United States
Environmental Protection
Agency

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Washington, DC 20460

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August 1996

EPA

Uranium-Radium in Water Performance Evaluation Study

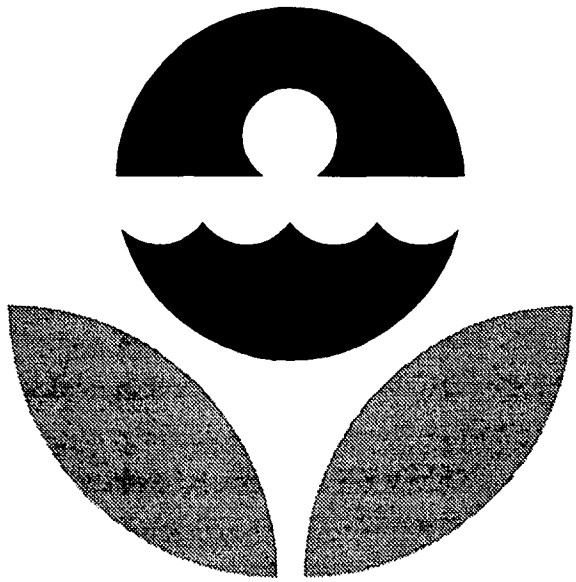
A Statistical Evaluation of the June 21,1996 Data

023RSL96.COV-101

Uranium-Radium in Water

Performance Evaluation Study

June 21, 1996



Environmental Protection Agency

National Exposure Research Laboratory

Characterization Research Division

Las Vegas, Nevada

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
NATIONAL EXPOSURE RESEARCH LABORATORY
CHARACTERIZATION RESEARCH DIVISION-LAS VEGAS
P.O. BOX 93478
LAS VEGAS, NEVADA 89193-3478
(702/798-2100)

Dear Participant,

Enclosed are the results of the Analytical Sciences Branch (CRD-LV) Performance Evaluation Study for ***Uranium-Radium in Water; June 21, 1996.***

The known value for each analysis was determined by gravimetric methods, checked by chemical analyses performed by CRD-LV's Radiochemistry Laboratory, and compared to the participating laboratories' grand average.

The expected precision, determined by the known value, was taken from "Table 3. Laboratory Precision: One Standard Deviation Values and Control Limits for Various Analyses", which is based on data accumulated over the years by the Performance Evaluation Program, and can be found in the Environmental Radioactivity Performance Evaluation Studies Program and Radioactive Standards Distribution Program information brochure.

Please take a few minutes to review this report and the analytical data your laboratory submitted to us. If there are any apparent discrepancies, please notify us immediately.

We encourage you to make use of the computer-automated data-entry system that has been in place for some time now. As the number of participants increases, and it becomes unrealistic for us to receive results by mail or FAX, the computer system will be our only avenue for accepting data.

If you have any questions or comments, please send a message via the data-entry system or contact Stephen Pia at 702/798-2102 or Patricia Honsa at 702/798-2141.

Sincerely,

Stephen Pia
Team Leader
RADQA Program

Enclosure

NOTICE

This material has been funded wholly by
the U.S. Environmental Protection Agency.
It has been subjected to the Agency's review,
and has been approved for publication as
an EPA document.

The following pages consist of separate sections for each of the nuclides in this study with four parts per section. After the first, each part is separated from the next by a new page or a thick horizontal bar. The first page of each section is a statistical summary for the nuclide and starts with a statement of the known value, the control limits, and the warning limits.

The warning limits are placed at two normalized standard deviations above and below the known value and the control limits are three normalized standard deviations above and below the known value. If you keep control charts, these values will be useful for anticipating problems with the accuracy of your analytical methods.

The coin shaped pie chart at the top of the summary page shows the fate of all the samples sent out in number and percentage terms. The pie chart starts at the top and rotates clockwise. The first sector represents those participants who submitted analytical results within both the warning and control limits. The next sector represents those who are in the warning region but not out of control. The third sector represents those who are out of control, but have passed the outlier test. The fourth sector represents those who have failed the outlier test. The last sector represents those participants who have failed to respond properly. This is the case if no analytical results were returned, or less than three determinations were reported, or if the results were received too late. The reeding on the edge of the coin is spaced at one percent intervals, and the sector shading becomes darker as the data reliability decreases. Sectors with zero width are not shown.

The table in the center shows a number of statistical quantities calculated from the submitted data based on the mean and median values in relation to the known value, both before and after outlier removal. The lower pie chart uses the same construction as the upper chart and shows the distribution of properly submitted data in terms of deviation from the known value divided into sectors representing one, two, three, and greater than three normalized standard deviations.

The second part is an alphabetical listing, in lab-code order, of submitted data and several calculated quantities. An entry that is shaded has been rejected because of one of the reasons listed above or failure of the outlier test. The fifth and sixth columns are a measure of laboratory precision. The Range analysis is a normalized value that you may use to keep precision control charts. The eighth and ninth columns are the differences from the mean of all non-outliers and from the known value, respectively. If this value is between 2.0 and 3.0, your analytical process precision is in the warning zone; if it exceeds 3.0 it is out of control. A tag symbol may appear in the last column. Each page with tags has a symbol definition summary at the bottom. If there is no tag symbol, the data is within the control limits, but it may be in the warning zone.

The third part is a three-column listing of result average, tag symbol, and lab-code in average order excluding those labs not responding properly. In this order, all outliers and out-of-control results appear at the top or bottom of the list.

The last part is two bar chart displays showing frequency distributions of responding participants. The first chart places the known value at the center and a bar at each 0.2 unit of expected precision. The second chart places the mean of the reported measurements at the center and a bar at each 0.2 unit of standard deviation. In both cases, a bar includes those results within 0.1 unit up to the maximum of six. Any results more than six units from the center value are shown cumulatively by a shaded bar one past the sixth unit. If the central tendency of the known value distribution falls away from the center, an error in accuracy is indicated. If the distribution is broad, poor precision is indicated. The mean value distribution is similar but uses the average and standard deviation of reported results as its basis.

The Range Analysis(R + SR) is calculated from the range, mean range and standard error of the range values. The range is the difference between the maximum and minimum results for the laboratory. The mean range is calculated by multiplying the expected precision by 1.693(for three results). The standard error of the range is calculated by multiplying the mean range by 2.575(for three results), subtracting the mean range from this product, and dividing the result by 3. If the range is greater than the mean range, then the range analysis is calculated by subtracting the mean range from the range, dividing the result by the standard error of the range and adding 1. If the mean range is greater than or equal to the range, then the range analysis is calculated by dividing the range by the mean range.

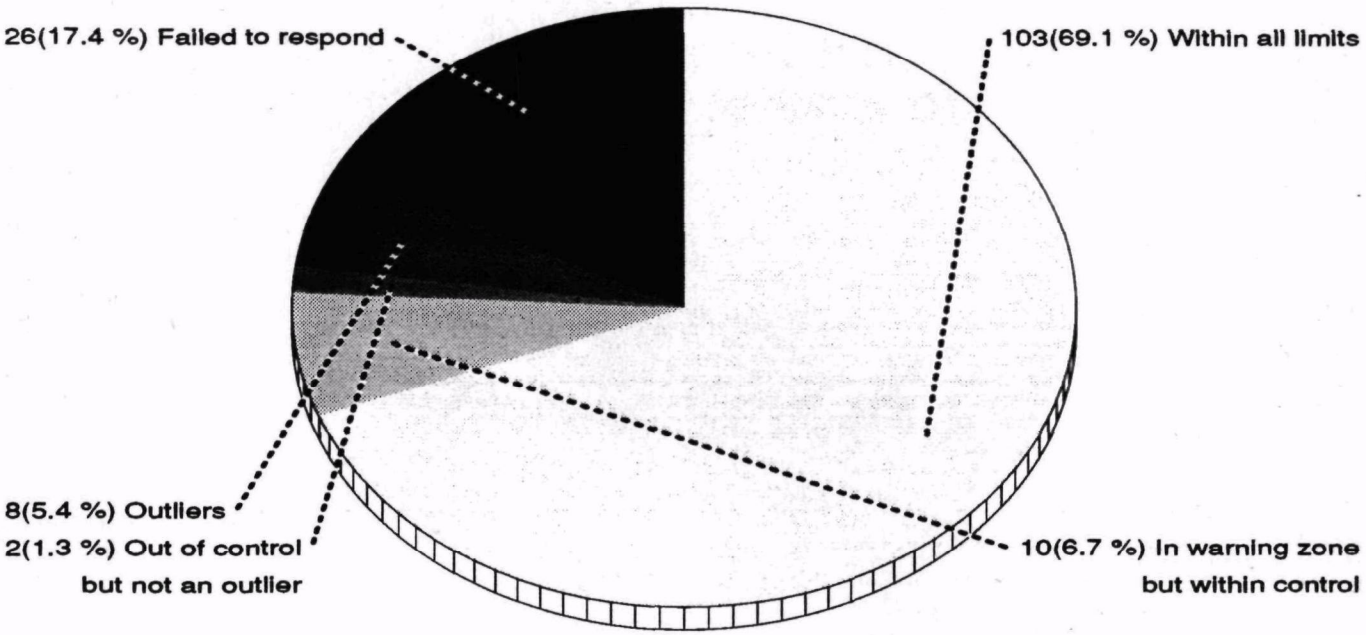
The normalized deviation of the mean from the grand average is calculated from the deviation of the mean from the grand average and the standard error of the mean values. The deviation of the mean from the grand average is calculated by subtracting the grand average from the average of the laboratory's three results. The standard error of the mean is calculated by dividing the expected precision by the square root of 3(the number of results). The normalized deviation of the mean from the grand average is calculated by dividing the deviation of the mean from the grand average by the standard error of the mean.

The normalized deviation of the mean from the known value is calculated from the deviation of the mean from the known value and the standard error of the mean values. The deviation of the mean from the known value is calculated by subtracting the known value from the average of the laboratory's three results. The standard error of the mean is calculated by dividing the expected precision by the square root of 3(the number of results). The normalized deviation of the mean from the known value is calculated by dividing the deviation of the mean from the known value by the standard error of the mean.

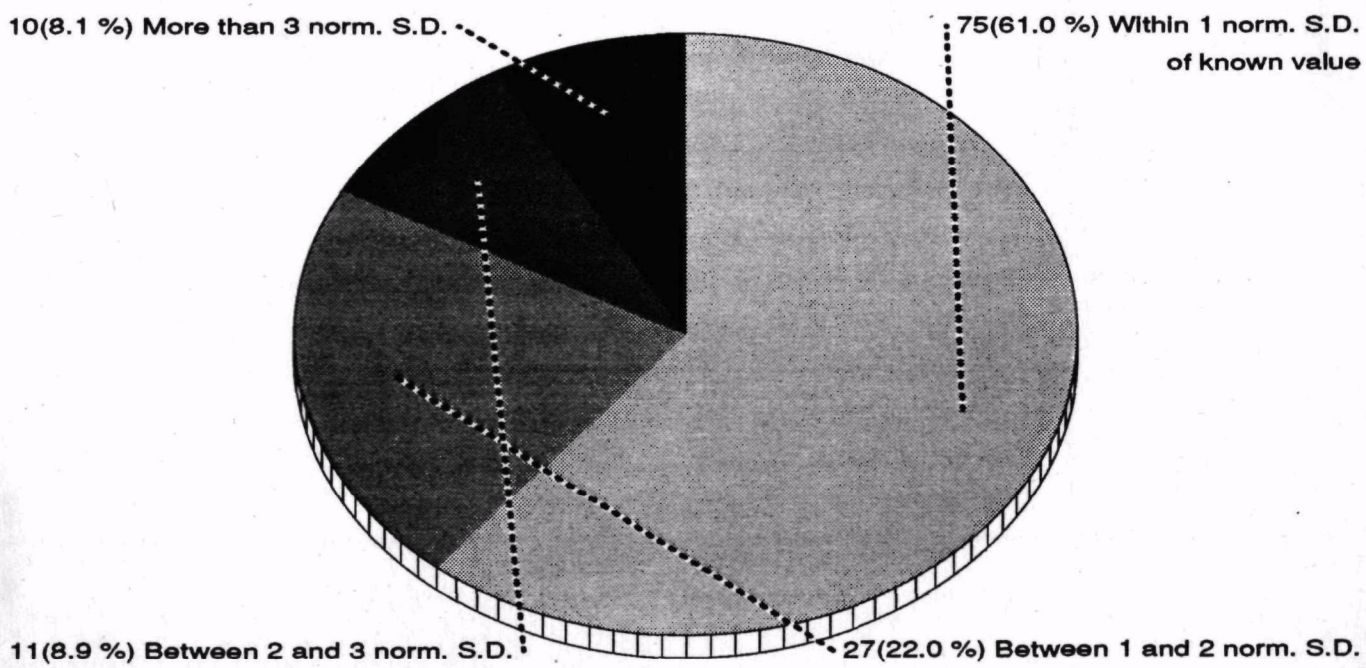
A complete explanation of the statistical calculations involved in the report may be found in the Environmental Radioactivity Performance Evaluation Studies Program information brochure [Draft Revision of EPA-600/4-81-004], available from Patricia Honsa, CRD-LV, 702/798-2141.

Uranium (Natural) Statistical Summary 149 Participants

The known value of this nuclide is **20.2 pCi/l** with an expected precision of **3.0**; the control limits are 15.0 to 25.4; the warning regions are 15.0 to 16.7 and 23.7 to 25.4



Statistic	Respondents	Non-outliers
Mean	21.20	**Grand Avg 19.90**
Std. Dev.	11.93	1.89
Variance	142.27	3.57
% Coef. of Var.	56.27	9.50
% deviation of mean from known value	4.93	-1.49
Norm. dev. of mean from known value	0.08	-0.16
Median	19.93	19.93
% deviation of median from known value	-1.32	-1.32
Norm. dev. of median from known value	-0.02	-0.14



CRD-LV Performance Evaluation: Uranium-Radium in Water, 21-Jun-1996

Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	Normalized deviation (known)	Tag
A	17.8	18.2	18.0	0.20	0.079	18.00	-1.10	-1.27	
AE	21.3	20.6	21.0	0.35	0.138	20.97	0.62	0.44	
AF	21.0	20.6	20.2	0.40	0.158	20.60	0.40	0.23	
AH	18.5	18.8	18.4	0.21	0.079	18.57	-0.77	-0.94	
AJ	22.7	23.8	20.7	1.57	0.610	22.40	1.44	1.27	
AK	20.1	20.9	21.5	0.70	0.276	20.83	0.54	0.37	
AL	19.7	21.1	22.9	1.60	0.630	21.23	0.77	0.60	
AP	21.6	18.8	19.0	1.56	0.551	19.80	-0.06	-0.23	
AR	14.7	14.7	14.8	0.06	0.020	14.73	-2.98	-3.16	⇓
AU									•
AW	17.4	18.6	18.4	0.64	0.236	18.13	-1.02	-1.19	
AZ	21.0	20.3	19.6	0.70	0.276	20.30	0.23	0.06	
BA	19.0	21.0	22.4	1.71	0.669	20.80	0.52	0.35	
BC	19.7	19.6	19.4	0.15	0.059	19.57	-0.19	-0.37	
BG	16.9	17.8	17.8	0.52	0.177	17.50	-1.39	-1.56	
BG	20.0	20.3	19.7	0.30	0.118	20.00	0.06	-0.12	
BG	24.0	26.0	23.1	1.48	0.571	24.37	2.58	2.41	
BH	11.6	11.8	12.0	0.20	0.079	11.80	-4.68	-4.85	×
BK	19.4	19.6	19.1	0.25	0.098	19.37	-0.31	-0.48	
BM	20.9	20.6	20.2	0.35	0.138	20.57	0.39	0.21	
BN	20.8	21.8	19.2	1.31	0.512	20.60	0.40	0.23	
BO	19.2	19.5	20.1	0.46	0.177	19.60	-0.17	-0.35	
C	19.5	20.6	20.0	0.55	0.217	20.03	0.08	-0.10	
CA	20.4	19.6	21.2	0.80	0.315	20.40	0.29	0.12	
CC	61.0	61.4	60.7	0.35	0.138	61.03	23.75	23.58	×
CE	19.0	19.5	19.1	0.26	0.098	19.20	-0.40	-0.58	
CG	20.6	20.9	19.7	0.62	0.236	20.40	0.29	0.12	
CJ	22.0	22.0	20.0	1.15	0.394	21.33	0.83	0.65	
CM	19.9	19.8	20.5	0.38	0.138	20.07	0.10	-0.08	
CS	17.6	18.3	17.9	0.35	0.138	17.93	-1.14	-1.31	
CX	23.0	23.3	22.7	0.30	0.118	23.00	1.79	1.62	
D	20.9	21.4	20.2	0.60	0.236	20.83	0.54	0.37	
DB	19.0	17.2	17.3	1.01	0.354	17.83	-1.19	-1.37	
DE	18.7	18.8	18.9	0.10	0.039	18.80	-0.63	-0.81	
DI	20.1	19.9	20.8	0.47	0.177	20.27	0.21	0.04	
DO	19.0	18.9	19.3	0.21	0.079	19.07	-0.48	-0.65	
DT	18.0	18.0	18.9	0.52	0.177	18.30	-0.92	-1.10	
DZ	20.6	19.1	21.8	1.35	0.532	20.50	0.35	0.17	
E	20.6	20.1	19.1	0.76	0.295	19.93	0.02	-0.15	
EB	19.8	19.2	19.5	0.30	0.118	19.50	-0.23	-0.40	
EL	19.0	19.7	18.3	0.70	0.276	19.00	-0.52	-0.69	
EO									•
EP									•
ER	17.4	19.8	18.1	1.23	0.473	18.43	-0.85	-1.02	
FJ	4.6	4.7	4.4	0.15	0.059	4.57	-8.85	-9.03	×

TAG SYMBOLS

• ≡ No data submitted
∅ ≡ Insufficient data
× ≡ Determined to be an outlier
⇑ ≡ Above control limit
⇓ ≡ Below control limit

Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	Normalized deviation (known)	Tag
FN	19.3	19.0	18.2	0.57	0.217	18.83	-0.62	-0.79	
FZ	25.8	21.9	25.1	2.08	0.768	24.27	2.52	2.35	
GN	16.1	15.6	16.2	0.32	0.118	15.97	-2.27	-2.44	
GQ	18.5	18.9	18.7	0.20	0.079	18.70	-0.69	-0.87	
HK	20.0	21.8	19.4	1.25	0.473	20.40	0.29	0.12	
HL	19.8	20.6	19.7	0.49	0.177	20.03	0.08	-0.10	
HP	19.6	19.8	20.0	0.20	0.079	19.80	-0.06	-0.23	
I	24.7	19.0	18.5	3.44	1.420	20.73	0.48	0.31	
ID	19.9	17.8	17.1	1.46	0.551	18.27	-0.94	-1.12	
J	20.4	20.8	20.0	0.40	0.158	20.40	0.29	0.12	
JE	19.1	19.5	17.6	1.00	0.374	18.73	-0.67	-0.85	
JG									•
JK	17.0	19.7	19.2	1.44	0.532	18.63	-0.73	-0.90	
JN	26.7	41.3	30.3	7.61	4.571	32.77	7.43	7.26	×
JP	21.9	22.1	22.1	0.12	0.039	22.03	1.23	1.06	
JS	19.0	19.4	19.8	0.40	0.158	19.40	-0.29	-0.46	
JX									•
JY	20.3	18.4	18.4	1.10	0.374	19.03	-0.50	-0.67	
K	22.1	25.1	22.5	1.63	0.591	23.23	1.92	1.75	
KH	19.6	19.5	19.4	0.10	0.039	19.50	-0.23	-0.40	
KL									•
KT	23.0	24.0	24.0	0.58	0.197	23.67	2.18	2.00	
L	20.8	20.2	19.3	0.75	0.295	20.10	0.12	-0.06	
LF									•
LH									•
LT	19.4	19.3	19.9	0.32	0.118	19.53	-0.21	-0.38	
LZ	20.3	19.6	20.9	0.65	0.256	20.27	0.21	0.04	
M									•
MX									•
N	20.8	20.7	20.9	0.10	0.039	20.80	0.52	0.35	
NA	18.0	19.0	20.0	1.00	0.394	19.00	-0.52	-0.69	
NH	21.0	22.0	20.0	1.00	0.394	21.00	0.64	0.46	
NJ	21.7	22.9	22.1	0.61	0.236	22.23	1.35	1.17	
NK	17.8	18.7	18.8	0.55	0.197	18.43	-0.85	-1.02	
NO	20.7	21.8	22.1	0.74	0.276	21.53	0.94	0.77	
NT	21.2	22.6	23.9	1.35	0.532	22.57	1.54	1.37	
O									•
OB	23.7	23.7	24.2	0.29	0.098	23.87	2.29	2.12	
OF									•
OM									•
OS	20.3	17.8	18.6	1.28	0.492	18.90	-0.58	-0.75	
OX									•
OY	26.2	23.6	24.8	1.30	0.512	24.87	2.87	2.69	
P	20.4	18.0	20.3	1.36	0.473	19.57	-0.19	-0.37	
PB	20.5	20.1	20.0	0.26	0.098	20.20	0.17	0.00	

TAG SYMBOLS

• ≡ No data submitted
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 CRD-LV Performance Evaluation: Uranium-Radium in Water, 21-Jun-1996

Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
PG	14.7	14.2	15.3	0.55	0.217	14.73	-2.98	-3.16	⇓
PQ	19.9	20.3	19.3	0.50	0.197	19.83	-0.04	-0.21	
PV	8.2	10.6	7.8	1.51	0.551	8.87	-6.37	-6.54	×
PW	16.8	12.1	21.0	4.45	2.433	16.63	-1.89	-2.06	
PX	22.0	21.9	22.2	0.15	0.059	22.03	1.23	1.06	
Q	20.1	21.5	18.7	1.40	0.551	20.10	0.12	-0.06	
QJ									•
QM	21.2	22.2	21.3	0.55	0.197	21.57	0.96	0.79	
QQ	16.5	17.2	19.8	1.74	0.650	17.83	-1.19	-1.37	
QU	24.0	26.5	21.5	2.50	0.984	24.00	2.37	2.19	
QX	17.8	18.7	18.3	0.45	0.177	18.27	-0.94	-1.12	
QZ	20.5	20.6	20.6	0.06	0.020	20.57	0.39	0.21	
R									•
RD	18.9	19.0	19.5	0.32	0.118	19.13	-0.44	-0.62	
RF	22.6	19.6	19.4	1.79	0.630	20.53	0.37	0.19	
RG	20.4	20.2	19.8	0.31	0.118	20.13	0.14	-0.04	
RK	16.7	20.4	18.7	1.85	0.728	18.60	-0.75	-0.92	
RP	20.0	20.1	20.1	0.06	0.020	20.07	0.10	-0.08	
RR	19.7	20.1	19.7	0.23	0.079	19.83	-0.04	-0.21	
RX	19.5	18.1	19.4	0.78	0.276	19.00	-0.52	-0.69	
RZ	18.8	17.5	18.1	0.65	0.256	18.13	-1.02	-1.19	
S	18.2	17.0	17.4	0.61	0.236	17.53	-1.37	-1.54	
SC	19.2	20.0	18.7	0.66	0.256	19.30	-0.35	-0.52	
SD	18.3	18.2	17.9	0.21	0.079	18.13	-1.02	-1.19	
SF	19.3	20.0	19.4	0.38	0.138	19.57	-0.19	-0.37	
SI	23.3	24.2	24.2	0.52	0.177	23.90	2.31	2.14	
SL	16.0	16.0	17.0	0.58	0.197	16.33	-2.06	-2.23	
SM	21.2	16.4	19.2	2.41	0.945	18.93	-0.56	-0.73	
SO	16.1	16.2	17.1	0.55	0.197	16.47	-1.98	-2.16	
SS	22.9	21.4	22.1	0.75	0.295	22.13	1.29	1.12	
SX	18.4	19.1	20.1	0.85	0.335	19.20	-0.40	-0.58	
SZ	19.0	18.8	19.4	0.31	0.118	19.07	-0.48	-0.65	
T	17.8	18.6	19.8	1.01	0.394	18.73	-0.67	-0.85	
TD	20.3	20.3	20.4	0.06	0.020	20.33	0.25	0.08	
TH									•
TL									•
TN									•
TQ	21.8	21.8	21.7	0.06	0.020	21.77	1.08	0.90	
TS									•
U	17.9	17.0	17.8	0.49	0.177	17.57	-1.35	-1.52	
UE	20.5	19.9	19.7	0.42	0.158	20.03	0.08	-0.10	
UN									•
UP	12.3	13.2	12.9	0.46	0.177	12.80	-4.10	-4.27	×
UQ									•
UZ	53.5	48.7	44.0	4.75	2.658	48.73	16.65	16.47	×

• ≡ No data submitted

∅ ≡ Insufficient data

TAG SYMBOLS

× ≡ Determined to be an outlier

⇑ ≡ Above control limit

⇓ ≡ Below control limit

Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
VA	142.1	137.7	134.8	3.68	1.833	138.20	68.30	68.13	×
VH	18.0	17.3	19.2	0.96	0.374	18.17	-1.00	-1.17	
VI	18.5	18.5	17.5	0.58	0.197	18.17	-1.00	-1.17	
W	20.5	20.0	19.8	0.36	0.138	20.10	0.12	-0.06	
WC									•
WG	22.8	22.9	23.8	0.55	0.197	23.17	1.89	1.71	
WH	19.8	23.3	20.0	1.97	0.689	21.03	0.65	0.48	
WI	17.8	18.4	18.8	0.50	0.197	18.33	-0.90	-1.08	
WO	20.8	19.5	22.5	1.50	0.591	20.93	0.60	0.42	
WQ									•
WR	18.2	19.9	21.7	1.75	0.689	19.93	0.02	-0.15	
WS									•
WV									•
X	23.0	20.5	20.5	1.44	0.492	21.33	0.83	0.65	

Data sorted by Laboratory Average

Average	Tag	Lab	Average	Tag	Lab	Average	Tag	Lab
4.57	×	FJ	18.57		AH	19.60		BO
8.87	×	PV	18.60		RK	19.80		HP
11.80	×	BH	18.63		JK	19.80		AP
12.80	×	UP	18.70		GQ	19.83		RR
14.73	⇓	PG	18.73		T	19.83		PQ
14.73	⇓	AR	18.73		JE	19.93		WR
15.97		GN	18.80		DE	19.93		E
16.33		SL	18.83		FN	20.00		BG
16.47		SO	18.90		OS	20.03		UE
16.63		PW	18.93		SM	20.03		HL
17.50		BG	19.00		RX	20.03		C
17.53		S	19.00		NA	20.07		RP
17.57		U	19.00		EL	20.07		CM
17.83		QQ	19.03		JY	20.10		W
17.83		DB	19.07		SZ	20.10		Q
17.93		CS	19.07		DO	20.10		L
18.00		A	19.13		RD	20.13		RG
18.13		SD	19.20		SX	20.20		PB
18.13		RZ	19.20		CE	20.27		LZ
18.13		AW	19.30		SC	20.27		DI
18.17		VI	19.37		BK	20.30		AZ
18.17		VH	19.40		JS	20.33		TD
18.27		QX	19.50		KH	20.40		J
18.27		ID	19.50		EB	20.40		HK
18.30		DT	19.53		LT	20.40		CG
18.33		WI	19.57		SF	20.40		CA
18.43		NK	19.57		P	20.50		DZ
18.43		ER	19.57		BC	20.53		RF

• ≡ No data submitted
Ø ≡ Insufficient data

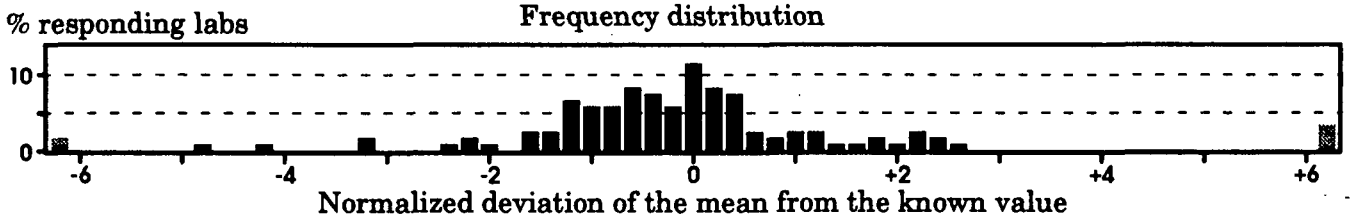
TAG SYMBOLS
× ≡ Determined to be an outlier

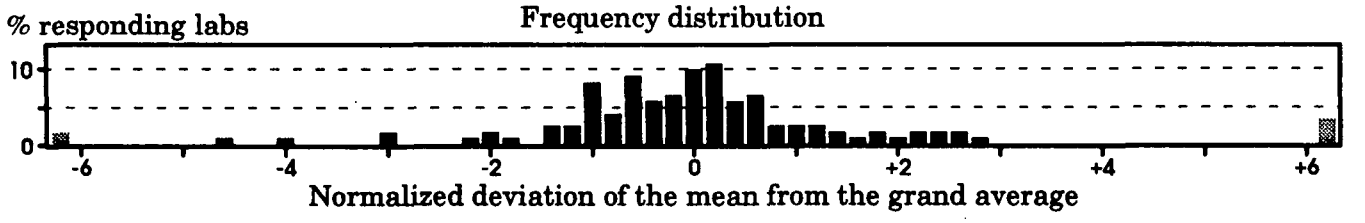
⇑ ≡ Above control limit
⇓ ≡ Below control limit

Uranium (Natural)

Data sorted by Laboratory Average

Average	Tag	Lab	Average	Tag	Lab	Average	Tag	Lab
20.57		QZ	21.23		AL	23.17		WG
20.57		BM	21.33		X	23.23		K
20.60		BN	21.33		CJ	23.67		KT
20.60		AF	21.53		NO	23.87		OB
20.73		I	21.57		QM	23.90		SI
20.80		N	21.77		TQ	24.00		QU
20.80		BA	22.03		PX	24.27		FZ
20.83		D	22.03		JP	24.37		BG
20.83		AK	22.13		SS	24.87		OY
20.93		WO	22.23		NJ	32.77	×	JN
20.97		AE	22.40		AJ	48.73	×	UZ
21.00		NH	22.57		NT	61.03	×	CC
21.03		WH	23.00		CX	138.20	×	VA





• ≡ No data submitted
∅ ≡ Insufficient data

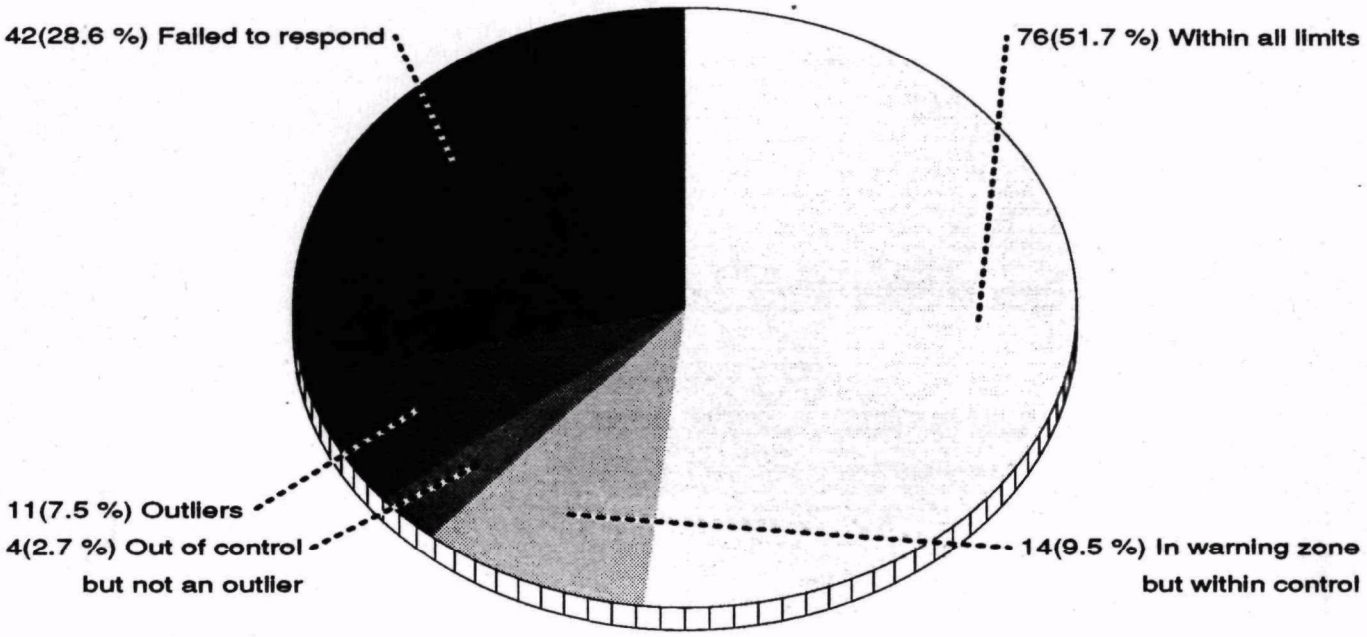
TAG SYMBOLS

× ≡ Determined to be an outlier

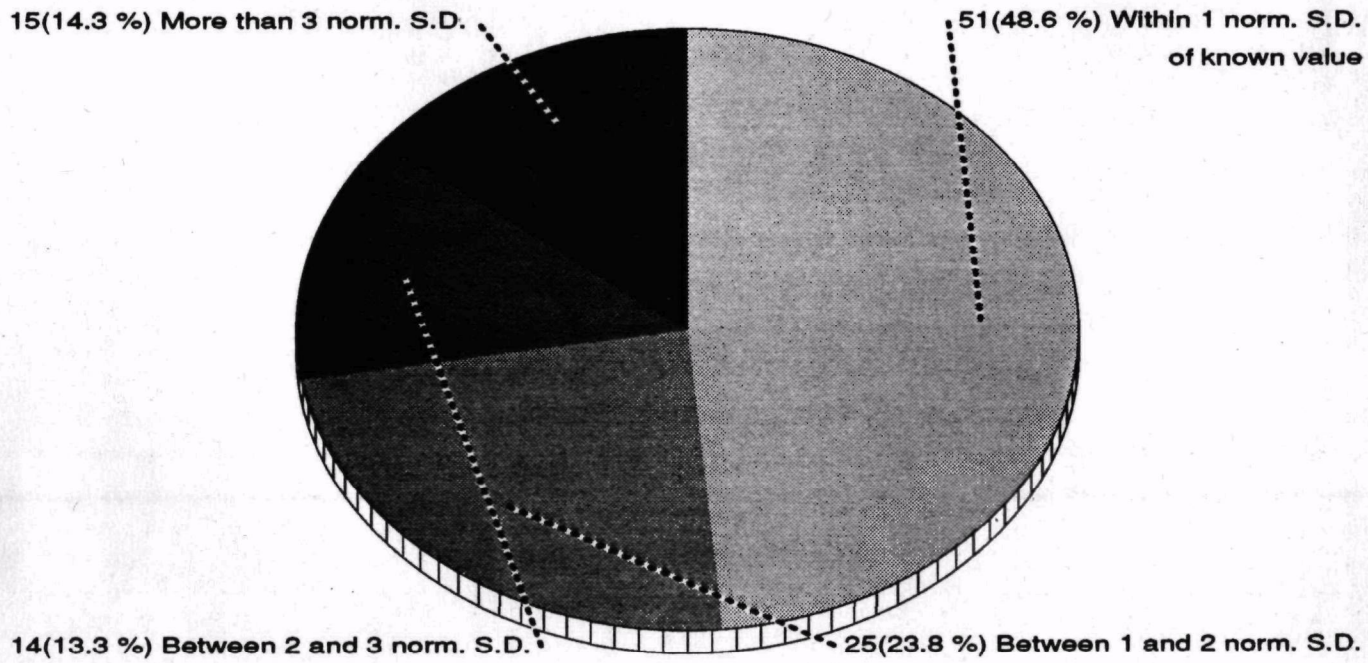
⇑ ≡ Above control limit
⇓ ≡ Below control limit

Radium-226 Statistical Summary 147 Participants

The known value of this nuclide is **4.9 pCi/l** with an expected precision of **0.7**; the control limits are 3.7 to 6.1; the warning regions are 3.7 to 4.1 and 5.7 to 6.1



Statistic	Respondents	Non-outliers
Mean	5.53	**Grand Avg 4.90**
Std. Dev.	2.27	0.64
Variance	5.15	0.41
% Coef. of Var.	41.05	13.05
% deviation of mean from known value	12.78	-0.06
Norm. dev. of mean from known value	0.28	0.00
Median	5.00	4.95
% deviation of median from known value	2.04	1.02
Norm. dev. of median from known value	0.04	0.08



 CRD-LV Performance Evaluation: Uranium-Radium in Water, 21-Jun-1996

Radium-226

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	Normalized deviation (known)	Tag
A									•
AE	5.3	5.2	5.4	0.10	0.169	5.30	1.00	0.99	
AF	4.9	4.8	4.7	0.10	0.169	4.80	-0.24	-0.25	
AH									•
AJ	3.6	4.2	4.0	0.31	0.506	3.93	-2.38	-2.39	
AK	4.9	5.2	5.4	0.25	0.422	5.17	0.67	0.66	
AL	4.3	4.3	4.5	0.12	0.169	4.37	-1.31	-1.32	
AP	4.6	4.4	4.8	0.20	0.338	4.60	-0.74	-0.74	
AR									•
AU	2.9	3.0	2.7	0.15	0.253	2.87	-5.02	-5.03	⇓
AW	4.8	5.0	5.6	0.42	0.675	5.13	0.58	0.58	
AZ	3.1	4.2	4.6	0.78	1.506	3.97	-2.30	-2.31	
BA	4.4	3.8	4.8	0.50	0.844	4.33	-1.40	-1.40	
BC	4.7	4.9	5.3	0.31	0.506	4.97	0.17	0.16	
BG	13.6	13.4	24.0	6.06	16.132	17.00	29.95	29.94	×
BH	4.1	4.8	4.9	0.44	0.675	4.60	-0.74	-0.74	
BK	5.1	5.2	5.1	0.06	0.084	5.13	0.58	0.58	
BM	4.8	4.6	4.4	0.20	0.338	4.60	-0.74	-0.74	
BN	7.0	6.4	6.8	0.31	0.506	6.73	4.54	4.54	⇑
BO	5.1	5.0	4.8	0.15	0.253	4.97	0.17	0.16	
C	4.7	4.0	4.4	0.35	0.591	4.37	-1.31	-1.32	
CA	4.7	4.9	4.8	0.10	0.169	4.80	-0.24	-0.25	
CC	9.3	10.2	9.7	0.45	0.759	9.73	11.97	11.96	×
CE	4.0	5.1	4.7	0.56	0.928	4.60	-0.74	-0.74	
CG	4.2	5.5	4.7	0.66	1.185	4.80	-0.24	-0.25	
CJ	5.2	5.6	5.7	0.26	0.422	5.50	1.49	1.48	
CM									•
CS	5.7	5.0	5.7	0.40	0.591	5.47	1.41	1.40	
CX									•
D									•
DB	5.1	5.0	5.1	0.06	0.084	5.07	0.42	0.41	
DE	5.3	5.4	5.5	0.10	0.169	5.40	1.24	1.24	
DI									•
DO									•
DT	4.6	4.3	4.8	0.25	0.422	4.57	-0.82	-0.82	
DZ	5.0	4.5	5.5	0.50	0.844	5.00	0.25	0.25	
E	4.8	5.4	4.9	0.32	0.506	5.03	0.34	0.33	
EB	5.2	4.9	4.7	0.25	0.422	4.93	0.09	0.08	
EL	5.5	5.6	5.1	0.26	0.422	5.40	1.24	1.24	
EO	5.1	5.3	5.2	0.10	0.169	5.20	0.75	0.74	
EP	4.7	4.7	4.7	0.00	0.000	4.70	-0.49	-0.49	
ER	5.1	5.0	5.1	0.06	0.084	5.07	0.42	0.41	
FJ									•
FN	5.6	6.1	5.8	0.25	0.422	5.83	2.32	2.31	
FZ									•

TAG SYMBOLS

• ≡ No data submitted
∅ ≡ Insufficient data
× ≡ Determined to be an outlier
⇑ ≡ Above control limit
⇓ ≡ Below control limit

Radium-226

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	Normalized deviation (known)	Tag
GN	5.5	5.9	5.4	0.26	0.422	5.60	1.74	1.73	
GQ	3.8	3.8	3.8	0.00	0.000	3.80	-2.71	-2.72	
HK	5.0	5.1	5.0	0.06	0.084	5.03	0.34	0.33	
HL	5.2	5.2	5.3	0.06	0.084	5.23	0.83	0.82	
HP	5.5	5.6	5.5	0.06	0.084	5.53	1.57	1.57	
I	6.8	4.7	5.0	1.14	2.470	5.50	1.49	1.48	
ID	3.5	2.0	4.6	1.31	3.274	3.37	-3.79	-3.79	⇓
J	4.0	4.8	4.8	0.46	0.675	4.53	-0.90	-0.91	
JE	5.0	6.0	5.1	0.55	0.844	5.37	1.16	1.15	
JG	2.7	4.3	4.5	0.99	1.988	3.83	-2.63	-2.64	
JK									•
JN									•
JP									•
JS	5.2	5.7	5.3	0.26	0.422	5.40	1.24	1.24	
JX	4.7	5.2	5.4	0.36	0.591	5.10	0.50	0.49	
JY	8.7	10.4	6.9	1.75	4.721	8.67	9.33	9.32	×
K	5.6	4.7	4.2	0.71	1.345	4.83	-0.16	-0.16	
KH	4.8	5.2	5.0	0.20	0.338	5.00	0.25	0.25	
KL	5.8	4.3	6.0	0.93	1.828	5.37	1.16	1.15	
KT									•
L	4.0	3.5	3.8	0.25	0.422	3.77	-2.80	-2.80	
LF									•
LH									•
LT	5.8	4.7	6.2	0.78	1.506	5.57	1.66	1.65	
LZ	4.2	3.8	4.0	0.20	0.338	4.00	-2.22	-2.23	
M	4.0	4.1	4.1	0.06	0.084	4.07	-2.05	-2.06	
MX									•
N	4.9	4.8	4.6	0.15	0.253	4.77	-0.32	-0.33	
NA									•
NH	6.2	5.8	6.0	0.20	0.338	6.00	2.73	2.72	
NJ	4.1	4.2	5.6	0.84	1.506	4.63	-0.65	-0.66	
NK									•
NO	4.9	5.5	5.9	0.50	0.844	5.43	1.33	1.32	
NT	5.0	5.0	5.0	0.00	0.000	5.00	0.25	0.25	
O	8.3	7.4	7.5	0.49	0.759	7.73	7.02	7.01	×
OB									•
OF	4.9	3.7	3.7	0.69	1.024	4.10	-1.97	-1.98	
OM									•
OS									•
OX									•
OY	3.6	3.8	3.8	0.12	0.169	3.73	-2.88	-2.89	
P	5.2	5.2	4.9	0.17	0.253	5.10	0.50	0.49	
PB	5.3	5.5	5.6	0.15	0.253	5.47	1.41	1.40	
PG	4.5	4.7	5.1	0.31	0.506	4.77	-0.32	-0.33	
PQ									•

• ≡ No data submitted

Ø ≡ Insufficient data

TAG SYMBOLS

× ≡ Determined to be an outlier

⇑ ≡ Above control limit

⇓ ≡ Below control limit

Radium-226

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	Normalized deviation (known)	Tag
PV	6.5	6.3	5.4	0.59	0.928	6.07	2.89	2.89	
PW	4.6	6.0	3.9	1.07	2.470	4.83	-0.16	-0.16	
PX	5.5	5.1	5.1	0.23	0.338	5.23	0.83	0.82	
Q	5.5	5.4	5.9	0.26	0.422	5.60	1.74	1.73	
QJ									•
QM	5.2	5.3	5.4	0.10	0.169	5.30	1.00	0.99	
QQ	4.0	3.6	3.8	0.20	0.338	3.80	-2.71	-2.72	
QU	7.8	8.4	7.1	0.65	1.185	7.77	7.10	7.09	×
QX	4.1	4.9	5.1	0.53	0.844	4.70	-0.49	-0.49	
QZ	4.6	5.0	4.7	0.21	0.338	4.77	-0.32	-0.33	
R	4.5	3.7	3.7	0.46	0.675	3.97	-2.30	-2.31	
RD	6.4	6.6	6.4	0.12	0.169	6.47	3.88	3.88	⇑
RF	5.0	5.2	5.3	0.15	0.253	5.17	0.67	0.66	
RG									•
RK	5.4	4.5	4.7	0.47	0.759	4.87	-0.08	-0.08	
RP									•
RR									•
RX	10.4	11.0	9.4	0.81	1.667	10.27	13.29	13.28	×
RZ	4.3	4.5	4.3	0.12	0.169	4.37	-1.31	-1.32	
S	5.0	4.9	4.7	0.15	0.253	4.87	-0.08	-0.08	
SC	5.2	4.4	4.7	0.40	0.675	4.77	-0.32	-0.33	
SD	5.4	5.5	4.9	0.32	0.506	5.27	0.91	0.91	
SF	4.5	4.4	4.3	0.10	0.169	4.40	-1.23	-1.24	
SI	16.5	16.5	12.2	2.48	6.006	15.07	25.16	25.16	×
SL									•
SM	6.2	6.0	4.9	0.70	1.185	5.70	1.99	1.98	
SO									•
SS	4.6	4.9	4.5	0.21	0.338	4.67	-0.57	-0.58	
SX	5.2	5.7	5.2	0.29	0.422	5.37	1.16	1.15	
SZ	5.2	4.7	4.7	0.29	0.422	4.87	-0.08	-0.08	
T	4.8	5.1	5.0	0.15	0.253	4.97	0.17	0.16	
TD	21.4	18.7							∅
TH									•
TL									•
TN	4.1	4.8	4.6	0.36	0.591	4.50	-0.98	-0.99	
TQ	5.5	5.0	5.5	0.29	0.422	5.33	1.08	1.07	
TS									•
U	5.0	5.3	5.0	0.17	0.253	5.10	0.50	0.49	
UE	8.6	8.7	9.7	0.61	0.928	9.00	10.15	10.14	×
UN									•
UP	5.2	4.8	5.0	0.20	0.338	5.00	0.25	0.25	
UQ	4.8	5.1	4.7	0.21	0.338	4.87	-0.08	-0.08	
UZ									•
VA	8.2	9.7	9.5	0.81	1.506	9.13	10.48	10.47	×
VH	6.1	6.5	5.2	0.67	1.185	5.93	2.56	2.56	

TAG SYMBOLS

• ≡ No data submitted
∅ ≡ Insufficient data
× ≡ Determined to be an outlier
⇑ ≡ Above control limit
⇓ ≡ Below control limit

Radium-226

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
VI	4.5	4.1	4.1	0.23	0.338	4.23	-1.64	-1.65	
W	5.0	4.6	5.1	0.26	0.422	4.90	0.01	0.00	
WC	14.0	19.7	19.2	3.16	8.257	17.63	31.51	31.51	×
WG									•
WH	4.7	5.0	5.1	0.21	0.338	4.93	0.09	0.08	
WI									•
WO	7.9	7.9	8.0	0.06	0.084	7.93	7.51	7.51	×
WQ									•
WR									•
WS									•
WV									•
X	4.9	4.0	4.4	0.45	0.759	4.43	-1.15	-1.15	

Data sorted by Laboratory Average

Average	Tag	Lab	Average	Tag	Lab	Average	Tag	Lab
2.87	⇓	AU	4.70		QX	5.10		JX
3.37	⇓	ID	4.77		SC	5.13		BK
3.73		OY	4.77		QZ	5.13		AW
3.77		L	4.77		PG	5.17		RF
3.80		QQ	4.77		N	5.17		AK
3.80		GQ	4.80		CG	5.20		EO
3.83		JG	4.80		CA	5.23		PX
3.93		AJ	4.80		AF	5.23		HL
3.97		AZ	4.83		PW	5.27		SD
3.97		R	4.83		K	5.30		QM
4.00		LZ	4.87		SZ	5.30		AE
4.07		M	4.87		UQ	5.33		TQ
4.10		OF	4.87		S	5.37		SX
4.23		VI	4.87		RK	5.37		KL
4.33		BA	4.90		W	5.37		JE
4.37		RZ	4.93		WH	5.40		JS
4.37		C	4.93		EB	5.40		EL
4.37		AL	4.97		T	5.40		DE
4.40		SF	4.97		BO	5.43		NO
4.43		X	4.97		BC	5.47		PB
4.50		TN	5.00		UP	5.47		CS
4.53		J	5.00		NT	5.50		I
4.57		DT	5.00		KH	5.50		CJ
4.60		CE	5.00		DZ	5.53		HP
4.60		BM	5.03		HK	5.57		LT
4.60		BH	5.03		E	5.60		Q
4.60		AP	5.07		ER	5.60		GN
4.63		NJ	5.07		DB	5.70		SM
4.67		SS	5.10		U	5.83		FN
4.70		EP	5.10		P	5.93		VH

• ≡ No data submitted
∅ ≡ Insufficient data

TAG SYMBOLS

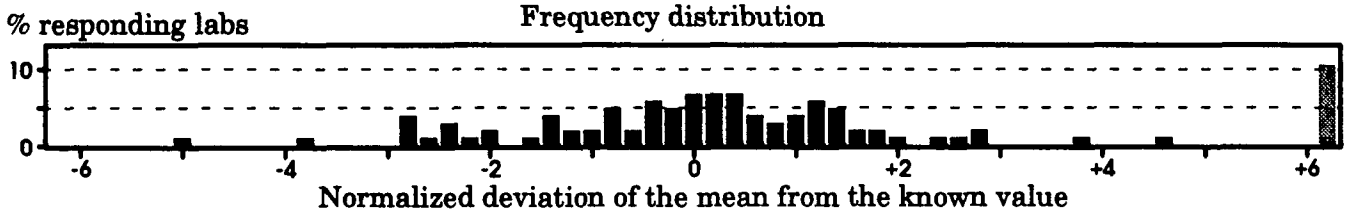
× ≡ Determined to be an outlier

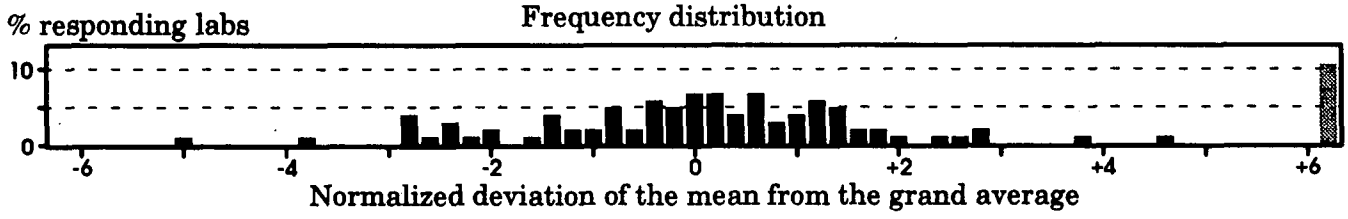
⇑ ≡ Above control limit
⇓ ≡ Below control limit

Radium-226

Data sorted by Laboratory Average

Average	Tag	Lab	Average	Tag	Lab	Average	Tag	Lab
6.00		**NH**	7.77	×	**QU**	9.73	×	**CC**
6.07		**PV**	7.93	×	**WO**	10.27	×	**RX**
6.47	⇑	**RD**	8.67	×	**JY**	15.07	×	**SI**
6.73	⇑	**BN**	9.00	×	**UE**	17.00	×	**BG**
7.73	×	**O**	9.13	×	**VA**	17.63	×	**WC**





• ≡ No data submitted
∅ ≡ Insufficient data

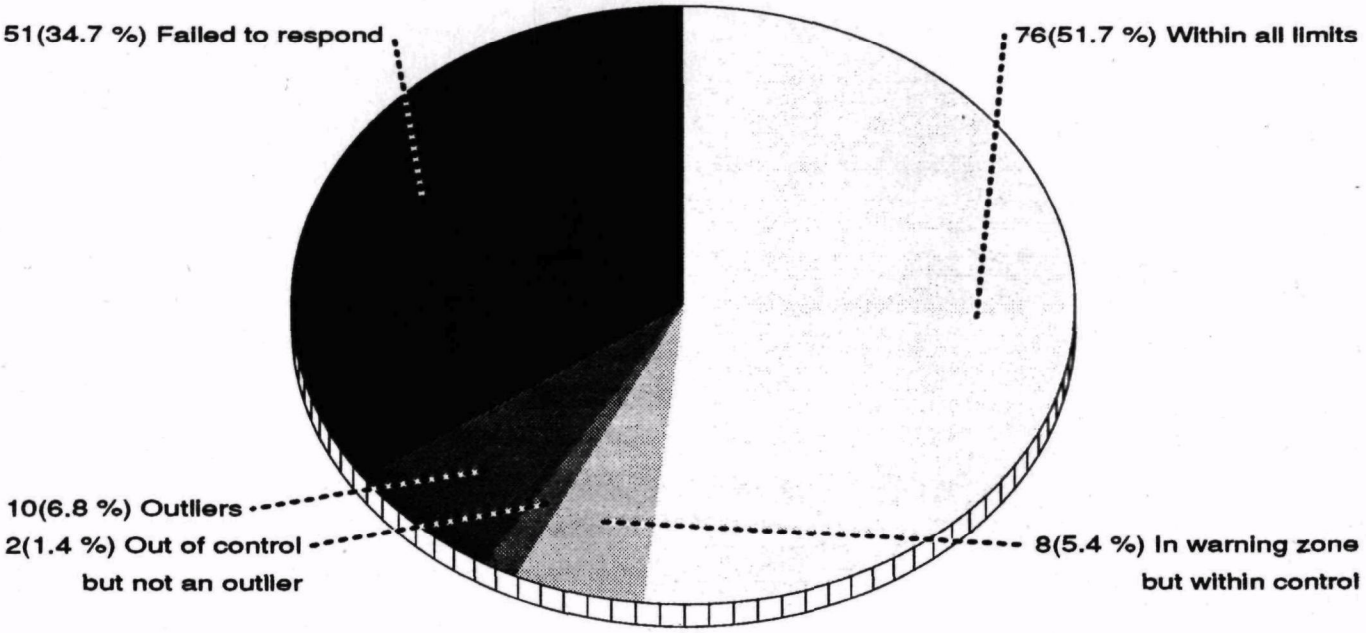
TAG SYMBOLS

× ≡ Determined to be an outlier

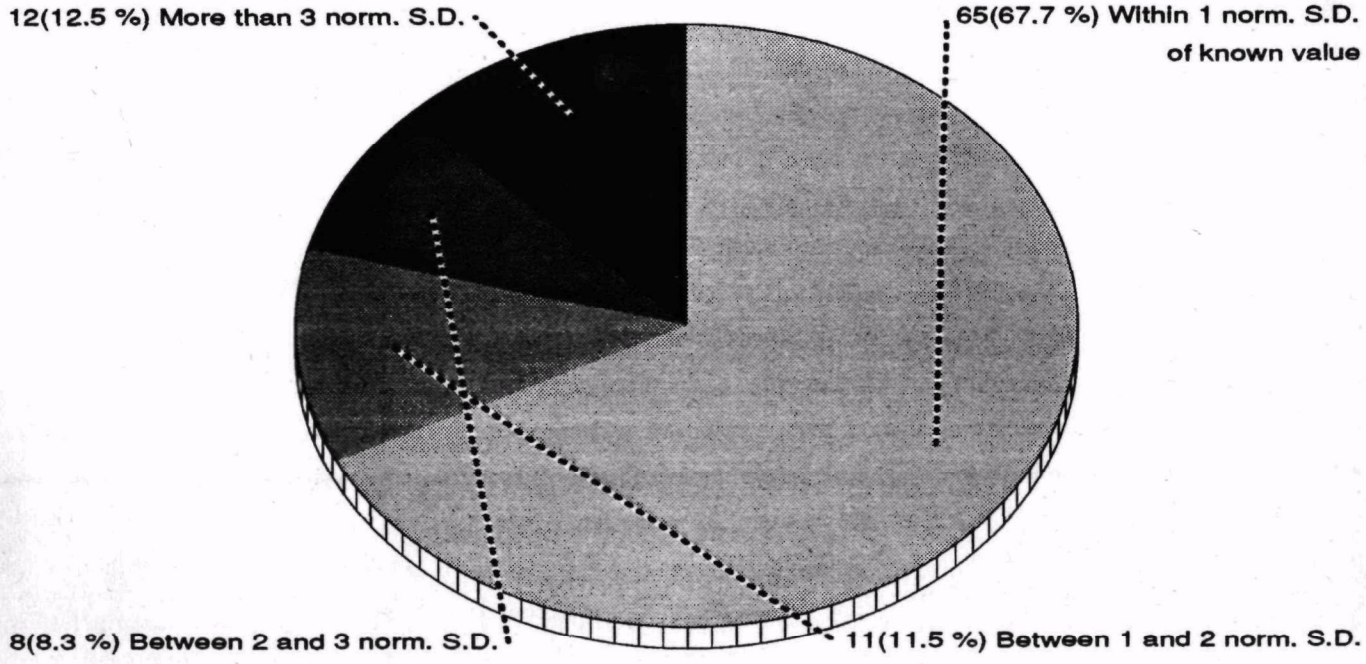
⇑ ≡ Above control limit
⇓ ≡ Below control limit

Radium-228 Statistical Summary 147 Participants

The known value of this nuclide is **9.0 pCi/l** with an expected precision of **2.3**; the control limits are 5.0 to 13.0; the warning regions are 5.0 to 6.3 and 11.7 to 13.0



Statistic	Respondents	Non-outliers
Mean	10.20	**Grand Avg 8.84**
Std. Dev.	5.88	1.51
Variance	34.55	2.28
% Coef. of Var.	57.63	17.07
% deviation of mean from known value	13.33	-1.74
Norm. dev. of mean from known value	0.20	-0.10
Median	9.20	9.05
% deviation of median from known value	2.22	0.56
Norm. dev. of median from known value	0.03	0.03



Radium-228

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
A	9.4	9.8	9.9	0.26	0.128	9.70	0.65	0.53	
AE	8.7	8.8	7.4	0.78	0.360	8.30	-0.41	-0.53	
AF	10.6	11.0	11.0	0.23	0.103	10.87	1.52	1.41	
AH	8.6	10.0	9.4	0.70	0.360	9.33	0.37	0.25	
AJ	6.7	6.3	5.2	0.78	0.385	6.07	-2.09	-2.21	
AK	9.7	9.5	9.1	0.31	0.154	9.43	0.44	0.33	
AL	7.0	7.9	7.7	0.47	0.231	7.53	-0.99	-1.10	
AP	5.4	5.8	6.8	0.72	0.360	6.00	-2.14	-2.26	
AR									•
AU									•
AW	9.3	9.8	9.3	0.29	0.128	9.47	0.47	0.35	
AZ	7.2	7.4	9.1	1.04	0.488	7.90	-0.71	-0.83	
BA	9.0	8.2	7.4	0.80	0.411	8.20	-0.48	-0.60	
BC	10.2	10.1	9.6	0.32	0.154	9.97	0.85	0.73	
BG									•
BH	9.6	10.1	9.2	0.45	0.231	9.63	0.59	0.48	
BK	8.4	9.2	9.5	0.57	0.282	9.03	0.14	0.03	
BM	8.2	9.1	9.3	0.59	0.282	8.87	0.02	-0.10	
BN									•
BO	10.0	9.0	9.5	0.50	0.257	9.50	0.49	0.38	
C	9.7	10.0	9.0	0.51	0.257	9.57	0.54	0.43	
CA	8.1	9.1	8.8	0.51	0.257	8.67	-0.13	-0.25	
CC	22.6	21.8	21.4	0.61	0.308	21.93	9.86	9.74	×
CE	7.3	8.4	7.6	0.57	0.282	7.77	-0.81	-0.93	
CG	8.1	9.0	9.2	0.59	0.282	8.77	-0.06	-0.18	
CJ	10.0	9.2	10.0	0.46	0.205	9.73	0.67	0.55	
CM									•
CS	11.8	12.1	11.4	0.35	0.180	11.77	2.20	2.08	
CX									•
D									•
DB	10.6	10.4	9.2	0.76	0.360	10.07	0.92	0.80	
DE	9.1	9.2	9.3	0.10	0.051	9.20	0.27	0.15	
DI									•
DO									•
DT	112.0	10.3	12.3	58.15	48.843	44.87	27.13	27.01	×
DZ	8.5	9.1	8.7	0.31	0.154	8.77	-0.06	-0.18	
E									•
EB	6.1	5.4	7.6	1.12	0.565	6.37	-1.87	-1.98	
EL	7.0	8.3	8.9	0.97	0.488	8.07	-0.58	-0.70	
EO	9.8	10.5	10.2	0.35	0.180	10.17	1.00	0.88	
EP	9.2	9.4	9.2	0.12	0.051	9.27	0.32	0.20	
ER									•
FJ									•
FN	9.0	9.6	9.1	0.32	0.154	9.23	0.29	0.18	
FZ	5.4	7.3	7.8	1.27	0.616	6.83	-1.51	-1.63	

• ≡ No data submitted

∅ ≡ Insufficient data

TAG SYMBOLS

× ≡ Determined to be an outlier

⇑ ≡ Above control limit

⇓ ≡ Below control limit

Radium-228

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	Normalized deviation (known)	Tag
GN	7.2	7.5	7.2	0.17	0.077	7.30	-1.16	-1.28	
GQ	2.6	2.6	2.6	0.00	0.000	2.60	-4.70	-4.82	×
HK	8.7	8.5	8.8	0.15	0.077	8.67	-0.13	-0.25	
HL	8.9	9.4	8.4	0.50	0.257	8.90	0.04	-0.08	
HP	6.6	9.6	9.9	1.82	0.847	8.70	-0.11	-0.23	
I	5.4	6.1	6.2	0.44	0.205	5.90	-2.22	-2.33	
ID	9.1	9.4	8.7	0.35	0.180	9.07	0.17	0.05	
J	8.1	8.7	8.8	0.38	0.180	8.53	-0.23	-0.35	
JE									•
JG	6.7	7.4	4.4	1.57	0.770	6.17	-2.02	-2.13	
JK									•
JN									•
JP									•
JS	7.5	8.2	8.2	0.40	0.180	7.97	-0.66	-0.78	
JX	8.7	7.6	7.0	0.86	0.437	7.77	-0.81	-0.93	
JY	12.0	14.0	14.0	1.15	0.514	13.33	3.38	3.26	⇑
K	10.0	9.0	11.1	1.05	0.539	10.03	0.90	0.78	
KH	10.5	9.9	10.0	0.32	0.154	10.13	0.97	0.85	
KL	11.9	10.5	9.9	1.03	0.514	10.77	1.45	1.33	
KT									•
L	9.9	9.7	9.7	0.12	0.051	9.77	0.70	0.58	
LF									•
LH									•
LT	18.3	17.5	18.7	0.61	0.308	18.17	7.02	6.90	×
LZ									•
M	8.6	8.0	7.0	0.81	0.411	7.87	-0.74	-0.85	
MX									•
N	9.9	11.1	10.1	0.64	0.308	10.37	1.15	1.03	
NA									•
NH	10.5	8.9	11.1	1.14	0.565	10.17	1.00	0.88	
NJ	8.3	8.1	8.2	0.10	0.051	8.20	-0.48	-0.60	
NK									•
NO	9.2	10.6	11.1	0.98	0.488	10.30	1.10	0.98	
NT	8.8	8.5	8.6	0.15	0.077	8.63	-0.16	-0.28	
O	6.1	8.9	8.7	1.56	0.719	7.90	-0.71	-0.83	
OB									•
OF	6.5	3.3	3.2	1.88	0.847	4.33	-3.40	-3.51	⇓
OM									•
OS									•
OX									•
OY	10.4	9.8	10.0	0.31	0.154	10.07	0.92	0.80	
P	6.4	8.3	6.9	0.98	0.488	7.20	-1.24	-1.36	
PB	9.8	10.0	9.6	0.20	0.103	9.80	0.72	0.60	
PG									•
PQ									•

TAG SYMBOLS

• ≡ No data submitted
∅ ≡ Insufficient data
× ≡ Determined to be an outlier
⇑ ≡ Above control limit
⇓ ≡ Below control limit

 CRD-LV Performance Evaluation: Uranium-Radium in Water, 21-Jun-1996

Radium-228

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
PV	11.0	13.3	12.7	1.19	0.591	12.33	2.63	2.51	
PW	9.5	9.8	9.7	0.15	0.077	9.67	0.62	0.50	
PX									•
Q	7.3	8.4	8.7	0.74	0.360	8.13	-0.53	-0.65	
QJ									•
QM									•
QQ									•
QU	10.1	9.7	9.3	0.40	0.205	9.70	0.65	0.53	
QX	9.4	10.3	10.0	0.46	0.231	9.90	0.80	0.68	
QZ	9.1	9.1	9.0	0.06	0.026	9.07	0.17	0.05	
R									•
RD	7.7	9.1	7.2	0.98	0.488	8.00	-0.64	-0.75	
RF	9.6	9.6	9.6	0.00	0.000	9.60	0.57	0.45	
RG									•
RK	22.4	22.6	21.3	0.70	0.334	22.10	9.98	9.87	×
RP									•
RR									•
RX	7.4	8.5	7.8	0.56	0.282	7.90	-0.71	-0.83	
RZ	9.6	9.2	9.6	0.23	0.103	9.47	0.47	0.35	
S	7.5	8.2	7.9	0.35	0.180	7.87	-0.74	-0.85	
SC	10.8	9.3	9.2	0.90	0.411	9.77	0.70	0.58	
SD	9.4	10.5	9.6	0.59	0.282	9.83	0.75	0.63	
SF	9.4	11.6	9.8	1.17	0.565	10.27	1.07	0.95	
SI	25.0	31.7	30.7	3.61	2.373	29.13	15.28	15.16	×
SL									•
SM	5.4	5.6	5.4	0.12	0.051	5.47	-2.54	-2.66	
SO									•
SS	9.1	8.9	8.2	0.47	0.231	8.73	-0.08	-0.20	
SX	7.9	9.6	6.0	1.80	0.925	7.83	-0.76	-0.88	
SZ	4.5	5.2	8.2	1.97	0.950	5.97	-2.17	-2.28	
T	9.4	10.1	10.6	0.60	0.308	10.03	0.90	0.78	
TD	32.5	36.9	31.8	2.76	1.590	33.73	18.74	18.63	×
TH									•
TL									•
TN	8.1	8.5	10.2	1.12	0.539	8.93	0.07	-0.05	
TQ	9.6	9.2	9.3	0.21	0.103	9.37	0.39	0.28	
TS									•
U	7.5	6.1	6.5	0.72	0.360	6.70	-1.61	-1.73	
UE	7.4	8.3	8.0	0.46	0.231	7.90	-0.71	-0.83	
UN									•
UP	9.1	9.2	9.3	0.10	0.051	9.20	0.27	0.15	
UQ	10.7	9.8	10.4	0.46	0.231	10.30	1.10	0.98	
UZ									•
VA	3.2	2.2	2.9	0.51	0.257	2.77	-4.58	-4.69	×
VH	11.6	8.8	9.4	1.47	0.719	9.93	0.82	0.70	

TAG SYMBOLS

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⇓ ≡ Below control limit

Radium-228

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
VI	7.8	7.4	7.0	0.40	0.205	7.40	-1.09	-1.20	
W									•
WC	25.2	32.5	28.3	3.66	2.666	28.67	14.93	14.81	×
WG									•
WH	11.5	9.9	10.1	0.87	0.411	10.50	1.25	1.13	
WI									•
WO	8.5	8.8	9.4	0.46	0.231	8.90	0.04	-0.08	
WQ									•
WR									•
WS									•
WV									•
X	17.3	13.9	12.7	2.39	1.345	14.63	4.36	4.24	×

Data sorted by Laboratory Average

Average	Tag	Lab	Average	Tag	Lab	Average	Tag	Lab
2.60	×	GQ	8.20		BA	9.67		PW
2.77	×	VA	8.30		AE	9.70		QU
4.33	⇓	OF	8.53		J	9.70		A
5.47		SM	8.63		NT	9.73		CJ
5.90		I	8.67		HK	9.77		L
5.97		SZ	8.67		CA	9.77		SC
6.00		AP	8.70		HP	9.80		PB
6.07		AJ	8.73		SS	9.83		SD
6.17		JG	8.77		DZ	9.90		QX
6.37		EB	8.77		CG	9.93		VH
6.70		U	8.87		BM	9.97		BC
6.83		FZ	8.90		HL	10.03		T
7.20		P	8.90		WO	10.03		K
7.30		GN	8.93		TN	10.07		OY
7.40		VI	9.03		BK	10.07		DB
7.53		AL	9.07		QZ	10.13		KH
7.77		JX	9.07		ID	10.17		NH
7.77		CE	9.20		UP	10.17		EO
7.83		SX	9.20		DE	10.27		SF
7.87		S	9.23		FN	10.30		UQ
7.87		M	9.27		EP	10.30		NO
7.90		O	9.33		AH	10.37		N
7.90		UE	9.37		TQ	10.50		WH
7.90		RX	9.43		AK	10.77		KL
7.90		AZ	9.47		RZ	10.87		AF
7.97		JS	9.47		AW	11.77		CS
8.00		RD	9.50		BO	12.33		PV
8.07		EL	9.57		C	13.33	⇑	JY
8.13		Q	9.60		RF	14.63	×	X
8.20		NJ	9.63		BH	18.17	×	LT

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∅ ≡ Insufficient data

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 CRD-LV Performance Evaluation: Uranium-Radium in Water, 21-Jun-1996

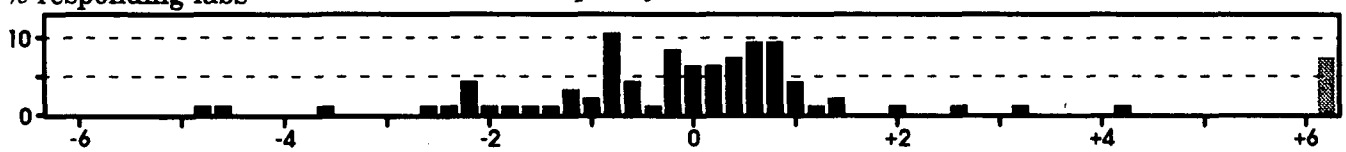
Radium-228

Data sorted by Laboratory Average

Average	Tag	Lab	Average	Tag	Lab	Average	Tag	Lab
21.93	×	**CC**	28.67	×	**WC**	33.73	×	**TD**
22.10	×	**RK**	29.13	×	**SI**	44.87	×	**DT**

% responding labs

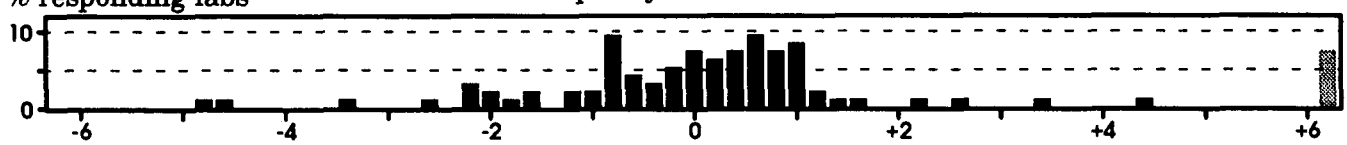
Frequency distribution



Normalized deviation of the mean from the known value

% responding labs

Frequency distribution



Normalized deviation of the mean from the grand average

• ≡ No data submitted

∅ ≡ Insufficient data

TAG SYMBOLS

× ≡ Determined to be an outlier

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⇓ ≡ Below control limit