

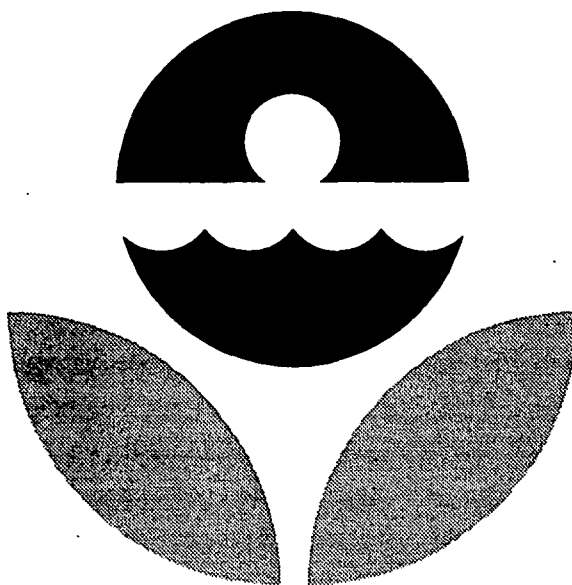


Performance Evaluation-A Intercomparison Study

A Statistical Evaluation of the April 20, 1993 Data



Performance Evaluation-A
Intercomparison Study
April 20, 1993



Environmental Protection Agency
Environmental Monitoring Systems Laboratory
Las Vegas, Nevada



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

Dear Participant,

Enclosed are the results of the Nuclear Radiation Assessment Division (EMSL-LV) Intercomparison Study for *Performance Evaluation-A; April 20, 1993*.

The known value for each analysis was determined by gravimetric methods, checked by chemical analyses performed by EMSL-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 Intercomparison Program, and can be found in the Environmental Radioactivity Laboratory Intercomparison 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 Frank Novielli at 702/798-2159 or Patricia Honsa at 702/798-2141.

Sincerely,

A handwritten signature in cursive script that reads "Frank Novielli".

Frank Novielli
Senior Chemist
Radioanalysis Branch

Enclosure

NOTICE

This material has been funded wholly by the U.S. Environmental Protection Agency. It has been subject 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. 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. The eighth and ninth columns are the differences from the mean of all non-outliers and from the known value, respectively. 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.

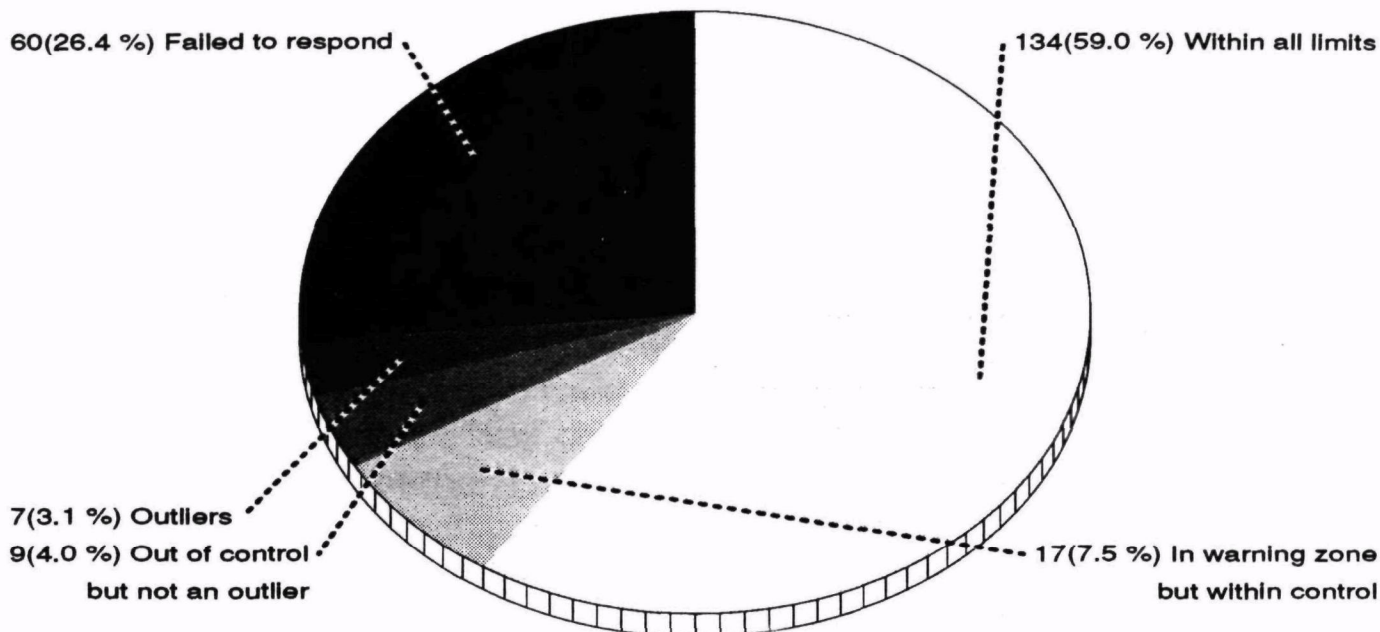
A complete explanation of the statistical calculations involved in the report may be found in the Environmental Radioactivity Laboratory Intercomparison Studies Program information brochure [Draft Revision of EPA-600/4-81-004], available from Frank Novielli, EMSL-LV, 702/798-2159.

Gross Alpha

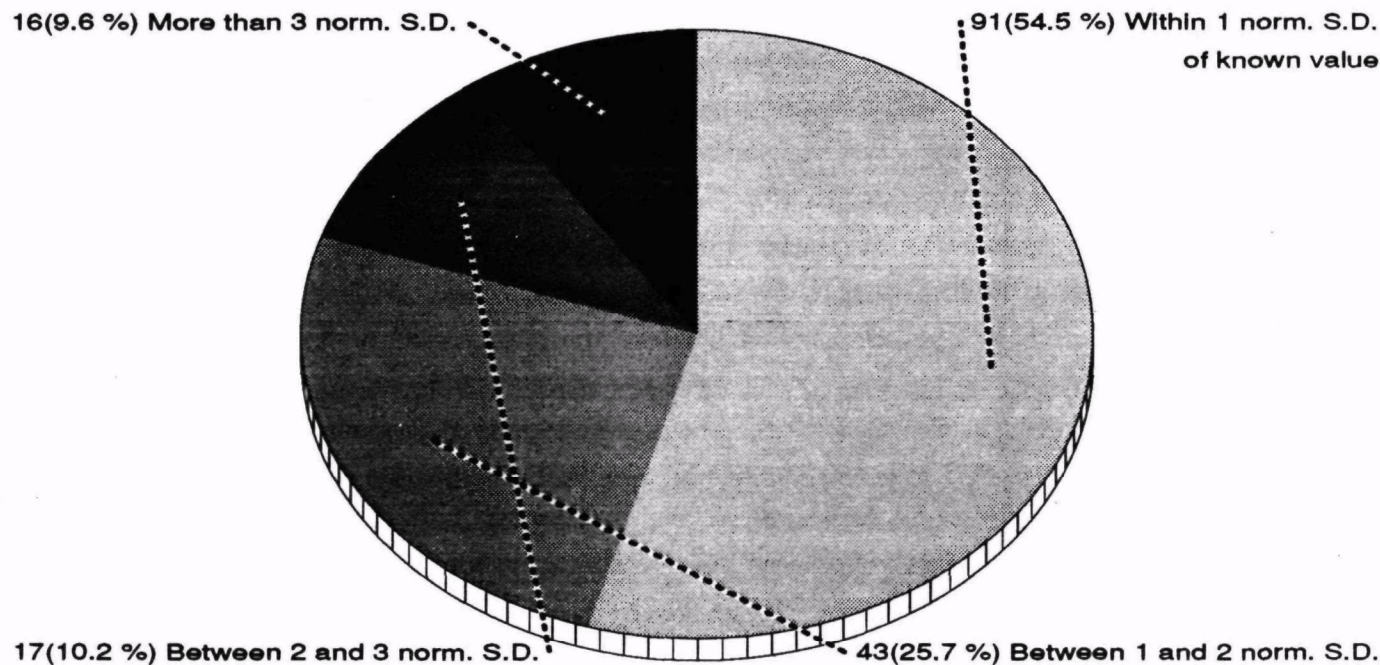
Statistical Summary

227 Participants

The known value of this nuclide is **95.0 pCi/l** with an expected precision of **24.0**; the control limits are 53.4 to 136.6; the warning regions are 53.4 to 67.2 and 122.8 to 136.6



Statistic	Respondents	Non-outliers
Mean	102.98	Grand Avg 96.63
Std. Dev.	76.32	20.17
Variance	5824.22	406.86
% Coef. of Var.	74.11	20.87
% deviation of mean from known value	8.40	1.71
Norm. dev. of mean from known value	0.10	0.08
Median	95.00	95.00
% deviation of median from known value	0.00	0.00
Norm. dev. of median from known value	0.00	0.00



Gross Alpha

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)		Tag
A	177.0	183.0	182.0	3.21	0.148	180.67	6.07	6.18	×
AA	99.0	103.0	82.0	11.15	0.517	94.67	-0.14	-0.02	
AE	98.0	94.0	93.0	2.65	0.123	95.00	-0.12	0.00	
AF	97.0	94.0	100.0	3.00	0.148	97.00	0.03	0.14	
AI	106.0	98.0	105.0	4.36	0.197	103.00	0.46	0.58	
AJ	101.0	99.0	100.0	1.00	0.049	100.00	0.24	0.36	
AK	92.0	90.0	95.0	2.52	0.123	92.33	-0.31	-0.19	
AL	89.0	88.0	92.0	2.08	0.098	89.67	-0.50	-0.38	
AO	115.0	120.0	122.0	3.61	0.172	119.00	1.61	1.73	
AP	98.0	93.0	105.0	6.03	0.295	98.67	0.15	0.26	
AR	91.0	92.0	94.0	1.53	0.074	92.33	-0.31	-0.19	
AU	100.0	93.0	119.0	13.45	0.640	104.00	0.53	0.65	
AW	102.0	96.0	97.0	3.21	0.148	98.33	0.12	0.24	
AZ	88.0	126.0	110.0	19.08	0.935	108.00	0.82	0.94	
BA	110.0	112.0	120.0	5.29	0.246	114.00	1.25	1.37	
BC	116.0	108.0	112.0	4.00	0.197	112.00	1.11	1.23	
BG	80.0	80.0	90.0	5.77	0.246	83.33	-0.96	-0.84	
BH	94.0	93.0	97.0	2.08	0.098	94.67	-0.14	-0.02	
BK	73.0	73.0	76.0	1.73	0.074	74.00	-1.63	-1.52	
BL									•
BM	98.0	102.0	103.0	2.65	0.123	101.00	0.32	0.43	
BN	112.0	111.0	109.0	1.53	0.074	110.67	1.01	1.13	
BO	147.0	131.0	129.0	9.87	0.443	135.67	2.82	2.93	
BS	117.0	99.0	111.0	9.17	0.443	109.00	0.89	1.01	
BW	8.0	23.0	11.0	7.94	0.369	14.00	-5.96	-5.85	×
C	92.0	90.0	89.0	1.53	0.074	90.33	-0.45	-0.34	
CA	92.0	89.0	84.0	4.04	0.197	88.33	-0.60	-0.48	
CE	84.0	93.0	90.0	4.58	0.222	89.00	-0.55	-0.43	
CG	93.0	97.0	93.0	2.31	0.098	94.33	-0.17	-0.05	
CJ	93.0	95.0	95.0	1.15	0.049	94.33	-0.17	-0.05	
CK	90.0	97.0	98.0	4.36	0.197	95.00	-0.12	0.00	
CM									•
CO	97.0	98.0	101.0	2.08	0.098	98.67	0.15	0.26	
CP									•
CQ	98.0	100.0	108.0	5.29	0.246	102.00	0.39	0.51	
CS	91.0	89.0	94.0	2.52	0.123	91.33	-0.38	-0.26	
CX	83.0	93.0	86.0	5.13	0.246	87.33	-0.67	-0.55	
D	108.0	110.0	110.0	1.15	0.049	109.33	0.92	1.03	
DB	107.0	119.0	118.0	6.66	0.295	114.67	1.30	1.42	
DD	58.0	54.0	56.0	2.00	0.098	56.00	-2.93	-2.81	
DE	123.0	124.0	125.0	1.00	0.049	124.00	1.98	2.09	
DG	42.0	66.0	45.0	13.08	0.591	51.00	-3.29	-3.18	↓
DJ	980.0	1014.0	1000.0	17.09	0.837	998.00	65.05	65.17	×
DL									•
DM									•

• = No data submitted

TAG SYMBOLS

↑ = Above control limit

∅ = Insufficient data

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↓ = Below control limit

Gross Alpha

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)		Tag
DO									•
DS	84.0	105.0	79.0	13.80	0.640	89.33	-0.53	-0.41	
DT	86.0	77.0	81.0	4.51	0.222	81.33	-1.10	-0.99	
DZ	79.0	81.0	82.0	1.53	0.074	80.67	-1.15	-1.03	
E	91.0	90.0	95.0	2.65	0.123	92.00	-0.33	-0.22	
EB	112.0	117.0	115.0	2.52	0.123	114.67	1.30	1.42	
EH	139.0	132.0	135.0	3.51	0.172	135.33	2.79	2.91	
EL									•
EO	110.0	111.0	113.0	1.53	0.074	111.33	1.06	1.18	
ER	102.0	98.0	96.0	3.06	0.148	98.67	0.15	0.26	
EV	72.0	81.0	77.0	4.51	0.222	76.67	-1.44	-1.32	
EX									•
FE	142.0	142.0	159.0	9.81	0.418	147.67	3.68	3.80	↑
FF	91.0	91.0	88.0	1.73	0.074	90.00	-0.48	-0.36	
FJ	86.0	92.0	88.0	3.06	0.148	88.67	-0.57	-0.46	
FK									•
FL	192.0	181.0	163.0	17.35	0.763	172.00	5.44	5.56	×
FN	84.0	87.0	85.0	1.53	0.074	85.33	-0.82	-0.70	
FU	106.0	107.0	108.0	1.00	0.049	107.00	0.75	0.87	
FW									•
FZ	110.0	100.0	90.0	10.00	0.492	100.00	0.24	0.36	
GE									•
GI									•
GQ	99.0	98.0	98.0	0.58	0.025	98.33	0.12	0.24	
GT	67.0	63.0	70.0	3.51	0.172	66.67	-2.16	-2.04	
GZ	80.0	80.0	80.0	0.00	0.000	80.00	-1.20	-1.08	
HH	81.0	85.0	91.0	5.03	0.246	85.67	-0.79	-0.67	
HI									•
HK	103.0	103.0	104.0	0.58	0.025	103.33	0.48	0.60	
HL	107.0	107.0	107.0	0.00	0.000	107.00	0.75	0.87	
HN	93.0	107.0	102.0	7.09	0.345	100.67	0.29	0.41	
HP	42.0	60.0	47.0	9.29	0.443	49.67	-3.39	-3.27	↓
HU									•
HY	108.0	106.0	101.0	3.61	0.172	105.00	0.60	0.72	
I	67.0	73.0	72.0	3.21	0.148	70.67	-1.87	-1.76	
IA									•
IC	146.0	142.0	136.0	5.03	0.246	141.33	3.23	3.34	↑
ID	75.0	80.0	78.0	2.52	0.123	77.67	-1.37	-1.25	
IE	94.0	108.0	108.0	8.08	0.345	103.33	0.48	0.60	
II									•
IU									•
J	103.0	110.0	106.0	3.51	0.172	106.33	0.70	0.82	
JE	94.0	92.0	92.0	1.15	0.049	92.67	-0.29	-0.17	
JG	95.0	101.0	103.0	4.16	0.197	99.67	0.22	0.34	
JH	129.0	135.0	132.0	3.00	0.148	132.00	2.55	2.67	

• ≡ No data submitted

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Gross Alpha

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)		Tag
JN	100.0	80.0	82.0	11.02	0.492	87.33	-0.67	-0.55	
JQ	95.0	103.0	99.0	4.00	0.197	99.00	0.17	0.29	
JS	100.0	108.0	93.0	7.51	0.369	100.33	0.27	0.38	
JY	77.0	76.0	72.0	2.65	0.123	75.00	-1.56	-1.44	
K	122.0	114.0	114.0	4.62	0.197	116.67	1.45	1.56	
KE	80.0	91.0	82.0	5.86	0.271	84.33	-0.89	-0.77	
KF									•
KM									•
KT	72.0	72.0	73.0	0.58	0.025	72.33	-1.75	-1.64	
KX	107.0	117.0	106.0	6.08	0.271	110.00	0.97	1.08	
KZ	108.0	110.0	111.0	1.53	0.074	109.67	0.94	1.06	
L	95.0	95.0	94.0	0.58	0.025	94.67	-0.14	-0.02	
LA									•
LE									•
LF	90.0	76.0	90.0	8.08	0.345	85.33	-0.82	-0.70	
LG									•
LL	108.0	100.0	91.0	8.50	0.418	99.67	0.22	0.34	
LM									•
LR	92.0	97.0	93.0	2.65	0.123	94.00	-0.19	-0.07	
LT	86.0	93.0	90.0	3.51	0.172	89.67	-0.50	-0.38	
M	107.0	105.0	103.0	2.00	0.098	105.00	0.60	0.72	
MA									•
ME									•
MN									•
MO									•
MP									•
MQ	92.0	94.0	92.0	1.15	0.049	92.67	-0.29	-0.17	
MS	93.0	91.0	90.0	1.53	0.074	91.33	-0.38	-0.26	
MV	57.0	66.0	62.0	4.51	0.222	61.67	-2.52	-2.41	
MY	101.0	78.0	128.0	25.03	1.439	102.33	0.41	0.53	
N	84.0	86.0	87.0	1.53	0.074	85.67	-0.79	-0.67	
NA	95.0	96.0	99.0	2.08	0.098	96.67	0.00	0.12	
NG	101.0	93.0	114.0	10.60	0.517	102.67	0.44	0.55	
NH	106.0	118.0	124.0	9.17	0.443	116.00	1.40	1.52	
NI									•
NJ									•
NK									•
NO	61.0	63.0	65.0	2.00	0.098	63.00	-2.43	-2.31	
NT	95.0	94.0	102.0	4.36	0.197	97.00	0.03	0.14	
NZ									•
O	104.0	104.0	102.0	1.15	0.049	103.33	0.48	0.60	
OE									•
OF	156.0	134.0	155.0	12.42	0.541	148.33	3.73	3.85	↑
OK									•
OM									•

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Gross Alpha

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)		Tag
OS	343.0	345.0	353.0	5.29	0.246	347.00	18.07	18.19	×
OX	81.0	66.0	80.0	8.39	0.369	75.67	-1.51	-1.40	
OY	131.0	133.0	135.0	2.00	0.098	133.00	2.62	2.74	
OZ									•
P	117.0	111.0	107.0	5.03	0.246	111.67	1.09	1.20	
PA	64.0	62.0	67.0	2.52	0.123	64.33	-2.33	-2.21	
PB	103.0	104.0	103.0	0.58	0.025	103.33	0.48	0.60	
PC	132.0	130.0	130.0	1.15	0.049	130.67	2.46	2.57	
PE									•
PG	90.0	96.0	93.0	3.00	0.148	93.00	-0.26	-0.14	
PM	96.0	96.0	101.0	2.89	0.123	97.67	0.08	0.19	
PP									•
PQ	87.0	90.0	94.0	3.51	0.172	90.33	-0.45	-0.34	
PR	89.0	85.0	80.0	4.51	0.222	84.67	-0.86	-0.75	
PT	55.0	73.0	70.0	9.64	0.443	66.00	-2.21	-2.09	
PV	89.0	88.0	99.0	6.08	0.271	92.00	-0.33	-0.22	
PW									•
PY									•
Q	109.0	93.0	126.0	16.50	0.812	109.33	0.92	1.03	
QC	106.0	110.0	94.0	8.33	0.394	103.33	0.48	0.60	
QJ	104.0	142.0	131.0	19.55	0.935	125.67	2.10	2.21	
QK									•
QL									•
QP									•
QQ	139.0	141.0	142.0	1.53	0.074	140.67	3.18	3.30	↑
QT	87.0	101.0	93.0	7.02	0.345	93.67	-0.21	-0.10	
QU	116.0	115.0	121.0	3.21	0.148	117.33	1.49	1.61	
QW	107.0	115.0	114.0	4.36	0.197	112.00	1.11	1.23	
QX	68.0	68.0	69.0	0.58	0.025	68.33	-2.04	-1.92	
QY									•
QZ	87.0	91.0	87.0	2.31	0.098	88.33	-0.60	-0.48	
RC									•
RD	92.0	94.0	91.0	1.53	0.074	92.33	-0.31	-0.19	
RE	94.0	99.0	71.0	14.93	0.689	88.00	-0.62	-0.51	
RF	100.0	98.0	98.0	1.15	0.049	98.67	0.15	0.26	
RG	68.0	68.0	79.0	6.35	0.271	71.67	-1.80	-1.68	
RJ	136.0	124.0	135.0	6.66	0.295	131.67	2.53	2.65	
RK	50.0	55.0	63.0	6.56	0.320	56.00	-2.93	-2.81	
RL	17.0	17.0	17.0	0.00	0.000	17.00	-5.75	-5.63	×
RM	77.0	77.0	86.0	5.20	0.222	80.00	-1.20	-1.08	
RN	74.0	69.0	78.0	4.51	0.222	73.67	-1.66	-1.54	
RP	1.0								∅
RR	83.0	83.0	81.0	1.15	0.049	82.33	-1.03	-0.91	
RT									•
RV	88.0	89.0	87.0	1.00	0.049	88.00	-0.62	-0.51	

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Gross Alpha

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known) Tag	
RZ	92.0	97.0	100.0	4.04	0.197	96.33	-0.02	0.10
S	96.0	98.0	104.0	4.16	0.197	99.33	0.20	0.31
SC	99.0	100.0	90.0	5.51	0.246	96.33	-0.02	0.10
SD	111.0	118.0	117.0	3.79	0.172	115.33	1.35	1.47
SF	89.0	81.0	91.0	5.29	0.246	87.00	-0.69	-0.58
SI	67.0	63.0	72.0	4.51	0.222	67.33	-2.11	-2.00
SL	147.0	139.0	121.0	13.32	0.640	135.67	2.82	2.93
SN								•
SO	86.0	86.0	87.0	0.58	0.025	86.33	-0.74	-0.63
SR	94.0	86.0	93.0	4.36	0.197	91.00	-0.41	-0.29
SS	105.0	101.0	95.0	5.03	0.246	100.33	0.27	0.38
ST	94.0	91.0	98.0	3.51	0.172	94.33	-0.17	-0.05
SW	108.0	107.0	115.0	4.36	0.197	110.00	0.97	1.08
SX								•
SZ	88.0	90.0	89.0	1.00	0.049	89.00	-0.55	-0.43
T	114.0	112.0	115.0	1.53	0.074	113.67	1.23	1.35
TA	97.0	86.0	106.0	10.02	0.492	96.33	-0.02	0.10
TC	9.0	8.0	8.0	0.58	0.025	8.33	-6.37	-6.25 ×
TD	52.0	63.0	53.0	6.08	0.271	56.00	-2.93	-2.81
TE	66.0	74.0	68.0	4.16	0.197	69.33	-1.97	-1.85
TG	78.0	86.0	82.0	4.00	0.197	82.00	-1.06	-0.94
TH	106.0	118.0	116.0	6.43	0.295	113.33	1.21	1.32
TI	104.0	111.0	110.0	3.79	0.172	108.33	0.84	0.96
TK	77.0	81.0	85.0	4.00	0.197	81.00	-1.13	-1.01
TL	99.0	95.0	93.0	3.06	0.148	95.67	-0.07	0.05
TM								•
TN	70.0	67.0	66.0	2.08	0.098	67.67	-2.09	-1.97
TQ	95.0	102.0	85.0	8.54	0.418	94.00	-0.19	-0.07
TR								•
TS								•
TT								•
TU								•
TV								•
TW								•
TY								•
U	72.0	77.0	65.0	6.03	0.295	71.33	-1.83	-1.71
UA	152.0	157.0	149.0	4.04	0.197	152.67	4.04	4.16 ↑
UB								•
UC								•
UE	146.0	154.0	150.0	4.00	0.197	150.00	3.85	3.97 ↑
UG	151.0	133.0	142.0	9.00	0.443	142.00	3.27	3.39 ↑
UK								•
UN	67.0	73.0	71.0	3.06	0.148	70.33	-1.90	-1.78
UQ	81.0	74.0	77.0	3.51	0.172	77.33	-1.39	-1.27
W	123.0	116.0	114.0	4.73	0.222	117.67	1.52	1.64

• ≡ No data submitted

TAG SYMBOLS

↑ ≡ Above control limit

∅ ≡ Insufficient data

× ≡ Determined to be an outlier

↓ ≡ Below control limit

Gross Alpha

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known) Tag	
X	71.0	66.0	72.0	3.21	0.148	69.67	-1.95	-1.83
Z	84.0	87.0	87.0	1.73	0.074	86.00	-0.77	-0.65

Data sorted by Laboratory Average

Average	Tag	Lab	Average	Tag	Lab	Average	Tag	Lab
8.33	×	TC	85.33		LF	94.67		BH
14.00	×	BW	85.33		FN	94.67		AA
17.00	×	RL	85.67		N	95.00		CK
49.67	↓	HP	85.67		HH	95.00		AE
51.00	↓	DG	86.00		Z	95.67		TL
56.00		TD	86.33		SO	96.33		TA
56.00		RK	87.00		SF	96.33		SC
56.00		DD	87.33		JN	96.33		RZ
61.67		MV	87.33		CX	96.67		NA
63.00		NO	88.00		RV	97.00		NT
64.33		PA	88.00		RE	97.00		AF
66.00		PT	88.33		QZ	97.67		PM
66.67		GT	88.33		CA	98.33		GQ
67.33		SI	88.67		FJ	98.33		AW
67.67		TN	89.00		SZ	98.67		RF
68.33		QX	89.00		CE	98.67		ER
69.33		TE	89.33		DS	98.67		CO
69.67		X	89.67		LT	98.67		AP
70.33		UN	89.67		AL	99.00		JQ
70.67		I	90.00		FF	99.33		S
71.33		U	90.33		PQ	99.67		LL
71.67		RG	90.33		C	99.67		JG
72.33		KT	91.00		SR	100.00		FZ
73.67		RN	91.33		MS	100.00		AJ
74.00		BK	91.33		CS	100.33		SS
75.00		JY	92.00		PV	100.33		JS
75.67		OX	92.00		E	100.67		HN
76.67		EV	92.33		RD	101.00		BM
77.33		UQ	92.33		AR	102.00		CQ
77.67		ID	92.33		AK	102.33		MY
80.00		RM	92.67		MQ	102.67		NG
80.00		GZ	92.67		JE	103.00		AI
80.67		DZ	93.00		PG	103.33		QC
81.00		TK	93.67		QT	103.33		PB
81.33		DT	94.00		TQ	103.33		O
82.00		TG	94.00		LR	103.33		IE
82.33		RR	94.33		ST	103.33		HK
83.33		BG	94.33		CJ	104.00		AU
84.33		KE	94.33		CG	105.00		M
84.67		PR	94.67		L	105.00		HY

• = No data submitted

TAG SYMBOLS

↑ = Above control limit

∅ = Insufficient data

× = Determined to be an outlier

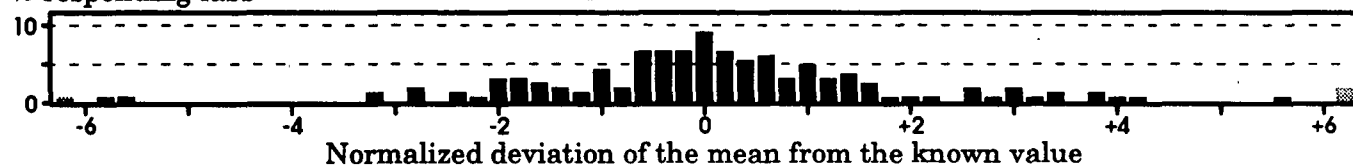
↓ = Below control limit

Gross Alpha**Data sorted by Laboratory Average**

Average	Tag	Lab	Average	Tag	Lab	Average	Tag	Lab
106.33		J	112.00		BC	132.00		JH
107.00		HL	113.33		TH	133.00		OY
107.00		FU	113.67		T	135.33		EH
108.00		AZ	114.00		BA	135.67		SL
108.33		TI	114.67		EB	135.67		BO
109.00		BS	114.67		DB	140.67	↑	QQ
109.33		Q	115.33		SD	141.33	↑	IC
109.33		D	116.00		NH	142.00	↑	UG
109.67		KZ	116.67		K	147.67	↑	FE
110.00		SW	117.33		QU	148.33	↑	OF
110.00		KX	117.67		W	150.00	↑	UE
110.67		BN	119.00		AO	152.67	↑	UA
111.33		EO	124.00		DE	172.00	×	FL
111.67		P	125.67		QJ	180.67	×	A
112.00		QW	130.67		PC	347.00	×	OS
			131.67		RJ	998.00	×	DJ

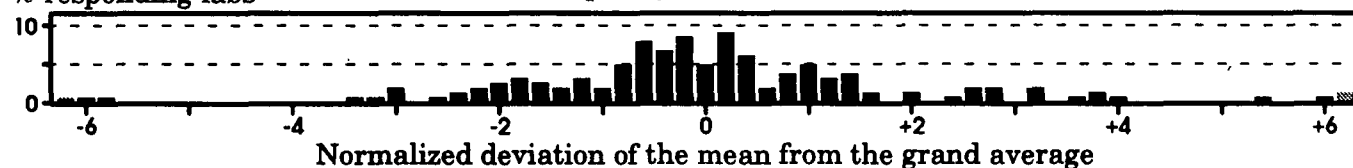
% responding labs

Frequency distribution



% responding labs

Frequency distribution



• ≡ No data submitted

TAG SYMBOLS

∅ ≡ Insufficient data

× ≡ Determined to be an outlier

↑ ≡ Above control limit

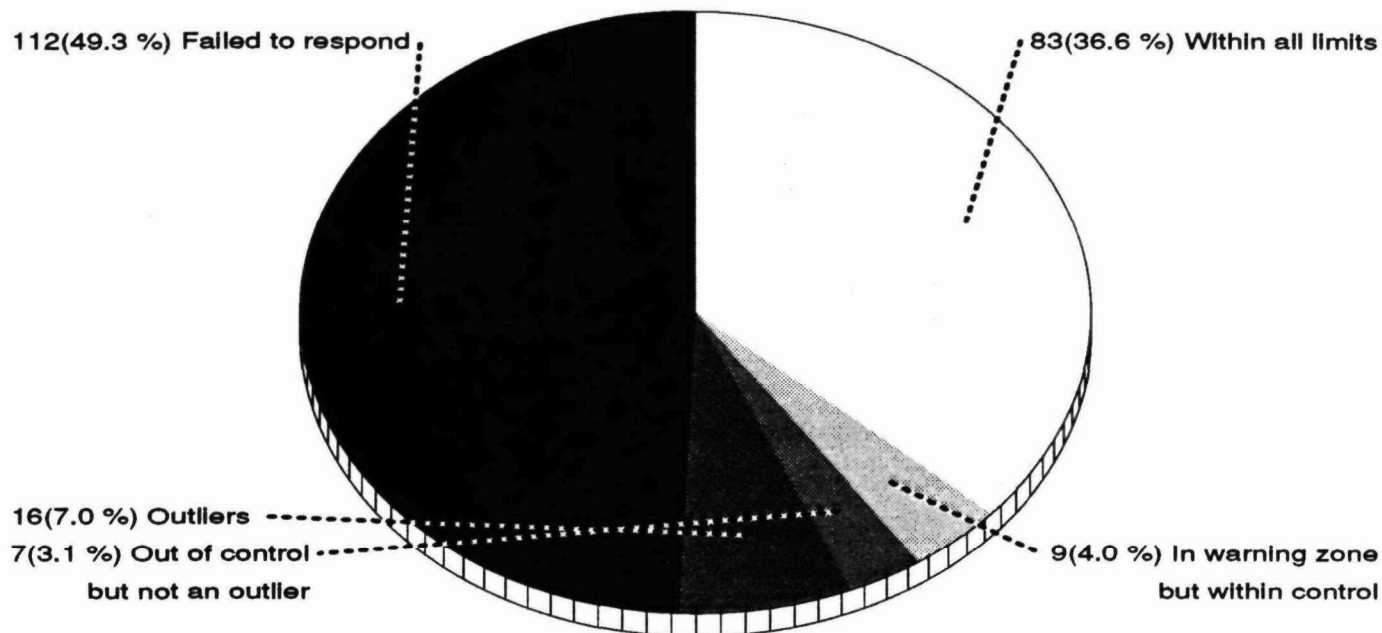
↓ ≡ Below control limit

Radium-226

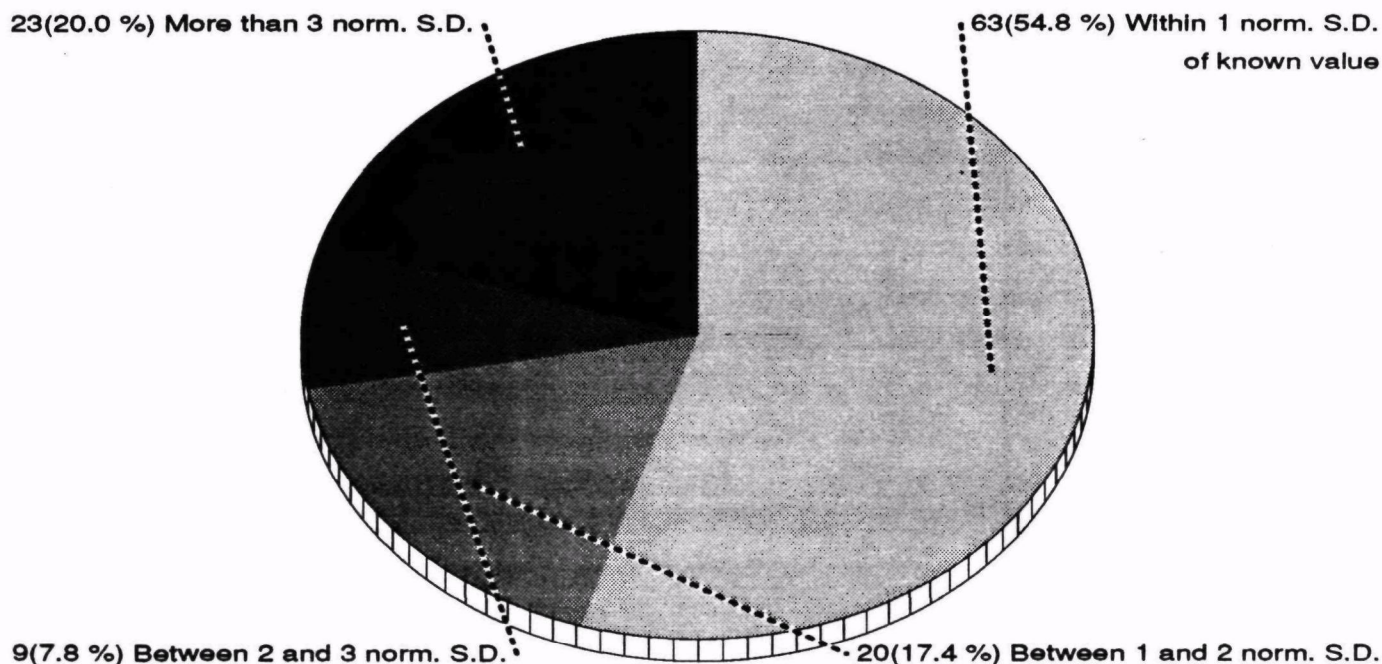
Statistical Summary

227 Participants

The known value of this nuclide is **24.9 pCi/l** with an expected precision of **3.7**; the control limits are 18.5 to 31.3; the warning regions are 18.5 to 20.6 and 29.2 to 31.3



Statistic	Respondents	Non-outliers
Mean	28.18	Grand Avg 24.41
Std. Dev.	32.42	3.14
Variance	1051.20	9.86
% Coef. of Var.	115.04	12.86
% deviation of mean from known value	13.19	-1.96
Norm. dev. of mean from known value	0.10	-0.16
Median	24.53	24.47
% deviation of median from known value	-1.47	-1.74
Norm. dev. of median from known value	-0.01	-0.14



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Radium-226

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)		Tag
A	25.3	24.2	24.1	0.67	0.192	24.53	0.06	-0.17	
AA	7.5	6.5	6.5	0.58	0.160	6.83	-8.23	-8.46	×
AE	25.0	24.5	26.5	1.04	0.319	25.33	0.43	0.20	
AF	22.6	22.7	22.8	0.10	0.032	22.70	-0.80	-1.03	
AI									•
AJ	24.9	25.2	25.9	0.51	0.160	25.33	0.43	0.20	
AK	22.6	21.9	21.8	0.44	0.128	22.10	-1.08	-1.31	
AL	22.6	22.9	23.5	0.46	0.144	23.00	-0.66	-0.89	
AO									•
AP	26.2	25.7	25.6	0.32	0.096	25.83	0.67	0.44	
AR									•
AU									•
AW	23.2	22.6	22.9	0.30	0.096	22.90	-0.71	-0.94	
AZ	28.9	26.5	25.5	1.75	0.543	26.97	1.20	0.97	
BA	24.9	28.1	26.3	1.60	0.511	26.43	0.95	0.72	
BC	25.4	19.7	21.9	2.87	0.910	22.33	-0.97	-1.20	
BG									•
BH	22.8	20.8	20.3	1.32	0.399	21.30	-1.46	-1.69	
BK	25.8	25.3	24.3	0.76	0.239	25.13	0.34	0.11	
BL	49.5	46.9	46.3	1.70	0.511	47.57	10.84	10.61	×
BM	21.2	21.6	20.5	0.56	0.176	21.10	-1.55	-1.78	
BN	23.0	24.1	26.1	1.57	0.495	24.40	-0.01	-0.23	
BO	22.5	23.1	23.2	0.38	0.112	22.93	-0.69	-0.92	
BS									•
BW									•
C	21.8	22.2	21.3	0.45	0.144	21.77	-1.24	-1.47	
CA	26.1	24.7	25.4	0.70	0.223	25.40	0.46	0.23	
CE	23.6	28.5	23.1	2.98	0.862	25.07	0.31	0.08	
CG	23.1	23.4	27.2	2.29	0.655	24.57	0.07	-0.16	
CJ	20.0	19.0	18.0	1.00	0.319	19.00	-2.53	-2.76	
CK	21.0	21.0	23.0	1.15	0.319	21.67	-1.29	-1.51	
CM									•
CO									•
CP									•
CQ									•
CS	24.2	24.8	25.8	0.81	0.255	24.93	0.24	0.02	
CX									•
D									•
DB	28.1	24.4	25.7	1.88	0.591	26.07	0.77	0.55	
DD									•
DE	26.6	27.3	27.8	0.60	0.192	27.23	1.32	1.09	
DG									•
DJ	350.0	370.0	364.0	10.26	5.177	361.33	157.72	157.49	×
DL									•
DM									•

• ≡ No data submitted

TAG SYMBOLS

↑ ≡ Above control limit

∅ ≡ Insufficient data

× ≡ Determined to be an outlier

↓ ≡ 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
DO									•
DS									•
DT	25.7	26.4	24.7	0.85	0.271	25.60	0.56	0.33	
DZ	23.8	25.4	25.9	1.10	0.335	25.03	0.29	0.06	
E	24.3	23.5	24.4	0.49	0.144	24.07	-0.16	-0.39	
EB	26.2	25.5	26.6	0.56	0.176	26.10	0.79	0.56	
EH									•
EL									•
EO	24.3	24.0	24.0	0.17	0.048	24.10	-0.15	-0.37	
ER	24.9	25.5	25.8	0.46	0.144	25.40	0.46	0.23	
EV									•
EX									•
FE	23.8	23.5	26.1	1.42	0.415	24.47	0.03	-0.20	
FF									•
FJ									•
FK									•
FL									•
FN	23.5	22.9	23.9	0.50	0.160	23.43	-0.46	-0.69	
FU									•
FW									•
FZ	33.0	31.0	36.0	2.52	0.798	33.33	4.18	3.95	↑
GE									•
GI									•
GQ	22.9	20.9	24.0	1.57	0.495	22.60	-0.85	-1.08	
GT									•
GZ									•
HH									•
HI									•
HK	23.7	22.6	24.0	0.74	0.223	23.43	-0.46	-0.69	
HL	26.5	26.5	26.5	0.00	0.000	26.50	0.98	0.75	
HN									•
HP	26.4	27.0	26.4	0.35	0.096	26.60	1.02	0.80	
HU									•
HY	21.0	23.1	25.3	2.15	0.686	23.13	-0.60	-0.83	
I	20.7	26.6	25.5	3.14	0.942	24.27	-0.07	-0.30	
IA									•
IC									•
ID	31.6	28.3	28.2	1.93	0.543	29.37	2.32	2.09	
IE									•
II									•
IU									•
J	23.1	24.1	23.5	0.50	0.160	23.57	-0.40	-0.62	
JE	30.9	27.3	32.1	2.50	0.766	30.10	2.66	2.43	
JG	20.4	21.6	26.7	3.35	1.011	22.90	-0.71	-0.94	
JH									•

• = No data submitted

TAG SYMBOLS

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↓ = Below control limit

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Radium-226

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)		Tag
JN	32.4	29.3	29.9	1.64	0.495	30.53	2.87	2.64	
JQ									•
JS	22.9	22.9	23.9	0.58	0.160	23.23	-0.55	-0.78	
JY									•
K	22.6	20.7	17.5	2.58	0.814	20.27	-1.94	-2.17	
KE									•
KF									•
KM									•
KT									•
KX									•
KZ	24.7	24.5	25.3	0.42	0.128	24.83	0.20	-0.03	
L	23.3	21.4	22.4	0.95	0.303	22.37	-0.96	-1.19	
LA									•
LE									•
LF									•
LG									•
LL									•
LM									•
LR									•
LT	25.5	24.7	24.3	0.61	0.192	24.83	0.20	-0.03	
M	49.0	45.0	46.0	2.08	0.639	46.67	10.42	10.19	× ⁷
MA									•
ME									•
MN									•
MO									•
MP									•
MQ									•
MS	26.3	23.1	26.8	2.01	0.591	25.40	0.46	0.23	
MV									•
MY	54.7	54.4	54.2	0.25	0.080	54.43	14.05	13.83	×
N	25.0	25.7	24.3	0.70	0.223	25.00	0.28	0.05	
NA									•
NG	10.2	9.8	10.6	0.40	0.128	10.20	-6.65	-6.88	×
NH	24.1	22.3	24.4	1.14	0.335	23.60	-0.38	-0.61	
NI									•
NJ	52.0	54.0	58.0	3.06	0.958	54.67	14.16	13.93	×
NK									•
NO	25.7	24.3	24.5	0.76	0.223	24.83	0.20	-0.03	
NT	22.5	23.6	24.6	1.05	0.335	23.57	-0.40	-0.62	
NZ									•
O									•
OE									•
OF	23.0	26.0	23.9	1.54	0.479	24.30	-0.05	-0.28	
OK									•
OM									•

• = No data submitted

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↓ = 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
OS	10.3	10.3	9.1	0.69	0.192	9.90	-6.79	-7.02	×
OX	24.7	24.2	24.4	0.25	0.080	24.43	0.01	-0.22	
OY	21.7	22.0	22.4	0.35	0.112	22.03	-1.11	-1.34	
OZ									•
P	28.5	26.3	21.4	3.63	1.254	25.40	0.46	0.23	
PA									•
PB	25.2	25.0	25.4	0.20	0.064	25.20	0.37	0.14	
PC	52.0	65.0	51.0	7.81	3.352	56.00	14.79	14.56	×
PE									•
PG	22.5	22.8	21.7	0.57	0.176	22.33	-0.97	-1.20	
PM	21.0	19.0	17.0	2.00	0.639	19.00	-2.53	-2.76	
PP									•
PQ									•
PR									•
PT	27.5	25.0	25.1	1.42	0.399	25.87	0.68	0.45	
PV	18.2	16.9	17.7	0.66	0.208	17.60	-3.19	-3.42	↓
PW									•
PY									•
Q	26.2	25.2	26.8	0.81	0.255	26.07	0.77	0.55	
QC									•
QJ									•
QK									•
QL									•
QP									•
QQ	39.6	40.0	33.0	3.93	1.224	37.53	6.14	5.91	×
QT	14.6	16.0	17.2	1.30	0.415	15.93	-3.97	-4.20	↓
QU	20.8	19.1	21.7	1.32	0.415	20.53	-1.82	-2.04	
QW									•
QX	32.8	33.3	31.8	0.76	0.239	32.63	3.85	3.62	↑
QY	24.4	25.4	25.4	0.58	0.160	25.07	0.31	0.08	
QZ	24.3	23.2	23.5	0.57	0.176	23.67	-0.35	-0.58	
RC	23.1	23.9	20.1	2.00	0.607	22.37	-0.96	-1.19	
RD	57.0	46.0	46.0	6.35	2.440	49.67	11.82	11.59	×
RE									•
RF	24.5	26.2	25.3	0.85	0.271	25.33	0.43	0.20	
RG	20.0	20.0	18.0	1.15	0.319	19.33	-2.38	-2.61	
RJ									•
RK	42.7	43.0							∅
RL	14.2	14.4	12.2	1.22	0.351	13.60	-5.06	-5.29	×
RM	27.7	27.9	27.9	0.12	0.032	27.83	1.60	1.37	
RN	33.7	32.3	37.0	2.41	0.750	34.33	4.64	4.42	↑
RP									•
RR									•
RT									•
RV									•

• ≡ No data submitted

TAG SYMBOLS

↑ ≡ Above control limit

∅ ≡ Insufficient data

× ≡ Determined to be an outlier

↓ ≡ 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
RZ	25.0	26.0	24.6	0.72	0.223	25.20	0.37	0.14	
S	25.2	25.9	25.5	0.35	0.112	25.53	0.52	0.30	
SC	22.4	24.7	24.3	1.23	0.367	23.80	-0.29	-0.51	
SD	22.9	22.8	21.7	0.67	0.192	22.47	-0.91	-1.14	
SF	27.6	26.7	28.0	0.67	0.208	27.43	1.41	1.19	
SI	27.1	27.4	29.1	1.08	0.319	27.87	1.62	1.39	
SL									•
SN									•
SO									•
SR									•
SS	25.2	24.2	24.0	0.64	0.192	24.47	0.03	-0.20	
ST	25.1	23.4	24.4	0.85	0.271	24.30	-0.05	-0.28	
SW	34.9	33.6	31.8	1.56	0.495	33.43	4.22	3.99	↑
SX									•
SZ	23.0	23.1	20.4	1.53	0.431	22.17	-1.05	-1.28	
T	23.1	23.8	23.9	0.44	0.128	23.60	-0.38	-0.61	
TA	23.0	23.0	24.0	0.58	0.160	23.33	-0.51	-0.73	
TC									•
TD	49.9	50.0	52.5	1.47	0.415	50.80	12.35	12.12	×
TE									•
TG	24.7	26.2	24.6	0.90	0.255	25.17	0.35	0.12	
TH	9.3	8.0	7.4	0.97	0.303	8.23	-7.57	-7.80	×
TI	9.5	11.8	14.5	2.50	0.798	11.93	-5.84	-6.07	×
TK	17.0	19.0	22.0	2.52	0.798	19.33	-2.38	-2.61	
TL	17.8	13.4	17.1	2.36	0.702	16.10	-3.89	-4.12	↓
TM									•
TN	28.4	27.3	30.1	1.41	0.447	28.60	1.96	1.73	
TQ	21.0	24.1	24.0	1.76	0.495	23.03	-0.65	-0.87	
TR									•
TS	24.6	25.3	24.9	0.35	0.112	24.93	0.24	0.02	
TT									•
TU	24.3	23.8	24.1	0.25	0.080	24.07	-0.16	-0.39	
TV									•
TW									•
TY									•
U	21.5	22.0	21.2	0.40	0.128	21.57	-1.33	-1.56	
UA									•
UB									•
UC									•
UE	26.1	23.2	25.3	1.50	0.463	24.87	0.21	-0.02	
UG									•
UK									•
UN	5.4	4.1	5.1	0.68	0.208	4.87	-9.15	-9.38	×
UQ	25.0	26.0	25.0	0.58	0.160	25.33	0.43	0.20	
W	24.2	23.3	26.3	1.54	0.479	24.60	0.09	-0.14	

• ≡ No data submitted

TAG SYMBOLS

↑ ≡ Above control limit

∅ ≡ Insufficient data

× ≡ Determined to be an outlier

↓ ≡ 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
X	26.0	27.4	24.2	1.60	0.511	25.87	0.68	0.45

Z

Data sorted by Laboratory Average

Average	Tag	Lab	Average	Tag	Lab	Average	Tag	Lab
4.87	×	UN	23.33		TA	25.33		AJ
6.83	×	AA	23.43		HK	25.33		AE
8.23	×	TH	23.43		FN	25.40		P
9.90	×	OS	23.57		NT	25.40		MS
10.20	×	NG	23.57		J	25.40		ER
11.93	×	TI	23.60		T	25.40		CA
13.60	×	RL	23.60		NH	25.53		S
15.93	↓	QT	23.67		QZ	25.60		DT
16.10	↓	TL	23.80		SC	25.83		AP
17.60	↓	PV	24.07		TU	25.87		X
19.00		PM	24.07		E	25.87		PT
19.00		CJ	24.10		EO	26.07		Q
19.33		TK	24.27		I	26.07		DB
19.33		RG	24.30		ST	26.10		EB
20.27		K	24.30		OF	26.43		BA
20.53		QU	24.40		BN	26.50		HL
21.10		BM	24.43		OX	26.60		HP
21.30		BH	24.47		SS	26.97		AZ
21.57		U	24.47		FE	27.23		DE
21.67		CK	24.53		A	27.43		SF
21.77		C	24.57		CG	27.83		RM
22.03		OY	24.60		W	27.87		SI
22.10		AK	24.83		NO	28.60		TN
22.17		SZ	24.83		LT	29.37		ID
22.33		PG	24.83		KZ	30.10		JE
22.33		BC	24.87		UE	30.53		JN
22.37		RC	24.93		TS	32.63	↑	QX
22.37		L	24.93		CS	33.33	↑	FZ
22.47		SD	25.00		N	33.43	↑	SW
22.60		GQ	25.03		DZ	34.33	↑	RN
22.70		AF	25.07		QY	37.53	×	QQ
22.90		JG	25.07		CE	46.67	×	M
22.90		AW	25.13		BK	47.57	×	BL
22.93		BO	25.17		TG	49.67	×	RD
23.00		AL	25.20		RZ	50.80	×	TD
23.03		TQ	25.20		PB	54.43	×	MY
23.13		HY	25.33		UQ	54.67	×	NJ
23.23		JS	25.33		RF	56.00	×	PC
						361.33	×	DJ

• = No data submitted

TAG SYMBOLS

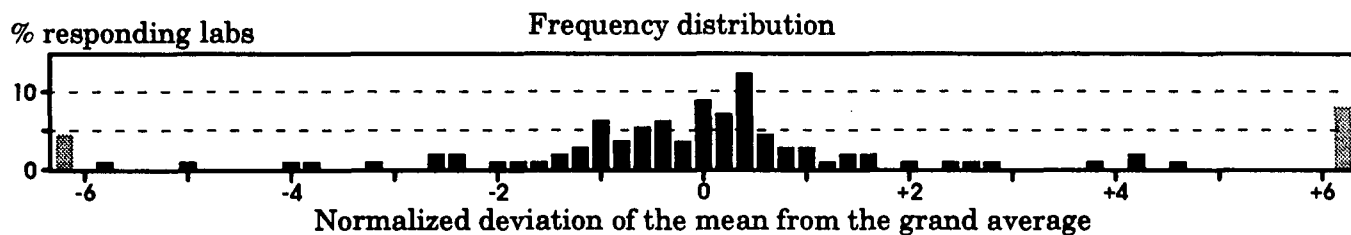
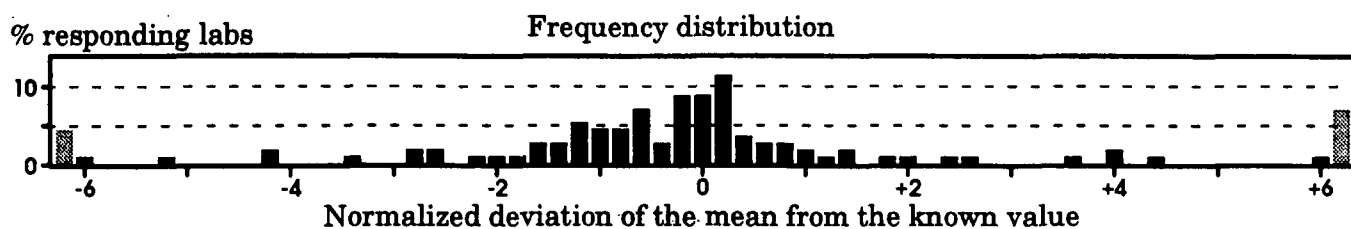
↑ = Above control limit

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Radium-226

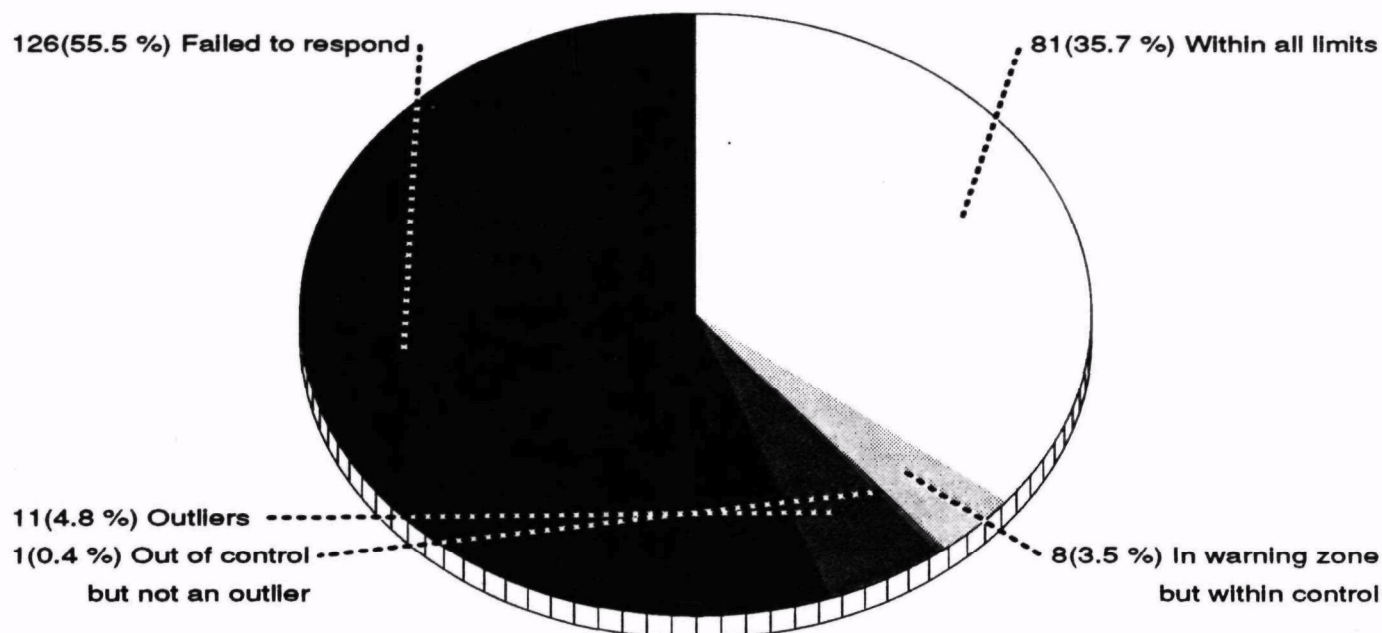


Radium-228

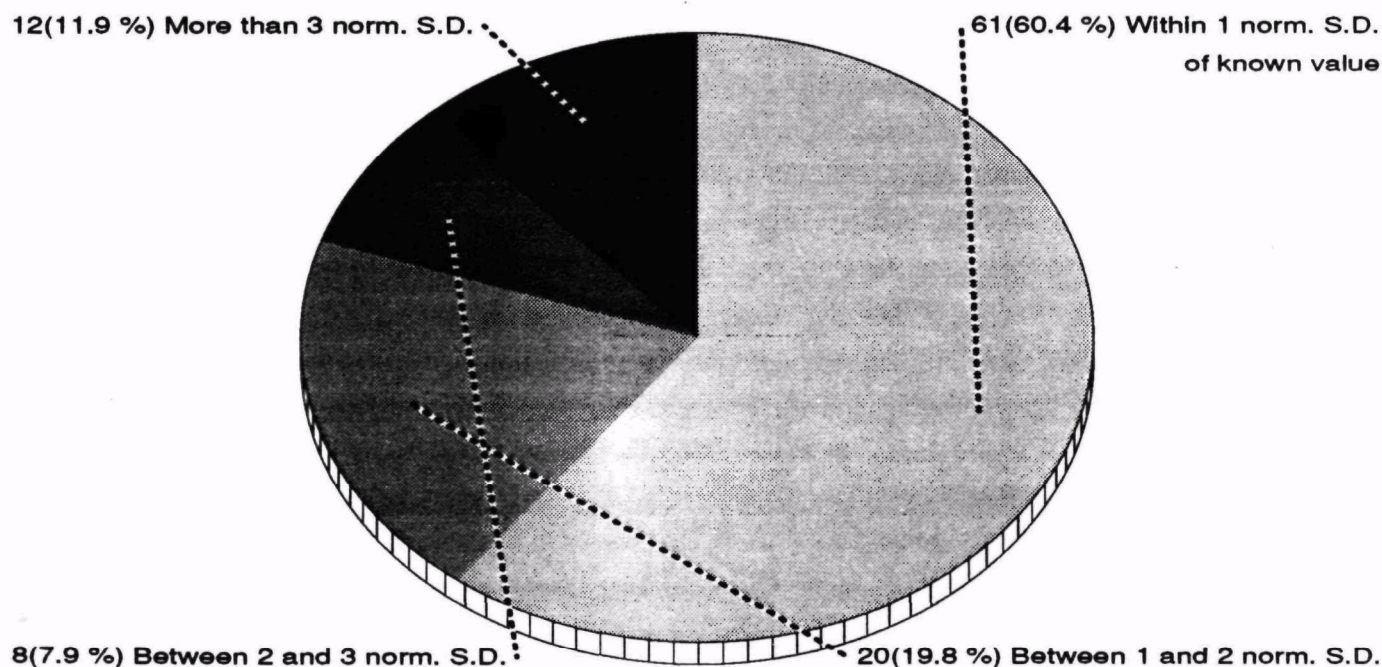
Statistical Summary

227 Participants

The known value of this nuclide is **19.0 pCi/l** with an expected precision of **4.8**; the control limits are 10.7 to 27.3; the warning regions are 10.7 to 13.4 and 24.6 to 27.3



Statistic	Respondents	Non-outliers
Mean	26.57	Grand Avg 18.61
Std. Dev.	50.81	3.14
Variance	2581.64	9.87
% Coef. of Var.	191.22	16.88
% deviation of mean from known value	39.85	-2.08
Norm. dev. of mean from known value	0.15	-0.13
Median	19.20	18.85
% deviation of median from known value	1.05	-0.79
Norm. dev. of median from known value	0.00	-0.05



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Radium-228

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)		Tag
A	17.1	17.8	19.1	1.01	0.246	18.00	-0.22	-0.36	
AA									•
AE	16.8	16.0	17.1	0.57	0.135	16.63	-0.71	-0.85	
AF	17.8	17.9	18.2	0.21	0.049	17.97	-0.23	-0.37	
AI	20.4	20.8	21.3	0.45	0.111	20.83	0.80	0.66	
AJ	18.0	17.9	17.6	0.21	0.049	17.83	-0.28	-0.42	
AK	19.0	19.1	18.0	0.61	0.135	18.70	0.03	-0.11	
AL	20.2	20.5	20.9	0.35	0.086	20.53	0.70	0.55	
AO									•
AP	12.1	11.6	11.1	0.50	0.123	11.60	-2.53	-2.67	
AR									•
AU									•
AW	17.5	16.5	17.1	0.50	0.123	17.03	-0.57	-0.71	
AZ									•
BA	17.8	17.8	18.6	0.46	0.098	18.07	-0.19	-0.34	
BC	23.4	23.1	23.9	0.40	0.098	23.47	1.75	1.61	
BG									•
BH	22.3	17.3	18.7	2.58	0.615	19.43	0.30	0.16	
BK	19.5	20.4	18.3	1.05	0.258	19.40	0.29	0.14	
BL									•
BM	19.4	21.0	19.9	0.82	0.197	20.10	0.54	0.40	
BN									•
BO	17.8	18.4	19.6	0.92	0.222	18.60	0.00	-0.14	
BS									•
BW									•
C	24.4	23.1	21.8	1.30	0.320	23.10	1.62	1.48	
CA	18.1	17.3	16.9	0.61	0.148	17.43	-0.42	-0.57	
CE	14.6	18.9	16.6	2.15	0.529	16.70	-0.69	-0.83	
CG	13.8	16.2	18.6	2.40	0.591	16.20	-0.87	-1.01	
CJ	19.0	18.0	18.0	0.58	0.123	18.33	-0.10	-0.24	
CK	21.0	23.0	25.0	2.00	0.492	23.00	1.59	1.44	
CM									•
CO									•
CP									•
CQ									•
CS	18.7	19.9	19.8	0.67	0.148	19.47	0.31	0.17	
CX									•
D									•
DB	15.5	15.2	15.0	0.25	0.062	15.23	-1.22	-1.36	
DD									•
DE	19.2	19.4	19.3	0.10	0.025	19.30	0.25	0.11	
DG									•
DJ	508.0	514.0	500.0	7.02	2.377	507.33	176.35	176.21	×
DL									•
DM									•

• = No data submitted

TAG SYMBOLS

↑ = Above control limit

∅ = Insufficient data

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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
DO									•
DS									•
DT	23.8	20.5	22.2	1.65	0.406	22.17	1.29	1.14	
DZ	18.5	19.5	18.7	0.53	0.123	18.90	0.11	-0.04	
E									•
EB	23.8	19.3	19.5	2.54	0.554	20.87	0.82	0.67	
EH									•
EL									•
EO	19.5	17.9	18.2	0.85	0.197	18.53	-0.03	-0.17	
ER									•
EV									•
EX									•
FE									•
FF									•
FJ									•
FK									•
FL									•
FN	22.7	20.9	19.3	1.70	0.418	20.97	0.85	0.71	
FU									•
FW									•
FZ	10.0	16.0	16.0	3.46	0.738	14.00	-1.66	-1.80	
GE									•
GI									•
GQ	16.9	16.3	15.9	0.50	0.123	16.37	-0.81	-0.95	
GT									•
GZ									•
HH									•
HI									•
HK	18.3	18.3	19.3	0.58	0.123	18.63	0.01	-0.13	
HL	17.7	16.9	20.4	1.83	0.431	18.33	-0.10	-0.24	
HN									•
HP	19.3	19.0	19.0	0.17	0.037	19.10	0.18	0.04	
HU									•
HY	16.7	15.1	16.1	0.81	0.197	15.97	-0.95	-1.09	
I	13.8	13.5	12.4	0.74	0.172	13.23	-1.94	-2.08	
IA									•
IC									•
ID									•
IE									•
II									•
IU									•
J	17.5	17.6	18.2	0.38	0.086	17.77	-0.30	-0.45	
JE	42.1	34.5	33.3	4.77	1.158	36.63	6.51	6.36	×
JG	21.4	17.0	23.1	3.15	0.751	20.50	0.68	0.54	
JH									•

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Radium-228

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)		Tag
JN									•
JQ									•
JS	24.0	22.0	24.0	1.15	0.246	23.33	1.71	1.56	
JY									•
K	18.8	19.0	21.1	1.27	0.283	19.63	0.37	0.23	
KE									•
KF									•
KM									•
KT									•
KX									•
KZ	17.7	18.6	21.7	2.10	0.492	19.33	0.26	0.12	
L	18.7	18.4	18.4	0.17	0.037	18.50	-0.04	-0.18	
LA									•
LE									•
LF									•
LG									•
LL									•
LM									•
LR									•
LT	15.6	16.9	13.5	1.72	0.418	15.33	-1.18	-1.32	
M	23.0	20.0	24.0	2.08	0.492	22.33	1.35	1.20	
MA									•
ME									•
MN									•
MO									•
MP									•
MQ									•
MS	16.5	19.3	21.6	2.55	0.628	19.13	0.19	0.05	
MV									•
MY									•
N	20.0	20.3	20.5	0.25	0.062	20.27	0.60	0.46	
NA									•
NG	23.1	20.9	21.1	1.22	0.271	21.70	1.12	0.97	
NH	16.5	16.5	19.0	1.44	0.308	17.33	-0.46	-0.60	
NI									•
NJ	21.0	21.0	21.0	0.00	0.000	21.00	0.86	0.72	
NK									•
NO	21.2	21.3	21.9	0.38	0.086	21.47	1.03	0.89	
NT	14.1	13.8	13.5	0.30	0.074	13.80	-1.73	-1.88	
NZ									•
O									•
OE									•
OF	22.4	19.2	18.8	1.97	0.443	20.13	0.55	0.41	
OK									•
OM									•

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Radium-228

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)		Tag
OS									•
OX	19.3	19.0	19.3	0.17	0.037	19.20	0.21	0.07	
OY	19.9	20.4	23.6	2.01	0.455	21.30	0.97	0.83	
OZ									•
P	24.5	22.7	26.6	1.95	0.480	24.60	2.16	2.02	
PA									•
PB	17.5	18.1	17.6	0.32	0.074	17.73	-0.31	-0.46	
PC	38.0	39.0	40.0	1.00	0.246	39.00	7.36	7.22	×
PE									•
PG									•
PM	23.0	23.0	21.0	1.15	0.246	22.33	1.35	1.20	
PP									•
PQ									•
PR									•
PT	14.0	13.9	15.9	1.13	0.246	14.60	-1.45	-1.59	
PV	14.1	11.6	13.5	1.31	0.308	13.07	-2.00	-2.14	
PW									•
PY									•
Q	12.1	11.6	12.6	0.50	0.123	12.10	-2.35	-2.49	
QC									•
QJ									•
QK									•
QL									•
QP									•
QQ	60.0	60.0	60.0	0.00	0.000	60.00	14.94	14.79	×
QT	21.8	21.2	19.1	1.42	0.332	20.70	0.76	0.61	
QU	20.8	19.1	20.2	0.86	0.209	20.03	0.52	0.37	
QW	20.4	18.9	19.3	0.78	0.185	19.53	0.33	0.19	
QX	53.7	55.3	54.5	0.80	0.197	54.50	12.95	12.81	×
QY	22.1	20.3	19.4	1.37	0.332	20.60	0.72	0.58	
QZ	18.4	17.7	17.7	0.40	0.086	17.93	-0.24	-0.38	
RC	41.9	35.4	35.3	3.78	0.812	37.53	6.83	6.69	×
RD	11.0	18.0	12.0	3.79	0.861	13.67	-1.78	-1.92	
RE									•
RF	22.8	19.4	17.9	2.51	0.603	20.03	0.52	0.37	
RG	33.0	32.0	31.0	1.00	0.246	32.00	4.83	4.69	×
RJ									•
RK	38.1								∅
RL	20.0	24.4	24.4	2.54	0.541	22.93	1.56	1.42	
RM	15.3	14.8	12.1	1.72	0.394	14.07	-1.64	-1.78	
RN	13.1	13.3	13.5	0.20	0.049	13.30	-1.91	-2.06	
RP									•
RR									•
RT									•
RV									•

• ≡ No data submitted

TAG SYMBOLS

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∅ ≡ Insufficient data

× ≡ Determined to be an outlier

↓ ≡ Below control limit

24 / 34 EMSL-LV Intercomparison Study: Performance Evaluation-A, 20-Apr-1993

Radium-228

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)		Tag
RZ	20.0	18.8	21.0	1.10	0.271	19.93	0.48	0.34	
S	19.2	18.7	18.5	0.36	0.086	18.80	0.07	-0.07	
SC	20.0	19.1	20.0	0.52	0.111	19.70	0.39	0.25	
SD	21.8	20.4	21.4	0.72	0.172	21.20	0.94	0.79	
SF	25.8	26.0	25.6	0.20	0.049	25.80	2.60	2.45	
SI	17.7	15.8	17.5	1.04	0.234	17.00	-0.58	-0.72	
SL									•
SN									•
SO									•
SR									•
SS	17.7	18.4	15.9	1.29	0.308	17.33	-0.46	-0.60	
ST	7.4	8.2	7.0	0.61	0.148	7.53	-4.00	-4.14	×
SW	93.4	99.4	61.3	20.49	8.026	84.70	23.85	23.71	×
SX									•
SZ	14.6	15.6	16.6	1.00	0.246	15.60	-1.08	-1.23	
T	18.1	19.1	18.8	0.51	0.123	18.67	0.02	-0.12	
TA	19.0	20.0	20.0	0.58	0.123	19.67	0.38	0.24	
TC									•
TD									•
TE									•
TG									•
TH	7.8	9.9	8.8	1.05	0.258	8.83	-3.53	-3.67	↓
TI	17.6	13.0	21.1	4.06	0.997	17.23	-0.50	-0.64	
TK	15.0	17.0	19.0	2.00	0.492	17.00	-0.58	-0.72	
TL	20.5	20.8	21.3	0.40	0.098	20.87	0.82	0.67	
TM									•
TN	23.0	27.4	28.7	2.99	0.701	26.37	2.80	2.66	
TQ	16.7	17.9	19.2	1.25	0.308	17.93	-0.24	-0.38	
TR									•
TS	19.8	19.2	20.8	0.81	0.197	19.93	0.48	0.34	
TT									•
TU									•
TV									•
TW									•
TY									•
U	5.5	4.8	5.6	0.44	0.098	5.30	-4.80	-4.94	×
UA									•
UB									•
UC									•
UE	20.2	18.7	21.1	1.21	0.295	20.00	0.50	0.36	
UG									•
UK									•
UN	136.7	154.9	142.4	9.31	3.361	144.67	45.49	45.35	×
UQ									•
W	15.9	17.5	11.9	2.88	0.689	15.10	-1.26	-1.41	

• = No data submitted

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Radium-228

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)	Tag
X	15.5	13.0	14.1	1.25	0.308	14.20	-1.59	-1.73
Z								

Data sorted by Laboratory Average

Average	Tag	Lab	Average	Tag	Lab	Average	Tag	Lab
5.30	×	U	17.93		TQ	20.27		N
7.53	×	ST	17.93		QZ	20.50		JG
8.83	↓	TH	17.97		AF	20.53		AL
11.60		AP	18.00		A	20.60		QY
12.10		Q	18.07		BA	20.70		QT
13.07		PV	18.33		HL	20.83		AI
13.23		I	18.33		CJ	20.87		TL
13.30		RN	18.50		L	20.87		EB
13.67		RD	18.53		EO	20.97		FN
13.80		NT	18.60		BO	21.00		NJ
14.00		FZ	18.63		HK	21.20		SD
14.07		RM	18.67		T	21.30		OY
14.20		X	18.70		AK	21.47		NO
14.60		PT	18.80		S	21.70		NG
15.10		W	18.90		DZ	22.17		DT
15.23		DB	19.10		HP	22.33		PM
15.33		LT	19.13		MS	22.33		M
15.60		SZ	19.20		OX	22.93		RL
15.97		HY	19.30		DE	23.00		CK
16.20		CG	19.33		KZ	23.10		C
16.37		GQ	19.40		BK	23.33		JS
16.63		AE	19.43		BH	23.47		BC
16.70		CE	19.47		CS	24.60		P
17.00		TK	19.53		QW	25.80		SF
17.00		SI	19.63		K	26.37		TN
17.03		AW	19.67		TA	32.00	×	RG
17.23		TI	19.70		SC	36.63	×	JE
17.33		SS	19.93		TS	37.53	×	RC
17.33		NH	19.93		RZ	39.00	×	PC
17.43		CA	20.00		UE	54.50	×	QX
17.73		PB	20.03		RF	60.00	×	QQ
17.77		J	20.03		QU	84.70	×	SW
17.83		AJ	20.10		BM	144.67	×	UN
			20.13		OF	507.33	×	DJ

• ≡ No data submitted

TAG SYMBOLS

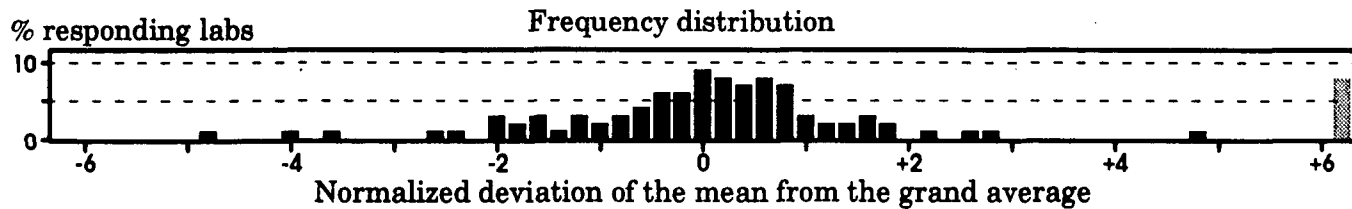
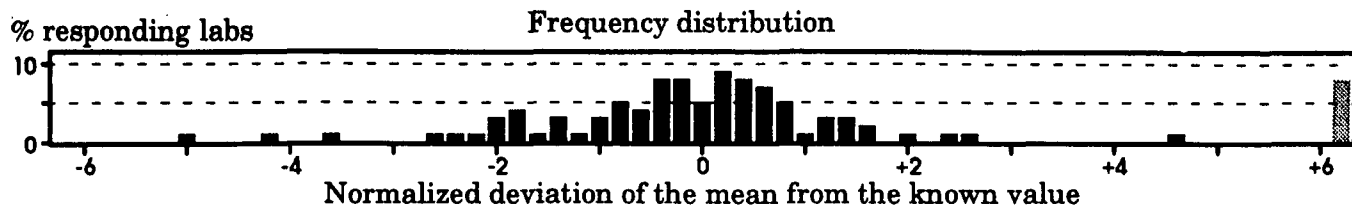
↑ ≡ Above control limit

∅ ≡ Insufficient data

× ≡ Determined to be an outlier

↓ ≡ Below control limit

Radium-228

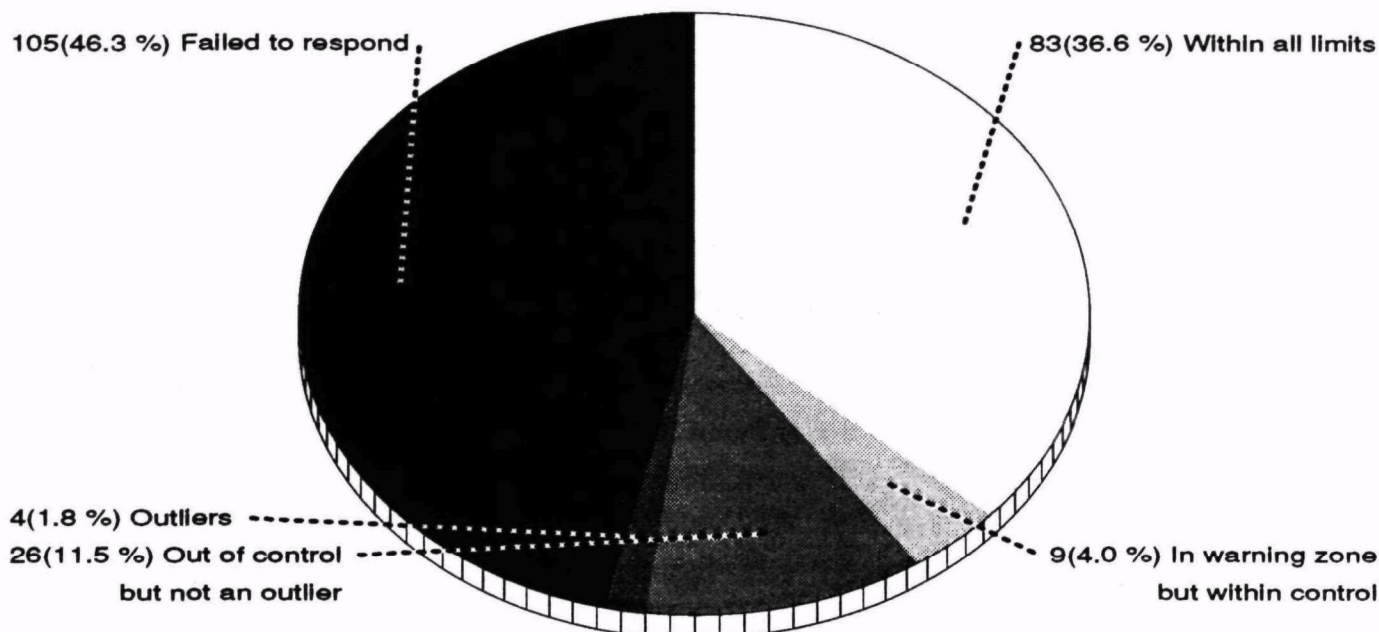


Uranium (Natural)

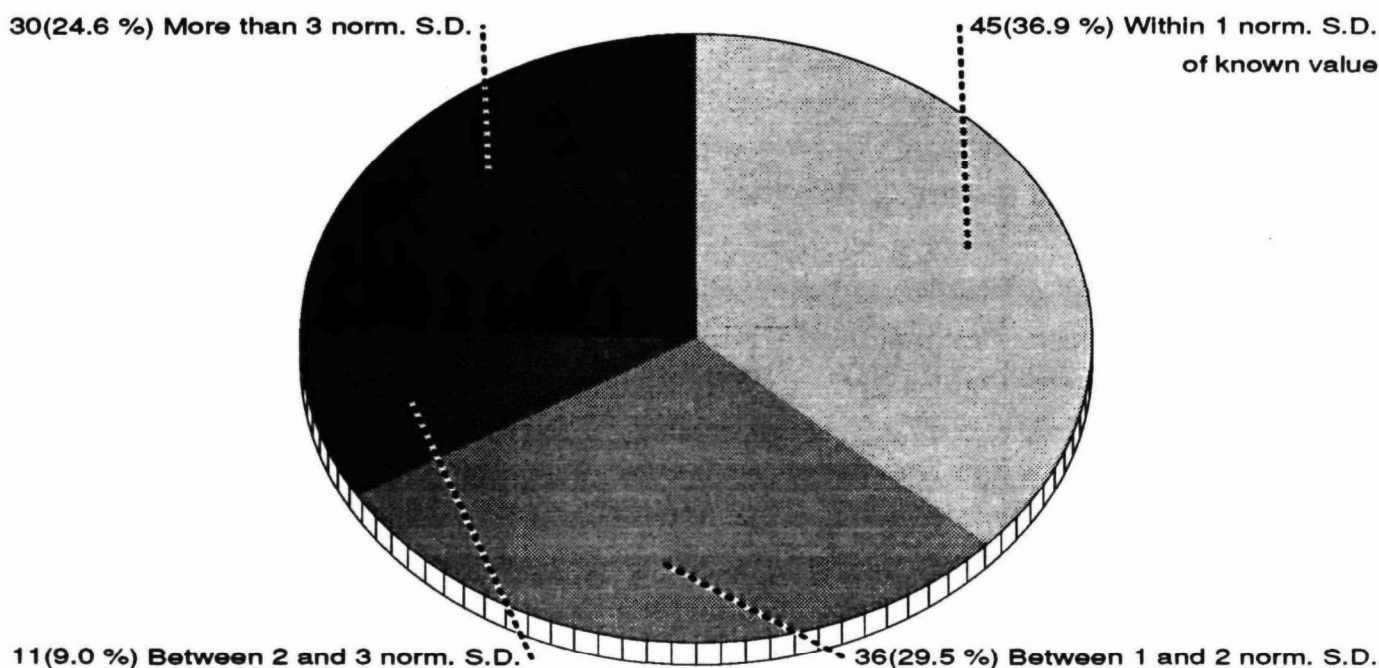
Statistical Summary

227 Participants

The known value of this nuclide is **28.9 pCi/l** with an expected precision of **3.0**; the control limits are 23.7 to 34.1; the warning regions are 23.7 to 25.4 and 32.4 to 34.1



Statistic	Respondents	Non-outliers
Mean	30.76	Grand Avg 27.64
Std. Dev.	20.83	5.01
Variance	433.77	25.13
% Coef. of Var.	67.70	18.14
% deviation of mean from known value	6.44	-4.35
Norm. dev. of mean from known value	0.09	-0.25
Median	28.32	28.25
% deviation of median from known value	-2.02	-2.25
Norm. dev. of median from known value	-0.03	-0.13



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Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)		Tag
A	29.7	29.5	29.8	0.15	0.059	29.67	1.17	0.44	
AA	29.4	27.0	28.3	1.20	0.473	28.23	0.34	-0.38	
AE	25.2	24.7	24.0	0.60	0.236	24.63	-1.74	-2.46	
AF	29.5	28.8	26.8	1.40	0.532	28.37	0.42	-0.31	
AI									•
AJ	32.0	34.0	31.0	1.53	0.591	32.33	2.71	1.98	
AK	33.6	33.6	33.6	0.01	0.000	33.60	3.44	2.71	
AL	21.3	21.8	22.6	0.66	0.256	21.90	-3.32	-4.04	↓
AO									•
AP	26.3	23.4	25.9	1.57	0.571	25.20	-1.41	-2.14	
AR									•
AU									•
AW	32.6	34.0	34.7	1.07	0.413	33.77	3.54	2.81	
AZ	31.6	30.9	31.1	0.36	0.138	31.20	2.05	1.33	
BA	30.6	33.6	29.8	2.00	0.748	31.33	2.13	1.40	
BC	27.9	28.7	28.4	0.40	0.158	28.33	0.40	-0.33	
BG	217.6	222.6	214.4	4.13	2.170	218.20	110.02	109.29	×
BH	24.7	21.2	22.9	1.75	0.689	22.93	-2.72	-3.44	↓
BK	25.9	26.0	26.0	0.06	0.020	25.97	-0.97	-1.69	
BL									•
BM	27.8	22.6	20.1	3.93	1.983	23.50	-2.39	-3.12	↓
BN	29.5	25.4	30.4	2.67	0.984	28.43	0.46	-0.27	
BO	27.8	25.4	27.5	1.31	0.473	26.90	-0.43	-1.15	
BS									•
BW									•
C	27.8	25.4	31.3	2.97	1.308	28.17	0.30	-0.42	
CA	28.4	26.5	28.4	1.10	0.374	27.77	0.07	-0.65	
CE	30.8	31.1	31.5	0.35	0.138	31.13	2.02	1.29	
CG	26.4	26.1	25.6	0.40	0.158	26.03	-0.93	-1.66	
CJ	32.0	32.0	31.0	0.58	0.197	31.67	2.32	1.60	
CK	25.1	29.2	27.7	2.07	0.807	27.33	-0.18	-0.90	
CM									•
CO	32.4	30.8	31.6	0.80	0.315	31.60	2.28	1.56	
CP									•
CQ									•
CS	30.1	29.9	29.0	0.59	0.217	29.67	1.17	0.44	
CX	28.6	28.7	28.3	0.21	0.079	28.53	0.51	-0.21	
D	28.1	28.4	28.2	0.15	0.059	28.23	0.34	-0.38	
DB	21.0	22.0	24.0	1.53	0.591	22.33	-3.07	-3.79	↓
DD									•
DE	29.1	29.2	29.2	0.06	0.020	29.17	0.88	0.15	
DG									•
DJ	122.0	130.0	136.0	7.02	4.346	129.33	58.71	57.99	×
DL									•
DM									•

• = No data submitted

TAG SYMBOLS

↑ = Above control limit

∅ = Insufficient data

× = Determined to be an outlier

↓ = 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
DO	33.7	26.8	29.8	3.46	1.683	30.10	1.42	0.69
DS								•
DT	28.0	30.0	26.0	2.00	0.788	28.00	0.21	-0.52
DZ	29.1	29.0	28.9	0.10	0.039	29.00	0.78	0.06
E	24.7	26.8	27.7	1.54	0.591	26.40	-0.72	-1.44
EB	29.7	27.6	30.1	1.34	0.492	29.13	0.86	0.13
EH								•
EL								•
EO								•
ER	31.8	30.1	28.5	1.65	0.650	30.13	1.44	0.71
EV								•
EX								•
FE	27.5	27.3	27.3	0.12	0.039	27.37	-0.16	-0.89
FF								•
FJ	28.1	29.1	29.2	0.61	0.217	28.80	0.67	-0.06
FK								•
FL								•
FN	28.1	32.8	31.7	2.46	0.925	30.87	1.86	1.14
FU								•
FW								•
FZ	31.5	32.7	30.2	1.25	0.492	31.47	2.21	1.48
GE								•
GI								•
GQ	28.9	27.4	28.5	0.78	0.295	28.27	0.36	-0.37
GT								•
GZ								•
HH								•
HI								•
HK	30.4	27.9	28.9	1.26	0.492	29.07	0.82	0.10
HL	31.8	26.9	33.3	3.35	1.495	30.67	1.75	1.02
HN								•
HP	24.4	26.8	26.2	1.25	0.473	25.80	-1.06	-1.79
HU								•
HY	29.0	27.7	26.3	1.35	0.532	27.67	0.01	-0.71
I	31.6	26.5	31.0	2.79	1.008	29.70	1.19	0.46
IA								•
IC								•
ID	27.3	25.0	26.4	1.16	0.453	26.23	-0.81	-1.54
IE	32.8	31.5	31.8	0.68	0.256	32.03	2.54	1.81
II								•
IU								•
J	30.8	29.6	29.7	0.67	0.236	30.03	1.38	0.65
JE	23.5	27.8	27.8	2.48	0.847	26.37	-0.74	-1.46
JG	18.7	18.9	22.7	2.25	0.788	20.10	-4.35	-5.08 ↓
JH								•

• = No data submitted

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↓ = Below control limit

30 / 34 EMSL-LV Intercomparison Study: Performance Evaluation-A, 20-Apr-1993
Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)		Tag
JN	14.0	13.5	12.6	0.71	0.276	13.37	-8.24	-8.97	↓
JQ									•
JS	81.9	81.2	80.6	0.65	0.256	81.23	30.94	30.21	×
JY	12.5	22.5	22.8	5.86	2.958	19.27	-4.84	-5.56	↓
K	33.2	30.8	31.3	1.27	0.473	31.77	2.38	1.66	
KE									•
KF									•
KM									•
KT	24.0	23.0	23.0	0.58	0.197	23.33	-2.49	-3.21	↓
KX									•
KZ									•
L	32.5	30.7	31.1	0.95	0.354	31.43	2.19	1.46	
LA									•
LE									•
LF									•
LG									•
LL									•
LM									•
LR									•
LT	28.9	27.4	27.3	0.90	0.315	27.87	0.13	-0.60	
M	10.0	14.0	15.0	2.65	0.984	13.00	-8.45	-9.18	↓
MA									•
ME									•
MN									•
MO									•
MP									•
MQ									•
MS	26.2	25.8	25.1	0.56	0.217	25.70	-1.12	-1.85	
MV									•
MY									•
N	27.8	27.3	28.1	0.40	0.158	27.73	0.05	-0.67	
NA	26.0	27.0	28.0	1.00	0.394	27.00	-0.37	-1.10	
NG									•
NH	33.5	32.7	33.5	0.46	0.158	33.23	3.23	2.50	
NI									•
NJ	27.0	26.0	27.0	0.58	0.197	26.67	-0.56	-1.29	
NK	60.7	62.2	64.3	1.81	0.709	62.40	20.07	19.34	×
NO	29.2	30.1	31.0	0.90	0.354	30.10	1.42	0.69	
NT	26.1	22.5	24.3	1.80	0.709	24.30	-1.93	-2.66	
NZ									•
O									•
OE									•
OF	26.0	22.2	23.3	1.96	0.748	23.83	-2.20	-2.93	
OK									•
OM									•

• ≡ No data submitted

TAG SYMBOLS

↑ ≡ Above control limit

∅ ≡ Insufficient data

× ≡ Determined to be an outlier

↓ ≡ 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
OS	28.8	27.1	26.3	1.28	0.492	27.40	-0.14	-0.87	
OX									•
OY	27.2	27.7	27.5	0.25	0.098	27.47	-0.10	-0.83	
OZ									•
P	32.5	30.6	32.1	1.00	0.374	31.73	2.36	1.64	
PA									•
PB	35.2	35.6	35.0	0.31	0.118	35.27	4.40	3.68	↑
PC									•
PE									•
PG									•
PM	32.0	33.0	32.0	0.58	0.197	32.33	2.71	1.98	
PP	22.0	21.6	21.6	0.23	0.079	21.73	-3.41	-4.14	↓
PQ	27.4	27.6	26.7	0.47	0.177	27.23	-0.24	-0.96	
PR									•
PT	23.0	22.7	22.1	0.46	0.177	22.60	-2.91	-3.64	↓
PV	23.5	21.9	21.2	1.18	0.453	22.20	-3.14	-3.87	↓
PW									•
PY									•
Q	25.5	26.6	27.1	0.82	0.315	26.40	-0.72	-1.44	
QC									•
QJ	28.7	28.1	28.8	0.38	0.138	28.53	0.51	-0.21	
QK									•
QL									•
QP									•
QQ	26.0	25.5	24.8	0.60	0.236	25.43	-1.28	-2.00	
QT									•
QU	30.3	30.4	31.7	0.78	0.276	30.80	1.82	1.10	
QW									•
QX	32.6	32.3	32.8	0.25	0.098	32.57	2.84	2.12	
QY	29.2	28.6	28.9	0.30	0.118	28.90	0.73	0.00	
QZ	31.4	33.4	33.7	1.25	0.453	32.83	3.00	2.27	
RC	29.8	31.9	30.3	1.10	0.413	30.67	1.75	1.02	
RD	42.1	43.6	42.9	0.75	0.295	42.87	8.79	8.06	↑
RE									•
RF	28.5	28.5	29.3	0.46	0.158	28.77	0.65	-0.08	
RG	29.7	29.7	29.0	0.40	0.138	29.47	1.05	0.33	
RJ									•
RK	27.9	26.5	27.2	0.70	0.276	27.20	-0.26	-0.98	
RL	15.0	18.0	20.0	2.52	0.984	17.67	-5.76	-6.49	↓
RM	20.0	19.0	22.9	2.03	0.768	20.63	-4.05	-4.77	↓
RN	35.5	35.0	33.6	0.98	0.374	34.70	4.07	3.35	↑
RP	30.6	30.6	30.6	0.01	0.000	30.60	1.71	0.98	
RR	28.8	30.3	29.6	0.75	0.295	29.57	1.11	0.38	
RT									•
RV	14.1	14.7	14.6	0.32	0.118	14.47	-7.61	-8.33	↓

• = No data submitted

TAG SYMBOLS

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× = Determined to be an outlier

↓ = Below control limit

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Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg) (known)		Tag
RZ	20.4	21.4	20.4	0.58	0.197	20.73	-3.99	-4.72	↓
S	27.1	26.0	26.4	0.56	0.217	26.50	-0.66	-1.39	
SC	26.1	25.9	25.5	0.31	0.118	25.83	-1.04	-1.77	
SD	31.7	32.9	28.2	2.44	0.925	30.93	1.90	1.17	
SF	41.2	41.7	42.1	0.45	0.177	41.67	8.10	7.37	↑
SI	31.3	31.7	30.9	0.40	0.158	31.30	2.11	1.39	
SL	15.0	19.0	19.8	2.57	0.945	17.93	-5.61	-6.33	↓
SN									•
SO	27.1	27.8	26.9	0.47	0.177	27.27	-0.22	-0.94	
SR									•
SS	25.9	27.6	22.8	2.43	0.945	25.43	-1.28	-2.00	
ST	28.7	28.2	29.5	0.66	0.256	28.80	0.67	-0.06	
SW	25.4	30.8	29.9	2.89	1.120	28.70	0.61	-0.12	
SX									•
SZ	27.2	26.6	27.2	0.35	0.118	27.00	-0.37	-1.10	
T	25.4	27.1	26.7	0.89	0.335	26.40	-0.72	-1.44	
TA	30.0	31.0	31.0	0.58	0.197	30.67	1.75	1.02	
TC									•
TD									•
TE									•
TG	30.1	27.1	27.7	1.59	0.591	28.30	0.38	-0.35	
TH	19.0	20.0	22.0	1.53	0.591	20.33	-4.22	-4.95	↓
TI	13.3	13.1	12.1	0.64	0.236	12.83	-8.55	-9.28	↓
TK									•
TL	26.8	26.7	25.9	0.49	0.177	26.47	-0.68	-1.40	
TM									•
TN									•
TQ	44.4	43.1	41.2	1.61	0.630	42.90	8.81	8.08	↑
TR									•
TS	22.9	23.8	22.3	0.75	0.295	23.00	-2.68	-3.41	↓
TT									•
TU	29.9	29.8	31.1	0.72	0.256	30.27	1.52	0.79	
TV									•
TW									•
TY									•
U									•
UA									•
UB									•
UC									•
UE	28.7	30.2	26.8	1.70	0.669	28.57	0.53	-0.19	
UG									•
UK									•
UN	19.7	19.3	19.9	0.31	0.118	19.63	-4.62	-5.35	↓
UQ									•
W	30.7	30.8	30.7	0.06	0.020	30.73	1.78	1.06	

• = No data submitted

TAG SYMBOLS

↑ = Above control limit

∅ = Insufficient data

× = Determined to be an outlier

↓ = 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	
X	28.6	27.5	26.2	1.20	0.473	27.43	-0.12	-0.85
Z	28.7	27.8	28.7	0.52	0.177	28.40	0.44	-0.29

Data sorted by Laboratory Average

Average	Tag	Lab	Average	Tag	Lab	Average	Tag	Lab
12.83	↓	TI	26.90		BO	29.67		A
13.00	↓	M	27.00		SZ	29.70		I
13.37	↓	JN	27.00		NA	30.03		J
14.47	↓	RV	27.20		RK	30.10		NO
17.67	↓	RL	27.23		PQ	30.10		DO
17.93	↓	SL	27.27		SO	30.13		ER
19.27	↓	JY	27.33		CK	30.27		TU
19.63	↓	UN	27.37		FE	30.60		RP
20.10	↓	JG	27.40		OS	30.67		TA
20.33	↓	TH	27.43		X	30.67		RC
20.63	↓	RM	27.47		OY	30.67		HL
20.73	↓	RZ	27.67		HY	30.73		W
21.73	↓	PP	27.73		N	30.80		QU
21.90	↓	AL	27.77		CA	30.87		FN
22.20	↓	PV	27.87		LT	30.93		SD
22.33	↓	DB	28.00		DT	31.13		CE
22.60	↓	PT	28.17		C	31.20		AZ
22.93	↓	BH	28.23		AA	31.30		SI
23.00	↓	TS	28.23		D	31.33		BA
23.33	↓	KT	28.27		GQ	31.43		L
23.50	↓	BM	28.30		TG	31.47		FZ
23.83		OF	28.33		BC	31.60		CO
24.30		NT	28.37		AF	31.67		CJ
24.63		AE	28.40		Z	31.73		P
25.20		AP	28.43		BN	31.77		K
25.43		SS	28.53		QJ	32.03		IE
25.43		QQ	28.53		CX	32.33		PM
25.70		MS	28.57		UE	32.33		AJ
25.80		HP	28.70		SW	32.57		QX
25.83		SC	28.77		RF	32.83		QZ
25.97		BK	28.80		ST	33.23		NH
26.03		CG	28.80		FJ	33.60		AK
26.23		ID	28.90		QY	33.77		AW
26.37		JE	29.00		DZ	34.70	↑	RN
26.40		T	29.07		HK	35.27	↑	PB
26.40		Q	29.13		EB	41.67	↑	SF
26.40		E	29.17		DE	42.87	↑	RD
26.47		TL	29.47		RG	42.90	↑	TQ
26.50		S	29.57		RR	62.40	×	NK
26.67		NJ	29.67		CS	81.23	×	JS

• ≡ No data submitted

TAG SYMBOLS

↑ ≡ Above control limit

∅ ≡ Insufficient data

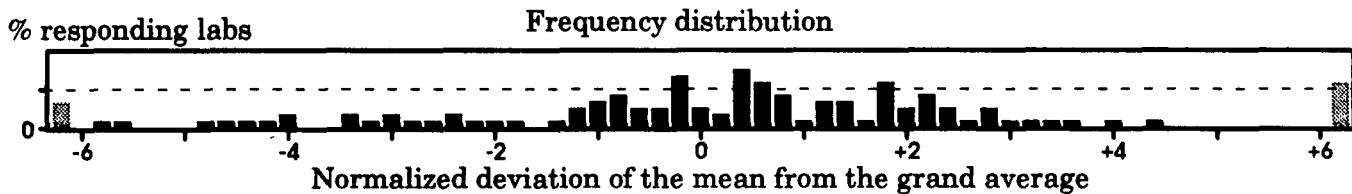
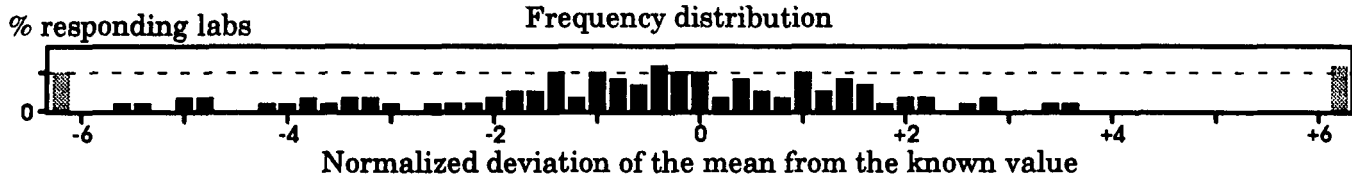
× ≡ Determined to be an outlier

↓ ≡ Below control limit

Uranium (Natural)

Data sorted by Laboratory Average

Average	Tag	Lab	Average	Tag	Lab	Average	Tag	Lab
			129.33	×	DJ	218.20	×	BG



• ≡ No data submitted

TAG SYMBOLS

∅ ≡ Insufficient data

× ≡ Determined to be an outlier

↑ ≡ Above control limit

↓ ≡ Below control limit