RESL CUSTOMER EXPORT CONTROL AGREEMENT

It is the Radiological and Environmental Sciences Laboratory's (RESL) policy to conduct business in accordance with all applicable U.S. export control laws and regulations. It is also RESL's policy that its Customers comply with U.S. export control laws and regulations. Therefore, Customer agrees to the following:

1. Because products, technical data, and technical assistance (i.e., services) provided to Customer by RESL may be subject to U.S. export control laws and regulations, (i) transactions with certain persons and companies and (ii) the export or reexport of certain types and levels of products, technical data, and services are prohibited or restricted.

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3. Customer acknowledges that export control requirements may change and that the export or reexport of RESL products, technical data, and services without an export license or other appropriate governmental authorization may result in criminal and/or civil liability.

4. The obligations and requirements described herein shall survive the expiration or termination of any agreement or contract between RESL and Customer.

XrM35 Participating Laboratories

Lab Code	Lab Name	Matrix Code
EULC01	EnergySolutions, LLC	XrM
FDHE01	Florida Dept of Health Environmental Laboratory	XrM
HECR01	SC Dept. Health and Environmental Control Radiological Laboratory	XrM
NARL01	National Analytical Radiation Environmental Laboratory	XrM
NARL02	USEPA - NAREL - MERL	XrM
ODHL01	Ohio Department of Health Laboratory	XrM
SEML01	SRS Environmental Monitoring Laboratory	XrM
SRPD01	Sandia National Laboratories, Radiation Protection Sample Diagnostics	XrM

Laboratories Not Reporting XrM35

Lab Code	Lab Name	Matrix Code
ANTE01	ALS Environmental - Fort Collins, CO	XrM
AREV01	AREVA - CMC	XrM
CMRC01	Carlsbad Environmental Monitoring and Research Center	XrM
GENE01	GEL Laboratories, LLC	XrM
LANL01	Los Alamos National Laboratory	XrM
ORIS01	ORISE/IEAV	XrM
QUAN01	TestAmerica St. Louis	XrM
QUAN03	TestAmerica Laboratories - Richland	XrM
SAVA01	SAVANNAH RIVER NUCLEAR SOLUTIONS (SRNS)	XrM
WSHL01	Wisconsin State Laboratory of Hygiene	XrM

MAPEP Mixed Analyte Performance Evaluation Program

Study Reference Values

MAPEP-16-XrM35

Radiological Reference Date: 08/01/2016

Analyte	Ref Value	Ref Unc
Radiological		Units: (Bq/kg)
Barium-140	328	16
Cerium-141	14300	700
Cerium-144	21900	1100
Cesium-137	990	50
Lanthanum-140	368	18
Niobium-95	57000	3000
Potassium-40	630	30
Ruthenium-103	10100	500
Ruthenium-106	1450	70
Strontium-89	22900	1100
Strontium-90	890	50
Uranium-234/233	2510	130
Uranium-235	51	3
Uranium-238	36	2
Yttrium-91	29000	1500
Zirconium-95	35500	1800

The XrM35 is a soil sample matrix.

MAPEP Mixed Analyte Performance Evaluation Program

Sample Statistical Summary

MAPEP-16-XrM35

Radiological Reference Date: 08/01/2016

Analyte	T(1)	Grand(2) Mean	Std Dev	Ref Value	Ref Unc
Radiological				Units: (Bq/kg)	
Barium-140	2			328	16
Cerium-141	3			14300	700
Cerium-144	6			21900	1100
Cesium-137	7	916	62	990	50
Lanthanum-140	1			368	18
Niobium-95	6			57000	3000
Potassium-40	6	620	99	630	30
Ruthenium-103	5			10100	500
Ruthenium-106	5			1450	70
Strontium-89	2			22900	1100
Strontium-90	3			890	50
Uranium-234/233	2			2510	130
Uranium-235	4			51	3
Uranium-238	2			36	2
Yttrium-91	3			29000	1500
Zirconium-95	6	34157	2655	35500	1800

Note: (1) T = Total number of laboratories reporting analyte.
(2) Mean excludes values derived as total metals and values outside of a bias range of +/- 30%.

The XrM35 is a soil sample matrix.

MAPEP Mixed Analyte Performance Evaluation Program

Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-16-XrM35
(EULC01) EnergySolutions, LLC
I-80, Exit 49
Clive, UT 84029

Radiological

Sample ID	Nuclide	Known Activity	Expt'l Activity	Bias (%)
MAPEP-16-XrM35	Ba-140	328 +/- 16 Bq/kg		
MAPEP-16-XrM35	Ce-141	14300 +/- 700 Bq/kg		
MAPEP-16-XrM35	Ce-144	21900 +/- 1100 Bq/kg	23152.75 +/- 4717.5 Bq/kg	5.7
MAPEP-16-XrM35	Cs-137	990 +/- 50 Bq/kg	929.63 +/- 118.49 Bq/kg	-6.1
MAPEP-16-XrM35	La-140	368 +/- 18 Bq/kg		
MAPEP-16-XrM35	Nb-95	57000 +/- 3000 Bq/kg	167887.5 +/- 19378.75 Bq/kg	194.5
MAPEP-16-XrM35	K-40	630 +/- 30 Bq/kg	619.75 +/- 134.77 Bq/kg	-1.6
MAPEP-16-XrM35	Ru-103	10100 +/- 500 Bq/kg		
MAPEP-16-XrM35	Ru-106	1450 +/- 70 Bq/kg		
MAPEP-16-XrM35	Sr-89	22900 +/- 1100 Bq/kg		
MAPEP-16-XrM35	Sr-90	890 +/- 50 Bq/kg		
MAPEP-16-XrM35	U-234	2510 +/- 130 Bq/kg		
MAPEP-16-XrM35	U-235	51 +/- 3 Bq/kg		
MAPEP-16-XrM35	U-238	36 +/- 2 Bq/kg		
MAPEP-16-XrM35	Y-91	29000 +/- 1500 Bq/kg		
MAPEP-16-XrM35	Zr-95	35500 +/- 1800 Bq/kg	34104.75 +/- 2861.95 Bq/kg	-3.9

Radiological Reference Date: August 1, 2016

MAPEP Mixed Analyte Performance Evaluation Program

Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-16-XrM35
(FDHE01) Florida Dept of Health Environmental Laboratory
PO Box 680069
Orlando, FL 32868-0069

Radiological

Sample ID	Nuclide	Known Activity	Expt'l Activity	Bias (%)
MAPEP-16-XrM35	Ba-140	328 +/- 16 Bq/kg		
MAPEP-16-XrM35	Ce-141	14300 +/- 700 Bq/kg		
MAPEP-16-XrM35	Ce-144	21900 +/- 1100 Bq/kg		
MAPEP-16-XrM35	Cs-137	990 +/- 50 Bq/kg	915 +/- 17 Bq/kg	-7.6
MAPEP-16-XrM35	La-140	368 +/- 18 Bq/kg		
MAPEP-16-XrM35	Nb-95	57000 +/- 3000 Bq/kg		
MAPEP-16-XrM35	K-40	630 +/- 30 Bq/kg	732 +/- 40 Bq/kg	16.2
MAPEP-16-XrM35	Ru-103	10100 +/- 500 Bq/kg		
MAPEP-16-XrM35	Ru-106	1450 +/- 70 Bq/kg	1002 +/- 51 Bq/kg	-30.9
MAPEP-16-XrM35	Sr-89	22900 +/- 1100 Bq/kg		
MAPEP-16-XrM35	Sr-90	890 +/- 50 Bq/kg	388 +/- 94 Bq/kg	-56.4
MAPEP-16-XrM35	U-234	2510 +/- 130 Bq/kg	3089 +/- 42 Bq/kg	23.1
MAPEP-16-XrM35	U-235	51 +/- 3 Bq/kg	58 +/- 6 Bq/kg	13.7
MAPEP-16-XrM35	U-238	36 +/- 2 Bq/kg	46 +/- 5 Bq/kg	27.8
MAPEP-16-XrM35	Y-91	29000 +/- 1500 Bq/kg		
MAPEP-16-XrM35	Zr-95	35500 +/- 1800 Bq/kg		

Radiological Reference Date: August 1, 2016

Mixed Analyte Performance Evaluation Program

Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-16-XrM35
(NARL01) National Analytical Radiation Environmental Laboratory
540 S. Morris Ave.
Montgomery, AL 36115-2601

Radiological

Sample ID	Nuclide	Known Activity	Expt'l Activity	Bias (%)
MAPEP-16-XrM35	Ba-140	328 +/- 16 Bq/kg	-1200 +/- 1940 Bq/kg	-465.9
MAPEP-16-XrM35	Ce-141	14300 +/- 700 Bq/kg	12600 +/- 684 Bq/kg	-11.9
MAPEP-16-XrM35	Ce-144	21900 +/- 1100 Bq/kg	20000 +/- 1080 Bq/kg	-8.7
MAPEP-16-XrM35	Cs-134		-1.76 +/- 3.87 Bq/kg	
MAPEP-16-XrM35	Cs-137	990 +/- 50 Bq/kg	891 +/- 48.8 Bq/kg	-10.0
MAPEP-16-XrM35	La-140	368 +/- 18 Bq/kg		
MAPEP-16-XrM35	Nb-95	57000 +/- 3000 Bq/kg	54000 +/- 7580 Bq/kg	-5.3
MAPEP-16-XrM35	Pu-238		0.0482 +/- 0.0885 Bq/kg	
MAPEP-16-XrM35	Pu-239		0.0723 +/- 0.0639 Bq/kg	
MAPEP-16-XrM35	K-40	630 +/- 30 Bq/kg	711 +/- 64.2 Bq/kg	12.9
MAPEP-16-XrM35	Ra-228		40.2 +/- 13.2 Bq/kg	
MAPEP-16-XrM35	Ru-103	10100 +/- 500 Bq/kg	9350 +/- 507 Bq/kg	-7.4
MAPEP-16-XrM35	Ru-106	1450 +/- 70 Bq/kg	1110 +/- 97.0 Bq/kg	-23.4
MAPEP-16-XrM35	Sr-89	22900 +/- 1100 Bq/kg	20400 +/- 839 Bq/kg	-10.9
MAPEP-16-XrM35	Sr-90	890 +/- 50 Bq/kg	742 +/- 65.1 Bq/kg	-16.6
MAPEP-16-XrM35	U-234	2510 +/- 130 Bq/kg		
MAPEP-16-XrM35	U-235	51 +/- 3 Bq/kg	54.5 +/- 6.25 Bq/kg	6.9
MAPEP-16-XrM35	U-238	36 +/- 2 Bq/kg		
MAPEP-16-XrM35	Y-91	29000 +/- 1500 Bq/kg	35900 +/- 4190 Bq/kg	23.8
MAPEP-16-XrM35	Zr-95	35500 +/- 1800 Bq/kg	33600 +/- 1800 Bq/kg	-5.4

Radiological Reference Date: August 1, 2016

MAPEP Mixed Analyte Performance Evaluation Program

Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-16-XrM35
(NARL02) USEPA - NAREL - MERL
540 S Morris Ave
Montgomery, AL 36115

Radiological

Sample ID	Nuclide	Known Activity	Expt'l Activity	Bias (%)
MAPEP-16-XrM35	Ba-140	328 +/- 16 Bq/kg		
MAPEP-16-XrM35	Ce-141	14300 +/- 700 Bq/kg		
MAPEP-16-XrM35	Ce-144	21900 +/- 1100 Bq/kg	28700 +/- 8500 Bq/kg	31.1
MAPEP-16-XrM35	Cs-134		14.5 +/- 20.0 Bq/kg	
MAPEP-16-XrM35	Cs-137	990 +/- 50 Bq/kg	950 +/- 88.0 Bq/kg	-4.0
MAPEP-16-XrM35	Co-57		18.1 +/- 11.0 Bq/kg	
MAPEP-16-XrM35	Co-60		-2.29 +/- 5.70 Bq/kg	
MAPEP-16-XrM35	La-140	368 +/- 18 Bq/kg		
MAPEP-16-XrM35	Mn-54		-1.30 +/- 6.10 Bq/kg	
MAPEP-16-XrM35	Nb-95	57000 +/- 3000 Bq/kg	55200 +/- 9600 Bq/kg	-3.2
MAPEP-16-XrM35	K-40	630 +/- 30 Bq/kg	544 +/- 63.0 Bq/kg	-13.7
MAPEP-16-XrM35	Ru-103	10100 +/- 500 Bq/kg	10700 +/- 1400 Bq/kg	5.9
MAPEP-16-XrM35	Ru-106	1450 +/- 70 Bq/kg		
MAPEP-16-XrM35	Sr-89	22900 +/- 1100 Bq/kg		
MAPEP-16-XrM35	Sr-90	890 +/- 50 Bq/kg		
MAPEP-16-XrM35	U-234	2510 +/- 130 Bq/kg		
MAPEP-16-XrM35	U-235	51 +/- 3 Bq/kg		
MAPEP-16-XrM35	U-238	36 +/- 2 Bq/kg		
MAPEP-16-XrM35	Y-91	29000 +/- 1500 Bq/kg		
MAPEP-16-XrM35	Zn-65		-14.0 +/- 12.0 Bq/kg	
MAPEP-16-XrM35	Zr-95	35500 +/- 1800 Bq/kg	35500 +/- 2100 Bq/kg	0.0

Radiological Reference Date: August 1, 2016

MAPEP Mixed Analyte Performance Evaluation Program

Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-16-XrM35
(ODHL01) Ohio Department of Health Laboratory
8995 E Main Street
Reynoldsburg, OH 43068

Radiological

Sample ID	Nuclide	Known Activity	Expt'l Activity	Bias (%)
MAPEP-16-XrM35	Ba-140	328 +/- 16 Bq/kg		
MAPEP-16-XrM35	Ce-141	14300 +/- 700 Bq/kg		
MAPEP-16-XrM35	Ce-144	21900 +/- 1100 Bq/kg	26400 +/- 2520 Bq/kg	20.5
MAPEP-16-XrM35	Cs-134		412 +/- 1.01 Bq/kg	
MAPEP-16-XrM35	Cs-137	990 +/- 50 Bq/kg	1020 +/- 62.3 Bq/kg	3.0
MAPEP-16-XrM35	Co-57		3.78 +/- 6.88 Bq/kg	
MAPEP-16-XrM35	Co-60		0.981 +/- 1.52 Bq/kg	
MAPEP-16-XrM35	La-140	368 +/- 18 Bq/kg		
MAPEP-16-XrM35	Mn-54		1.59 +/- 2.17 Bq/kg	
MAPEP-16-XrM35	Nb-95	57000 +/- 3000 Bq/kg	129000 +/- 7770 Bq/kg	126.3
MAPEP-16-XrM35	K-40	630 +/- 30 Bq/kg	638 +/- 40.2 Bq/kg	1.3
MAPEP-16-XrM35	Ru-103	10100 +/- 500 Bq/kg	10900 +/- 603 Bq/kg	7.9
MAPEP-16-XrM35	Ru-106	1450 +/- 70 Bq/kg	1280 +/- 139 Bq/kg	-11.7
MAPEP-16-XrM35	Sr-89	22900 +/- 1100 Bq/kg		
MAPEP-16-XrM35	Sr-90	890 +/- 50 Bq/kg		
MAPEP-16-XrM35	U-234	2510 +/- 130 Bq/kg		
MAPEP-16-XrM35	U-235	51 +/- 3 Bq/kg	59.5 +/- 10.2 Bq/kg	16.7
MAPEP-16-XrM35	U-238	36 +/- 2 Bq/kg		
MAPEP-16-XrM35	Y-91	29000 +/- 1500 Bq/kg		
MAPEP-16-XrM35	Zn-65		-0.708 +/- 3.144 Bq/kg	
MAPEP-16-XrM35	Zr-95	35500 +/- 1800 Bq/kg	38400 +/- 1700 Bq/kg	8.2

Radiological Reference Date: August 1, 2016

MAPEP Mixed Analyte Performance Evaluation Program

Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-16-XrM35
(SEML01) SRS Environmental Monitoring Laboratory
Bldg 735-B
Aiken, SC 29808

Radiological

Sample ID	Nuclide	Known Activity	Expt'l Activity	Bias (%)
MAPEP-16-XrM35	Am-241		0.10 +/- 0.04 Bq/kg	
MAPEP-16-XrM35	Ba-140	328 +/- 16 Bq/kg		
MAPEP-16-XrM35	Ce-141	14300 +/- 700 Bq/kg	14230 +/- 880 Bq/kg	-0.5
MAPEP-16-XrM35	Ce-144	21900 +/- 1100 Bq/kg	21547 +/- 1333 Bq/kg	-1.6
MAPEP-16-XrM35	Cs-137	990 +/- 50 Bq/kg	886 +/- 59 Bq/kg	-10.5
MAPEP-16-XrM35	Cm-244		0.013 +/- 0.013 Bq/kg	
MAPEP-16-XrM35	La-140	368 +/- 18 Bq/kg		
MAPEP-16-XrM35	Nb-95	57000 +/- 3000 Bq/kg	52715 +/- 3151 Bq/kg	-7.5
MAPEP-16-XrM35	Pu-238		-0.0069 +/- 0.029 Bq/kg	
MAPEP-16-XrM35	Pu-239		-0.014 +/- 0.04 Bq/kg	
MAPEP-16-XrM35	K-40	630 +/- 30 Bq/kg		
MAPEP-16-XrM35	Ra-226		247 +/- 134 Bq/kg	
MAPEP-16-XrM35	Ru-103	10100 +/- 500 Bq/kg	10256 +/- 714 Bq/kg	1.5
MAPEP-16-XrM35	Ru-106	1450 +/- 70 Bq/kg	1131 +/- 107 Bq/kg	-22.0
MAPEP-16-XrM35	Sr-89	22900 +/- 1100 Bq/kg	23100 +/- 1200 Bq/kg	0.9
MAPEP-16-XrM35	Sr-90	890 +/- 50 Bq/kg	881 +/- 40 Bq/kg	-1.0
MAPEP-16-XrM35	U-234	2510 +/- 130 Bq/kg	2290 +/- 220 Bq/kg	-8.8
MAPEP-16-XrM35	U-235	51 +/- 3 Bq/kg	52.5 +/- 5.9 Bq/kg	2.9
MAPEP-16-XrM35	U-238	36 +/- 2 Bq/kg	31.2 +/- 3.5 Bq/kg	-13.3
MAPEP-16-XrM35	Y-91	29000 +/- 1500 Bq/kg	23920 +/- 4866 Bq/kg	-17.5
MAPEP-16-XrM35	Zr-95	35500 +/- 1800 Bq/kg	32838 +/- 1963 Bq/kg	-7.5

Radiological Reference Date: August 1, 2016

Mixed Analyte Performance Evaluation Program

Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

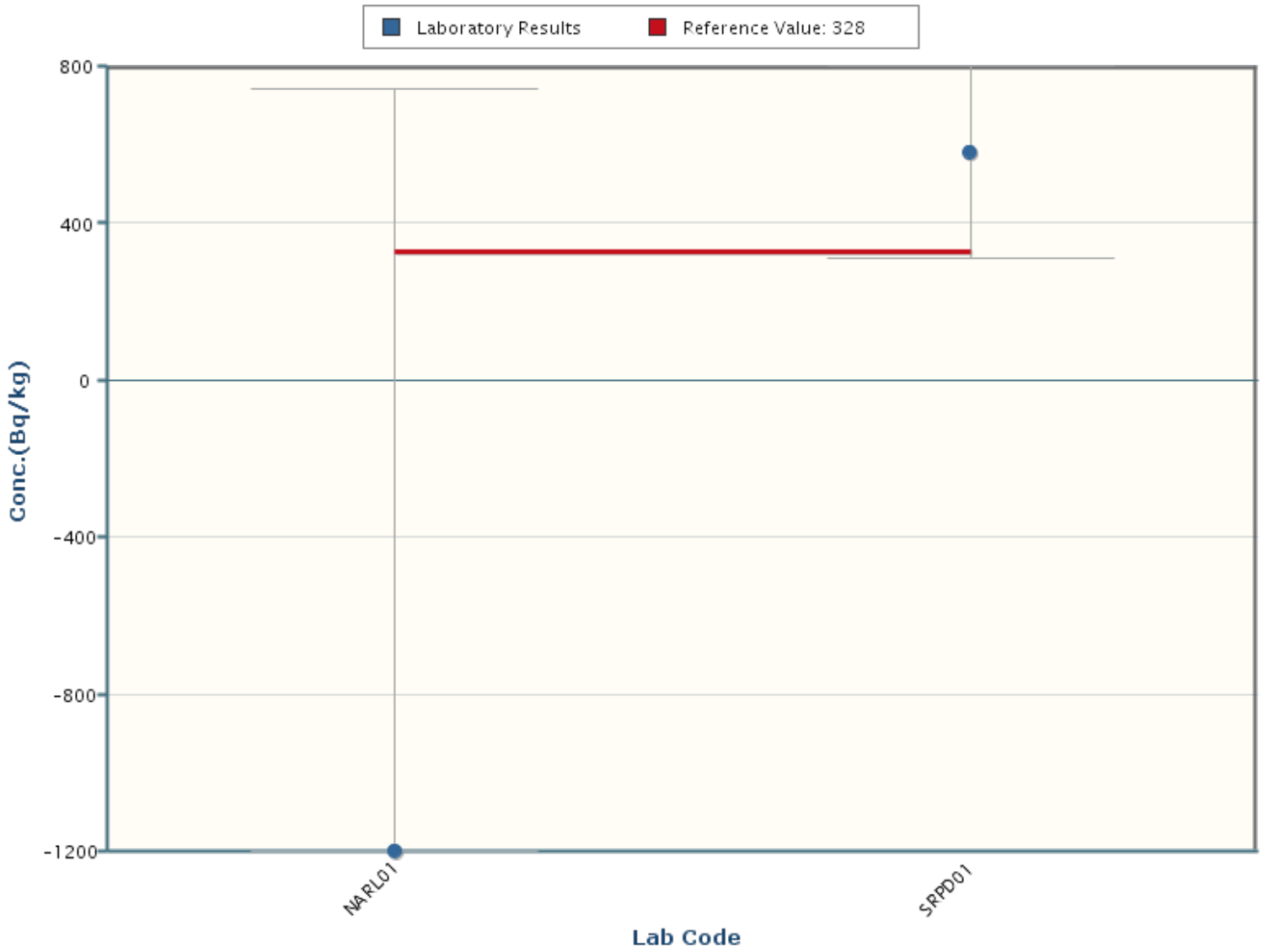
Laboratory Results For MAPEP-16-XrM35
(SRPD01) Sandia National Laboratories, Radiation Protection Sample Diagnostics
PO Box 5800, MS1103
Albuquerque, NM 87185-1103

Radiological

Sample ID	Nuclide	Known Activity	Expt'l Activity	Bias (%)
MAPEP-16-XrM35	Ba-140	328 +/- 16 Bq/kg	5.80E+02 +/- 2.70E+02 Bq/kg	76.8
MAPEP-16-XrM35	Ce-141	14300 +/- 700 Bq/kg	1.22E+04 +/- 1.36E+03 Bq/kg	-14.7
MAPEP-16-XrM35	Ce-144	21900 +/- 1100 Bq/kg	2.04E+04 +/- 2.72E+03 Bq/kg	-6.8
MAPEP-16-XrM35	Cs-137	990 +/- 50 Bq/kg	8.19E+02 +/- 7.43E+01 Bq/kg	-17.3
MAPEP-16-XrM35	La-140	368 +/- 18 Bq/kg	5.80E+02 +/- 2.70E+02 Bq/kg	57.6
MAPEP-16-XrM35	Nb-95	57000 +/- 3000 Bq/kg	5.15E+04 +/- 4.71E+03 Bq/kg	-9.6
MAPEP-16-XrM35	K-40	630 +/- 30 Bq/kg	4.73E+02 +/- 6.04E+01 Bq/kg	-24.9
MAPEP-16-XrM35	Ru-103	10100 +/- 500 Bq/kg	8.94E+03 +/- 8.05E+02 Bq/kg	-11.5
MAPEP-16-XrM35	Ru-106	1450 +/- 70 Bq/kg	1.03E+03 +/- 1.84E+02 Bq/kg	-29.0
MAPEP-16-XrM35	Sr-89	22900 +/- 1100 Bq/kg		
MAPEP-16-XrM35	Sr-90	890 +/- 50 Bq/kg		
MAPEP-16-XrM35	U-234	2510 +/- 130 Bq/kg		
MAPEP-16-XrM35	U-235	51 +/- 3 Bq/kg		
MAPEP-16-XrM35	U-238	36 +/- 2 Bq/kg		
MAPEP-16-XrM35	Y-91	29000 +/- 1500 Bq/kg	1.81E+04 +/- 3.74E+03 Bq/kg	-37.6
MAPEP-16-XrM35	Zr-95	35500 +/- 1800 Bq/kg	3.05E+04 +/- 2.78E+03 Bq/kg	-14.1

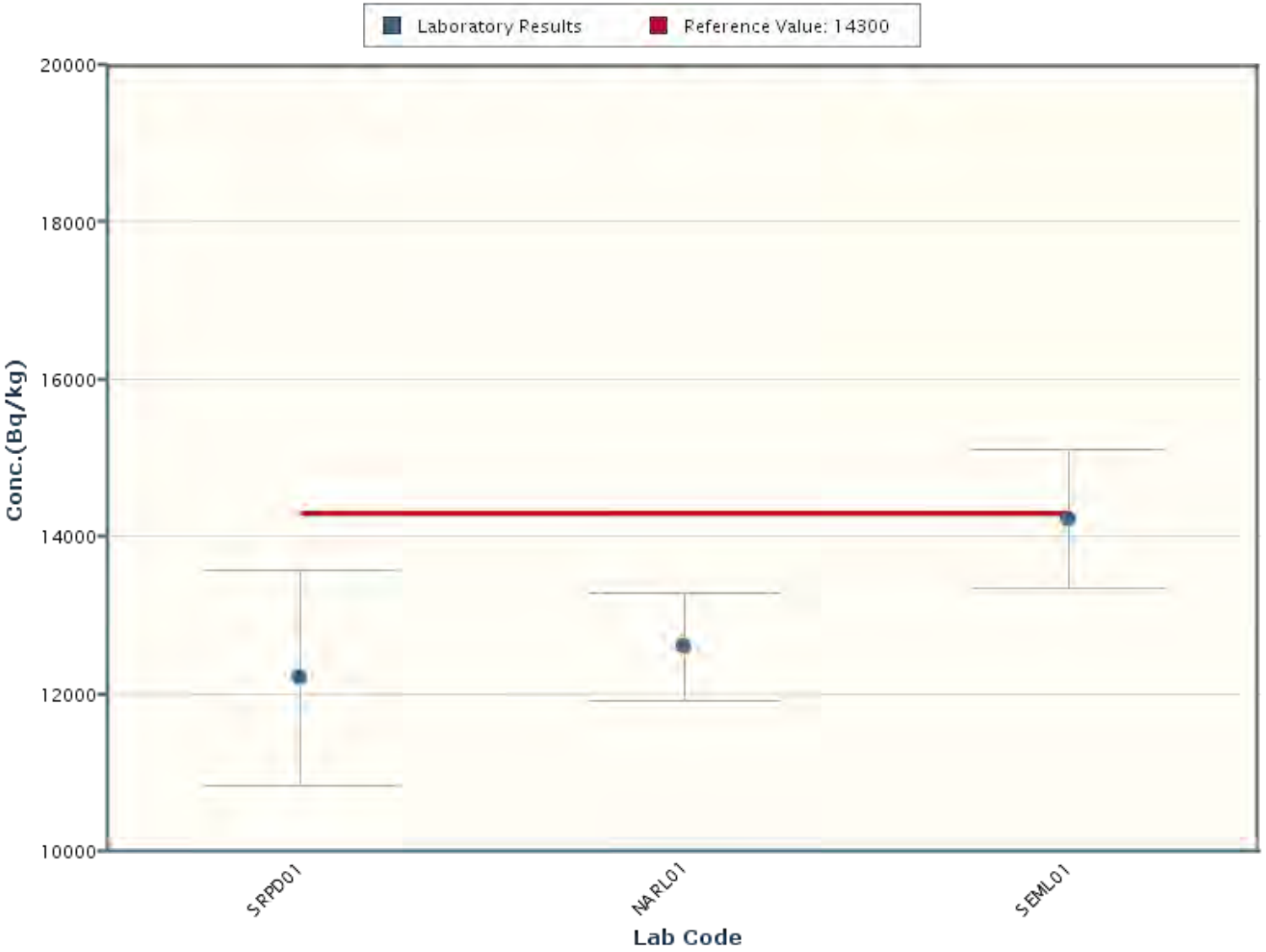
Radiological Reference Date: August 1, 2016

Barium-140
MAPEP-16-XrM35



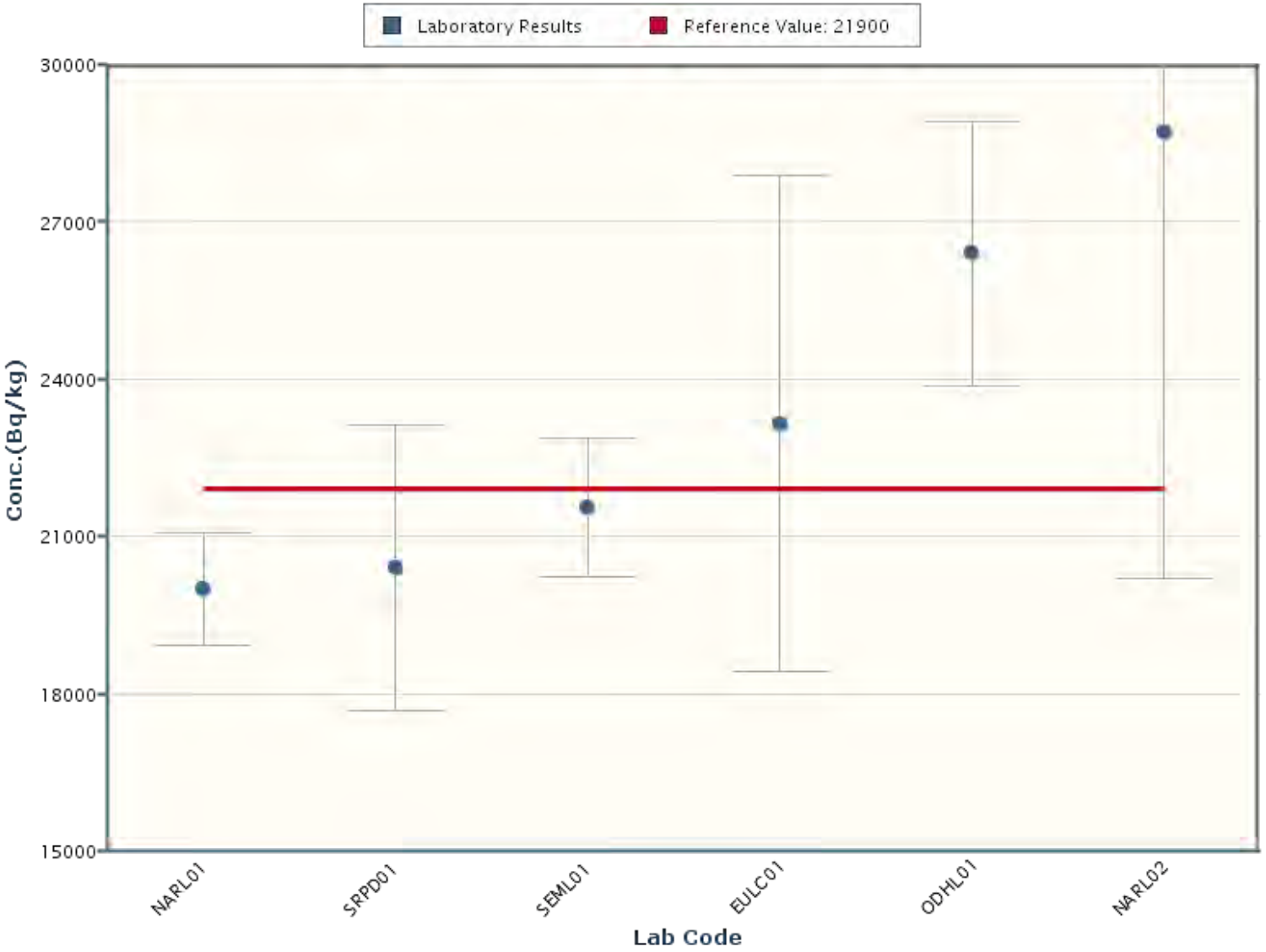
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

Cerium-141
MAPEP-16-XrM35



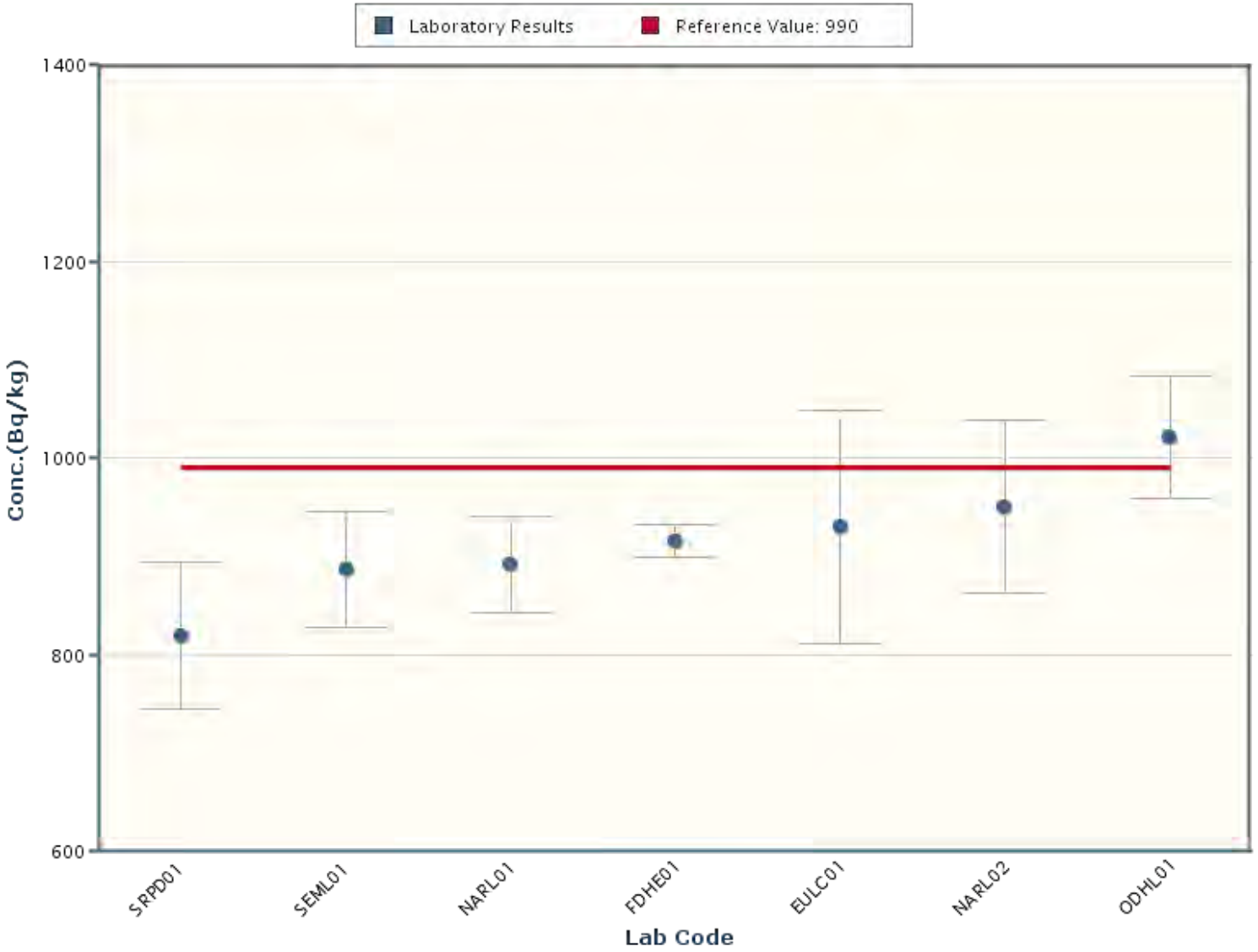
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

Cerium-144
MAPEP-16-XrM35



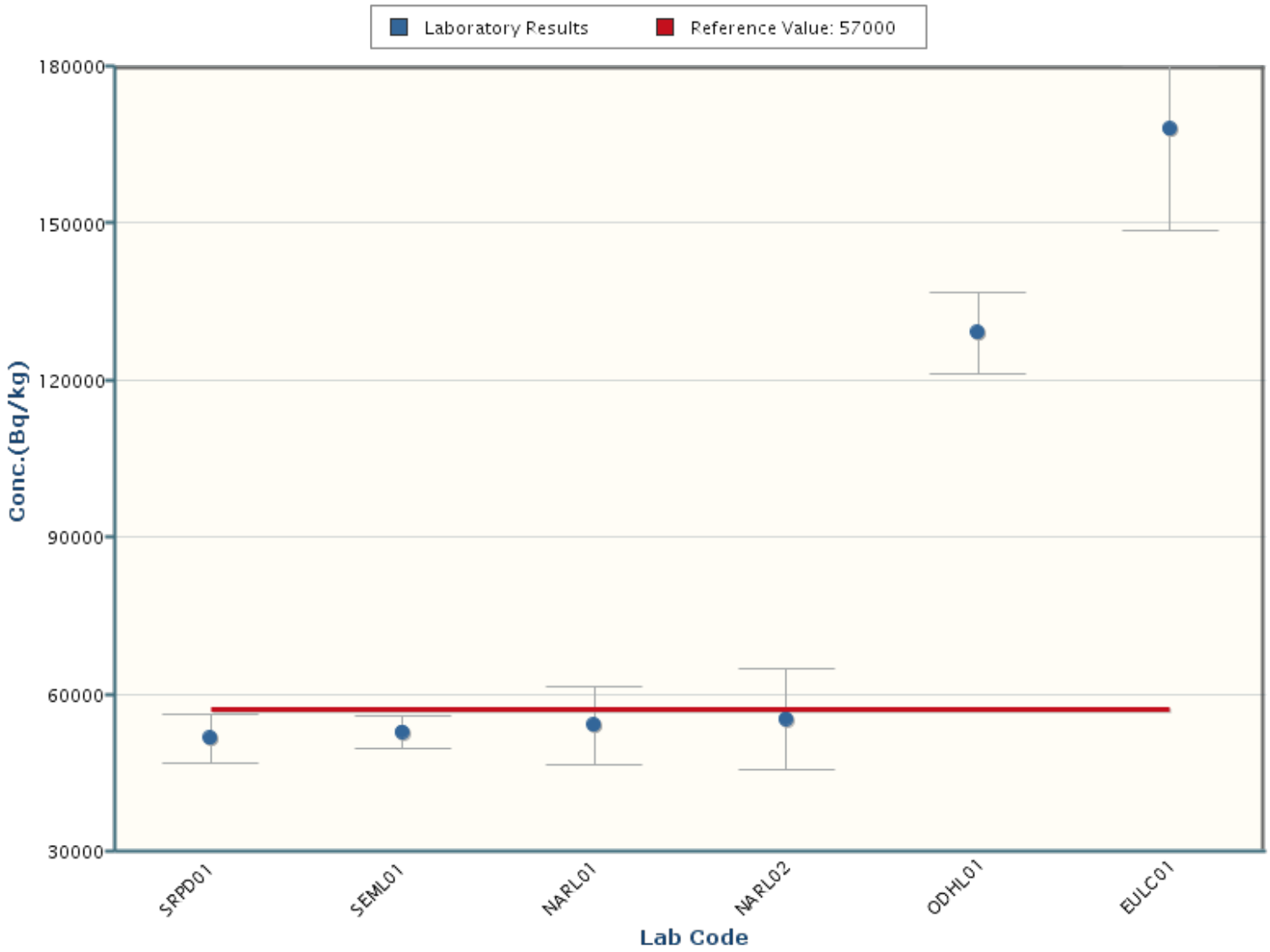
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

Cesium-137
MAPEP-16-XrM35



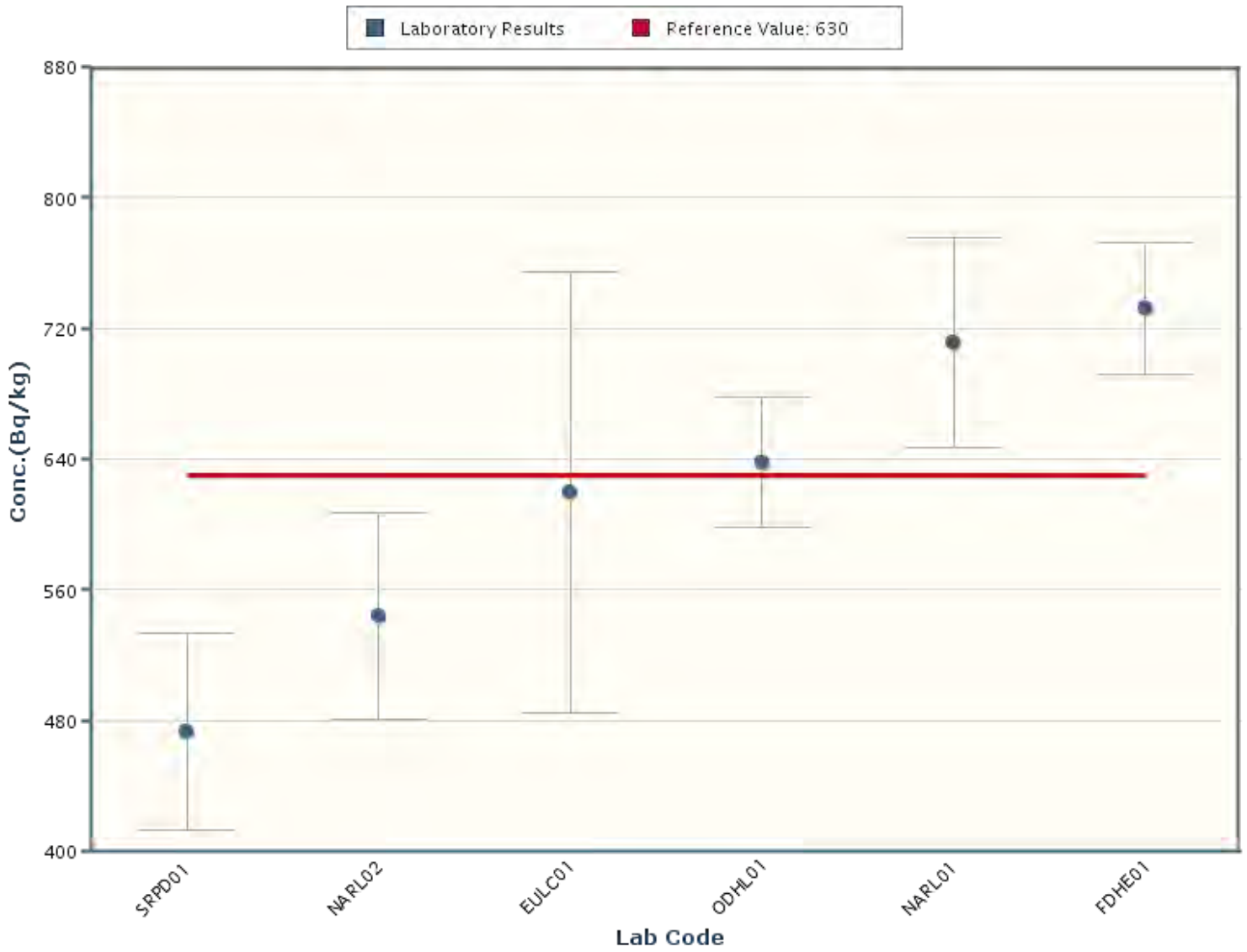
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

Niobium-95
MAPEP-16-XrM35



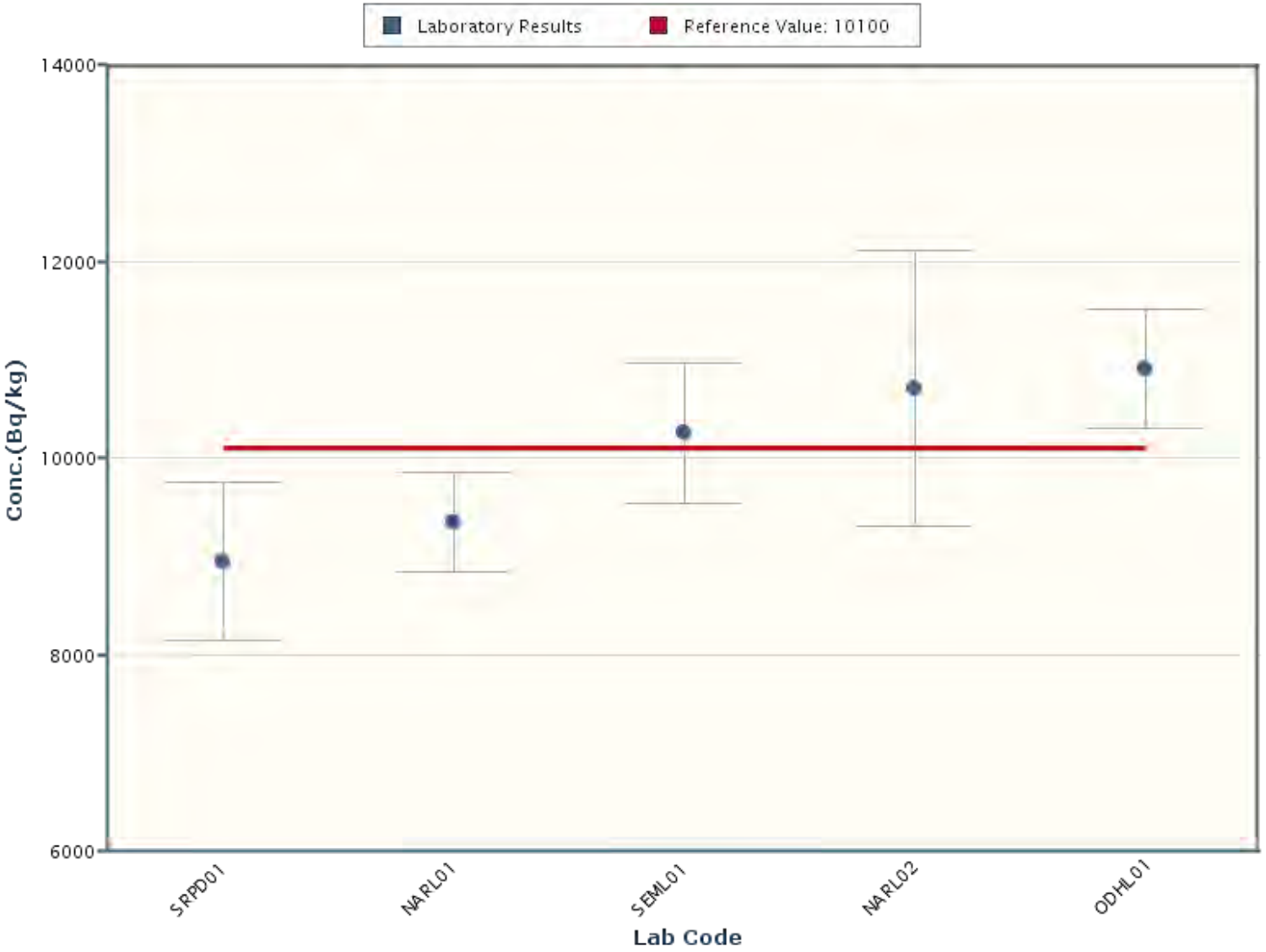
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

Potassium-40
MAPEP-16-XrM35



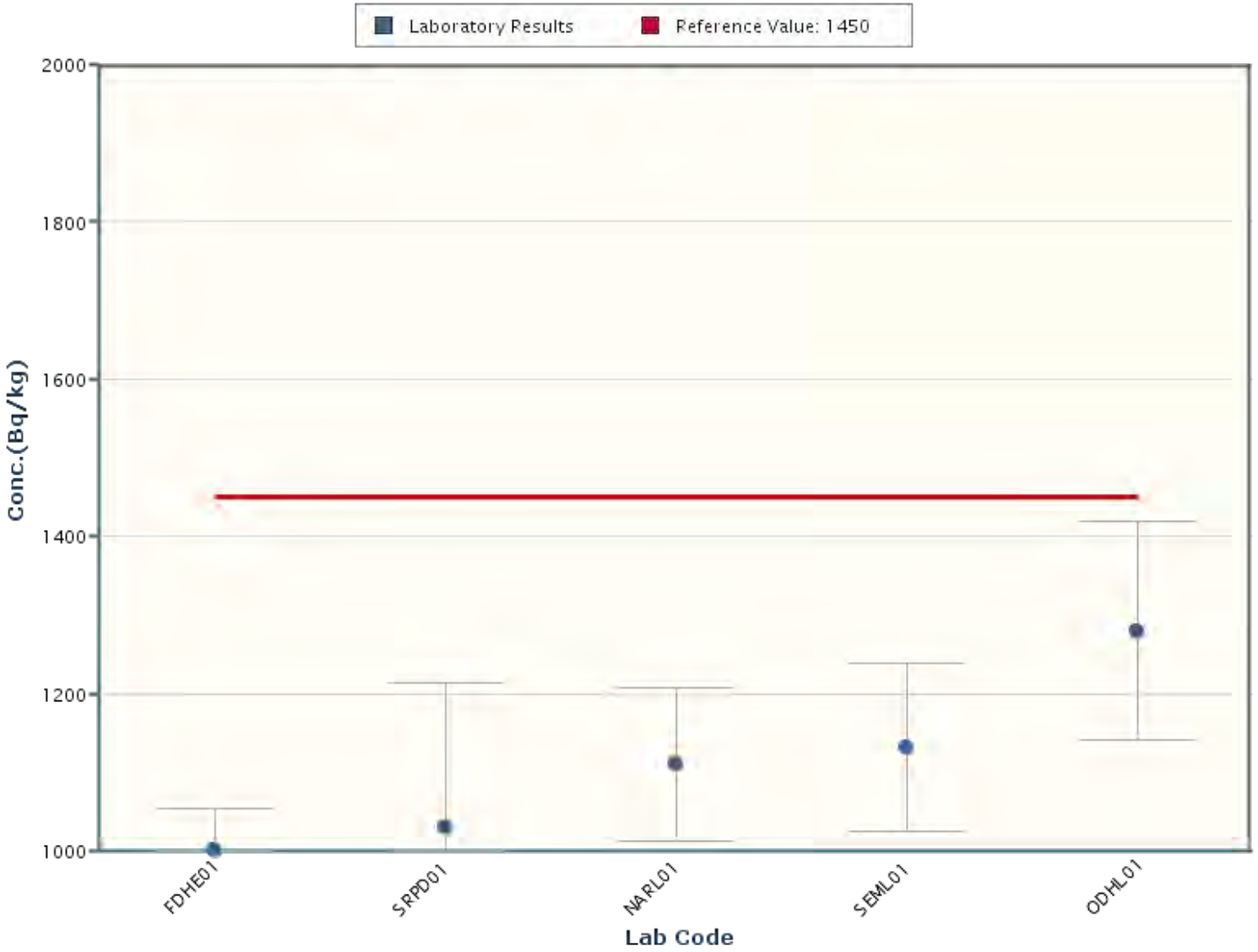
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

Ruthenium-103
MAPEP-16-XrM35



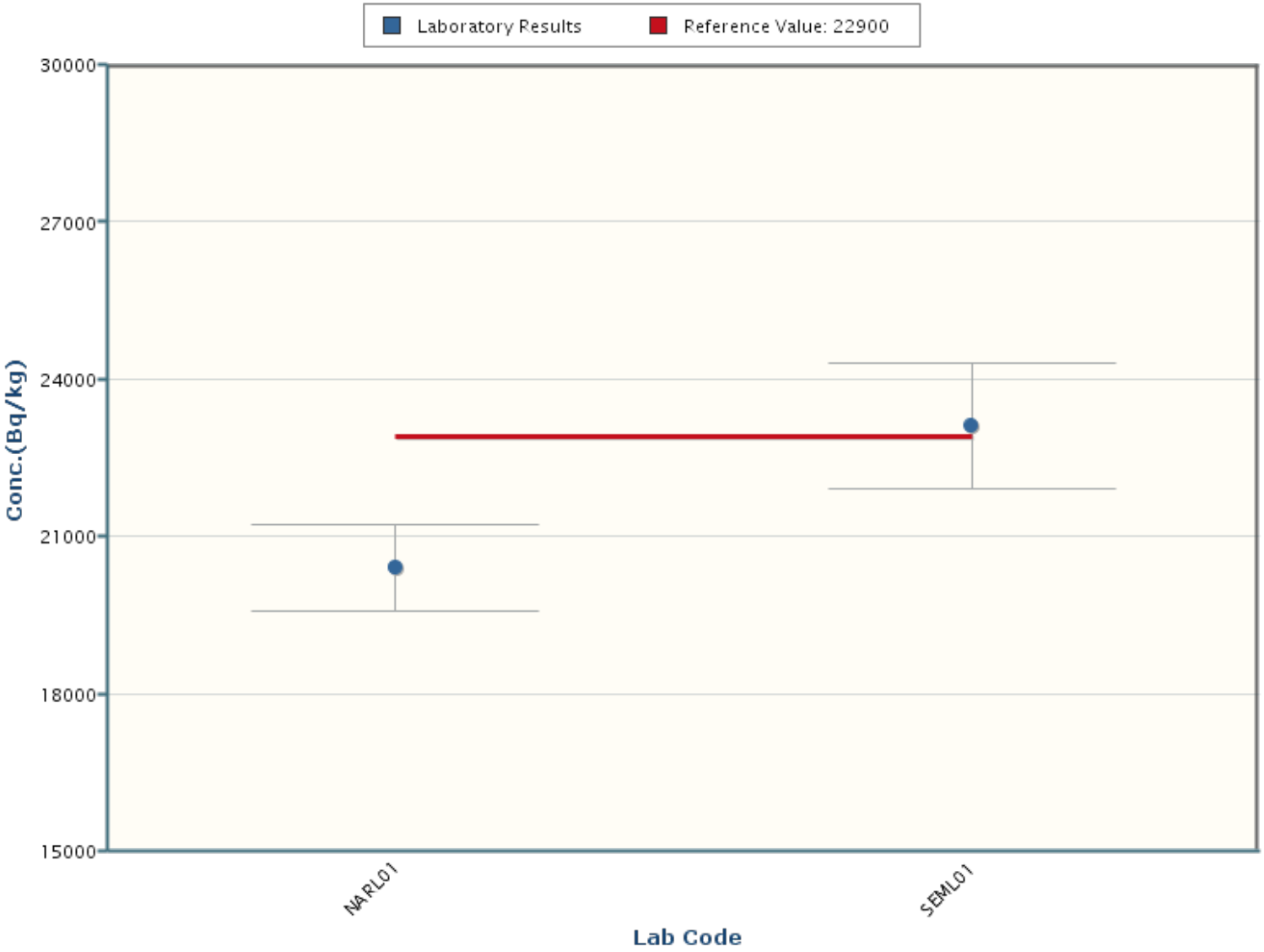
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

Ruthenium-106
MAPEP-16-XrM35



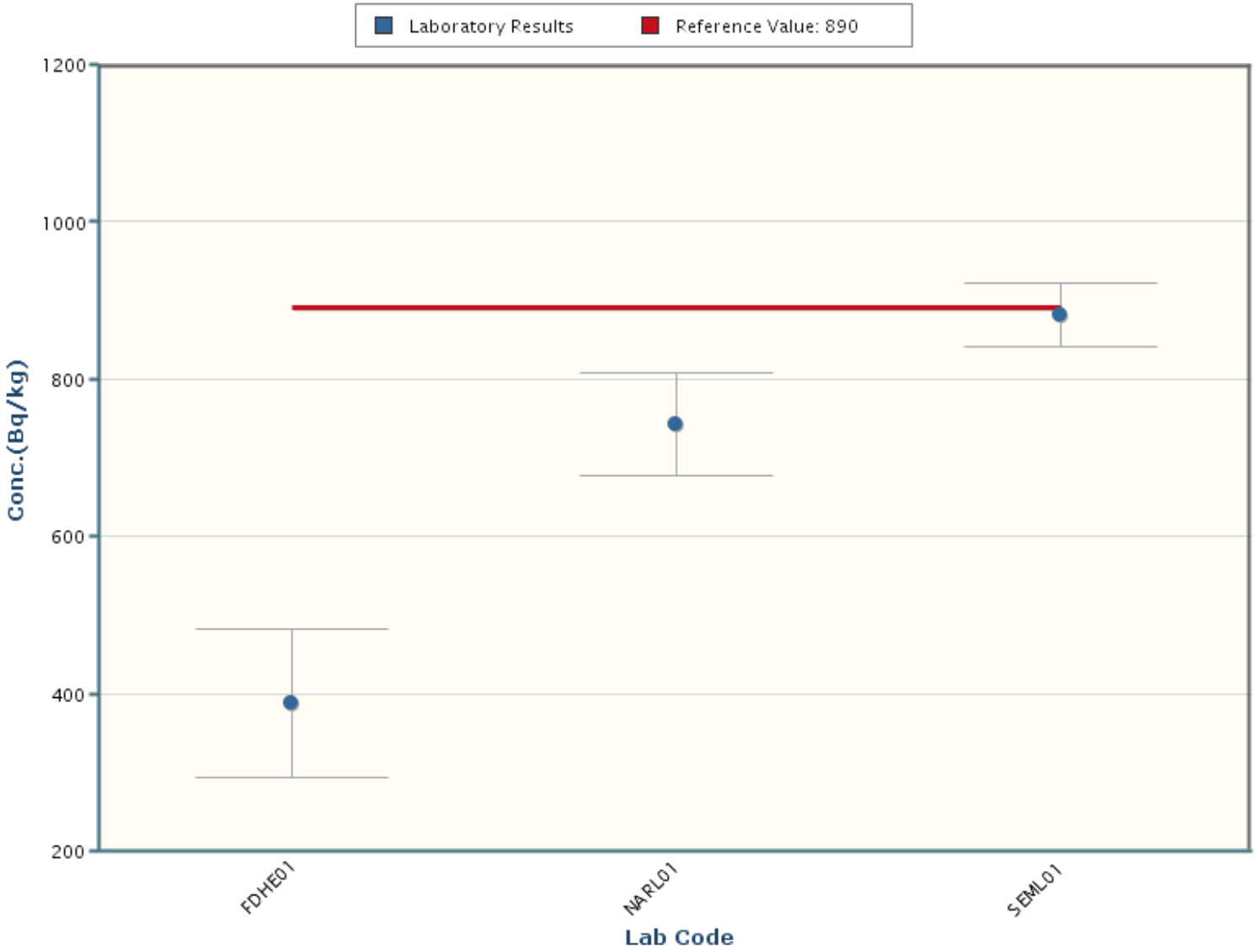
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

Strontium-89
MAPEP-16-XrM35



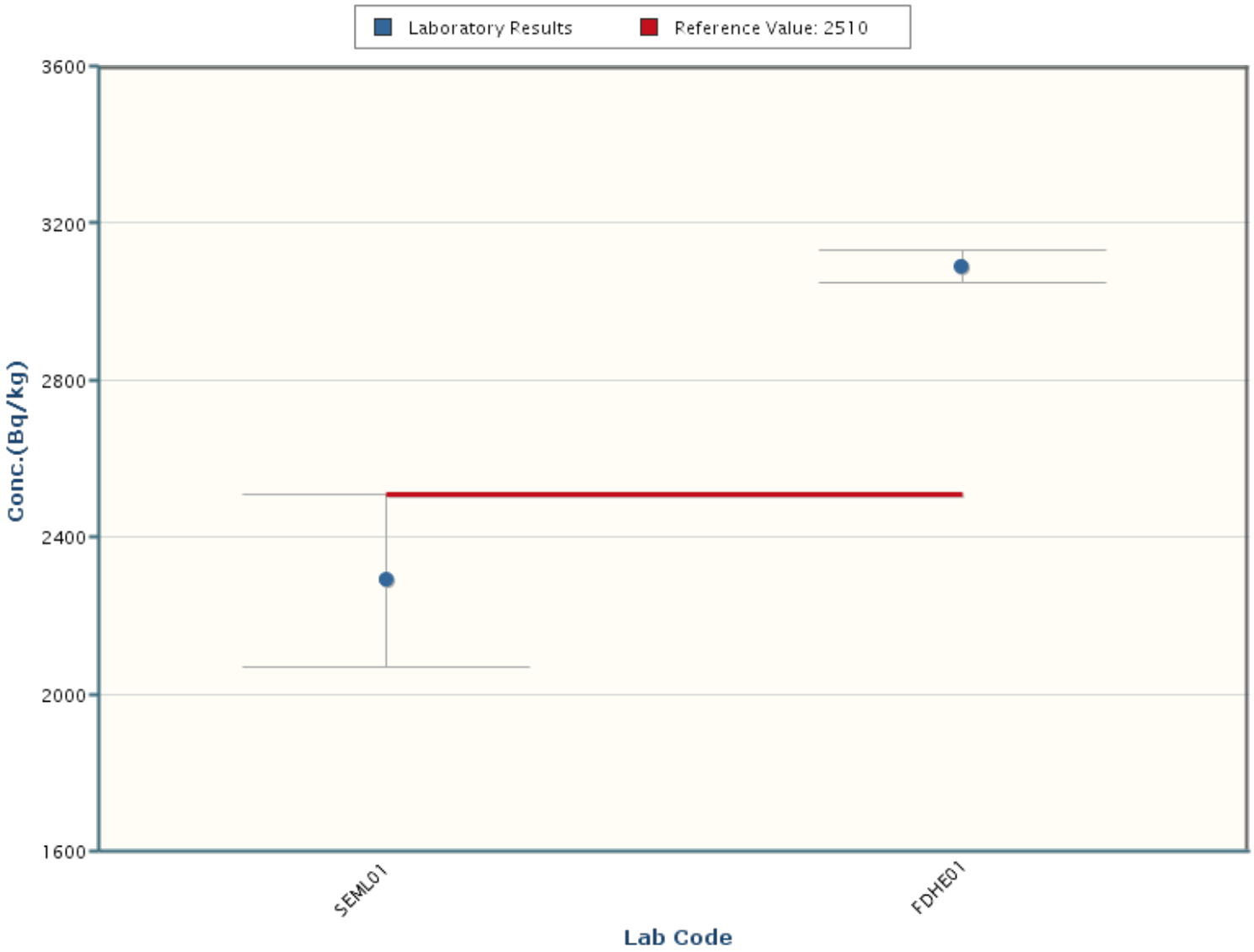
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

Strontium-90
MAPEP-16-XrM35



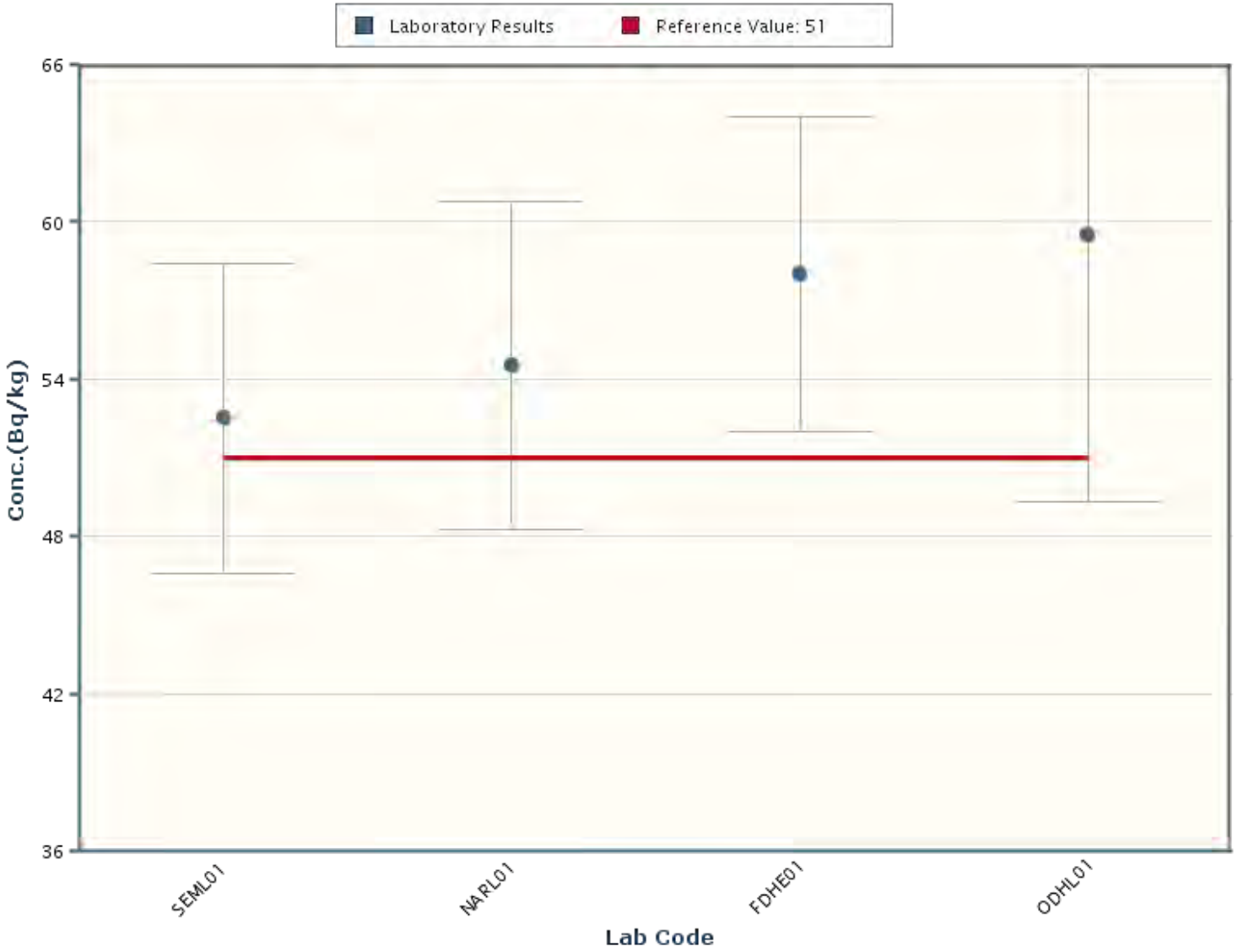
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

Uranium-234/233
MAPEP-16-XrM35



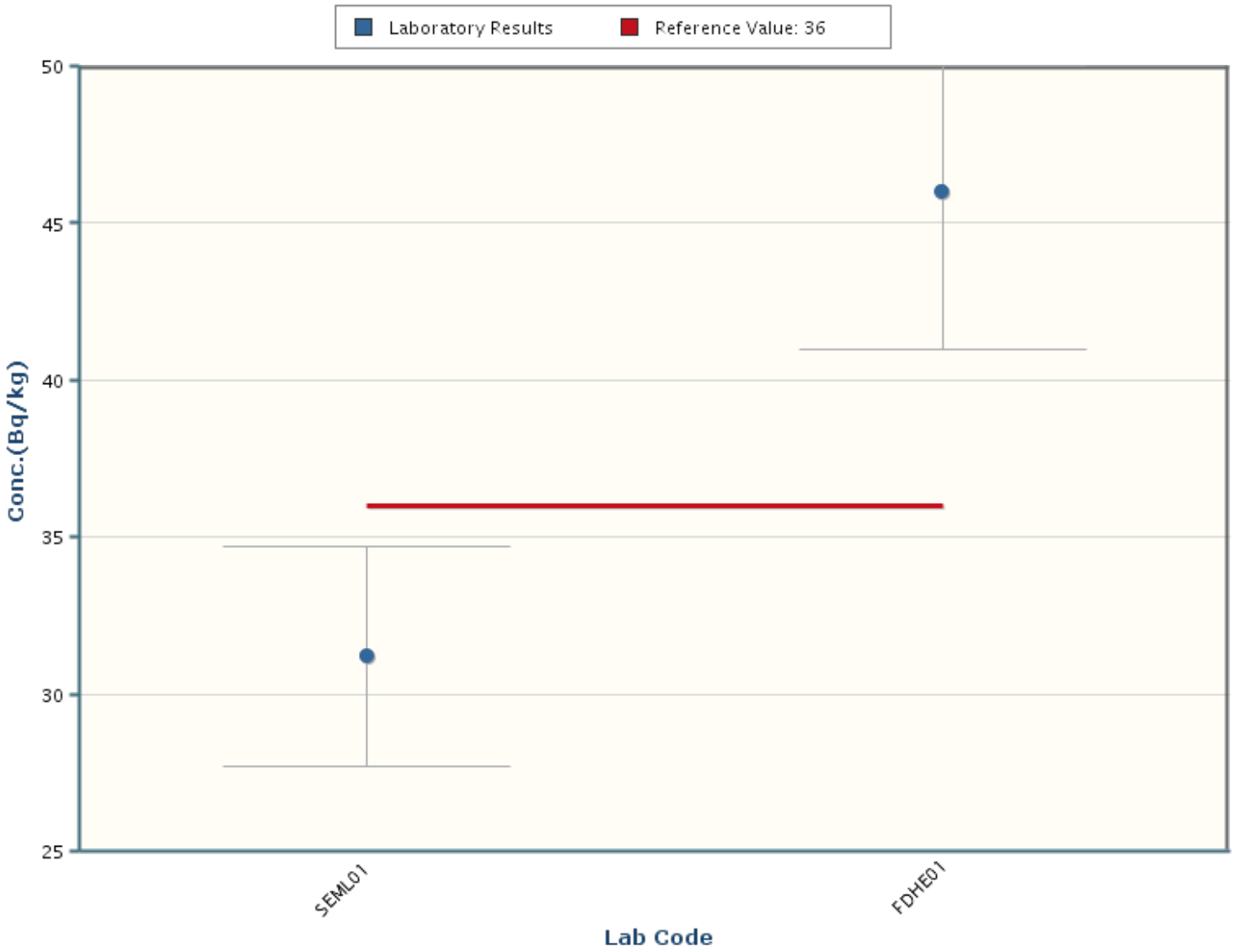
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

Uranium-235
MAPEP-16-XrM35



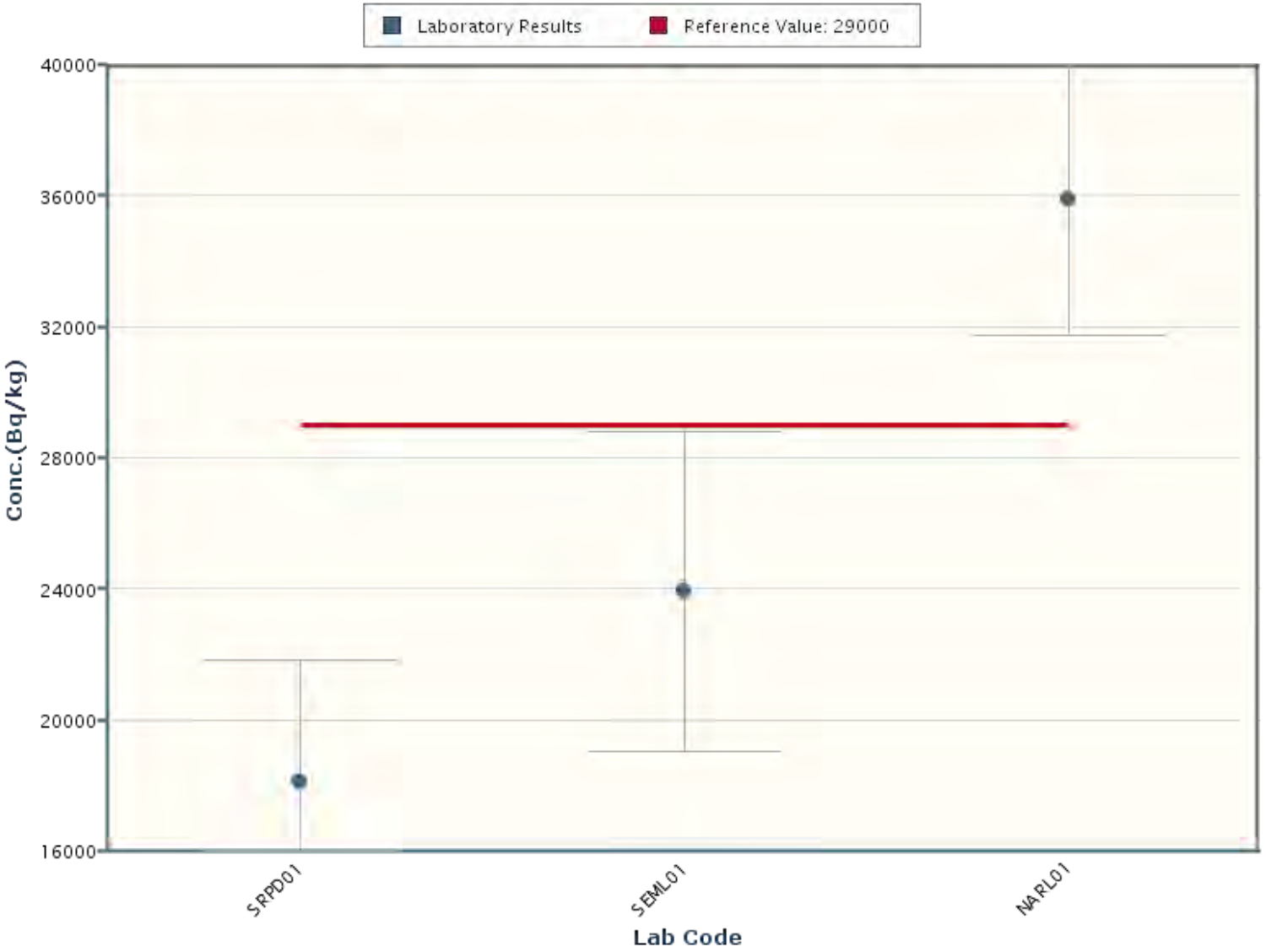
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

Uranium-238
MAPEP-16-XrM35



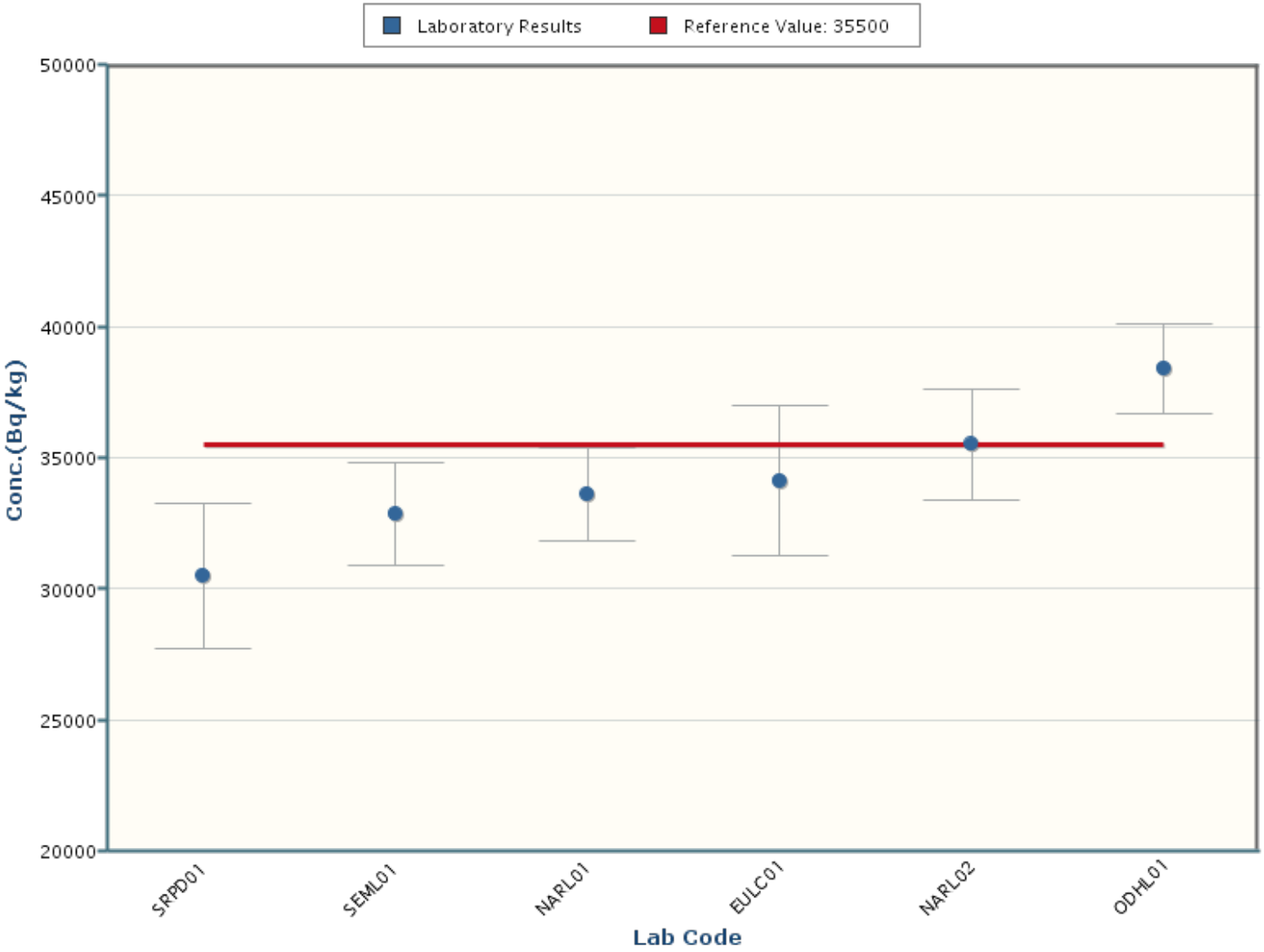
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

Yttrium-91
MAPEP-16-XrM35



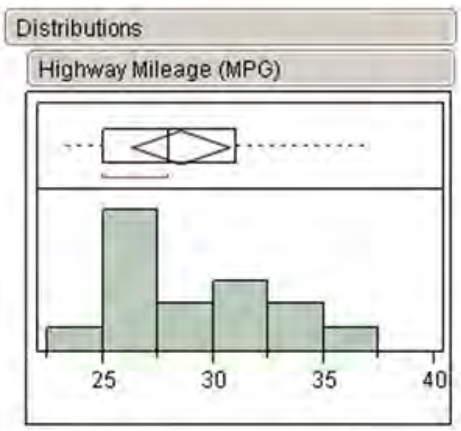
Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

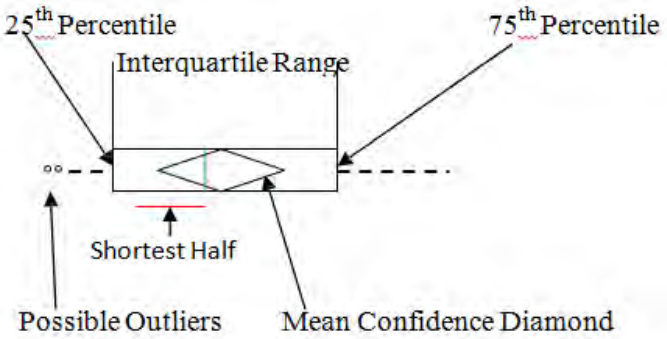
Zirconium-95
MAPEP-16-XrM35



Notes:
The error bars encompassing each result are plotted at ± one standard deviation.

The intent of the distribution graphs contained within this report is to graphically demonstrate to users how % Bias data within the current MAPEP Series appears when examined by matrix, by analyte, by method of sample preparation or by method of detection. The data points (small 'dots') plot the bias (or z-score for organic constituents) of each of the analytes in each of the matrices. Biases greater than +/- 100% have been screened from the data. The BLACK small vertical line inside the small rectangle at the top of the data distribution graph is the mean of the population of the bias shown for that analyte in the matrix.





Moments

Mean	28.466667
Std Dev	3.9797104
Std Err Mean	1.0275568
Upper 95% Mean	30.670557
Lower 95% Mean	26.262776
N	15
Sum Wgt	15
Sum	427
Variance	15.838095
Skewness	0.7309964
Kurtosis	-0.165153
CV	13.980247
N Missing	0

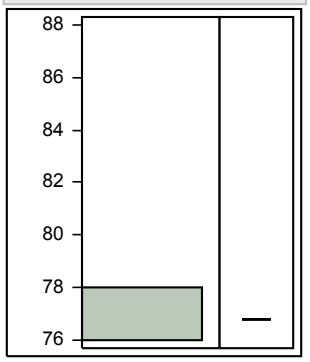
The box plots summarize the distribution of points for each analyte. The ends of the box are the 25th and 75th quantiles. The difference between the quartiles is the interquartile range. The line across the middle of the box identifies the median bias value. Each box has lines, sometimes called whiskers, which extend from each end. The whiskers extend from the ends of the small box to the outermost data point that falls within the distances computed. The bracket along the edge of the box identified the shortest half, which is the most dense 50% of the observations. Potential outliers are represented as small black dots.

The box plot of the bias data points and the mean visually illustrate the breadth of the distribution and where potential outliers in the distribution might lie. The moments for the distribution plot are provided below the Bias plot. In some cases, N becomes very small and thus developed statistics may not accurately reflect estimates of the population if N were a significantly larger value.

XrM Distribution by Detection Method

Distributions Analyte_Detection=Barium-140 Gamma Spectrometry

Bias



Quantiles

100.0%	maximum	76.8
99.5%		76.8
97.5%		76.8
90.0%		76.8
75.0%	quartile	76.8
50.0%	median	76.8
25.0%	quartile	76.8
10.0%		76.8
2.5%		76.8
0.5%		76.8
0.0%	minimum	76.8

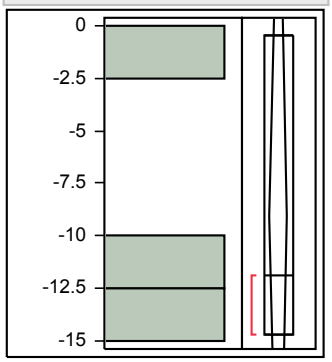
Summary Statistics

Mean	76.8
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Cerium-141 Gamma Spectrometry

Bias



Quantiles

100.0%	maximum	-0.5
99.5%		-0.5
97.5%		-0.5
90.0%		-0.5
75.0%	quartile	-0.5
50.0%	median	-11.9
25.0%	quartile	-14.7
10.0%		-14.7
2.5%		-14.7
0.5%		-14.7
0.0%	minimum	-14.7

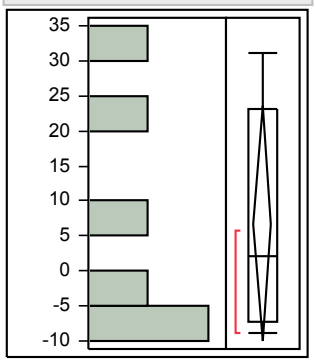
Summary Statistics

Mean	-9.0
Std Dev	7.5
Std Err Mean	4.3
Upper 95% Mean	9.7
Lower 95% Mean	-27.7
N	3.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Cerium-144 Gamma Spectrometry

Bias



Quantiles

100.0%	maximum	31.1
99.5%		31.1
97.5%		31.1
90.0%		31.1
75.0%	quartile	23.2
50.0%	median	2.1
25.0%	quartile	-7.3
10.0%		-8.7
2.5%		-8.7
0.5%		-8.7
0.0%	minimum	-8.7

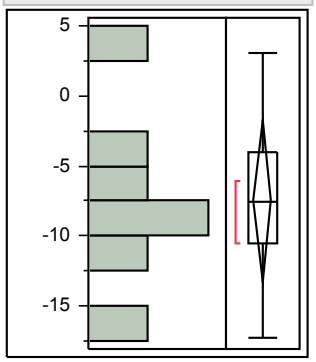
Summary Statistics

Mean	6.7
Std Dev	16.0
Std Err Mean	6.5
Upper 95% Mean	23.5
Lower 95% Mean	-10.1
N	6.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Cesium-137 Gamma Spectrometry

Bias



Quantiles

100.0%	maximum	3.0
99.5%		3.0
97.5%		3.0
90.0%		3.0
75.0%	quartile	-4.0
50.0%	median	-7.6
25.0%	quartile	-10.5
10.0%		-17.3
2.5%		-17.3
0.5%		-17.3
0.0%	minimum	-17.3

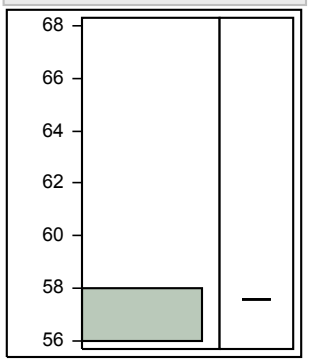
Summary Statistics

Mean	-7.5
Std Dev	6.3
Std Err Mean	2.4
Upper 95% Mean	-1.7
Lower 95% Mean	-13.3
N	7.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Lanthanum-140 Gamma Spectrometry

Bias



Quantiles

100.0%	maximum	57.6
99.5%		57.6
97.5%		57.6
90.0%		57.6
75.0%	quartile	57.6
50.0%	median	57.6
25.0%	quartile	57.6
10.0%		57.6
2.5%		57.6
0.5%		57.6
0.0%	minimum	57.6

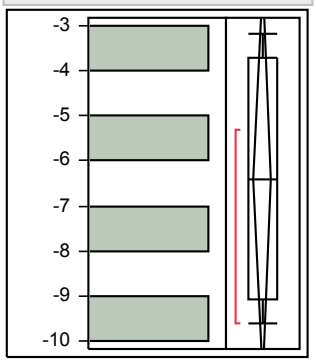
Summary Statistics

Mean	57.6
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Niobium-95 Gamma Spectrometry

Bias



Quantiles

100.0%	maximum	-3.2
99.5%		-3.2
97.5%		-3.2
90.0%		-3.2
75.0%	quartile	-3.7
50.0%	median	-6.4
25.0%	quartile	-9.1
10.0%		-9.6
2.5%		-9.6
0.5%		-9.6
0.0%	minimum	-9.6

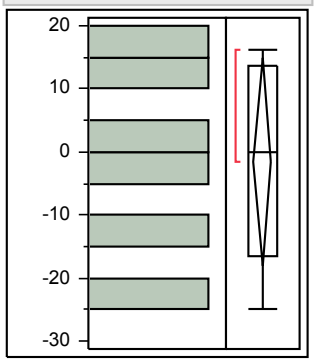
Summary Statistics

Mean	-6.4
Std Dev	2.8
Std Err Mean	1.4
Upper 95% Mean	-2.0
Lower 95% Mean	-10.8
N	4.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Potassium-40 Gamma Spectrometry

Bias



Quantiles

100.0%	maximum	16.2
99.5%		16.2
97.5%		16.2
90.0%		16.2
75.0%	quartile	13.7
50.0%	median	-0.2
25.0%	quartile	-16.5
10.0%		-24.9
2.5%		-24.9
0.5%		-24.9
0.0%	minimum	-24.9

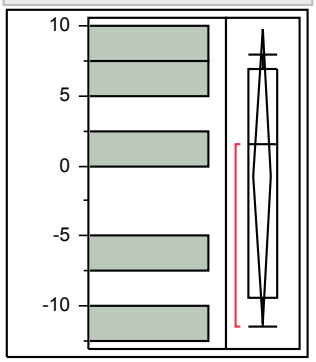
Summary Statistics

Mean	-1.6
Std Dev	15.7
Std Err Mean	6.4
Upper 95% Mean	14.8
Lower 95% Mean	-18.1
N	6.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Ruthenium-103 Gamma Spectrometry

Bias



Quantiles

100.0%	maximum	7.9
99.5%		7.9
97.5%		7.9
90.0%		7.9
75.0%	quartile	6.9
50.0%	median	1.5
25.0%	quartile	-9.5
10.0%		-11.5
2.5%		-11.5
0.5%		-11.5
0.0%	minimum	-11.5

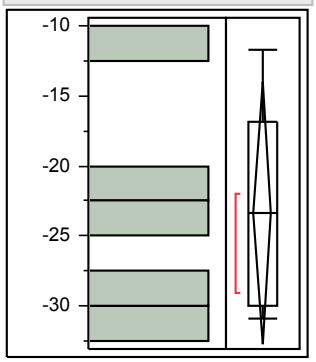
Summary Statistics

Mean	-0.7
Std Dev	8.4
Std Err Mean	3.8
Upper 95% Mean	9.7
Lower 95% Mean	-11.2
N	5.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Ruthenium-106 Gamma Spectrometry

Bias



Quantiles

100.0%	maximum	-11.7
99.5%		-11.7
97.5%		-11.7
90.0%		-11.7
75.0%	quartile	-16.9
50.0%	median	-23.4
25.0%	quartile	-30.0
10.0%		-30.9
2.5%		-30.9
0.5%		-30.9
0.0%	minimum	-30.9

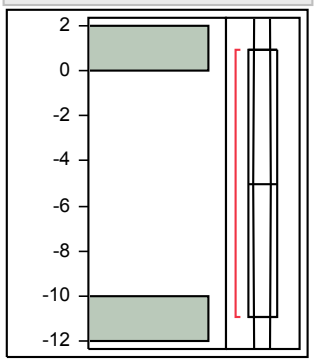
Summary Statistics

Mean	-23.4
Std Dev	7.5
Std Err Mean	3.4
Upper 95% Mean	-14.1
Lower 95% Mean	-32.7
N	5.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Strontium-89 Beta Counting - 2 pi gas flow proportional counter

Bias



Quantiles

100.0%	maximum	0.9
99.5%		0.9
97.5%		0.9
90.0%		0.9
75.0%	quartile	0.9
50.0%	median	-5.0
25.0%	quartile	-10.9
10.0%		-10.9
2.5%		-10.9
0.5%		-10.9
0.0%	minimum	-10.9

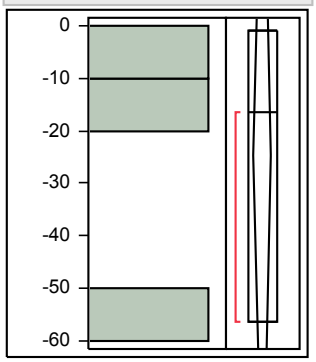
Summary Statistics

Mean	-5.0
Std Dev	8.3
Std Err Mean	5.9
Upper 95% Mean	70.0
Lower 95% Mean	-80.0
N	2.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Strontium-90 Beta Counting - 2 pi gas flow proportional counter

Bias



Quantiles

100.0%	maximum	-1.0
99.5%		-1.0
97.5%		-1.0
90.0%		-1.0
75.0%	quartile	-1.0
50.0%	median	-16.6
25.0%	quartile	-56.4
10.0%		-56.4
2.5%		-56.4
0.5%		-56.4
0.0%	minimum	-56.4

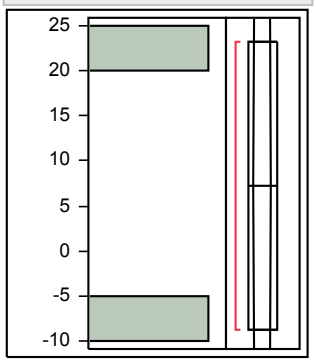
Summary Statistics

Mean	-24.7
Std Dev	28.6
Std Err Mean	16.5
Upper 95% Mean	46.3
Lower 95% Mean	-95.6
N	3.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Uranium-234/233 Alpha Spectrometry

Bias



Quantiles

100.0%	maximum	23.1
99.5%		23.1
97.5%		23.1
90.0%		23.1
75.0%	quartile	23.1
50.0%	median	7.2
25.0%	quartile	-8.8
10.0%		-8.8
2.5%		-8.8
0.5%		-8.8
0.0%	minimum	-8.8

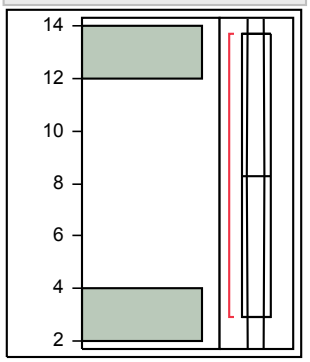
Summary Statistics

Mean	7.2
Std Dev	22.6
Std Err Mean	16.0
Upper 95% Mean	209.8
Lower 95% Mean	-195.5
N	2.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Uranium-235 Alpha Spectrometry

Bias



Quantiles

100.0%	maximum	13.7
99.5%		13.7
97.5%		13.7
90.0%		13.7
75.0%	quartile	13.7
50.0%	median	8.3
25.0%	quartile	2.9
10.0%		2.9
2.5%		2.9
0.5%		2.9
0.0%	minimum	2.9

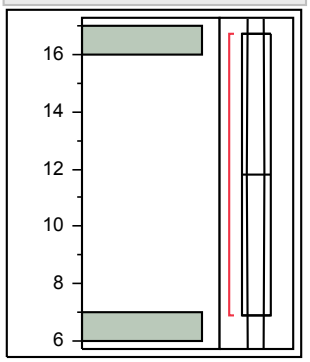
Summary Statistics

Mean	8.3
Std Dev	7.6
Std Err Mean	5.4
Upper 95% Mean	76.9
Lower 95% Mean	-60.3
N	2.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Uranium-235 Gamma Spectrometry

Bias



Quantiles

100.0%	maximum	16.7
99.5%		16.7
97.5%		16.7
90.0%		16.7
75.0%	quartile	16.7
50.0%	median	11.8
25.0%	quartile	6.9
10.0%		6.9
2.5%		6.9
0.5%		6.9
0.0%	minimum	6.9

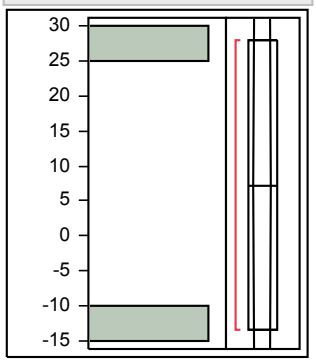
Summary Statistics

Mean	11.8
Std Dev	6.9
Std Err Mean	4.9
Upper 95% Mean	74.1
Lower 95% Mean	-50.5
N	2.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Uranium-238 Alpha Spectrometry

Bias



Quantiles

100.0%	maximum	27.8
99.5%		27.8
97.5%		27.8
90.0%		27.8
75.0%	quartile	27.8
50.0%	median	7.3
25.0%	quartile	-13.3
10.0%		-13.3
2.5%		-13.3
0.5%		-13.3
0.0%	minimum	-13.3

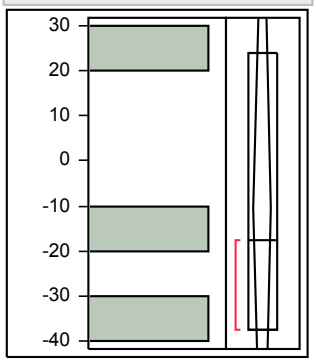
Summary Statistics

Mean	7.3
Std Dev	29.1
Std Err Mean	20.6
Upper 95% Mean	268.4
Lower 95% Mean	-253.9
N	2.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Yttrium-91 Gamma Spectrometry

Bias



Quantiles

100.0%	maximum	23.8
99.5%		23.8
97.5%		23.8
90.0%		23.8
75.0%	quartile	23.8
50.0%	median	-17.5
25.0%	quartile	-37.6
10.0%		-37.6
2.5%		-37.6
0.5%		-37.6
0.0%	minimum	-37.6

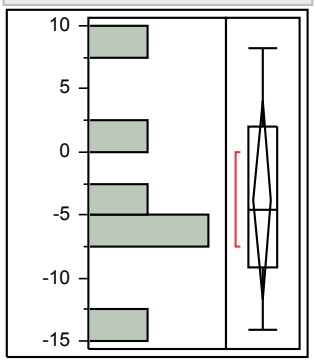
Summary Statistics

Mean	-10.4
Std Dev	31.3
Std Err Mean	18.1
Upper 95% Mean	67.3
Lower 95% Mean	-88.2
N	3.0

XrM Distribution by Detection Method

Distributions Analyte_Detection=Zirconium-95 Gamma Spectrometry

Bias



Quantiles

100.0%	maximum	8.2
99.5%		8.2
97.5%		8.2
90.0%		8.2
75.0%	quartile	2.1
50.0%	median	-4.7
25.0%	quartile	-9.2
10.0%		-14.1
2.5%		-14.1
0.5%		-14.1
0.0%	minimum	-14.1

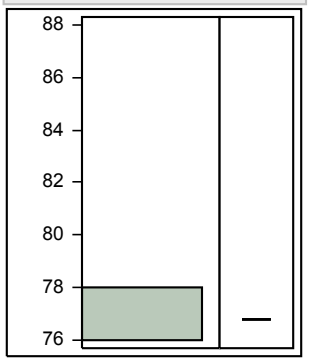
Summary Statistics

Mean	-3.8
Std Dev	7.5
Std Err Mean	3.1
Upper 95% Mean	4.1
Lower 95% Mean	-11.6
N	6.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Barium-140
No preparation - analyzed as received

Bias



Quantiles

100.0%	maximum	76.8
99.5%		76.8
97.5%		76.8
90.0%		76.8
75.0%	quartile	76.8
50.0%	median	76.8
25.0%	quartile	76.8
10.0%		76.8
2.5%		76.8
0.5%		76.8
0.0%	minimum	76.8

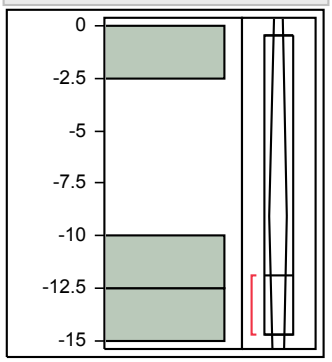
Summary Statistics

Mean	76.8
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Cerium-141
No preparation - analyzed as received

Bias



Quantiles

100.0%	maximum	-0.5
99.5%		-0.5
97.5%		-0.5
90.0%		-0.5
75.0%	quartile	-0.5
50.0%	median	-11.9
25.0%	quartile	-14.7
10.0%		-14.7
2.5%		-14.7
0.5%		-14.7
0.0%	minimum	-14.7

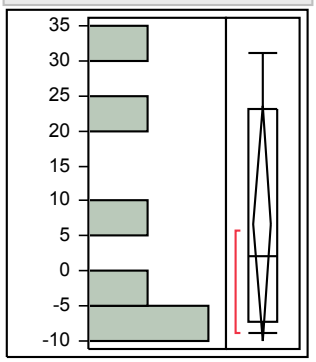
Summary Statistics

Mean	-9.0
Std Dev	7.5
Std Err Mean	4.3
Upper 95% Mean	9.7
Lower 95% Mean	-27.7
N	3.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Cerium-144
No preparation - analyzed as received

Bias



Quantiles

100.0%	maximum	31.1
99.5%		31.1
97.5%		31.1
90.0%		31.1
75.0%	quartile	23.2
50.0%	median	2.1
25.0%	quartile	-7.3
10.0%		-8.7
2.5%		-8.7
0.5%		-8.7
0.0%	minimum	-8.7

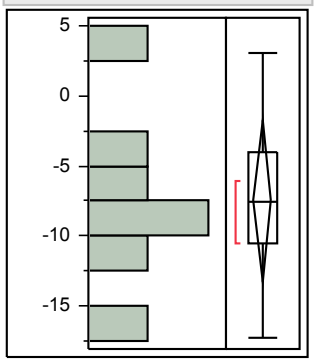
Summary Statistics

Mean	6.7
Std Dev	16.0
Std Err Mean	6.5
Upper 95% Mean	23.5
Lower 95% Mean	-10.1
N	6.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Cesium-137
No preparation - analyzed as received

Bias



Quantiles

100.0%	maximum	3.0
99.5%		3.0
97.5%		3.0
90.0%		3.0
75.0%	quartile	-4.0
50.0%	median	-7.6
25.0%	quartile	-10.5
10.0%		-17.3
2.5%		-17.3
0.5%		-17.3
0.0%	minimum	-17.3

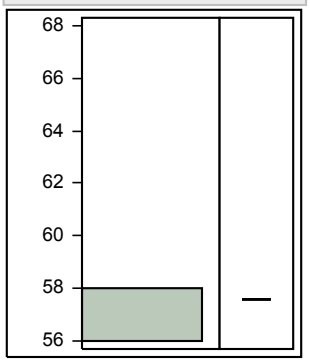
Summary Statistics

Mean	-7.5
Std Dev	6.3
Std Err Mean	2.4
Upper 95% Mean	-1.7
Lower 95% Mean	-13.3
N	7.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Lanthanum-140 No preparation - analyzed as received

Bias



Quantiles

100.0%	maximum	57.6
99.5%		57.6
97.5%		57.6
90.0%		57.6
75.0%	quartile	57.6
50.0%	median	57.6
25.0%	quartile	57.6
10.0%		57.6
2.5%		57.6
0.5%		57.6
0.0%	minimum	57.6

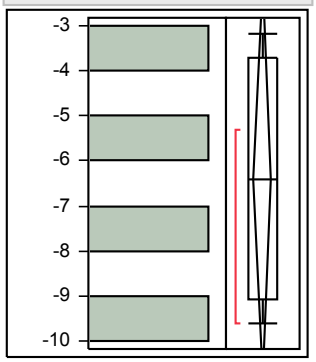
Summary Statistics

Mean	57.6
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Niobium-95
No preparation - analyzed as received

Bias



Quantiles

100.0%	maximum	-3.2
99.5%		-3.2
97.5%		-3.2
90.0%		-3.2
75.0%	quartile	-3.7
50.0%	median	-6.4
25.0%	quartile	-9.1
10.0%		-9.6
2.5%		-9.6
0.5%		-9.6
0.0%	minimum	-9.6

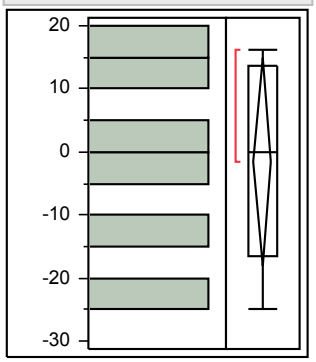
Summary Statistics

Mean	-6.4
Std Dev	2.8
Std Err Mean	1.4
Upper 95% Mean	-2.0
Lower 95% Mean	-10.8
N	4.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Potassium-40 No preparation - analyzed as received

Bias



Quantiles

100.0%	maximum	16.2
99.5%		16.2
97.5%		16.2
90.0%		16.2
75.0%	quartile	13.7
50.0%	median	-0.2
25.0%	quartile	-16.5
10.0%		-24.9
2.5%		-24.9
0.5%		-24.9
0.0%	minimum	-24.9

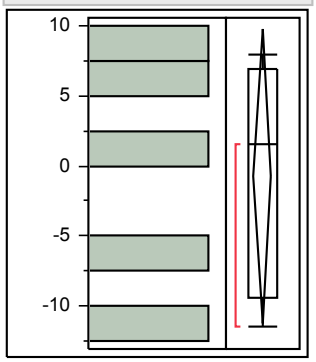
Summary Statistics

Mean	-1.6
Std Dev	15.7
Std Err Mean	6.4
Upper 95% Mean	14.8
Lower 95% Mean	-18.1
N	6.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Ruthenium-103 No preparation - analyzed as received

Bias



Quantiles

100.0%	maximum	7.9
99.5%		7.9
97.5%		7.9
90.0%		7.9
75.0%	quartile	6.9
50.0%	median	1.5
25.0%	quartile	-9.5
10.0%		-11.5
2.5%		-11.5
0.5%		-11.5
0.0%	minimum	-11.5

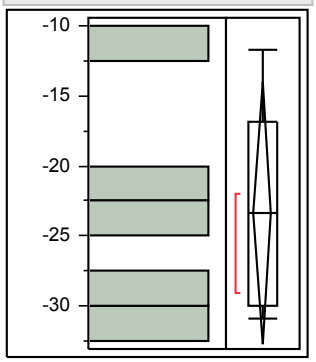
Summary Statistics

Mean	-0.7
Std Dev	8.4
Std Err Mean	3.8
Upper 95% Mean	9.7
Lower 95% Mean	-11.2
N	5.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Ruthenium-106 No preparation - analyzed as received

Bias



Quantiles

100.0%	maximum	-11.7
99.5%		-11.7
97.5%		-11.7
90.0%		-11.7
75.0%	quartile	-16.9
50.0%	median	-23.4
25.0%	quartile	-30.0
10.0%		-30.9
2.5%		-30.9
0.5%		-30.9
0.0%	minimum	-30.9

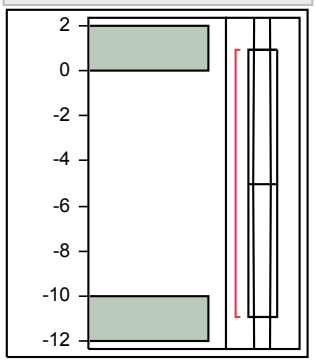
Summary Statistics

Mean	-23.4
Std Dev	7.5
Std Err Mean	3.4
Upper 95% Mean	-14.1
Lower 95% Mean	-32.7
N	5.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Strontium-89 Total dissolution by fusion

Bias



Quantiles

100.0%	maximum	0.9
99.5%		0.9
97.5%		0.9
90.0%		0.9
75.0%	quartile	0.9
50.0%	median	-5.0
25.0%	quartile	-10.9
10.0%		-10.9
2.5%		-10.9
0.5%		-10.9
0.0%	minimum	-10.9

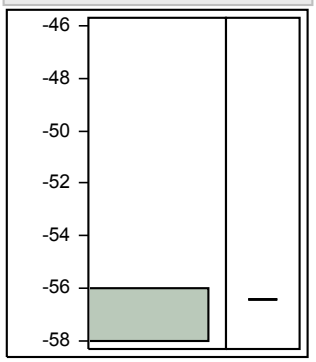
Summary Statistics

Mean	-5.0
Std Dev	8.3
Std Err Mean	5.9
Upper 95% Mean	70.0
Lower 95% Mean	-80.0
N	2.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Strontium-90 Acid leaching without hydrofluoric acid

Bias



Quantiles

100.0%	maximum	-56.4
99.5%		-56.4
97.5%		-56.4
90.0%		-56.4
75.0%	quartile	-56.4
50.0%	median	-56.4
25.0%	quartile	-56.4
10.0%		-56.4
2.5%		-56.4
0.5%		-56.4
0.0%	minimum	-56.4

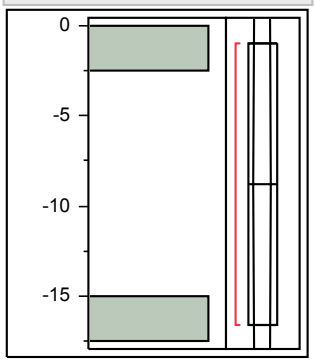
Summary Statistics

Mean	-56.4
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Strontium-90 Total dissolution by fusion

Bias



Quantiles

100.0%	maximum	-1.0
99.5%		-1.0
97.5%		-1.0
90.0%		-1.0
75.0%	quartile	-1.0
50.0%	median	-8.8
25.0%	quartile	-16.6
10.0%		-16.6
2.5%		-16.6
0.5%		-16.6
0.0%	minimum	-16.6

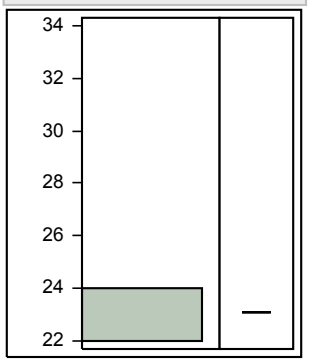
Summary Statistics

Mean	-8.8
Std Dev	11.0
Std Err Mean	7.8
Upper 95% Mean	90.3
Lower 95% Mean	-107.9
N	2.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Uranium-234/233 Acid dissolution by strong Aqua Reqia, hydrofluoric acid, etc.

Bias



Quantiles

100.0%	maximum	23.1
99.5%		23.1
97.5%		23.1
90.0%		23.1
75.0%	quartile	23.1
50.0%	median	23.1
25.0%	quartile	23.1
10.0%		23.1
2.5%		23.1
0.5%		23.1
0.0%	minimum	23.1

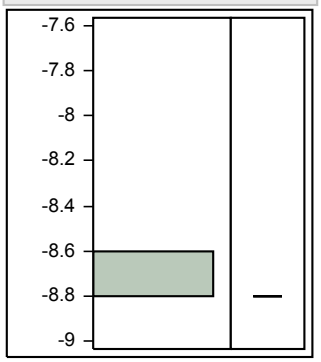
Summary Statistics

Mean	23.1
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Uranium-234/233 Total dissolution by fusion

Bias



Quantiles

100.0%	maximum	-8.8
99.5%		-8.8
97.5%		-8.8
90.0%		-8.8
75.0%	quartile	-8.8
50.0%	median	-8.8
25.0%	quartile	-8.8
10.0%		-8.8
2.5%		-8.8
0.5%		-8.8
0.0%	minimum	-8.8

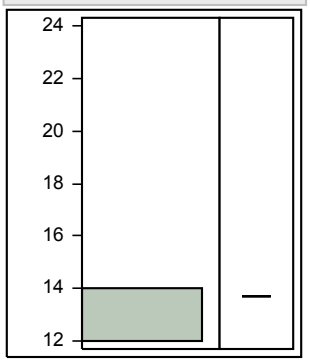
Summary Statistics

Mean	-8.8
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Uranium-235 Acid dissolution by strong Aqua Reqia, hydrofluoric acid, etc.

Bias



Quantiles

100.0%	maximum	13.7
99.5%		13.7
97.5%		13.7
90.0%		13.7
75.0%	quartile	13.7
50.0%	median	13.7
25.0%	quartile	13.7
10.0%		13.7
2.5%		13.7
0.5%		13.7
0.0%	minimum	13.7

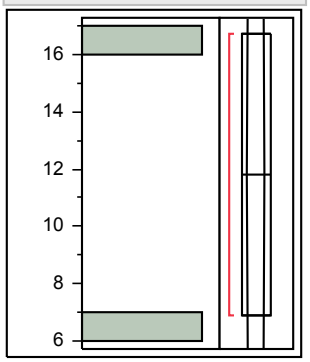
Summary Statistics

Mean	13.7
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Uranium-235 No preparation - analyzed as received

Bias



Quantiles

100.0%	maximum	16.7
99.5%		16.7
97.5%		16.7
90.0%		16.7
75.0%	quartile	16.7
50.0%	median	11.8
25.0%	quartile	6.9
10.0%		6.9
2.5%		6.9
0.5%		6.9
0.0%	minimum	6.9

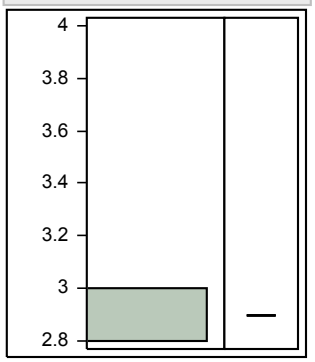
Summary Statistics

Mean	11.8
Std Dev	6.9
Std Err Mean	4.9
Upper 95% Mean	74.1
Lower 95% Mean	-50.5
N	2.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Uranium-235 Total dissolution by fusion

Bias



Quantiles

100.0%	maximum	2.9
99.5%		2.9
97.5%		2.9
90.0%		2.9
75.0%	quartile	2.9
50.0%	median	2.9
25.0%	quartile	2.9
10.0%		2.9
2.5%		2.9
0.5%		2.9
0.0%	minimum	2.9

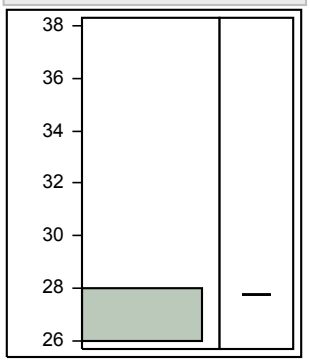
Summary Statistics

Mean	2.9
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Uranium-238 Acid dissolution by strong Aqua Reqia, hydrofluoric acid, etc.

Bias



Quantiles

100.0%	maximum	27.8
99.5%		27.8
97.5%		27.8
90.0%		27.8
75.0%	quartile	27.8
50.0%	median	27.8
25.0%	quartile	27.8
10.0%		27.8
2.5%		27.8
0.5%		27.8
0.0%	minimum	27.8

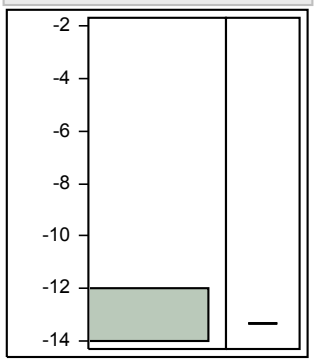
Summary Statistics

Mean	27.8
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Uranium-238 Total dissolution by fusion

Bias



Quantiles

100.0%	maximum	-13.3
99.5%		-13.3
97.5%		-13.3
90.0%		-13.3
75.0%	quartile	-13.3
50.0%	median	-13.3
25.0%	quartile	-13.3
10.0%		-13.3
2.5%		-13.3
0.5%		-13.3
0.0%	minimum	-13.3

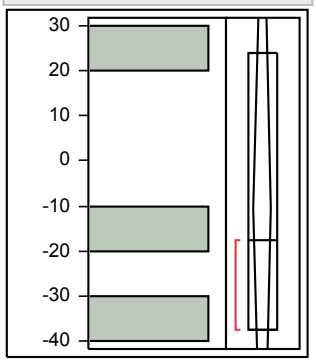
Summary Statistics

Mean	-13.3
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Yttrium-91
No preparation - analyzed as received

Bias



Quantiles

100.0%	maximum	23.8
99.5%		23.8
97.5%		23.8
90.0%		23.8
75.0%	quartile	23.8
50.0%	median	-17.5
25.0%	quartile	-37.6
10.0%		-37.6
2.5%		-37.6
0.5%		-37.6
0.0%	minimum	-37.6

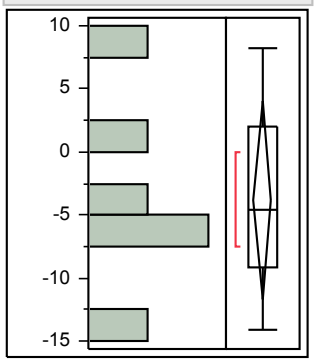
Summary Statistics

Mean	-10.4
Std Dev	31.3
Std Err Mean	18.1
Upper 95% Mean	67.3
Lower 95% Mean	-88.2
N	3.0

XrM Distribution by Prep Method

Distributions Analyte_Method=Zirconium-95 No preparation - analyzed as received

Bias



Quantiles

100.0%	maximum	8.2
99.5%		8.2
97.5%		8.2
90.0%		8.2
75.0%	quartile	2.1
50.0%	median	-4.7
25.0%	quartile	-9.2
10.0%		-14.1
2.5%		-14.1
0.5%		-14.1
0.0%	minimum	-14.1

Summary Statistics

Mean	-3.8
Std Dev	7.5
Std Err Mean	3.1
Upper 95% Mean	4.1
Lower 95% Mean	-11.6
N	6.0