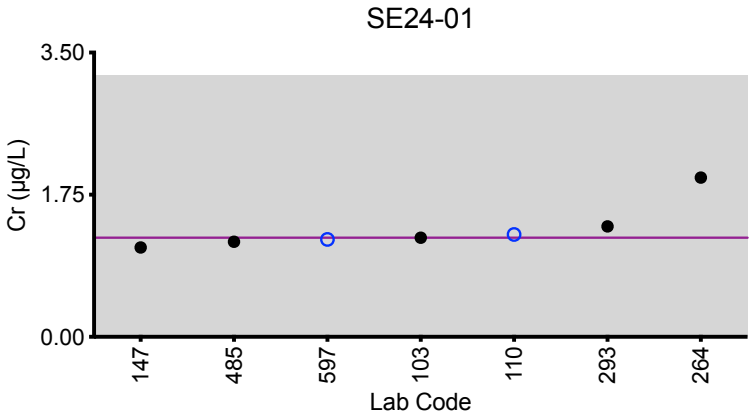
		Serum Cr (µg/L)				
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
	Target	**1.22**	**0.30**	**3.41**	**4.21**	**0.20**
103	ICP-MS/MS	1.22	<0.300	3.35	4.05	<0.300
110	ICP-MS/MS	1.26	0.376	3.44	4.16	0.201
147	DRC/CC-ICP-MS	1.10	0.204	3.07	3.89	0.137
264	ICP-MS	*1.96	*0.75	4.00	4.91	*0.58
293	DRC/CC-ICP-MS	1.36	0.36	3.43	4.34	0.28
485	HR-ICP-MS	1.17	0.274	3.39	4.21	0.168
597	ICP-MS/MS	1.20	0.272	3.19	3.90	0.190

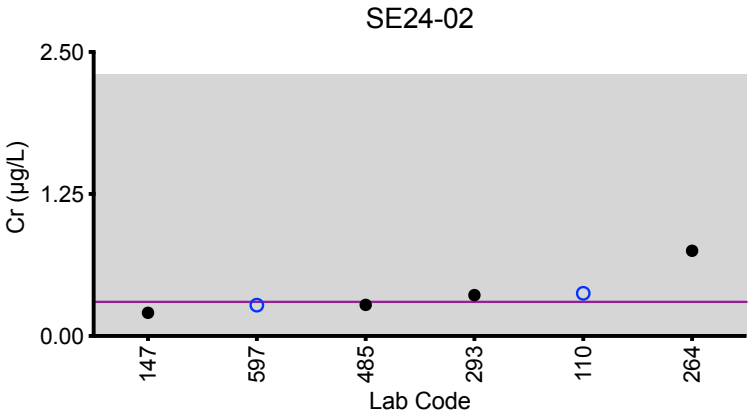
Based on the grading criteria for Cr in Serum, 100% of results were satisfactory, with 0 of the 7 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

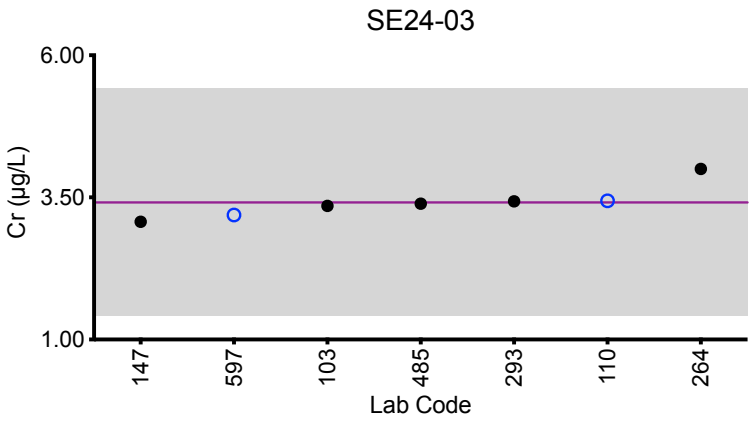
NEW YORK STATE | Department of Health | Wadsworth Center

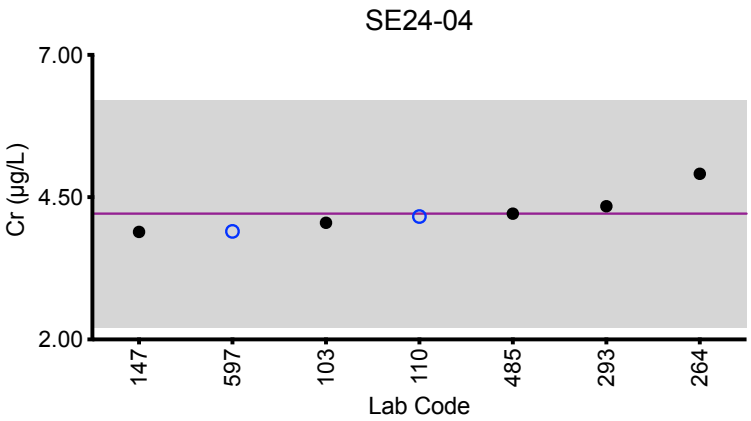
Results for Event #1, 2024: Summary Figures

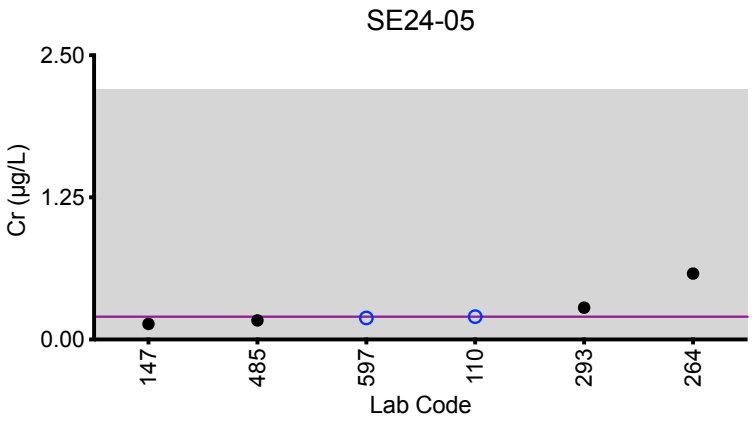
Serum Cr











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the arithmetic mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±2 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±2 µg/L at concentrations less than or equal to 10 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Summary Statistics

Serum Cu (µg/L)					
	SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Target (Arithmetic Mean ($\bar{x}$))	860	1500	1440	1220	724
Upper Limit	990	1730	1660	1400	833
Lower Limit	730	1280	1220	1040	615
Arithmetic SD (s)	40	50	80	60	27
Arithmetic RSD (%)	4.7	3.3	5.6	4.9	3.7
Number of Sample Measurements (N)	7	7	7	7	7

The acceptable range is based on quality specifications:
±95 µg/L or ±15% around the target value, whichever is greater; thus, it is fixed at ±95 µg/L at concentrations less than or equal to 635 µg/L. These quality specifications were established by New York State Department of Health's Wadsworth Center, the PT Program organizer.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

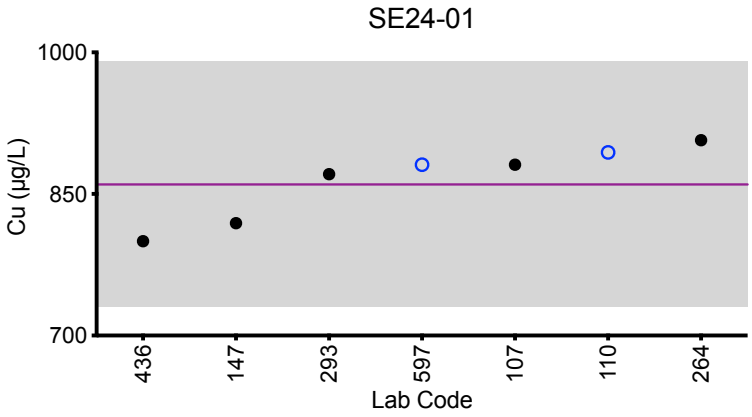
Serum Cu (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
	Target	**860**	**1500**	**1440**	**1220**	**724**
107	DRC/CC-ICP-MS	881	1590	1530	1310	756
110	ICP-MS/MS	894	1540	1500	1240	735
147	DRC/CC-ICP-MS	819	1438	1423	1189	707
264	ICP-MS	907	1503	1471	1246	745
293	DRC/CC-ICP-MS	871	1449	1430	1189	718
436	FAAS	800	1493	1270	1111	675
597	ICP-MS/MS	881	1470	1440	1220	735

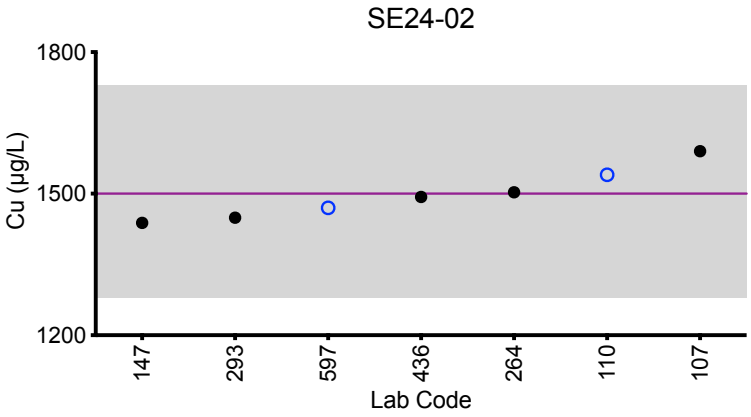
Based on the grading criteria for Cu in Serum, 100% of results were satisfactory, with 0 of the 7 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

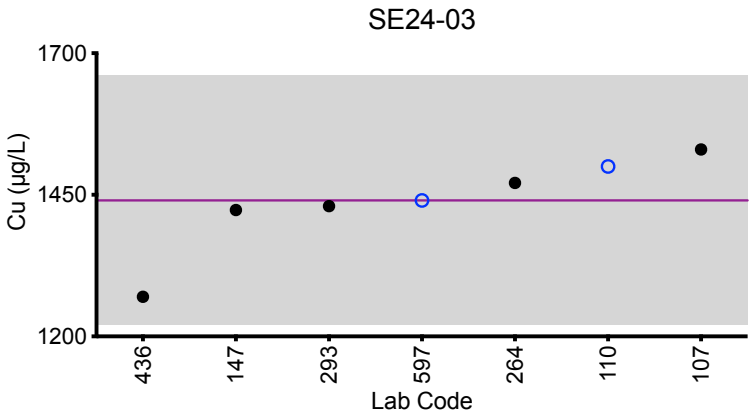
NEW YORK STATE | Department of Health | Wadsworth Center

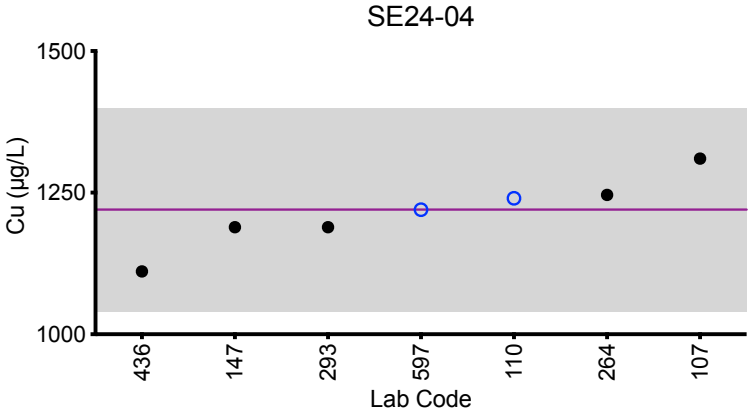
Results for Event #1, 2024: Summary Figures

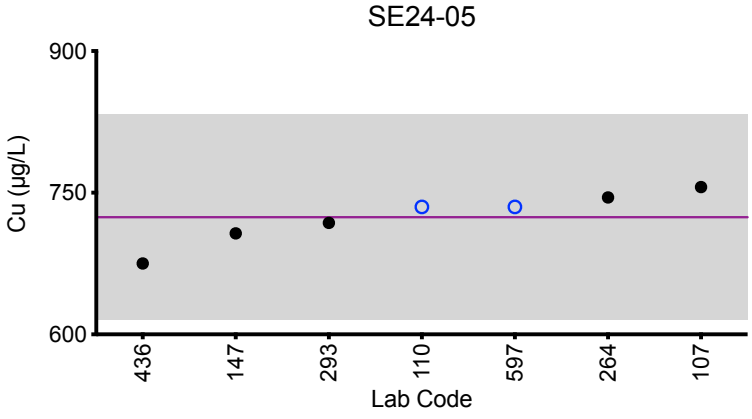
Serum Cu











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the arithmetic mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±95 µg/L or ±15% around the target value, whichever is greater; thus, it is fixed at ±95 µg/L at concentrations less than or equal to 635 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Summary Statistics

Serum Se (µg/L)					
	SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Target (Arithmetic Mean ($\bar{x}$))	131	114	256	153	265
Upper Limit	157	137	307	184	318
Lower Limit	105	91	205	122	212
Arithmetic SD (s)	11	5	11	8	16
Arithmetic RSD (%)	8.4	4.4	4.3	5.2	6.2
Number of Sample Measurements (N)	8	7	8	8	8

The acceptable range is based on quality specifications:
±2 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±2 µg/L at concentrations less than or equal to 10 µg/L. These quality specifications were established by New York State Department of Health's Wadsworth Center, the PT Program organizer.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

		Serum Se (µg/L)				
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
	Target	**131**	**114**	**256**	**153**	**265**
103	ICP-MS/MS	138	116	260	162	267
107	DRC/CC-ICP-MS	129	112	252	157	255
110	ICP-MS/MS	134	111	248	150	253
147	DRC/CC-ICP-MS	123	106	237	145	241
264	ICP-MS	141.94	118.70	259.03	156.45	271.89
293	DRC/CC-ICP-MS	141	120	267	160	280
436	ETAAS-Other	110	*90 ↓	271	138	292
597	ICP-MS/MS	134	112	250	154	259

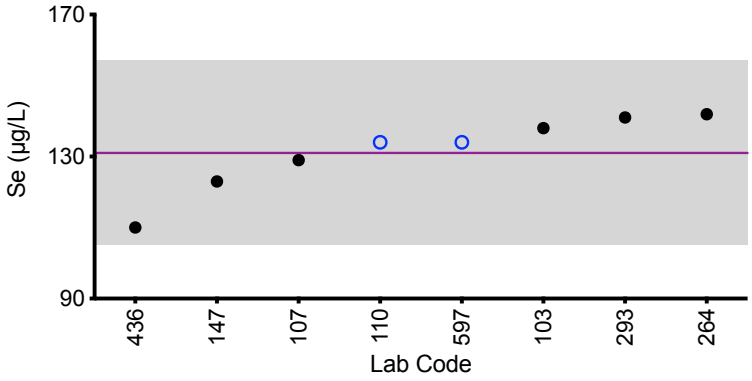
Based on the grading criteria for Se in Serum, 98% of results were satisfactory, with 0 of the 8 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

NEW YORK STATE | Department of Health | Wadsworth Center

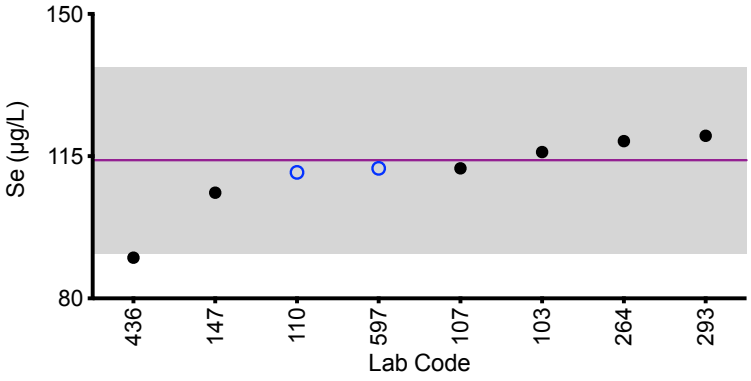
Results for Event #1, 2024: Summary Figures

Serum Se

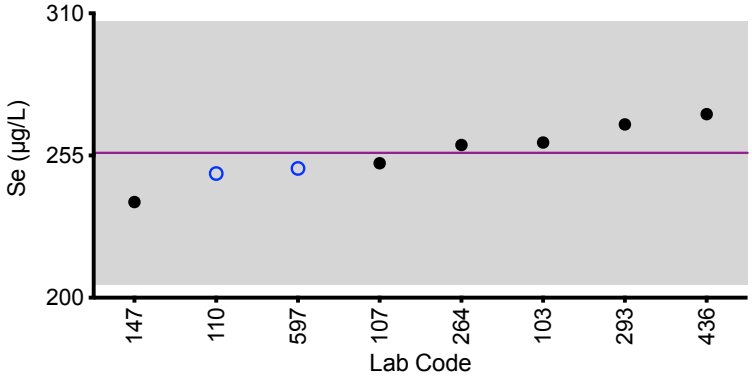
SE24-01



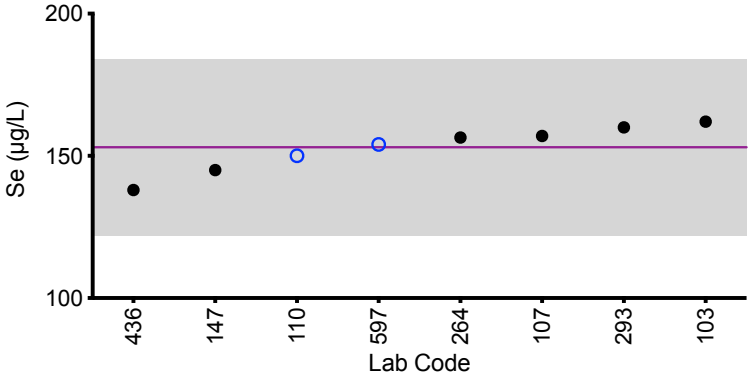
SE24-02



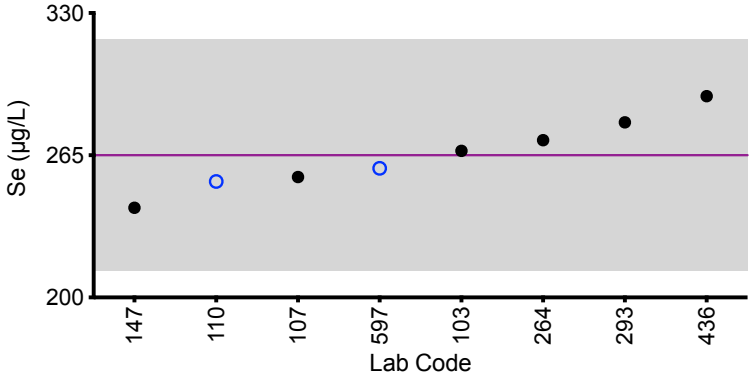
SE24-03



SE24-04



SE24-05



Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the arithmetic mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±2 µg/L or ±20% around the target value, whichever is greater; thus, it is fixed at ±2 µg/L at concentrations less than or equal to 10 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Summary Statistics

Serum Zn (µg/L)					
	SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Target (Arithmetic Mean ($\bar{x}$))	980	1120	1740	785	2590
Upper Limit	1130	1290	2000	903	2980
Lower Limit	830	950	1480	667	2200
Arithmetic SD (s)	40	70	80	20	90
Arithmetic RSD (%)	4.1	6.3	4.6	2.5	3.5
Number of Sample Measurements (N)	6	6	6	5	6

The acceptable range is based on quality specifications:
±15 µg/L or ±15% around the target value, whichever is greater; thus, it is fixed at ±15 µg/L at concentrations less than or equal to 100 µg/L. These quality specifications were established by New York State Department of Health's Wadsworth Center, the PT Program organizer.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Performance of Participating Laboratories

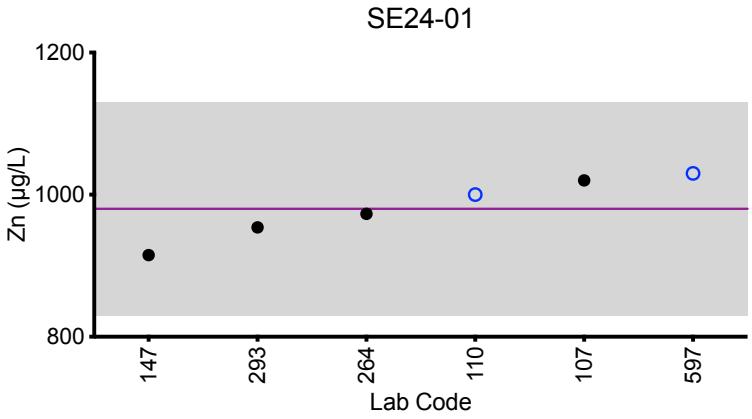
		Serum Zn (µg/L)				
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
	Target	**980**	**1120**	**1740**	**785**	**2590**
107	DRC/CC-ICP-MS	1020	1250	1880	*891	2640
110	ICP-MS/MS	1000	1140	1770	795	2710
147	DRC/CC-ICP-MS	915	1068	1696	771	2500
264	ICP-MS	973	1081	1666	795	2505
293	DRC/CC-ICP-MS	954	1065	1686	758	2556
597	ICP-MS/MS	1030	1130	1740	805	2650

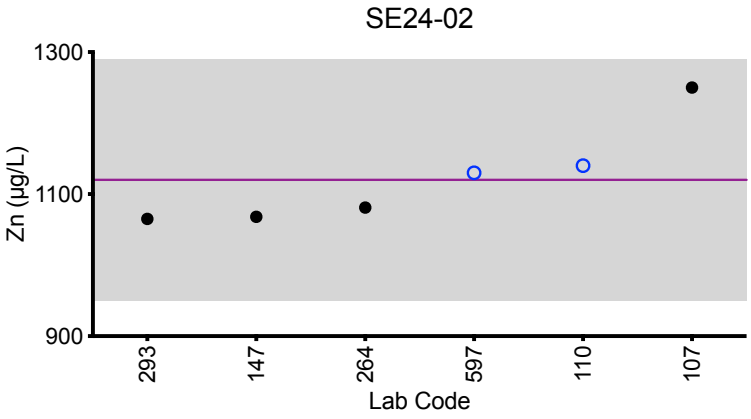
Based on the grading criteria for Zn in Serum, 100% of results were satisfactory, with 0 of the 6 laboratories reporting 2 or more of the 5 results outside of the acceptable ranges.

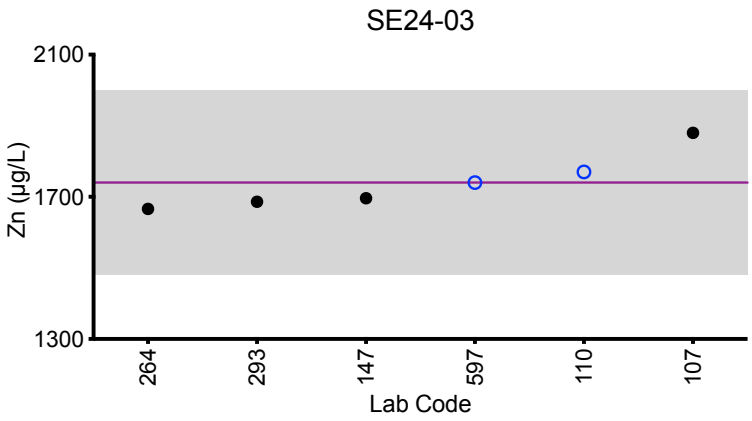
NEW YORK STATE | Department of Health | Wadsworth Center

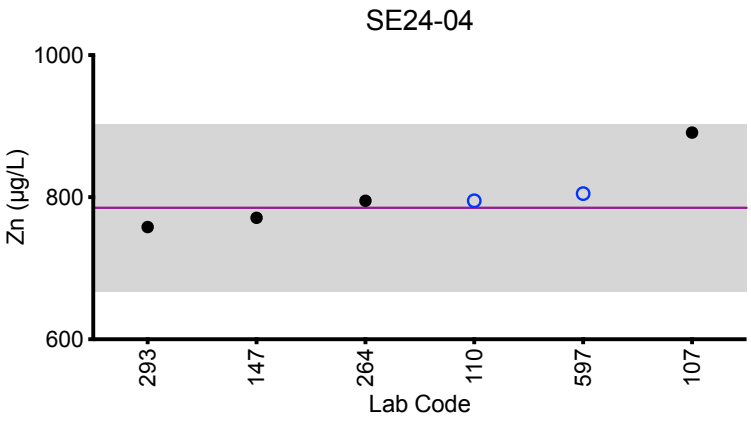
Results for Event #1, 2024: Summary Figures

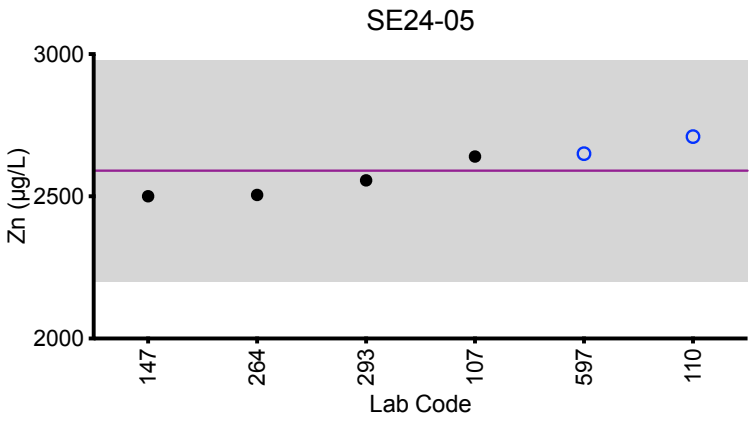
Serum Zn











Legend:

o HHEAR Labs ● Other Labs

Horizontal purple line = assigned target value based on the arithmetic mean of all laboratories.

Gray area = acceptable range based on quality specifications:

±15 µg/L or ±15% around the target value, whichever is greater; thus, it is fixed at ±15 µg/L at concentrations less than or equal to 100 µg/L.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Mn (µg/L)

Lab Code	Method	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
103	ICP-MS/MS	3.65	5.34	10.5	3.06	8.25
110	ICP-MS/MS	3.48	5.24	10.2	3.03	8.10
147	DRC/CC-ICP-MS	3.27	5.13	10.1	2.92	8.03
264	ICP-MS	*4.68	*6.26	*12.41	*4.06	*9.99
293	DRC/CC-ICP-MS	3.410	5.27	10.23	2.94	8.170
597	ICP-MS/MS	3.78	5.55	10.6	3.37	8.58

Summary Statistics

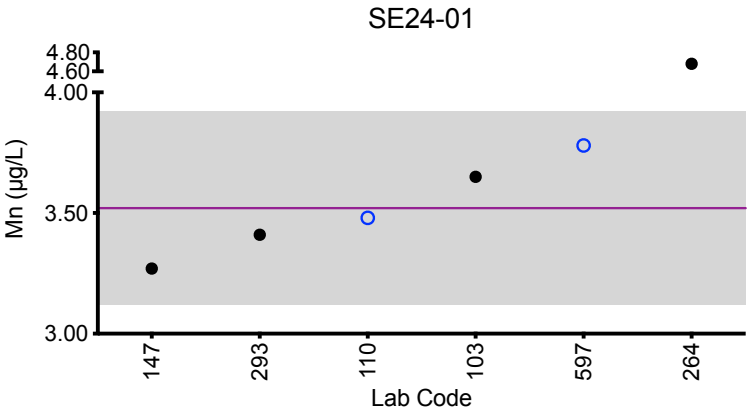
	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
Arithmetic Mean ($\bar{x}$)	3.52	5.31	10.33	3.06	8.23
Arithmetic SD (s)	0.20	0.16	0.21	0.18	0.21
Arithmetic RSD (%)	5.7	2.9	2.1	5.9	2.6
Number of Sample Measurements (N)	5	5	5	5	5

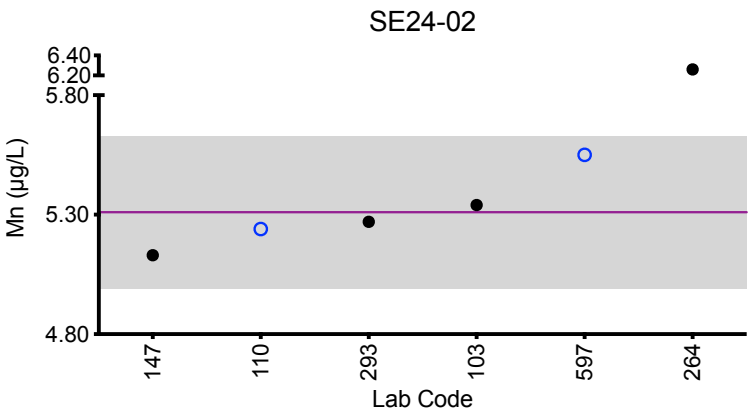
*Denotes a statistical Outlier.

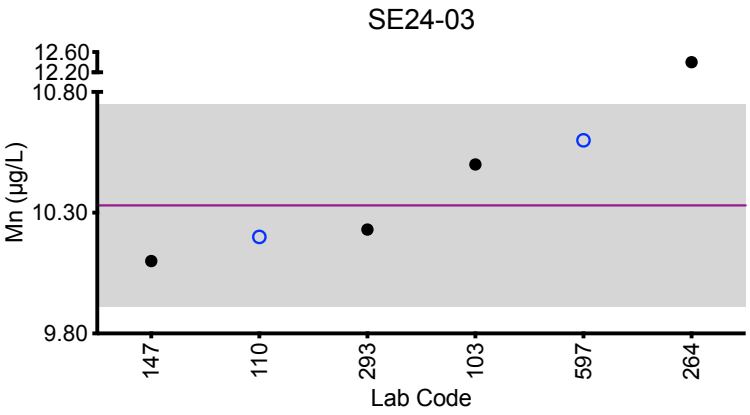
NEW YORK STATE | Department of Health | Wadsworth Center

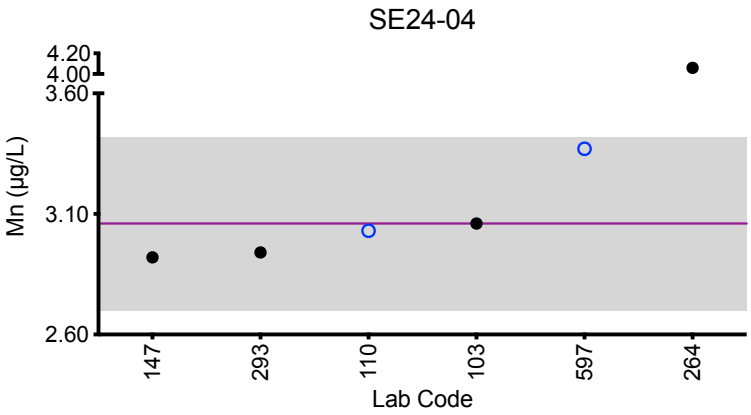
Results for Event #1, 2024: Summary Figures

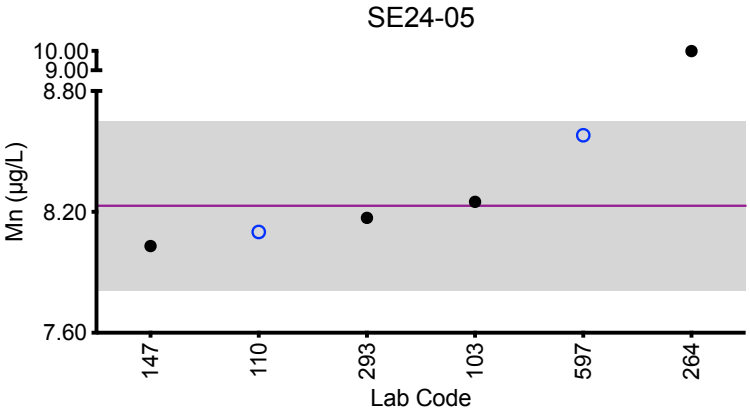
Serum Mn











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Mo (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
103	ICP-MS/MS	2.09	6.90	4.67	1.05	0.764
110	ICP-MS/MS	2.20	6.93	4.80	1.06	0.78
147	DRC/CC-ICP-MS	1.97	6.75	4.70	0.960	0.688
293	DRC/CC-ICP-MS	2.340	6.510	4.700	1.130	*3.99
485	HR-ICP-MS	2.32	7.11	4.79	1.13	0.792
597	ICP-MS/MS	2.10	6.47	4.58	1.05	0.771
Summary Statistics						
		SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Arithmetic Mean ($\bar{x}$)		2.17	6.78	4.71	1.06	0.76
Arithmetic SD (s)		0.14	0.25	0.08	0.06	0.04
Arithmetic RSD (%)		6.5	3.7	1.7	5.7	5.3
Number of Sample Measurements (N)		6	6	6	6	5

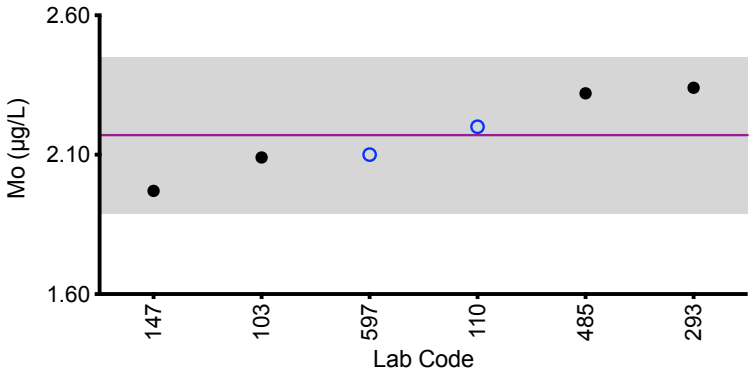
*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

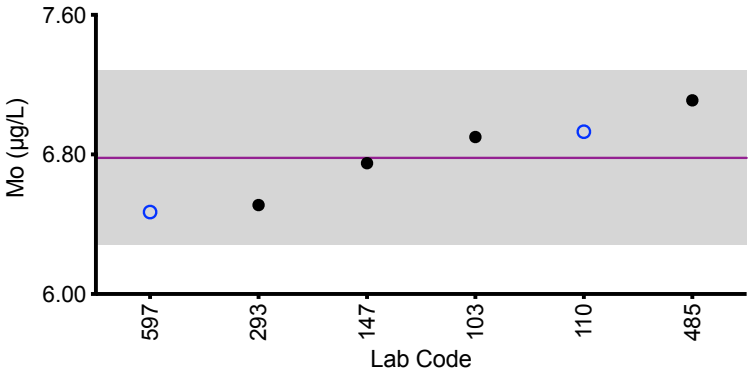
Results for Event #1, 2024: Summary Figures

Serum Mo

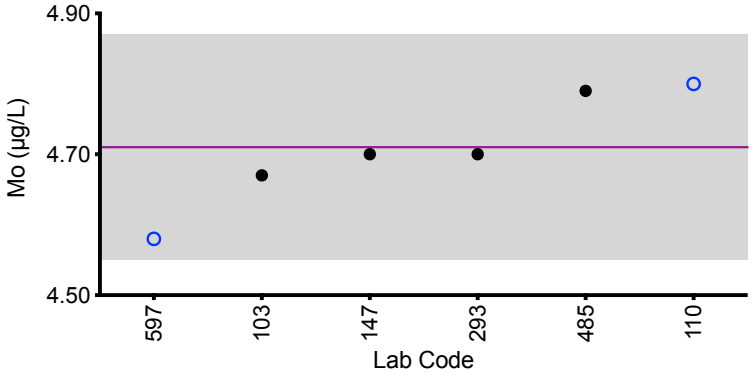
SE24-01



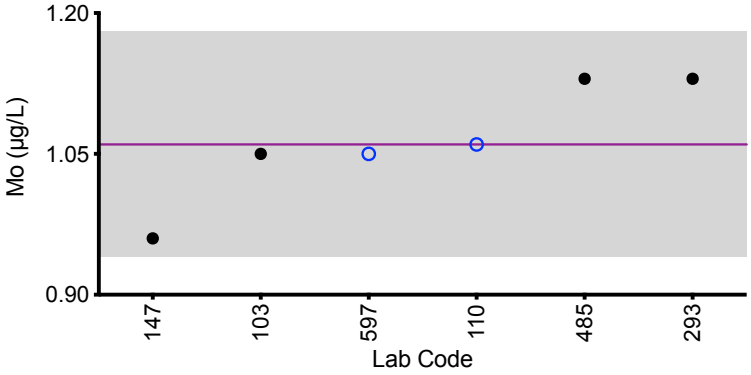
SE24-02



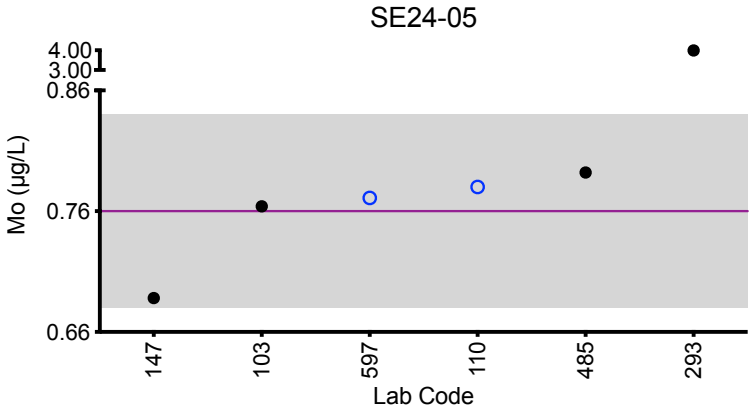
SE24-03



SE24-04



SE24-05



Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Ni (µg/L)

Lab Code	Method	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
103	ICP-MS/MS	7.61	0.752	1.15	2.96	0.461
110	ICP-MS/MS	6.73	0.83	1.67	*3.73	*0.94
147	DRC/CC-ICP-MS	6.21	0.747	1.17	3.14	<0.294
293	DRC/CC-ICP-MS	6.71	0.82	1.24	3.03	0.52
442	DRC/CC-ICP-MS	7.45	0.685	1.37	3.20	0.331
485	HR-ICP-MS	7.01	0.568	1.03	2.94	0.272
597	ICP-MS/MS	6.53	0.797	1.48	2.94	0.401

Summary Statistics

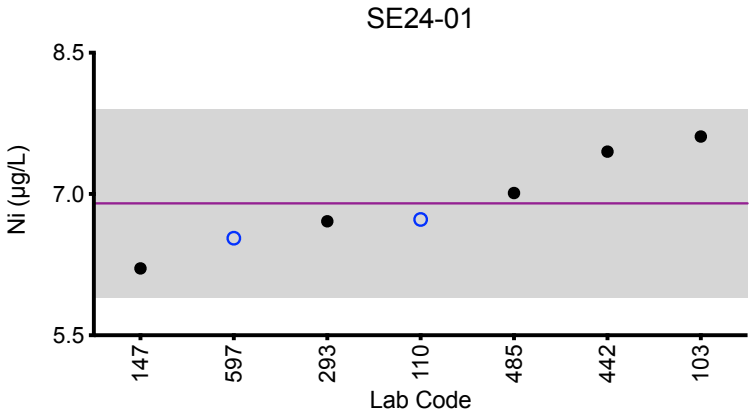
	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
Arithmetic Mean ($\bar{x}$)	6.9	0.74	1.30	3.04	0.40
Arithmetic SD (s)	0.5	0.09	0.22	0.11	0.10
Arithmetic RSD (%)	7.2	12	17	3.6	25
Number of Sample Measurements (N)	7	7	7	6	5

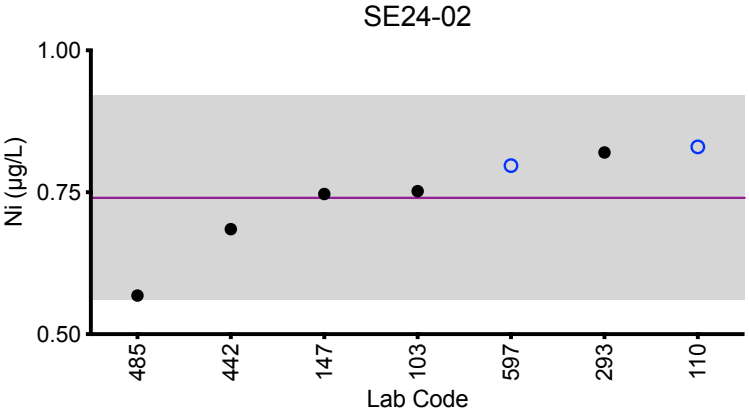
*Denotes a statistical Outlier.

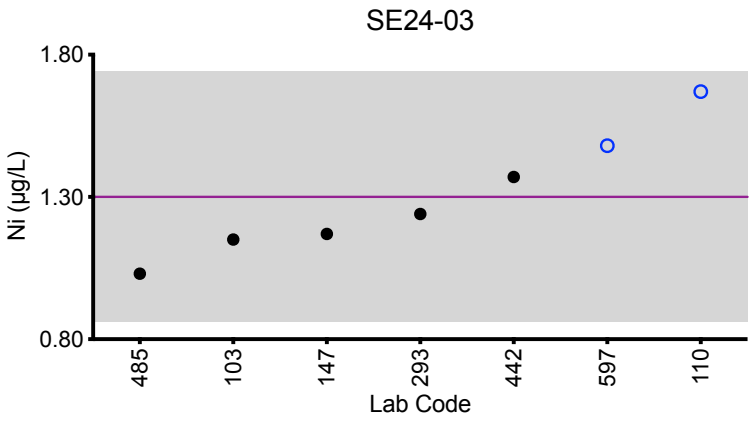
NEW YORK STATE | Department of Health | Wadsworth Center

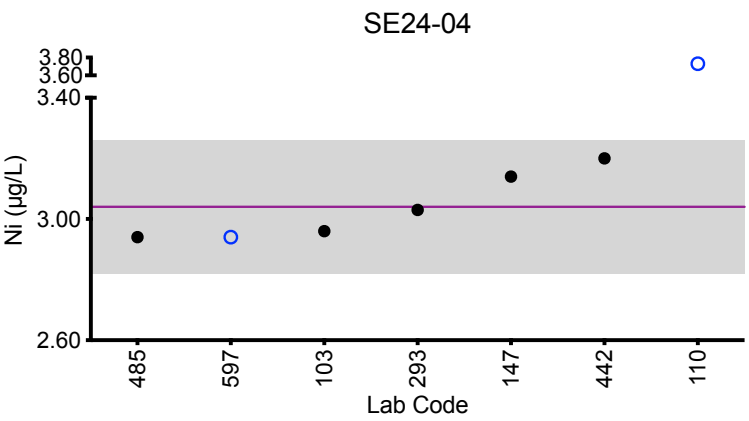
Results for Event #1, 2024: Summary Figures

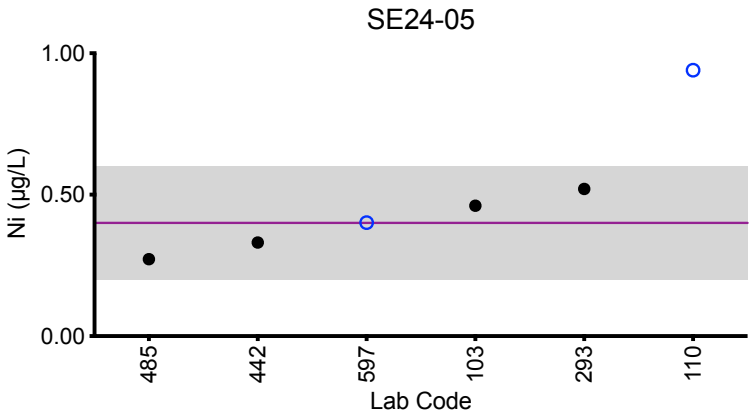
Serum Ni











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

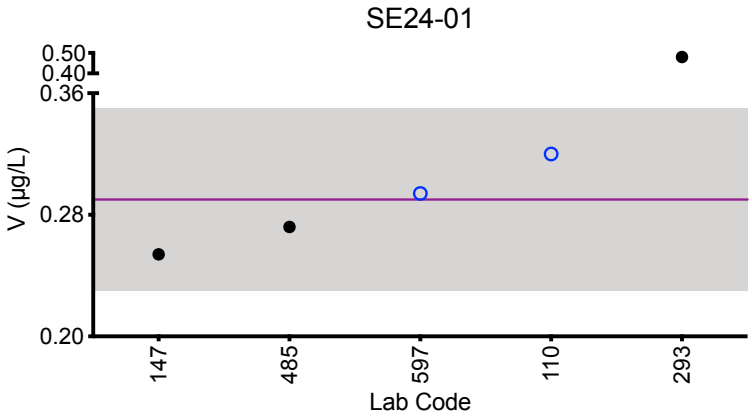
Serum V (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
110	ICP-MS/MS	0.32	0.98	3.84	0.53	2.41
147	DRC/CC-ICP-MS	0.254	0.957	3.91	0.483	2.42
293	DRC/CC-ICP-MS	*0.48	*1.14	3.87	*0.73	2.63
485	HR-ICP-MS	0.272	0.967	3.78	0.514	2.30
597	ICP-MS/MS	0.294	0.948	3.63	0.483	2.27
Summary Statistics						
		SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Arithmetic Mean ($\bar{x}$)		0.29	0.963	3.81	0.50	2.41
Arithmetic SD (s)		0.03	0.014	0.11	0.02	0.14
Arithmetic RSD (%)		9.8	1.5	2.9	4.6	5.8
Number of Sample Measurements (N)		4	4	5	4	5

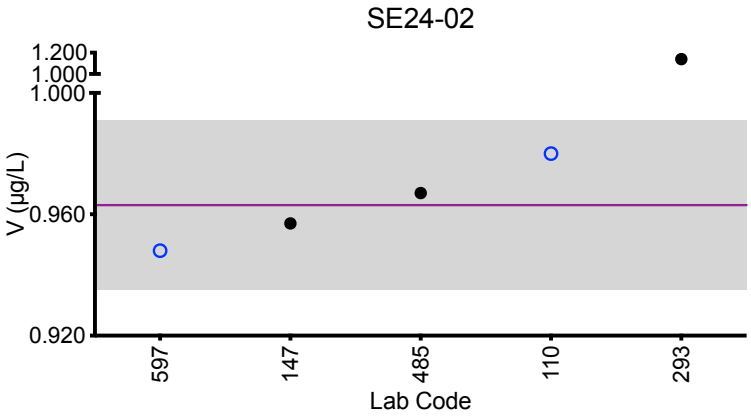
*Denotes a statistical Outlier.

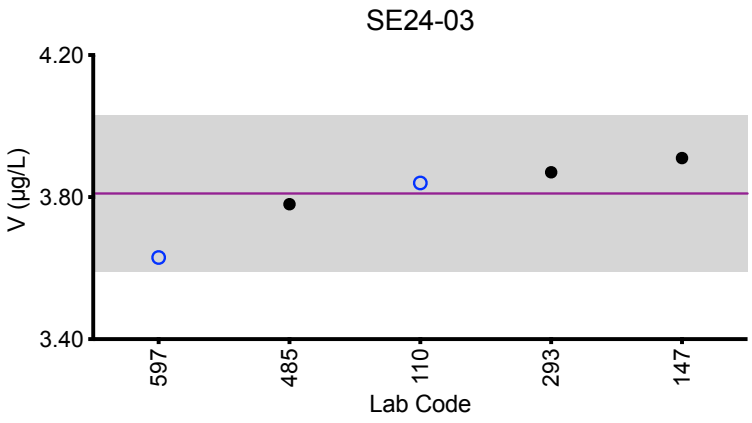
NEW YORK STATE | Department of Health | Wadsworth Center

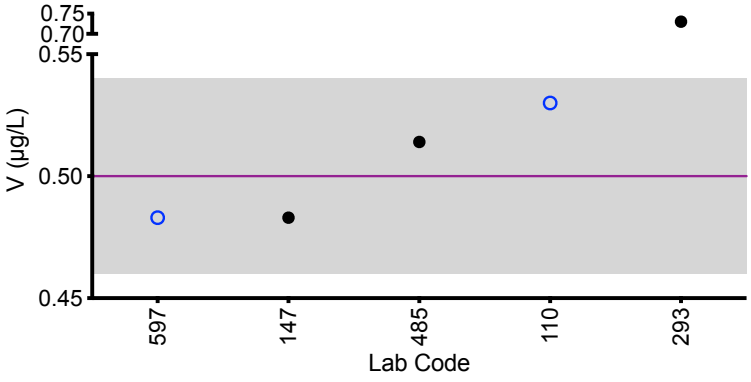
Results for Event #1, 2024: Summary Figures

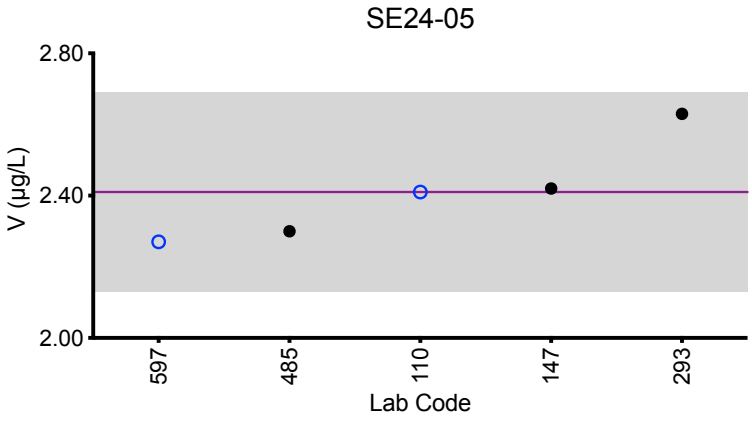
Serum V











Legend:
o HHEAR Labs ● Other Labs
Horizontal purple line = arithmetic mean of all laboratories.
Gray area = ±2SD of the mean.

The mean and ±2SD of all laboratories are not intended to be quality specifications and are included for informational purposes only.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum As (µg/L)

Lab Code	Method	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
103	ICP-MS/MS	2.38	4.79	1.21	11.3	7.40
110	ICP-MS/MS	2.25	4.41	1.07	10.1	6.61
147	DRC/CC-ICP-MS	2.21	4.39	1.15	10.2	6.66
597	ICP-MS/MS	2.27	4.39	1.16	10.2	6.82

Summary Statistics

	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
Arithmetic Mean ($\bar{x}$)	2.28	4.5	1.15	10.5	6.9
Arithmetic SD (s)	0.07	0.2	0.06	0.6	0.4
Arithmetic RSD (%)	3.1	4.4	5.2	5.7	5.8
Number of Sample Measurements (N)	4	4	4	4	4

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Ba (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
110	ICP-MS/MS	5.94	4.09	4.12	1.21	1.56
147	ICP-MS	5.48	3.73	3.60	0.972	1.40
597	ICP-MS/MS	5.80	4.00	3.84	1.32	1.60
Summary Statistics						
		SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Arithmetic Mean ($\bar{x}$)		5.7	3.9	3.9	1.2	1.52
Arithmetic SD (s)		0.2	0.2	0.3	0.2	0.11
Arithmetic RSD (%)		4.2	4.8	7.7	15	7.2
Number of Sample Measurements (N)		3	3	3	3	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Be (µg/L)

Lab Code	Method	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
110	ICP-MS/MS	0.27	1.04	2.97	0.49	1.50
147	ICP-MS	0.256	0.895	2.72	0.346	1.36
293	ICP-MS	0.26	0.90	2.75	0.39	1.41
597	ICP-MS/MS	0.265	0.880	2.68	0.357	1.35

Summary Statistics

	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
Arithmetic Mean ($\bar{x}$)	0.263	0.93	2.78	0.40	1.41
Arithmetic SD (s)	0.006	0.07	0.13	0.07	0.07
Arithmetic RSD (%)	2.3	7.5	4.7	18	5.0
Number of Sample Measurements (N)	4	4	4	4	4

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Cd (µg/L)

Lab Code	Method	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
103	ICP-MS/MS	1.19	0.488	5.17	0.231	0.785
110	ICP-MS/MS	1.15	0.45	5.01	0.21	0.73
147	ICP-MS	1.14	0.482	4.96	0.221	0.743
597	ICP-MS/MS	1.17	0.462	5.08	0.225	0.784

Summary Statistics

	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
Arithmetic Mean ($\bar{x}$)	1.16	0.471	5.05	0.222	0.76
Arithmetic SD (s)	0.02	0.018	0.09	0.009	0.03
Arithmetic RSD (%)	1.9	3.8	1.8	4.1	3.7
Number of Sample Measurements (N)	4	4	4	4	4

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Cs (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
110	ICP-MS/MS	0.63	0.39	0.77	0.37	0.25
597	ICP-MS/MS	0.605	0.443	0.767	0.387	0.280
Summary Statistics						
		SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Arithmetic Mean ($\bar{x}$)		0.62	0.42	0.769	0.379	0.27
Arithmetic SD (s)		0.02	0.04	0.002	0.012	0.02
Arithmetic RSD (%)		2.9	9.5	0.27	3.2	7.9
Number of Sample Measurements (N)		2	2	2	2	2

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Hg (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
103	ICP-MS/MS	0.568	2.64	0.833	4.56	1.34
110	ICP-MS/MS	0.56	2.55	0.81	4.55	1.30
597	ICP-MS/MS	0.547	2.38	0.772	4.26	1.30
Summary Statistics						
		SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Arithmetic Mean ($\bar{x}$)		0.558	2.52	0.81	4.46	1.31
Arithmetic SD (s)		0.011	0.13	0.03	0.17	0.02
Arithmetic RSD (%)		2.0	5.2	3.7	3.8	1.8
Number of Sample Measurements (N)		3	3	3	3	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum I (µg/L)

Lab Code	Method	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
147	ICP-MS	49.2	47.4	39.8	65.8	44.2
442	ICP-MS	51.3	47.2	*67.9	*41.5	46.5
597	ICP-MS/MS	53.1	50.4	39.7	67.1	43.6

Summary Statistics

	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
Arithmetic Mean ($\bar{x}$)	51.2	48.3	39.75	66.5	44.8
Arithmetic SD (s)	2.0	1.8	0.07	0.9	1.5
Arithmetic RSD (%)	3.9	3.7	0.18	1.4	3.3
Number of Sample Measurements (N)	3	3	2	2	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Mg (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
264	ICP-MS	19458.0	19657.0	19005.0	17718.2	17368.7
597	ICP-MS/MS	19800	20100	19600	18100	17800
Summary Statistics						
		SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Arithmetic Mean ($\bar{x}$)		19600	19900	19300	17900	17600
Arithmetic SD (s)		200	300	400	300	300
Arithmetic RSD (%)		1.2	1.5	2.1	1.7	1.7
Number of Sample Measurements (N)		2	2	2	2	2

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Pb (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
103	ICP-MS/MS	1.18	<0.100	8.84	0.453	3.57
110	ICP-MS/MS	1.24	0.95	9.62	0.50	3.82
597	ICP-MS/MS	1.24	0.310	8.47	0.520	3.55
Summary Statistics						
		SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Arithmetic Mean ($\bar{x}$)		1.22	NA	9.0	0.49	3.65
Arithmetic SD (s)		0.03	NA	0.6	0.03	0.15
Arithmetic RSD (%)		2.5	NA	6.7	6.1	4.1
Number of Sample Measurements (N)		3	NA	3	3	3

*Denotes a statistical Outlier.

Statistical data was not calculated for SE24-02 based on a lack of consensus among participating labs.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Pt (µg/L)

Lab Code	Method	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
110	ICP-MS/MS	0.135	1.72	0.354	0.169	0.772
264	ICP-MS	*0.54	2.15	0.40	0.14	0.78
293	DRC/CC-ICP-MS	0.12	1.62	0.34	0.16	0.7

Summary Statistics

	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
Arithmetic Mean ($\bar{x}$)	0.10	1.8	0.36	0.156	0.75
Arithmetic SD (s)	0.01	0.3	0.03	0.015	0.04
Arithmetic RSD (%)	8.3	17	8.3	9.6	5.3
Number of Sample Measurements (N)	2	3	3	3	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Sb (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
103	ICP-MS/MS	2.71	0.742	3.07	0.299	4.86
110	ICP-MS/MS	2.58	0.72	2.99	0.31	4.58
147	ICP-MS	2.55	0.748	3.09	0.330	4.62
597	ICP-MS/MS	2.74	0.699	2.91	0.326	4.38
Summary Statistics						
		SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Arithmetic Mean ($\bar{x}$)		2.65	0.73	3.02	0.316	4.6
Arithmetic SD (s)		0.09	0.02	0.08	0.014	0.2
Arithmetic RSD (%)		3.4	3.1	2.6	4.4	4.3
Number of Sample Measurements (N)		4	4	4	4	4

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Sn (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
110	ICP-MS/MS	0.75	1.11	6.03	2.38	3.71
597	ICP-MS/MS	0.810	1.14	6.01	2.44	3.69
Summary Statistics						
		SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Arithmetic Mean ($\bar{x}$)		0.78	1.13	6.02	2.41	3.70
Arithmetic SD (s)		0.04	0.02	0.01	0.04	0.01
Arithmetic RSD (%)		5.1	1.9	0.23	1.7	0.38
Number of Sample Measurements (N)		2	2	2	2	2

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Sr (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
103	ICP-MS/MS	79.8	53.3	116	40.6	77.0
597	ICP-MS/MS	78.9	51.5	114	39.3	75.9
Summary Statistics						
		SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Arithmetic Mean ($\bar{x}$)		79.3	52.4	115	40.0	76.5
Arithmetic SD (s)		0.6	1.3	1	0.9	0.8
Arithmetic RSD (%)		0.76	2.5	1.2	2.3	1.0
Number of Sample Measurements (N)		2	2	2	2	2

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Ti (µg/L)

Lab Code	Method	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
200	DRC/CC-ICP-MS	4.5	4.6	12.3	2.6	4.6
442	ICP-MS/MS	3.43	2.18	9.70	2.59	4.71
485	HR-ICP-MS	3.64	2.20	9.87	2.53	4.66
597	ICP-MS/MS	*6.82	5.13	12.6	*5.40	*7.65

Summary Statistics

	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
Arithmetic Mean ($\bar{x}$)	3.9	NA	11.1	2.57	4.66
Arithmetic SD (s)	0.6	NA	1.5	0.04	0.06
Arithmetic RSD (%)	15	NA	14	1.5	1.2
Number of Sample Measurements (N)	3	NA	4	3	3

*Denotes a statistical Outlier.

Statistical data was not calculated for SE24-02 based on a lack of consensus among participating labs.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum Tl (µg/L)

Lab Code	Method	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
103	ICP-MS/MS	0.117	0.466	0.302	1.00	0.809
110	ICP-MS/MS	0.116	0.451	0.294	0.972	0.778
147	ICP-MS	0.102	0.437	0.275	0.949	0.750
597	ICP-MS/MS	0.120	0.524	0.287	0.964	0.783

Summary Statistics

	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
Arithmetic Mean ($\bar{x}$)	0.114	0.47	0.289	0.97	0.78
Arithmetic SD (s)	0.008	0.04	0.011	0.02	0.02
Arithmetic RSD (%)	7.0	8.5	3.8	2.2	3.1
Number of Sample Measurements (N)	4	4	4	4	4

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum U (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
103	ICP-MS/MS	0.0949	0.202	0.164	0.167	0.0283
110	ICP-MS/MS	0.092	0.198	0.170	0.167	0.027
597	ICP-MS/MS	0.0927	0.173	0.169	0.158	0.0344
Summary Statistics						
		SE24-01	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
Arithmetic Mean ($\bar{x}$)		0.0932	0.191	0.168	0.164	0.030
Arithmetic SD (s)		0.0015	0.016	0.003	0.005	0.004
Arithmetic RSD (%)		1.6	8.4	1.8	3.2	13
Number of Sample Measurements (N)		3	3	3	3	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024:
Laboratory Data and Summary Statistics

Serum W (µg/L)

Lab Code	Method	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
110	ICP-MS/MS	0.33	0.77	0.31	1.51	0.48
200	ICP-MS	0.39	0.88	0.37	1.58	0.51
597	ICP-MS/MS	0.339	0.737	0.297	1.46	0.468

Summary Statistics

	SE24-01	SE24-02	SE24-03	SE24-04	SE24-05
Arithmetic Mean ($\bar{x}$)	0.35	0.80	0.33	1.52	0.49
Arithmetic SD (s)	0.03	0.07	0.04	0.06	0.02
Arithmetic RSD (%)	8.6	8.8	12	3.9	4.5
Number of Sample Measurements (N)	3	3	3	3	3

*Denotes a statistical Outlier.

NEW YORK STATE | Department of Health | Wadsworth Center

Results for Event #1, 2024: Additional Elements in Serum

Serum Bi (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
147	ICP-MS	<0.0397	<0.0397	<0.0397	<0.0397	<0.0397
597	ICP-MS/MS	<0.0556	<0.0556	<0.0556	<0.0556	<0.0556

Serum Fe (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
264	ICP-MS	19000.00	5808.00	12904.00	3951.00	3278.00

Serum Li (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
147	ICP-MS	0.317	0.622	0.663	0.364	0.169

Serum Te (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
110	ICP-MS/MS	<0.02	<0.02	<0.02	<0.02	<0.02

Serum Th (µg/L)						
Lab Code	**Method**	**SE24-01**	**SE24-02**	**SE24-03**	**SE24-04**	**SE24-05**
597	ICP-MS/MS	<0.0235	<0.0235	<0.0235	<0.0235	<0.0235

References

1. ISO/FDIS-13528 (2005) Statistical methods for use in proficiency testing by interlaboratory comparisons. International Organization for Standardization, Geneva.

2. Taylor A, Angerer J, Arnaud J, Claeys F, Jones RL, Mazarrasa O, Mairiaux E, Menditto A, Parsons PJ, Patriarca M, Pineau A, Valkonen S, Weber J-P, Weykamp C. Occupational and environmental laboratory medicine: A network of EQAS organisers. Accreditation and Quality Assurance. 2006;11(8-9):435-9. PubMed PMID: 086NJ-0011.