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9306290

Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

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93-ASB-065

Mr. Doug Sherwood
Hanford Project Manager
U. S. Environmental Protection Agency
712 Swift Boulevard, Suite 5
Richland, Washington

Mr. Dave Nylander
State of Washington
Department of Ecology
7601 W. Clearwater #102
Kennewick, Washington

Dear Messrs. Sherwood and Nylander:

QUARTERLY PERFORMANCE EVALUATION (PE) RESULTS

Enclosed are the PE results for Hanford's analytical laboratories. This submittal includes the results from Hanford's 222-S and 325 Laboratories, as well as the Thermo Analytical and Weston laboratories. If you have any questions, please feel free to contact Donna Wanek of my staff on (509) 376-5778.

Sincerely,

for June M. Hennig, Director
Waste Management Division

WMD:DMW

Enclosure

cc w/encl:
B. A. Austin, WHC
B. Mauss, Ecology

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Author	Addressee	Correspondence No.
J. M. Hennig, RL	D. R. Sherwood, EPA D. Nylander, Ecology	Incoming: 9306290

Subject: QUARTERLY PERFORMANCE EVALUATION (PE) RESULTS

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PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: Battlle Pacific Northern Laboratory

PE sample	Number Acceptable	Number Analyzed	% Acceptable
DOE-EML 551	25	26	96.2
WP-029 (325 Lab.)			
Metals	48	50	96.0
Inorganic	16	20	80.0
Organic	49	54	90.7
WP-029 (3708 Lab.)			
Metals	50	50	100.0

	EPA/CLP Score
EMSL-LV QB4 FY92	
Metals	91.7
Organics	82.8
EMSL-LV QB1 FY93	
Metals	79.5
Organics	76.4
EMSL-LV QB3 FY93	54.5

	EMSL-LV Acceptance Range (%)	% of EMSL-LV True Value	% of all Participating Laboratory's Grand Average
January 29, 1993			
Alpha	54.1 to 145.9	45.0 (LOW)	89.7
February 12, 1993			
Uranium	31.6 to 168.4	100.0	106.1

PE #QAP-37, 1992; Laboratory Listing – PNL/ACL

Date	Type	Lab	Isotope	Ser	Reported Value	Reported % Error	EML Value	Ratio Rp/EML	Ratio +/-	ACL Score (%)
92 09	AIR	BP	BE 7	1	0.285E+03	2	0.308E+03	0.93	0.03	92.5
92 09	AIR	BP	MN 54	1	0.240E+02	0	0.259E+02	0.93	0.03	92.7
92 09	AIR	BP	CO 57	1	0.456E+01	0	0.640E+01	0.71	0.03	71.2
92 09	AIR	BP	CO 60	1	0.278E+01	1	0.306E+01	0.91	0.06	90.8
92 09	AIR	BP	CS 134	1	0.291E+01	1	0.372E+01	0.78	0.02	78.2
92 09	AIR	BP	CS 137	1	0.542E+01	0	0.582E+01	0.93	0.05	93.1
92 09	AIR	BP	CE 144	1	0.294E+02	1	0.433E+02	0.68	0.02	67.9
92 09	SOIL	BP	K 40	1	0.412E+03	0	0.384E+03	1.07	0.04	92.7
92 09	SOIL	BP	SR 90	1	0.134E+02	7	0.957E+01	1.40	0.17	60.0
92 09	SOIL	BP	CS 137	1	0.334E+03	0	0.285E+03	1.17	0.02	82.8
92 09	SOIL	BP	PU 238	1	0.230E+02	2	0.219E+02	1.05	0.05	95.0
92 09	SOIL	BP	PU 239	1	0.789E+01	2	0.776E+01	1.02	0.07	98.3
92 09	SOIL	BP	AM 241	1	0.287E+01	19	0.183E+01	1.57	0.35	43.2
92 09	SOIL	BP	U UG	1	0.213E+01	1	0.232E+01	0.92	0.08	91.8
92 09	VEGETN	BP	K 40	1	0.109E+04	0	0.101E+04	1.08	0.03	92.1
92 09	VEGETN	BP	CS 137	1	0.341E+02	0	0.292E+02	1.17	0.05	83.2
92 09	WATER	BP	MN 54	1	0.371E+02	0	0.333E+02	1.11	0.03	88.6
92 09	WATER	BP	CO 60	1	0.294E+02	0	0.278E+02	1.06	0.04	94.2
92 09	WATER	BP	SR 90	1	0.245E+01	5	0.220E+01	1.11	0.11	88.6
92 09	WATER	BP	CS 134	1	0.525E+02	1	0.441E+02	1.19	0.06	81.0
92 09	WATER	BP	CS 137	1	0.349E+02	0	0.290E+02	1.20	0.04	79.7
92 09	WATER	BP	CE 144	1	0.521E+02	0	0.512E+02	1.02	0.04	98.2
92 09	WATER	BP	PU 238	1	0.193E+01	9	0.197E+01	0.98	0.11	98.0
92 09	WATER	BP	PU 239	1	0.240E+00	4	0.238E+00	1.01	0.10	99.2
92 09	WATER	BP	AM 241	1	0.290E+00	10	0.205E+00	1.41	0.16	58.5
92 09	WATER	BP	U UG	1	0.894E-02	0	0.906E-02	0.99	0.05	98.7

ACL Averages:

Air - 83.8

Soil - 80.5

Vegetation - 87.6

Water - 88.5

00–002

PE # QAP-37, 1992; STATISTICAL SUMMARY — ~ 75 Laboratories

Isotope		Type	No. Avgd	EML Value	Mean * Reported	Ratio Range 0.8-1.2	0.5-1.5	Outside
H	3	Water	44	0.118E+03	0.129E+03	61%	80%	20%
BE	7	Air	59	0.308E+03	0.300E+03	83%	95%	5%
K	40	Soil	56	0.384E+03	0.411E+03	67%	87%	13%
K	40	Vegetn	49	0.101E+04	0.105E+04	82%	94%	6%
MN	54	Air	61	0.259E+02	0.251E+02	85%	98%	2%
MN	54	Water	66	0.333E+02	0.357E+02	88%	95%	5%
FE	55	Water	8	0.529E+02	0.556E+02	55%	88%	12%
CO	57	Air	59	0.640E+01	0.551E+01	63%	93%	7%
CO	60	Air	64	0.306E+01	0.312E+01	87%	98%	2%
CO	60	Water	66	0.278E+02	0.290E+02	88%	94%	6%
SR	90	Air	15	0.137E+00	0.147E+00	28%	53%	47%
SR	90	Soil	26	0.957E+01	0.973E+01	53%	81%	19%
SR	90	Vegetn	28	0.489E+03	0.411E+03	50%	93%	7%
SR	90	Water	36	0.220E+01	0.235E+01	61%	85%	15%
CS	134	Air	62	0.372E+01	0.339E+01	77%	98%	2%
CS	134	Water	63	0.441E+02	0.504E+02	70%	92%	8%
CS	137	Air	64	0.582E+01	0.570E+01	76%	98%	2%
CS	137	Soil	65	0.285E+03	0.316E+03	63%	95%	5%
CS	137	Vegetn	53	0.292E+02	0.318E+02	76%	94%	6%
CS	137	Water	68	0.290E+02	0.327E+02	69%	95%	5%
CE	144	Air	57	0.433E+02	0.364E+02	64%	96%	4%
CE	144	Water	64	0.512E+02	0.554E+02	82%	95%	5%
PU	238	Air	28	0.420E-01	0.338E-01	48%	75%	25%
PU	238	Soil	43	0.219E+02	0.204E+02	70%	89%	11%
PU	238	Vegetn	26	0.125E+01	0.122E+01	62%	81%	19%
PU	238	Water	44	0.197E+01	0.187E+01	75%	89%	11%
PU	239	Air	31	0.450E-01	0.407E-01	64%	79%	21%
PU	239	Soil	44	0.776E+01	0.744E+01	64%	88%	12%
PU	239	Vegetn	27	0.379E+00	0.378E+00	57%	81%	19%
PU	239	Water	43	0.238E+00	0.251E+00	67%	87%	13%
AM	241	Air	14	0.320E-01	0.297E-01	50%	63%	37%
AM	241	Soil	16	0.183E+01	0.201E+01	27%	55%	45%
AM	241	Vegetn	14	0.242E+00	0.259E+00	38%	66%	34%
AM	241	Water	25	0.205E+00	0.218E+00	48%	80%	20%
U	234	Air	15	0.166E-01	0.157E-01	40%	68%	32%
U	234	Soil	21	0.292E+02	0.264E+02	53%	80%	20%
U	234	Water	21	0.115E+00	0.114E+00	70%	87%	13%
U	238	Air	14	0.160E-01	0.174E-01	37%	58%	42%
U	238	Soil	22	0.296E+02	0.254E+02	48%	75%	25%
U	238	Water	21	0.115E+00	0.112E+00	73%	91%	9%
U	BQ	Air	7	0.326E-01	0.355E-01	75%	87%	13%
U	BQ	Soil	5	0.588E+02	0.675E+02	37%	62%	38%
U	BQ	Water	9	0.230E+00	0.234E+00	63%	81%	19%
U	UG	Air	14	0.128E+01	0.140E+01	50%	87%	13%
U	UG	Soil	11	0.232E+01	0.198E+01	47%	57%	43%
U	UG	Water	19	0.906E-02	0.866E-02	76%	76%	24%

* : Mean of submitted data in range of 0.5 to 1.5 times EML value.

00-003

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: WA015 (226)

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
ALUMINUM	1	70	65.9	40.1- 100	47.7- 92.6	ACCEPTABLE
	2	571	548	435- 645	462- 619	ACCEPTABLE
ARSENIC	1	133	140	113- 168	120- 161	ACCEPTABLE
	2	14.0	15.0	11.1- 19.4	12.2- 18.4	ACCEPTABLE
BERYLLIUM	1	16.9	16.8	12.4- 21.4	13.5- 20.2	ACCEPTABLE
	2	620	609	497- 714	525- 686	ACCEPTABLE
CADMIUM	1	18.0	16.8	12.2- 21.5	13.4- 20.4	ACCEPTABLE
	2	389	380	319- 440	334- 425	ACCEPTABLE
COBALT	1	680	651	566- 724	586- 703	ACCEPTABLE
	2	13.9	13.3	9.54- 17.0	10.5- 16.0	ACCEPTABLE
CHROMIUM	1	633	620	516- 717	541- 691	ACCEPTABLE
	2	9.7	8.11	3.37- 12.3	4.49- 11.2	ACCEPTABLE
COPPER	1	7.2	6.33	3.68- 8.58	4.30- 7.97	ACCEPTABLE
	2	253	241	213- 267	219- 260	ACCEPTABLE
IRON	1	732	711	625- 800	647- 778	ACCEPTABLE
	2	85.4	83.0	68.2- 97.7	71.9- 94.0	ACCEPTABLE
MERCURY	1	7.69	8.12	6.26- 10.3	6.77- 9.81	ACCEPTABLE
	2	12.2	13.0	9.49- 16.9	10.4- 15.9	ACCEPTABLE
MANGANESE	1	349	340	303- 373	312- 364	ACCEPTABLE
	2	31.1	30.6	25.7- 35.6	26.9- 34.3	ACCEPTABLE
NICKEL	1	33.1	31.7	25.5- 37.4	27.0- 35.9	ACCEPTABLE
	2	604	569	498- 632	515- 616	ACCEPTABLE
LEAD	1	1020	959	831- 1080	862- 1050	ACCEPTABLE
	2	1580	1500	1300- 1680	1350- 1630	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: WA015

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	4.82	6.01	3.28- 8.06	3.88- 7.46	ACCEPTABLE
	2	163	170	116- 203	127- 192	ACCEPTABLE
VANADIUM	1	490	490	431- 541	445- 527	ACCEPTABLE
	2	38.4	38.2	30.6- 46.8	32.7- 44.7	ACCEPTABLE
ZINC	1	17.4	17.0	11.3- 22.9	12.8- 21.4	ACCEPTABLE
	2	639	612	536- 689	555- 670	ACCEPTABLE
ANTIMONY	3	21.6	22.0	12.4- 29.9	14.6- 27.6	ACCEPTABLE
	4	131	146	96.6- 182	107- 171	ACCEPTABLE
SILVER	3	5.32	5.59	4.20- 7.01	4.56- 6.66	ACCEPTABLE
	4	13.6	14.0	11.1- 16.8	11.8- 16.1	ACCEPTABLE
THALLIUM	3	4.29	5.30	3.45- 7.01	3.92- 6.54	ACCEPTABLE
	4	82.0	76.2	58.3- 94.0	63.0- 89.4	ACCEPTABLE
MOLYBDENUM	3	51.5	49.0	38.0- 61.2	41.0- 58.2	ACCEPTABLE
	4	9.16	7.96	4.27- 12.2	5.31- 11.2	ACCEPTABLE
STRONTIUM	3	13.9	12.9	10.1- 15.4	10.8- 14.7	ACCEPTABLE
	4	67.7	61.9	50.3- 71.9	53.2- 69.1	ACCEPTABLE
TITANIUM	3	218	214	185- 237	192- 230	ACCEPTABLE
	4	79.8	78.0	65.4- 88.2	68.5- 85.2	ACCEPTABLE
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH-UNITS	3	4.22	4.40	4.28- 4.48	4.31- 4.45	NOT ACCEPTABLE
	4	7.71	8.00	7.76- 8.21	7.81- 8.16	NOT ACCEPTABLE
SPEC. COND.	1	161	182	162- 199	167- 194	NOT ACCEPTABLE
(UMHOS/CM AT 25 C)	2	735	812	752- 882	769- 865	NOT ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: WA015

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
CALCIUM	1	14.9	15.0	12.8- 15.9	13.2- 15.5	ACCEPTABLE
	2	50.5	49.0	44.7- 54.1	45.9- 53.0	ACCEPTABLE
MAGNESIUM	1	2.67	2.48	2.07- 2.90	2.17- 2.79	ACCEPTABLE
	2	25.5	24.0	21.0- 26.9	21.8- 26.2	ACCEPTABLE
SODIUM	1	12.3	9.68	8.19- 11.3	8.59- 10.9	NOT ACCEPTABLE
	2	55.2	48.4	42.4- 55.2	44.0- 53.6	CHECK FOR ERROR
POTASSIUM	1	7.7	6.30	5.16- 7.32	5.44- 7.05	NOT ACCEPTABLE
	2	37.3	34.0	29.1- 38.9	30.3- 37.6	ACCEPTABLE
CHLORIDE	1	31.9	33.3	28.8- 36.0	29.7- 35.1	ACCEPTABLE
	2	155	159	143- 171	146- 167	ACCEPTABLE
FLUORIDE	1	0.523	0.460	0.378-0.544	0.399-0.523	ACCEPTABLE
	2	2.22	1.80	1.55- 2.02	1.61- 1.96	NOT ACCEPTABLE
SULFATE	1	16.8	17.0	13.2- 20.2	14.1- 19.4	ACCEPTABLE
	2	81.9	84.0	70.1- 93.9	73.1- 90.9	ACCEPTABLE
NUTRIENTS IN MILLIGRAMS PER LITER:						
AMMONIA-NITROGEN	1	113	0.960	0.658- 1.25	0.729- 1.18	NOT ACCEPTABLE
	2	44.8	0.350	0.185-0.535	0.227-0.493	NOT ACCEPTABLE
NITRATE-NITROGEN	1	0.172	0.170	.0849-0.256	0.105-0.235	ACCEPTABLE
	2	1.20	1.30	1.00- 1.59	1.07- 1.52	ACCEPTABLE
ORTHOPHOSPHATE	1	<0.163	0.030	.0116-.0498	.0162-.0452	UNUSABLE DATA
	2	0.630	0.670	0.555-0.779	0.582-0.752	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: WA015

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
DEMANDS IN MILLIGRAMS PER LITER:						
TOC	1	124	120	100- 142	105- 136	ACCEPTABLE
	2	64	62.0	51.8- 73.6	54.6- 70.8	ACCEPTABLE
PCB'S IN MICROGRAMS PER LITER:						
PCB-AROCLOR 1248	2	1.98	1.76	0.538- 2.74	0.816- 2.46	ACCEPTABLE
PCB-AROCLOR 1254	1	1.94	2.37	1.41- 2.95	1.60- 2.76	ACCEPTABLE
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
PCB IN OIL- 1016/1242	2	39.7	42.6	8.20- 60.7	14.9- 54.0	ACCEPTABLE
PCB IN OIL- 1254	1	49.2	35.2	12.2- 51.4	17.2- 46.4	CHECK FOR ERRO
PESTICIDES IN MICROGRAMS PER LITER:						
CHLORDANE	3	3.34	6.48	3.59- 8.25	4.19- 7.65	NOT ACCEPTABLE
	4	0.653	1.43	0.764- 1.88	0.907- 1.74	NOT ACCEPTABLE
ALDRIN	1	0.321	0.676	0.179-0.834	0.262-0.751	ACCEPTABLE
	2	0.054	0.126	.0254-0.176	.0446-0.157	ACCEPTABLE
DIELDRIN	1	0.377	0.617	0.309-0.892	0.384-0.817	CHECK FOR ERRO
	2	0.061	0.137	.0650-0.200	.0823-0.183	NOT ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

WATER POLLUTION STUDY NUMBER WP029

BORATORY: WA015

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
PESTICIDES IN MICROGRAMS PER LITER:						
DDD	1	0.460	0.777	0.431- 1.05	0.510-0.973	CHECK FOR ERR
	2	0.052	0.129	.0511-0.192	.0690-0.175	CHECK FOR ERR
DDE	1	0.298	0.548	0.245-0.785	0.314-0.716	CHECK FOR ERR
	2	0.033	0.087	.0352-0.124	.0465-0.112	NOT ACCEPTABL
DDT	1	0.391	0.674	0.353-0.856	0.416-0.792	CHECK FOR ERR
	2	0.061	0.150	.0572-0.210	.0766-0.191	CHECK FOR ERR
HEPTACHLOR	1	0.245	0.486	0.168-0.657	0.231-0.594	ACCEPTABL
	2	0.055	0.129	.0346-0.190	.0545-0.170	ACCEPTABL
HEPTACHLOR EPOXIDE	1	0.353	0.571	0.312-0.722	0.364-0.670	CHECK FOR ERR
	2	0.070	0.143	.0705-0.189	.0855-0.174	NOT ACCEPTABL
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
1,2 DICHLOROETHANE	1	13.6	13.8	9.64- 18.6	10.8- 17.4	ACCEPTABL
	2	56.2	58.5	40.8- 76.1	45.3- 71.6	ACCEPTABI
CHLOROFORM	1	7.90	8.40	5.60- 11.2	6.32- 10.5	ACCEPTABI
	2	36.5	38.3	26.1- 50.9	29.3- 47.8	ACCEPTABI
1,1,1 TRICHLOROETHANE	1	10.9	12.6	7.58- 17.0	8.77- 15.8	ACCEPTABL
	2	57.8	63.8	41.9- 83.7	47.2- 78.4	ACCEPTAB
TRICHLOROETHENE	1	14.4	15.5	10.2- 20.0	11.5- 18.8	ACCEPTAB
	2	48.8	53.3	36.1- 67.2	40.1- 63.3	ACCEPTAB
CARBONTETRACHLORIDE	1	8.47	10.7	6.73- 14.8	7.76- 13.8	ACCEPTAB
	2	47.9	54.5	34.2- 77.3	39.6- 71.9	ACCEPTAB
TETRACHLOROETHENE	1	13.2	14.9	9.77- 19.5	11.0- 18.3	ACCEPTAB
	2	43.8	46.2	30.5- 60.2	34.2- 56.5	ACCEPTAB

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY

PERFORMANCE EVALUATION REPORT DATE: 12/21/91

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: WA015

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
BROMODICHLOROMETHANE	1	14.7	16.4	11.1- 21.3	12.4- 20.0	ACCEPTABLE
	2	62.0	62.9	43.6- 82.9	48.6- 77.9	ACCEPTABLE
DIBROMOCHLOROMETHANE	1	10.6	12.5	8.09- 16.6	9.17- 15.6	ACCEPTABLE
	2	40.2	45.4	28.8- 61.3	32.9- 57.2	ACCEPTABLE
BROMOFORM	1	14.8	16.3	7.67- 24.0	9.73- 21.9	ACCEPTABLE
	2	36.5	37.7	22.7- 52.3	26.4- 48.6	ACCEPTABLE
METHYLENE CHLORIDE	1	12.6	12.8	6.66- 19.0	8.22- 17.4	ACCEPTABLE
	2	64.4	65.6	43.6- 91.0	49.5- 85.0	ACCEPTABLE
CHLOROBENZENE	1	10.1	10.3	6.92- 13.5	7.76- 12.7	ACCEPTABLE
	2	59.6	57.2	39.7- 73.8	44.1- 69.5	ACCEPTABLE
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
BENZENE	1	41.2	43.9	30.0- 59.0	33.6- 55.4	ACCEPTABLE
	2	11.7	12.7	9.00- 17.0	10.0- 16.0	ACCEPTABLE
ETHYLBENZENE	1	47.8	47.7	31.4- 64.3	35.6- 60.2	ACCEPTABLE
	2	9.30	9.71	6.19- 13.0	7.06- 12.2	ACCEPTABLE
TOLUENE	1	62.4	59.7	42.1- 76.7	46.5- 72.3	ACCEPTABLE
	2	16.7	17.2	12.0- 22.0	13.3- 20.8	ACCEPTABLE
1,2-DICHLOROBENZENE	1	66.2	57.1	36.9- 74.5	41.7- 69.7	ACCEPTABLE
	2	17.2	15.4	10.6- 19.7	11.8- 18.5	ACCEPTABLE
1,3-DICHLOROBENZENE	1	54.5	47.0	32.1- 59.6	35.6- 56.2	ACCEPTABLE
	2	17.8	16.5	11.4- 21.2	12.6- 19.9	ACCEPTABLE
1,4-DICHLOROBENZENE	1	55.0	50.0	30.3- 67.8	35.1- 63.0	ACCEPTABLE
	2	15.2	13.3	9.91- 17.8	10.9- 16.8	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 12/21/

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: WA015

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MISCELLANEOUS PARAMETERS:						
TOTAL CYANIDE	1	0.037	0.040	.0108-.0592	.0169-.0531	ACCEPTABL
(IN MG/L)	2	0.358	0.350	0.206-0.461	0.239-0.429	ACCEPTABI

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 12/31/

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: WA184 (3708)

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
ALUMINUM	1	67.8	65.9	40.1- 100	47.7- 92.6	ACCEPTABL
	2	553	548	435- 645	462- 619	ACCEPTABL
ARSENIC	1	144	140	113- 168	120- 161	ACCEPTABL
	2	16.8	15.0	11.1- 19.4	12.2- 18.4	ACCEPTABL
BERYLLIUM	1	19.2	16.8	12.4- 21.4	13.5- 20.2	ACCEPTABL
	2	648	609	497- 714	525- 686	ACCEPTABL
CADMIUM	1	17.0	16.8	12.2- 21.5	13.4- 20.4	ACCEPTABL
	2	381	380	319- 440	334- 425	ACCEPTABL
COBALT	1	693	651	566- 724	586- 703	ACCEPTABL
	2	14.1	13.3	9.54- 17.0	10.5- 16.0	ACCEPTABL
CHROMIUM	1	614	620	516- 717	541- 691	ACCEPTABL
	2	8.43	8.11	3.37- 12.3	4.49- 11.2	ACCEPTABL
COPPER	1	7.37	6.33	3.68- 8.58	4.30- 7.97	ACCEPTABL
	2	254	241	213- 267	219- 260	ACCEPTABL
IRON	1	767	711	625- 800	647- 778	ACCEPTABL
	2	81.1	83.0	68.2- 97.7	71.9- 94.0	ACCEPTABL
MERCURY	1	7.21	8.12	6.26- 10.3	6.77- 9.81	ACCEPTABL
	2	11.3	13.0	9.49- 16.9	10.4- 15.9	ACCEPTABL
MANGANESE	1	355	340	303- 373	312- 364	ACCEPTABL
	2	30.9	30.6	25.7- 35.6	26.9- 34.3	ACCEPTABL
NICKEL	1	32.8	31.7	25.5- 37.4	27.0- 35.9	ACCEPTABL
	2	581	569	498- 632	515- 616	ACCEPTABL
LEAD	1	1060	959	831- 1080	862- 1050	CHECK FOR ER
	2	1610	1500	1300- 1680	1350- 1630	ACCEPTABL

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: WA184

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	6.45	6.01	3.28- 8.06	3.88- 7.46	ACCEPTABLE
	2	181	170	116- 203	127- 192	ACCEPTABLE
VANADIUM	1	520	490	431- 541	445- 527	ACCEPTABLE
	2	42.2	38.2	30.6- 46.8	32.7- 44.7	ACCEPTABLE
ZINC	1	17.4	17.0	11.3- 22.9	12.8- 21.4	ACCEPTABLE
	2	569	612	536- 689	555- 670	ACCEPTABLE
ANTIMONY	3	19.0	22.0	12.4- 29.9	14.6- 27.6	ACCEPTABLE
	4	123	146	96.6- 182	107- 171	ACCEPTABLE
SILVER	3	6.44	5.59	4.20- 7.01	4.56- 6.66	ACCEPTABLE
	4	15.6	14.0	11.1- 16.8	11.8- 16.1	ACCEPTABLE
THALLIUM	3	5.34	5.30	3.45- 7.01	3.92- 6.54	ACCEPTABLE
	4	82.4	76.2	58.3- 94.0	63.0- 89.4	ACCEPTABLE
MOLYBDENUM	3	51.4	49.0	38.0- 61.2	41.0- 58.2	ACCEPTABLE
	4	7.43	7.96	4.27- 12.2	5.31- 11.2	ACCEPTABLE
STRONTIUM	3	13.8	12.9	10.1- 15.4	10.8- 14.7	ACCEPTABLE
	4	68.0	61.9	50.3- 71.9	53.2- 69.1	ACCEPTABLE
TITANIUM	3	235	214	185- 237	192- 230	CHECK FOR ERRO
	4	87.3	76.0	65.4- 88.2	68.5- 85.2	CHECK FOR ERRO
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
CALCIUM	1	14.3	15.0	12.8- 15.9	13.2- 15.5	ACCEPTABLE
	2	50.4	49.0	44.7- 54.1	45.9- 53.0	ACCEPTABLE
MAGNESIUM	1	2.31	2.48	2.07- 2.90	2.17- 2.79	ACCEPTABLE
	2	23.6	24.0	21.0- 26.9	21.8- 26.2	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 12/31/9

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: WA184

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
SODIUM	1	9.3	9.68	8.19- 11.3	8.59- 10.9	ACCEPTABL
	2	49.1	48.4	42.4- 55.2	44.0- 53.6	ACCEPTABL
POTASSIUM	1	6.10	6.30	5.16- 7.32	5.44- 7.05	ACCEPTABL
	2	35.9	34.0	29.1- 38.9	30.3- 37.6	ACCEPTABL

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

bcc: JL Daniel
EW Hoppe
AG King
JM Latkovich
MW Urie
Project File-T5
File/LB

Battelle
Pacific Northwest Laboratories
Battelle Boulevard
P.O. Box 999
Richland, Washington 99352
Telephone (509)
372-0398

February 4, 1993

Mr. Arthur Dan Baker, III (PE Study)
Quality Assurance Office, ESD
US EPA, Region 10
1200 Sixth Avenue (ES095)
Seattle, Washington 98101

Dear Mr. Baker:

PACIFIC NORTHWEST LABORATORY, ANALYTICAL CHEMISTRY LABORATORY RESPONSE TO DEFICIENCIES UNCOVERED BY WATER POLLUTION EVALUATION STUDY NUMBER 29

A careful review of the Analytical Chemistry Laboratory 325 Building laboratory performance on the WP029 Performance Evaluation Study has resulted in the following conclusions:

Inorganic Metals/Mineral -- ICP

The unacceptably high values reported for Na and K have been traced to apparent contamination from the sample preparation process. A batch process blank demonstrated higher than normal Na and K values; these values were not subtracted from the reported values. If subtracted, the reported values would have been 10.5 mg/L for Na and 6.1 mg/L for K for M1 and 53.4 mg/L for Na and 35.8 mg/L for K for M2; all within acceptance limits. The actual concentrations found in the process blank did not cause concern, as the majority of samples analyzed routinely fall over ten times the process blank levels. In cases such as these, the laboratory typically either subtracts the process blank or reports it as detected with the sample results, based upon client requirements. CORRECTIVE ACTION: The process blank will be monitored more closely in future PE studies, since the levels detected in these studies are generally much lower than our "typical" samples.

Classical Chemistry:

Ammonia: The final results reported were inadvertently based on the initial sample; i.e., the 100x preparation dilution was included. The normal reporting mode for the laboratory is to include all processing dilution factors when reporting data. The PE samples are the only exceptions, and this leads to this type of reporting error. CORRECTIVE ACTION: Greater care will be taken with calculation and review in this area in the future.

Battelle

pH Measurement: The error in the reporting of the pH is well within 5%, which is the Laboratory's target accuracy. The most likely reason for the small error is temperature nonequilibrium.
CORRECTIVE ACTION: Future analyses will address this issue by performing repetitive analyses at 10 to 15 minute intervals to verify that the samples have been equilibrated to room temperature.

Conductivity: The error in the conductivity measurements is about 10% and is most likely caused by temperature nonequilibrated samples. However, recent evaluation of the conductivity measurement operation has identified an instrument "drift" problem, something that is also highly suspect of generating the "low" values reported since the drift is always to lower conductivity.
CORRECTIVE ACTION: A new conductivity meter will be placed in use as soon as possible. Additionally, greater care will be taken to ensure adequate time for sample temperature to equilibrate.

Fluoride: The fluoride results were reported from IC analysis. The samples were analyzed in two ways: with and without eluent matching. The reported results were those from the eluent-matched analyses, and it appears that a "small" bias from an eluent mismatch from carbonate exits. It appears the quantification of the IC peak is performed more accurately without the "attempt" to match the eluent (i.e., to reduce errors associated with the negative water dip peak). Although not reported, the analyses of the WP029 samples without eluent matching were within the acceptable ranges.
CORRECTIVE ACTION: Future analyses will be performed on samples without any attempt at eluent matching.

Organic Analysis:

Pesticides: It currently appears that the consistently low results achieved for all pesticides tested were a result of a problem with standards.
CORRECTIVE ACTION: An investigation of standards currently in use in the laboratory, for pesticide analyses, is under way.

If you have any questions regarding the responses above, please contact me at your earliest convenience.

Sincerely,

Kristine J. Kuhl-Klinger

Kristine J. Kuhl-Klinger
QA/QC Project Manager
Analytical Chemistry Laboratory

KJK:pl

00-017

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 4 FY 92

LABORATORY NAME: Battelle Pacific Northwest(WA) [I3] (BATTWA)
PERFORMANCE LEVEL: ACCEPTABLE
LABORATORY RANK: Above = 19 Same = 0 Below = 17

% Score: 91.7
REPORT DATE: 9/11/1992
MATRIX: SOIL

ELEMENT	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	9580	21000	8350	22200	12100			0	1	0	0	2	37
ANTIMONY	12.0	16.5	12.0	18.5	3	B		0	2	0	28	1	37
ARSENIC	453	731	423	760	559			0	1	0	2	1	37
BARIUM	286	347	280	353	318			0	2	0	0	0	37
BERYLLIUM	1.0	1.8	1.0	1.9	1.1			0	0	0	1	0	37
CADMIUM	17.3	23.6	16.6	24.3	18.6			0	3	0	3	0	37
CALCIUM	3940	5060	3820	5180	4730			0	0	0	0	0	37
CHROMIUM	9.1	23.5	7.6	25.0	16.3			0	1	0	1	2	37
COBALT	10.0	11.5	10.0	12.1	7.8	B		0	1	0	0	0	37
COPPER	2490	2880	2450	2920	2810			0	2	0	0	0	37
[illegible]	19900	28400	18900	29400	21600			0	1	0	0	0	37
[illegible]	4610	5270	4540	5340	5110			0	6	0	0	1	37
MAGNESIUM	3900	5910	3680	6130	4580			0	1	0	0	0	37
MANGANESE	6800	8260	6640	8420	7630			0	1	0	0	0	37
MERCURY	22.6	40.9	20.6	42.9	23.7			1	3	0	0	0	37
NICKEL	8.0	14.1	8.0	15.2	8.4			0	4	0	0	0	37
POTASSIUM	4050	5310	3910	5450	3840		X	0	2	0	0	0	37
SELENIUM	c	c	c	c	4.2	U		0	0	4	9	2	37
SILVER	22.1	33.9	20.8	35.2	27.3			0	2	0	4	1	37
SODIUM	d	d	d	d	518	B		0	0	1	0	0	37
THALLIUM	d	d	d	d	5.2	U		0	0	1	7	0	37
VANADIUM	32.3	51.4	30.2	53.5	39.3			0	1	0	0	0	37
ZINC	5190	6080	5090	6180	5560			0	3	0	0	0	37

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 1
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
SOIL :

OF DUPLICATES OUT: 0

00-019

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 4 FY 92

LABORATORY NAME: Battelle Pacific Northwest(WA) [I3] (BATTWA)
PERFORMANCE LEVEL: ACCEPTABLE
LABORATORY RANK: Above = 19 Same = 0 Below = 17

% Score: 91.7
REPORT DATE: 9/11/1992
MATRIX: WATER 1

ELEMENT	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q	PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	c	c	c	c	13	U	0	0	0	0	0	37
ANTIMONY	269	330	262	336	296		0	5	0	1	1	37
ARSENIC	51.5	60.5	50.5	61.4	58		0	6	0	0	0	37
BARIUM	c	c	c	c	1	U	0	0	0	1	0	37
BERYLLIUM	54.4	61.6	53.7	62.3	55.9		0	6	0	0	0	37
CADMIUM	16.8	23.1	16.1	23.7	18.8		0	2	0	3	1	37
CALCIUM	25900	30600	25400	31200	27800		0	2	0	0	0	37
CHROMIUM	77.2	94.0	75.4	95.8	83.1		0	2	0	0	0	37
COBALT	317	370	311	375	336		0	1	0	0	0	37
COPPER	242	273	239	276	266		0	2	0	0	0	37
[illegible]	459	535	451	544	478		0	6	0	0	0	37
[illegible]	13.4	16.9	13.0	17.3	19.2	X	1	9	0	3	3	37
MAGNESIUM	18500	21500	18200	21800	19700		0	1	0	0	0	37
MANGANESE	c	c	c	c	1	U	0	0	0	0	0	37
MERCURY	8.6	10.8	8.4	11.0	8.8		1	11	0	0	1	37
NICKEL	276	319	272	324	293		0	3	0	0	0	37
POTASSIUM	c	c	c	c	490	U	0	0	0	0	0	37
SELENIUM	49.0	65.4	47.2	67.2	63.9		0	2	0	1	2	37
SILVER	44.6	55.1	43.5	56.2	52.2		1	1	0	3	0	37
SODIUM	d	d	d	d	45.8	B	0	0	0	0	0	37
THALLIUM	81.3	106	78.6	109	108	$	0	2	0	5	0	37
VANADIUM	c	c	c	c	2	U	0	0	0	0	0	37
ZINC	230	272	226	276	247		0	1	0	0	0	37

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 1
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
WATER :

[illegible] DUPLICATES OUT: 0
[illegible] :

00-020

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 4 FY 92

LABORATORY NAME: Battelle Pacific Northwest(WA) [I3] (BATTWA)
PERFORMANCE LEVEL: ACCEPTABLE
LABORATORY RANK: Above = 19 Same = 0 Below = 17

% Score: 91.7
REPORT DATE: 9/11/1992
MATRIX: WATER 2

ELEMENT	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	1060	1360	1030	1390	1250			0	0	0	0	0	37
ANTIMONY	392	487	381	498	213		X	0	4	0	1	1	37
ARSENIC	29.8	41.0	28.6	42.2	32.2			0	2	0	0	0	37
BARIUM	931	1030	920	1040	1020			0	0	0	1	0	37
BERYLLIUM	36.5	42.9	35.8	43.6	40.4			0	4	0	0	0	37
CADMIUM	25.5	34.6	24.5	35.6	30.1			0	1	0	3	1	37
CALCIUM	c	c	c	c	9	U		0	0	0	0	0	37
CHROMIUM	46.0	57.3	44.8	58.6	51.4			0	1	0	0	0	37
COBALT	238	266	235	269	257			0	1	0	0	0	37
[illegible]PPER	c	c	c	c	3	U		0	0	1	0	0	37
[illegible]	732	857	719	871	801			0	3	0	0	0	37
[illegible]EAD	25.6	35.0	24.6	36.0	27.8			0	7	0	3	3	37
MAGNESIUM	c	c	c	c	13	U		0	0	0	0	0	37
MANGANESE	112	125	111	127	119			0	2	0	0	0	37
MERCURY	12.0	16.5	11.5	17.0	11.9		$	1	6	0	0	1	37
NICKEL	c	c	c	c	5	U		0	0	0	0	0	37
POTASSIUM	18400	21200	18000	21500	20500			0	0	0	0	0	37
SELENIUM	27.9	41.0	26.5	42.4	36.1			0	0	0	1	2	37
SILVER	53.8	64.8	52.7	65.9	62.4			1	4	0	3	0	37
SODIUM	23000	26000	22700	26300	24300			0	2	0	0	0	37
THALLIUM	c	c	c	c	26	U		0	0	0	5	0	37
VANADIUM	419	470	414	476	442			0	1	0	0	0	37
ZINC	c	c	c	c	2	U		0	0	3	0	0	37

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 1
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
WATER :

[illegible] DUPLICATES OUT: 0
[illegible]R :

00-021

Battelle
Pacific Northwest Laboratories

Project Number 95116, 92-09234+

Internal Distribution

MW Urie
ICP-325-405 Inst.File
File/LB

Date October 9, 1992

To KJ Kuhl-Klinger

From JJ Wagner

Subject Response to the three analytes misquantified in USEPA QB4-FY92 INORGANIC PE

The analytes misquantified were:

1) Potassium by ICP-OES in sample "SOIL";

2) Lead by GFAA in sample "WATER-1"; and

3) Antimony by ICP-OES in sample "WATER-2"

Potassium (1) was about 2% below the lower "action" limit in the soil sample. Normally the ICP-OES measurements have been within the acceptance window in the past. Other reference samples have not been a problem. No apparent reason is known that would explain the results.

The high (11% above the upper "action" limit) GFAA lead measurement was probably due to an argon leak problem that affected the background correction on the graphite furnace. The leak has been fixed.

The low antimony measurement in "WATER-2" may be related to the length of time it is heated (during sample processing). This particular sample had a higher concentration of antimony than "WATER-1" but was heated for a longer period of time, yet the results were low (about 50% of the average range). This problem may be like the 200BP1 pre-digestion spike recovery issue for antimony. If so, an addition of tartaric acid to the sample during preparation should solve the problem. We will test this as soon as possible.

00-022

REGION 10
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 4 FY 92

LABORATORY: Battelle Pacific NW (WA)
PERFORMANCE: ACCEPTABLE - Response Explaining Deficiency(ies) Required
RANK: Above = 5 Same = 0 Below = 10

% SCORE: 82.8
REPORT DATE: 09/20/92
MATRIX: WATER

COMPOUND	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY DATA CONC	Q	#LABS MIS-QNT	PROGRAM DATA #LABS NOT-ID	#LABS ID-CPD	TOTAL #LABS
TCL VOLATILE										
BROMOMETHANE	22	36	20	44	34		3	0	60	60
CHLOROFORM	10	12	10	13	11		2	0	60	60
CARBON TETRACHLORIDE	57	72	55	74	65		4	0	60	60
BROMODICHLOROMETHANE	74	91	71	94	79		6	0	60	60
DIBROMOCHLOROMETHANE	49	62	47	64	53		4	0	60	60
BROMOFORM	11	16	10	17	14		2	0	60	60
1,1,2,2-TETRACHLOROETHANE	58	78	55	81	65		2	0	60	60
STYRENE	88	110	85	120	100		2	0	60	60
TCL SEMIVOLATILE										
PHENOL	15	23	14	24	23		4	1	59	60
2-METHYLPHENOL	32	49	29	58	52	$	6	0	60	60
HEXACHLOROETHANE	10	16	10	20	18	$	2	0	60	60
ISOPHORONE	26	38	24	44	39	$	4	0	60	60
2,4-DIMETHYLPHENOL	10	17	10	21	16		2	1	59	60
BIS(2-CHLOROETHOXY)METHANE	12	18	10	19	18		1	1	59	60
1,2,4-TRICHLOROBENZENE	10	15	10	17	16	$	1	0	60	60
NAPHTHALENE	23	34	21	40	37	$	6	0	60	60
HEXACHLOROCYCLOPENTADIENE	NU	NU	NU	NU	10		0	27	33	60
4,6-TRICHLOROPHENOL	12	17	12	18	17		8	0	60	60
4-DINITROTOLUENE	30	45	27	54	35		3	0	60	60
-CHLOROPHENYL PHENYL ETHER	14	21	13	22	21		9	0	60	60
ANTHRACENE	NU	NU	NU	NU	10	U	0	5	55	60
PYRENE	64	140	53	190	110		1	0	60	60
DI-N-OCTYL PHTHALATE	24	44	21	47	41		8	1	59	60
BENZO(A)PYRENE	11	15	10	18	14		1	1	59	60
TCL PESTICIDES										
ALPHA-BHC	0.1	0.16	0.096	0.16	0.13		5	0	60	60
HEPTACHLOR	0.17	0.28	0.16	0.3	0.36	X	5	0	60	60
ENDOSULFAN II	0.59	0.88	0.55	0.92	0.64		5	0	60	60
ENDOSULFAN SULFATE	0.3	0.45	0.27	0.47	0.39		4	0	60	60
ENDRIN KETONE	0.19	0.28	0.18	0.29	0.22		6	0	60	60
ENDRIN ALDEHYDE	0.44	0.87	0.38	0.93	0.82		7	2	58	60
AROCLOR-1248	1.4	2.1	1.3	2.2	0.5	U &	12	3	57	60
NON-TCL VOLATILE										
BENZENE,N-PROPYL-					130			4	56	60
VINYL ACETATE					0	NR		60	0	60
NON-TCL SEMIVOLATILE										
BETA-BHC					0	NR		44	16	60
TCL VOLATILE (Contaminants)										
2-BUTANONE					13			27	33	60

00-024

REGION 10
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 4 FY 92

LABORATORY: Battelle Pacific NW (WA)
PERFORMANCE: ACCEPTABLE - Response Explaining Deficiency(ies) Required
RANK: Above = 5 Same = 0 Below = 10

% SCORE: 82.8
REPORT DATE: 09/20/92
MATRIX: WATER

COMPOUND	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY DATA CONC	Q	#LABS MIS-QNT	PROGRAM DATA #LABS NOT-ID	#LABS ID-CPD	TOTAL #LABS
TCL PESTICIDES (Contaminants)										
AROCLOR-1242					3.3	C		57	3	60
NON-TCL VOLATILE (Contaminants)										
2-PROPANOL					76			28	32	60
ACETIC ACID,METHYL ESTER					10			44	16	60
PROPANE,2-METHOXY-					21			51	9	60
NON-TCL SEMIVOLATILE (Contaminants)										
CYCLOHEXANE,1,2,3,4,5,6-HEX					42			59	1	60

OF TCL COMPOUNDS NOT-IDENTIFIED: 1
OF TCL COMPOUNDS MIS-QUANTIFIED: 1
OF TCL CONTAMINANTS: 1

OF NON-TCL COMPOUNDS NOT-IDENTIFIED: 0
OF NON-TCL CONTAMINANTS: 0

DON'T SAY IT -- *Write It!* **Date:** December 3, 1992

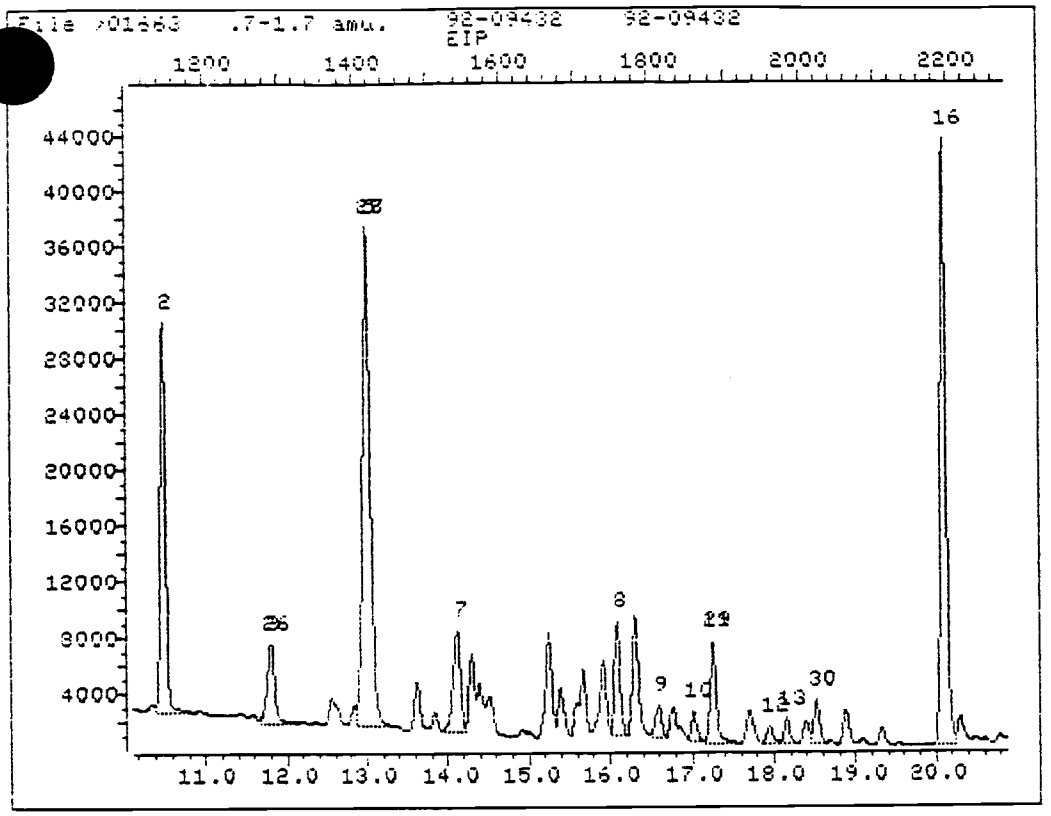
To: EW Hoppe **From:** GS Klinger

Subject: QB4 PE Pesticide/PCB response

The Fourth Quarter PE samples were extracted and analyzed in accordance with EPA CLP SOW 2/88. No unusual circumstances were noted. Upon receiving the results of scoring, it was noted that points where deducted for Heptachlor, which was detected and reported at a value only very slighter greater that the acceptable limit. The current statement of work, which is used by all the laboratories participating in the CLP program, requires that the lower calculated concentration value of each the two column results be reported on the Form I (13.5.4, D-55/PEST). The 2/88 SOW requires that all the results of the primary column analysis be reported. It the case of Heptachlor, a positive interference from a coeluting PCB peak resulted in a high calculated concentration. Points where also deducted for failure to identify PCB Arochlor 1242. Additionally, more points where also deducted for reporting PCB Arochlor 1248 as a contaminant. PCB Arochlor 1242 and PCB Arochlor 1248 both contain approximately the same peaks in slightly different ratios. When they are detected at a low level and in the presence of six interfering pesticides, it can be difficult to identify the correct Arochlor. In an actual sample, weathering and degradation may also affect the ratio of peaks, especially at low levels. If the PCB had been simply not reported our score would have been 87, and would not have required a response.

Corrective Actions

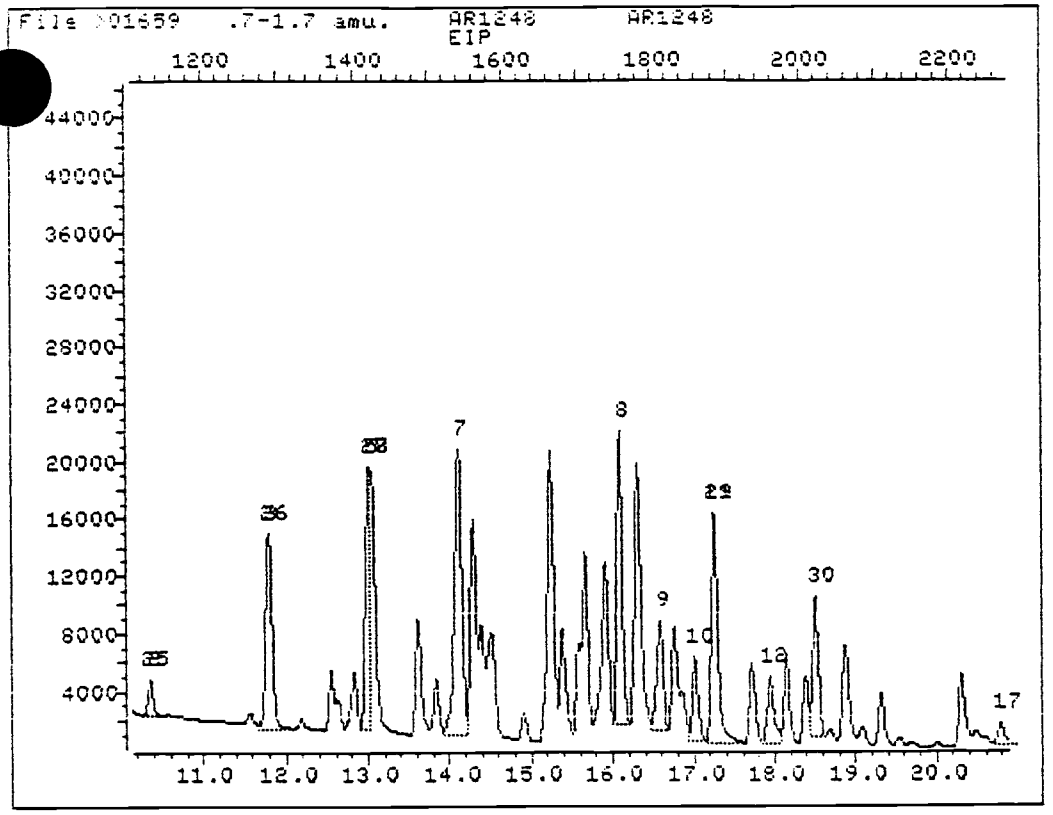
- PCB/pesticide analysis should be performed in accordance with the current statement of work, however this can not be done at the present time.



Data File: >01663:3396:D1 Quant Output File: ^01663::DF
Name: 92-09432 Instrument ID: PRIMA
Misc: 92-09432

Id File: ID608::QT
Title: 2/88 SOW Pest/PCB's for CLP by Capillary Column Battelle PNL
Last Calibration: 920212 10:44 Last Qcal Time: 920715 16:01

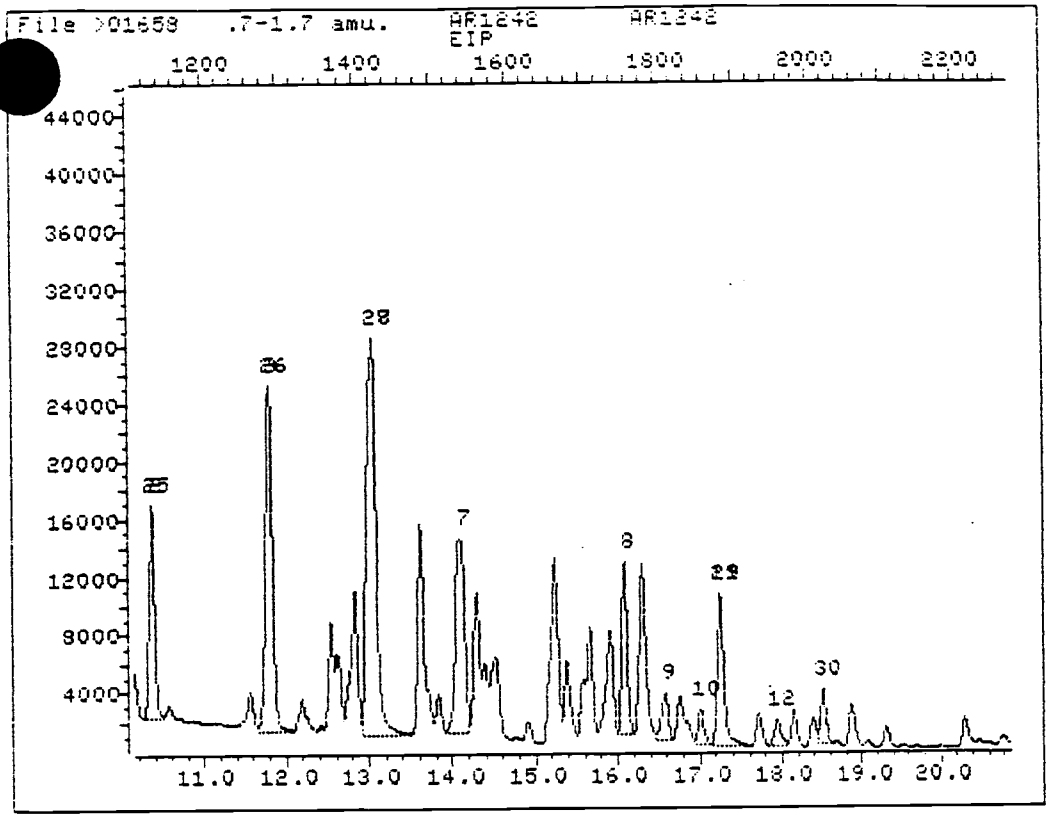
Operator ID:
Quant Time : 920813 03:27
Injected at: 920813 02:44



Data File: >01659:3396:D1 Quant Output File: ^01659::OF
Name: AR1248 Instrument ID: PRIMA
Misc: AR1248

Id File: ID608::QT
Title: 2/88 SOW Pest/PCB's for CLP by Capillary Column Battelle PNL
Last Calibration: 920212 10:44 Last Qcal Time: 920715 16:01

Operator ID:
Quant Time : 920813 00:28
Injected at: 920812 23:44



Data File: >01658:3396:D1 Quant Output File: ^01658::OF
Name: AR1242 Instrument ID: PRIMA
Misc: AR1242

Id File: ID608::QT
Title: 2/88 SOW Pest/PCB's for CLP by Capillary Column Battelle PNL
Last Calibration: 920212 10:44 Last Qcal Time: 920715 16:01

Operator ID:
Quant Time : 920812 23:43
Injected at: 920812 23:00

92-09432

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

14083

Lab Name: Battelle-PNL Contract: --------

Lab Code: ------ Case No.: 18450 SAS No.: ------ SDG No.: ------

Matrix: (soil/water) WATER Lab Sample ID: 92-09432

Sample wt/vol: 1000 (g/mL)ML Lab File ID: >01663

Level: (low/med) LOW Date Received: 07/30/92

% Moisture: not dec. --- dec. --- Date Extracted: 08/04/92

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 08/13/92

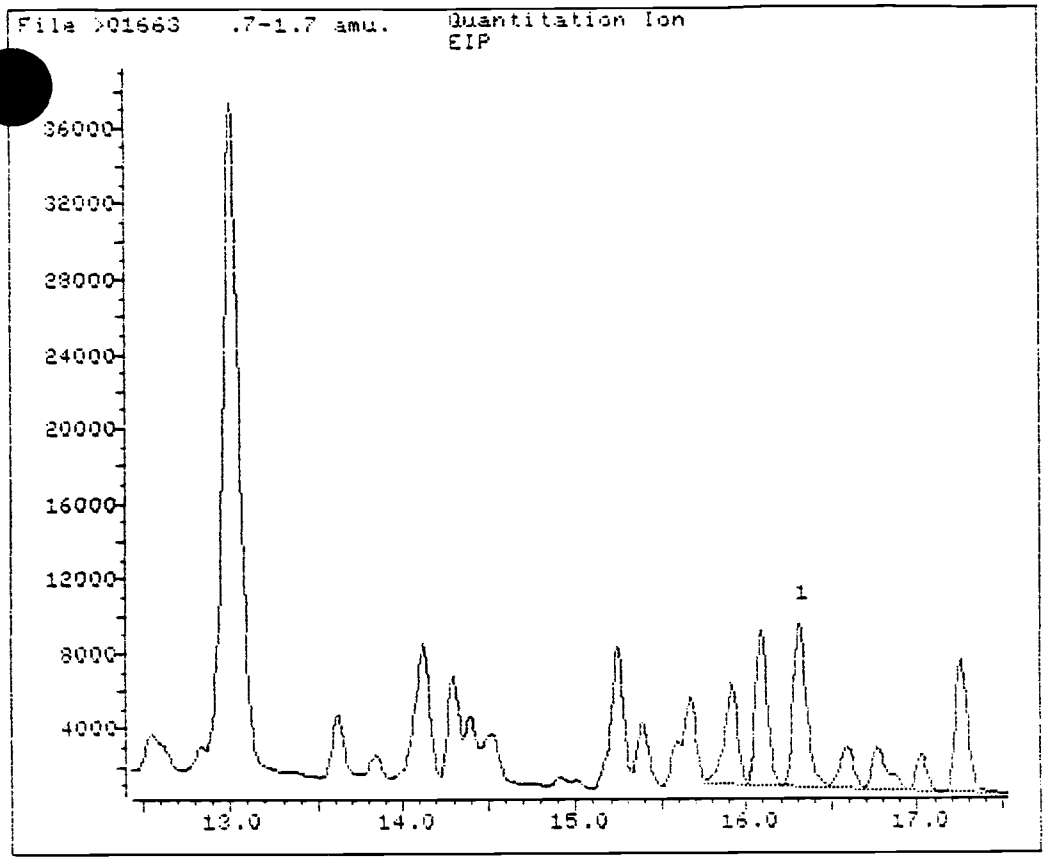
GPC Cleanup: (Y/N) N pH: --- Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
319-84-6	Alpha-BHC	0.13	
319-85-7	Beta-BHC	0.05	U
319-86-8	Delta-BHC	0.05	U
58-89-9	Gamma-BHC (Lindane)	0.05	U
76-44-8	Heptachlor	0.36	
309-00-2	Aldrin	0.05	U
1024-57-3	Heptachlor Epoxide	0.05	U
959-98-8	Endosulfan I	0.05	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.64	
72-54-8	4,4'-DDD	0.10	U
1013-07-8	Endosulfan Sulfate	0.39	
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin Ketone	0.22	
5103-71-9	alpha-Chlordane	0.50	U
5103-74-2	gamma-Chlordane	0.50	U
8001-35-2	Toxaphene	1.00	U
12674-11-2	Aroclor-1016	0.50	U
11104-28-2	Aroclor-1221	0.50	U
11141-16-5	Aroclor-1232	0.50	U
53469-21-9	Aroclor-1242	3.30	
12672-29-6	Aroclor-1248	0.50	U
11097-69-1	Aroclor-1254	1.00	U
11096-82-5	Aroclor-1260	1.00	U
(1) 7421-36-3	Endrin Aldehyde	0.82	

00-030

FORM I PEST 1/89 Rev.

(1) This compound was added to this form for reporting purposes in this instance only



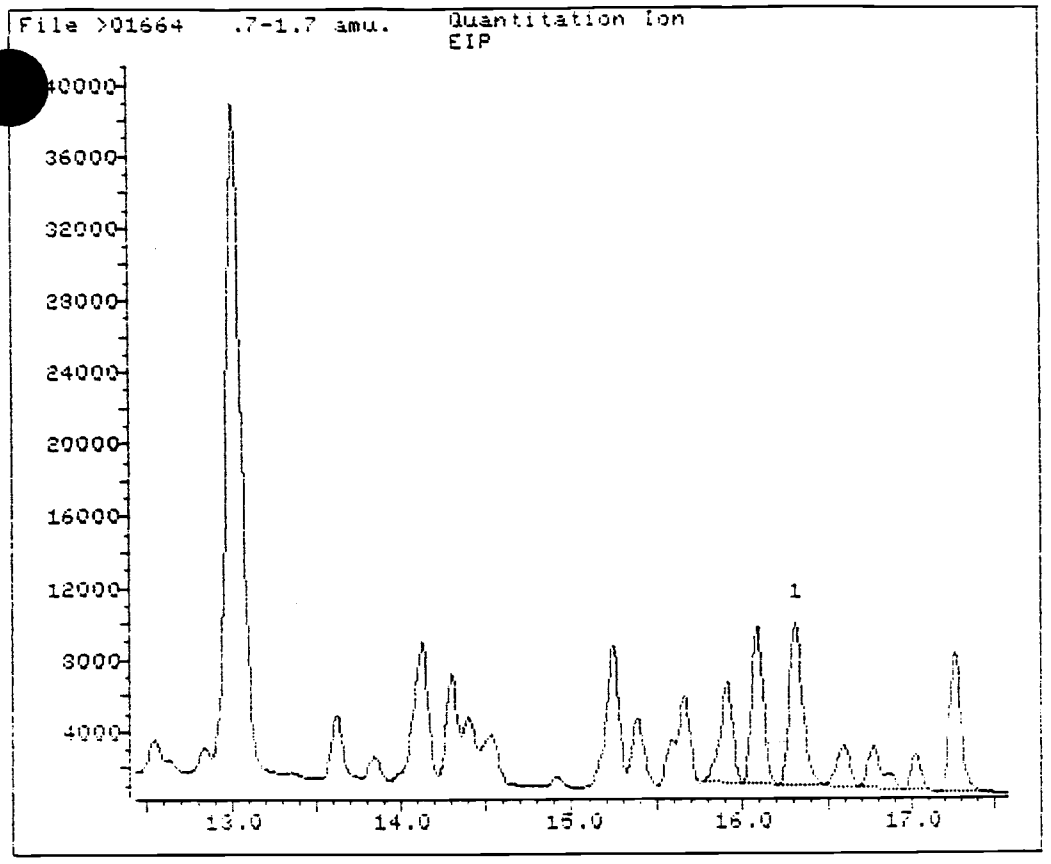
Data File: >01663:3396:D1 Quant Output File: ^01663::OF
Name: 92-09432 Instrument ID: PRIMA
Misc: 92-09432
Quant Time: 920813 03:27 Quant ID File: ID608::QT
Injected at: 920813 02:44 Last Calibration: 920212 10:44
Last Qcal Time: 920715 16:01

Compound No : 28
Compound Name: Aroclor-1242
Quant Ion : 1.0

Hit	R.T.	Scan#	Area	Conc	Units	q
1	16.32	1780	187083M	517.81	ng/mL	100

Search results for Data File /chem/HPRTE2.i/DW2006.d
Converted from RTE data file: >W2006:
Injected 20 Nov 92 2:50 pm by GER SUPER GR

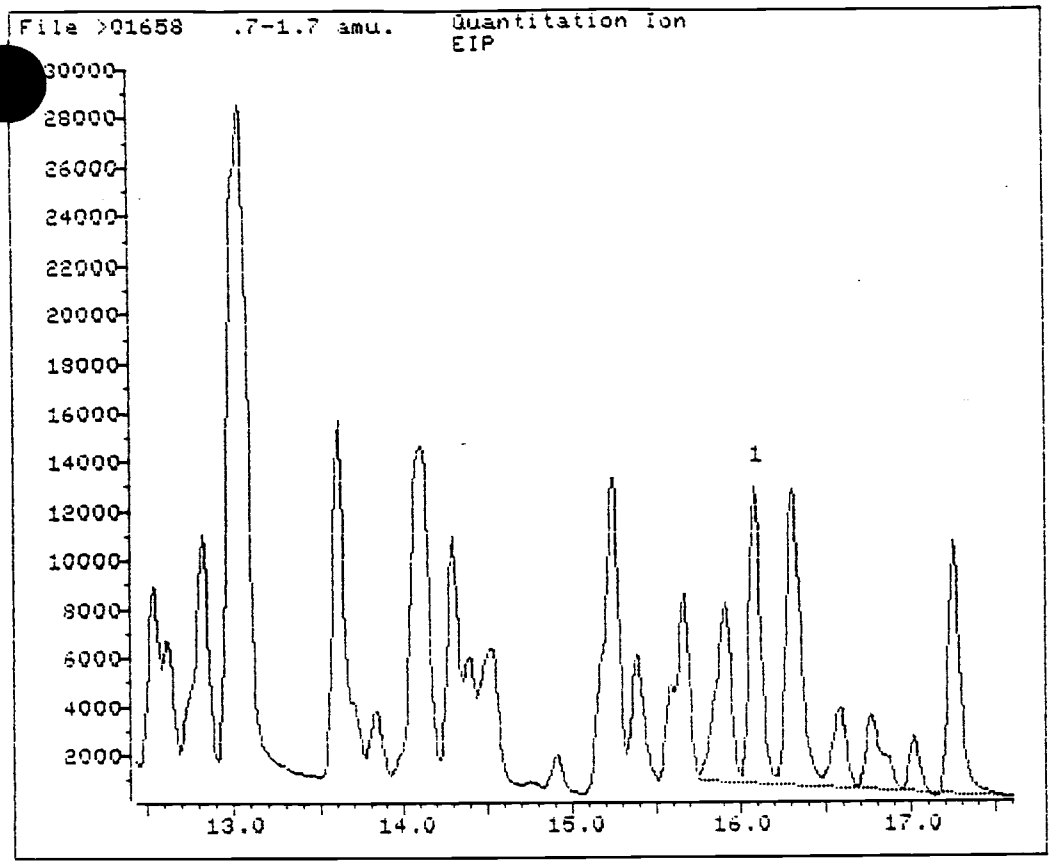
Peak Number	Retention Time	Prob.	Compound Name
1	2.394	0	No matches found
2	2.824	0	No matches found
3	9.374	0	No matches found
4	13.282	94	Methane, bromochloro-
5	15.133	0	No matches found
6	16.695	95	Benzene, 1,4-difluoro-
7	17.124	90	2-Heptene
8	17.622	81	2-Heptene, (E)-
9	20.635	0	No matches found
10	22.626	80	Cyclotrisiloxane, hexamethyl-
11	24.388	0	No matches found
12	27.621	94	Benzene, 1-bromo-2-fluoro-
13	28.757	25	4-HYDROXYPHENYLACETIC ACID ETHYL ESTER T
14	30.720	0	No matches found



Data File: >01664:3396:D1 Quant Output File: ^01664::OF
Name: 92-09432 Instrument ID: PRIMA
Misc: 92-09432
Quant Time: 920813 04:12 Quant ID File: ID608::QT
Injected at: 920813 03:28 Last Calibration: 920212 10:44
Last Qcal Time: 920715 16:01

Compound No : 28
Compound Name: Aroclor-1242
Quant Ion : 1.0

Hit	R.T.	Scan#	Area	Conc	Units	q
1	16.31	1779	195737M	541.76	ng/mL	100



Data File: >01658:3396:D1 Quant Output File: ^01658::OF
Name: AR1242 Instrument ID: PRIMA
Misc: AR1242
Quant Time: 920812 23:43 Quant ID File: ID608::QT
Injected at: 920812 23:00 Last Calibration: 920212 10:44
Last Qcal Time: 920715 16:01

Compound No : 28
Compound Name: Aroclor-1242
Quant-Ion : 1.0

Hit	R.T.	Scan#	Area	Conc	Units	q
1	16.09	1755	282647M	782.31	ng/mL	100

Battelle
Pacific Northwest Laboratories

Project Number 95116

Internal Distribution

JL Daniel (w/o att)
TY Hosaka "
AG King "
JM Latkovich "
SG McKinley "
Project File
File/LB

Date March 15, 1993

To Eric Hoppe, Mike Urie

From Kristine Kuhl-Klinger

Subject USEPA-CLP QB1. FY93 PE Results

Attached please find a copy of both the Inorganic and Organic results for the U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) QB1, FY93 Performance Evaluation (PE) Study.

As can be seen from the attached, the Inorganic Group achieved a score of 79.5% and the Organic Group achieved a score of 76.4%. These scores are both down from the previous quarter (Inorganic at 91.7% and Organic at 82.8%). These scores are considered "Acceptable, Corrective Action Required." Review of the results shows that discrepancies were noted across all analyses performed, i.e., GFAA, CVAA and ICP for Inorganic, and VOA, SVOA and Pest/PCB for Organic.

As with all PE studies, you are required to investigate all discrepancies uncovered by this PE study to determine potential sources of error which can affect all work performed in the laboratory.

Your corrective action plan is required by this office no later than April 5, 1993. Your plan must include a statement of the discrepancy, results of investigation, and all corrective actions taken to alleviate recurrence. Please note that this exercise benefits you and your operation and is not simply a record-keeping activity on behalf of this office. Your ability to isolate potential sources of error in your analyses and correct them is the primary means of improving the overall quality of your operation.

If you have any questions or concerns related to this PE study, please contact me at your earliest convenience.

KJK:pl

Attachments

00-035

INORGANIC QUARTERLY BLIND PERFORMANCE EVALUATION SAMPLE

KEY EXPLANATION

c TOLERANCE INTERVALS (TI) WERE NOT SET SINCE 40 % OR MORE OF THE LABORATORIES SUBMITTED A VALUE BELOW THE CONTRACT REQUIRED DETECTION LIMIT (CRDL).
d TI NOT USED. SEE SCORING NOTES, PROCEDURE FOR GRADING U-VALUES NO. 4.
U ANALYZED FOR BUT NOT DETECTED.
B INDICATES A VALUE LESS THAN THE CRDL BUT GREATER THAN OR EQUAL TO THE INSTRUMENT DETECTION LIMIT (IDL).
E INDICATES AN ESTIMATED VALUE DUE TO THE POSSABLE PRESENCE OF INTERFERENCE.
W INDICATES A POST DIGESTION SPIKE FOR GRAPHITE FURNACE ATOMIC ABSORPTION (GFAA) IS OUT OF CRITERIA.
S INDICATES VALUE DETERMINED BY THE METHOD OF STANDARD ADDITION.
* CORRELATION COEFFICIENT FOR THE MSA IS LESS THAN 0.995.
X VALUE WAS OUTSIDE BOTH THE WARNING AND THE ACTION LIMIT. POINTS DEDUCTED.
S VALUE WAS OUTSIDE THE WARNING LIMIT ONLY. NO POINTS DEDUCTED.
UX ELEMENT WAS NOT IDENTIFIED (FALSE NEGATIVE). POINTS DEDUCTED.
\# INDICATES A FALSE POSITIVE WITH VALUE GREATER THAN THE CRDL. POINTS DEDUCTED.
& VALUE WAS NOT SUBMITTED.
? BEST ESTIMATE OF VALUE AND/OR QUALIFIER. POOR COPY AND/OR ILLEGIBLE VALUE SUBMITTED.
@ ANALYSIS OF ELEMENT NOT REQUIRED.

SCORING NOTES:

$$\% \text{ Score} = 100 - \left[\frac{\sum_{i=1}^{n} (10A + B + 4C)}{n} \right] - 0.5S - D$$

where A = number of elements that were not identified

$$B = \left[1 - \left[\frac{T - x}{T} \right]^{1.5} \right] \cdot 100$$

T = total number of elements for which TIs have been established
x = number of mis-quantitations + number of elements that were not identified
n = number of samples
C = number of false positives
S = number of matrix spikes outside the criteria
D = number of duplicates outside the criteria

TOLERANCE INTERVALS (TI) WERE DERIVED FROM LABORATORY SUBMITTED VALUES. LESS THAN VALUES (<x), U-VALUES, AND NON-SUBMITTED VALUES (-) WERE NOT USED IN THE CALCULATION OF THE TI.

PROCEDURE FOR GRADING U-VALUES

1. ANY U-VALUE RESPONSE (INSTRUMENT DETECTION LIMIT) > CRDL FOR THE APPROPRIATE DILUTION, EVEN IF IT IS IN THE ACTION TOLERANCE INTERVAL, CAUSES A POINT DEDUCTION. IF 25 % OR MORE OF THE LABORATORIES REPORT A U-VALUE OVER THE CRDL, NO POINTS ARE DEDUCTED FOR ANY LABORATORY, POSSIBLY INDICATING A MATRIX INTERFERENCE IN THE SAMPLE.

2. IF CRDL < LOWER TI, THEN USE TI AS SET.

3. IF LOWER TI < CRDL AND CRDL < UPPER TI, THEN SET LOWER TI TO CRDL. NO POINTS DEDUCTED FOR IDENTIFICATION OR QUANTITATION LESS THAN OR EQUAL TO THE CRDL.

4. IF CRDL > LOWER AND UPPER TI, THEN NO TI USED. PARAMETER DROPPED FROM THE SCORING. NO POINTS DEDUCTED FOR IDENTIFICATIONS OR QUANTITATIONS. FALSE POSITIVES POSSIBLE.

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 1 FY 93

LABORATORY NAME: Battelle Pacific Northwest(WA) [G2] (BATTWA)
PERFORMANCE LEVEL: ACCEPTABLE - Corrective Actions Necessary
LABORATORY RANK: Above = 31 Same = 0 Below = 4

% Score: 79.5
REPORT DATE: 12/9/1992
MATRIX: SOIL

ELEMENT	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	11400	23000	10200	24200	12100			0	0	0	0	2	36
ANTIMONY	c	c	c	c	7.92			0	0	0	30	0	36
ARSENIC	80.2	105	77.5	108	103.8			0	2	0	0	0	36
BARIUM	170	212	166	217	184			0	2	0	0	0	36
BERYLLIUM	1.0	1.5	1.0	1.6	0.85	B		0	1	0	0	0	36
CADMIUM	33.3	44.6	32.1	45.8	34.84			0	0	0	1	0	36
CALCIUM	18900	21700	18600	22000	20900			0	4	0	0	0	36
CHROMIUM	15.6	21.6	15.0	22.2	13.9		X	0	12	0	1	2	36
COBALT	10.0	10.7	10.0	11.2	6.2	B		0	0	0	0	0	36
COPPER	96.6	116	94.5	118	108			0	3	0	1	0	36
IRON	16800	22600	16100	23300	14900		X	0	6	0	0	2	36
LEAD	999	1200	977	1220	955.6		X	0	4	0	0	0	36
MAGNESIUM	6280	8250	6070	8460	6450			0	0	0	0	0	36
MANGANESE	444	539	434	550	466			0	1	0	0	0	36
MERCURY	4.0	8.4	3.5	8.9	5.34	7		0	1	0	2	0	36
NICKEL	12.1	19.0	11.3	19.8	14			0	1	0	0	0	36
POTASSIUM	3020	5320	2770	5570	2720		X	0	3	0	0	0	36
SELENIUM	1.0	1.6	1.0	1.8	1.74		S	2	4	0	17	1	36
SILVER	2.7	5.3	2.4	5.5	4.01			0	1	0	5	0	36
SODIUM	d	d	d	d	410	B		0	0	0	0	0	36
THALLIUM	0.86	2.0	2.0	2.2	2.13		S	0	1	0	9	0	36
VANADIUM	31.9	47.8	30.2	49.5	25.6		X	0	10	0	1	1	36
ZINC	275	337	268	344	302			0	2	0	0	0	36

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 5
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
SOIL :

OF DUPLICATES OUT: 0
SOIL :

00-037

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QS 1 FY 93

LABORATORY NAME: Battelle Pacific Northwest(WA) [G2] (BATTWA)
PERFORMANCE LEVEL: ACCEPTABLE - Corrective Actions Necessary
LABORATORY RANK: Above = 31 Same = 0 Below = 4

% Score: 79.5
REPORT DATE: 12/9/1992
MATRIX: WATER 1

ELEMENT	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	1070	1140	1060	1150	1110			0	7	0	0	0	36
ANTIMONY	346	401	340	407	400.3			0	1	0	1	1	36
ARSENIC	58.3	76.5	56.3	78.5	68.22			0	0	0	3	1	36
BARIUM	c	c	c	c	2	U		0	0	0	0	0	36
BERYLLIUM	63.5	74.3	62.3	75.5	70.6			0	1	0	0	0	36
CADMIUM	38.8	42.6	38.4	43.0	44.04		X	0	10	0	0	0	36
CALCIUM	28100	31300	27700	31700	29800			0	3	0	0	0	36
CHROMIUM	64.1	78.2	62.6	79.7	83.2		X	0	2	0	0	0	36
COBALT	185	214	182	217	199			0	0	0	0	0	36
COPPER	228	261	224	265	247			0	1	0	1	0	36
IRON	379	448	372	455	421			0	1	0	0	0	36
LEAD	11.7	17.0	11.1	17.6	17.56		S	0	3	0	1	1	36
MAGNESIUM	21300	23500	21000	23800	22800			0	1	0	0	0	36
MANGANESE	c	c	c	c	2	U		0	0	0	0	0	36
MERCURY	2.4	7.3	1.8	8.4	1.8		S	0	7	0	2	0	36
NICKEL	227	286	221	292	267			0	0	0	0	0	36
POTASSIUM	c	c	c	c	1350	U		0	0	0	0	0	36
SELENIUM	49.2	65.0	47.5	66.7	53.83			0	3	0	2	1	36
SILVER	46.9	53.7	46.2	54.4	51.42			0	5	0	3	0	36
SODIUM	d	d	d	d	102	U		0	0	0	0	0	36
THALLIUM	83.4	110	80.4	113	117.7		X	0	5	0	5	0	36
VANADIUM	c	c	c	c	6	U		0	0	0	0	0	36
ZINC	226	274	220	279	248			0	1	0	0	0	36

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 3
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
WATER :

OF DUPLICATES OUT: 0
WATER :

00-038

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 1 FY 93

LABORATORY NAME: Battelle Pacific Northwest(WA) (G21 (BATTWA)
PERFORMANCE LEVEL: ACCEPTABLE - Corrective Actions Necessary
LABORATORY RANK: Above = 31 Same = 0 Below = 4

% Score: 79.5
REPORT DATE: 12/9/1992
MATRIX: WATER Z

ELEMENT	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	c	c	c	c	43.7	U		0	0	0	0	0	36
ANTIMONY	270	559	239	590	462.2			0	0	0	1	1	36
ARSENIC	35.0	59.2	32.3	61.9	49.7			0	2	0	3	1	36
BARIUM	827	1470	757	1540	1340			0	0	0	0	0	36
BERYLLIUM	36.2	64.6	33.2	67.7	57.2			0	0	0	0	0	36
CADMIUM	13.2	29.2	11.5	30.9	25.12			0	0	0	0	0	36
CALCIUM	c	c	c	c	8.3	U		0	0	0	0	0	36
CHROMIUM	77.7	136	71.3	142	120			0	0	0	0	0	36
COBALT	311	528	288	551	481			0	1	0	0	0	36
[illegible]PPER	c	c	c	c	60.4		#	0	0	1	1	0	36
[illegible]N	554	871	519	906	828			0	5	0	0	0	36
LEAD	18.0	34.1	16.3	35.9	23.17			0	4	0	1	1	36
MAGNESIUM	c	c	c	c	29.1	U		0	0	0	0	0	36
MANGANESE	108	173	101	180	154			0	1	0	0	0	36
MERCURY	0.2	1.6	0.2	1.7	0.28			0	1	0	2	0	36
NICKEL	c	c	c	c	12.5	U		0	0	0	0	0	36
POTASSIUM	15400	29200	13800	30700	20700			0	0	0	0	0	36
SELENIUM	24.2	51.0	21.3	53.9	36.51			0	0	0	2	1	36
SILVER	43.3	82.5	39.0	86.8	71.36			0	0	0	3	0	36
SODIUM	19800	34201	18200	35801	31400			0	0	0	0	0	36
THALLIUM	c	c	c	c	2.7	U		0	0	0	5	0	36
VANADIUM	389	663	359	693	573			0	0	0	0	0	36
ZINC	c	c	c	c	4.2	U		0	0	0	0	0	36

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 0
OF FALSE POSITIVES: 1

OF MATRIX SPIKES OUT: 0
WATER :

[illegible]F DUPLICATES OUT: 0
[illegible]ER :

00-039

12/20/92 Revision

ORGANIC PERFORMANCE EVALUATION MATERIAL SCORING PROCEDURE

OVERVIEW:

An integral responsibility of the Contract Laboratory Program's (CLP) quality assurance program is the monitoring of the CLP laboratory's continuing ability to produce acceptable analytical data. To assist in this process, the US Environmental Protection Agency (US EPA) Environmental Monitoring Systems Laboratory-Las Vegas (EMSL-LV), under the direction of the CLP National Program Office (NPO), prepares and ships Performance Evaluation Materials (PEM) each quarter to specified laboratories. These laboratories are required to analyze the PEM and return data packages within the contract-required turn-around time. The PEM results are evaluated and summarized by the EMSL-LV. The EMSL-LV forwards the PEM results to the NPO and the Technical Project Officers (TPOs). The NPO, in conjunction with the TPO, determines the appropriate remedial action(s) when the PEM results are unacceptable. The CLP NPO makes final policy decisions for any PEM study. The EMSL-LV has no authority over the laboratories.

COMPOUNDS ADDED TO THE PEM:

Compounds added to the PEM are classified into two different groups:

1) Target Compound List (TCL) Compounds -- Compounds included on the TCL in Exhibit C of the CLP Statement-of-Work (SOW). Points are deducted when a TCL compound added to the matrix is not identified, when a TCL compound added to the matrix is mis-quantified, or when a TCL compound that was not added to the matrix is identified by the laboratory (see "Scoring Procedures Used for Classifying a TCL Compound as a TCL Contaminant").

2) Non-TCL Compounds (non-TCL), also referred to as Tentatively Identified Compounds (TIC) -- Compounds which are not included on the TCL in Exhibit C of the CLP SOW but are contaminants found in the environment. A laboratory identifies the compounds using a forward library search routine which compares the sample compound spectra against spectra in the National Institute of Standards and Technology (NIST) Mass Spectral Library. Points are deducted when a non-TCL compound added to the matrix is not identified.

GENERAL SCORING PROCEDURE COMMENTS:

The following comments apply to the scoring procedures discussed in this document.

For the TCL and non-TCL identification scoring procedures, the NPO reserves the right to eliminate a compound from the scoring of the study if a large percentage of the laboratories do not identify the compound.

Tolerance intervals (TI) for TCL compounds are derived from the CLP laboratory-submitted values, using statistical procedures. When determining the TI for a TCL compound, if the lower TI limit is less than the Contract Required Quantitation Limit (CRQL) for the compound, the lower TI limit is set to the CRQL. If the upper TI limit is less than the CRQL for the compound, the compound is not included in the scoring procedures.

For the TCL contaminant classification procedures, the NPO will not deduct points if the NPO determines that the contaminant was a breakdown product from the compounds added to the PEM or that the matrix used to prepare the PEM contained the contaminant.

SCORING ALGORITHM:

The following algorithm is used to score the PEM:

$$\text{Score} = 100 - \left[\left[\frac{125 * (2A + B + C)}{X} \right] + \left[2.2 * D \right] \right]$$

Where:

X = The number of TCL compounds added to the PEM, which were used for scoring.

A = The number of TCL compounds added to the PEM, which the laboratory did not identify.

B = The number of TCL compounds added to the PEM, which the laboratory did not correctly quantify (value is not within the action TI).

C = The number of TCL compounds <u>not</u> added to the PEM (contaminants), which the laboratory identified.

D = The number of non-TCL compounds added to the PEM, which the laboratory did not identify.

The non-TCL term; [2.2 * D], is limited to a maximum deduction of 11 points.

SCORING PROCEDURES USED WHEN A LABORATORY DOES NOT IDENTIFY A TCL COMPOUND:

The following scoring procedures are used when a laboratory does not identify a TCL compound added to the PEM:

1) If a laboratory reports the CRQL (e.g., 10 U) for a TCL compound, and the CRQL is less than the lower limit of the action TI (e.g., 40 to 100), points are deducted.

2) If a laboratory reports a detection limit value (e.g., 50 U) for a TCL compound, greater than the compound's CRQL (e.g., 20), and the laboratory's detection limit value is included within or is greater than the limits of the action TI (e.g., 40 to 100), points are deducted.

SCORING PROCEDURES USED WHEN A LABORATORY DOES NOT IDENTIFY A NON-TCL COMPOUND:

The following scoring procedures are used when a laboratory does not identify a non-TCL compound added to the PEM:

1) If a laboratory does not identify a non-TCL compound added to the PEM, points are deducted.

2) For those non-TCL compounds which have similar mass spectra, if a laboratory reports an isomer of the compound, points are not deducted.

SCORING PROCEDURE USED WHEN A LABORATORY DOES NOT CORRECTLY QUANTIFY A TCL COMPOUND:

The following scoring procedure is used when a laboratory does not correctly quantify a TCL compound added to the PEM:

1) If a laboratory reports a value for a TCL compound, not within the limits of the action TI, points are deducted.

SCORING PROCEDURES USED FOR CLASSIFYING A TCL COMPOUND AS A TCL CONTAMINANT:

A TCL contaminant is defined as an identification of a TCL compound that was not added to the PEM and was not in the matrix material used to prepare the PEM. The following scoring procedures are used when a laboratory identifies a TCL contaminant.

1) If the TCL contaminant's concentration is reported as greater than the limit for the TCL compound, points are deducted. For the common solvents and the phthalate esters, the limit is defined as five times the compound's CRQL. For all other TCL compounds, the limit is defined as the compound's CRQL.

2) Note: Identification of TCL compounds added to the PEM will be classified as TCL contaminants when a) a TI was not calculated for the compound and b) the laboratory reported an unusually high concentration of the compound.

DESCRIPTION OF THE INDIVIDUAL LABORATORY SUMMARY REPORT

OVERVIEW:

The Individual Laboratory Summary Report (ILSR), also known as the "score sheet", summarizes the information from the quarterly PEM study. The report is comprised of two parts: the laboratory data summary and the program data summary. Information from an individual laboratory is summarized in the laboratory data summary. Information from all laboratories is summarized in the program data summary.

EXPLANATION OF ILSR HEADER INFORMATION:

Laboratory Data Summary:

Header	Definition
LABORATORY	The laboratory's name and location (state)

00-042

Laboratory Data Summary (continued):

Header	Definition
PERFORMANCE	A laboratory's performance is classified into one of three categories. ACCEPTABLE, No Response Required - Score greater than or equal to 90 percent. ACCEPTABLE, Response Explaining Deficiency(ies) Required - Score greater than or equal to 75 percent and less than 90 percent. UNACCEPTABLE, Response Explaining Deficiency(ies) Required - Score less than 75 percent.
RANK	Ranking of individual laboratory's score. Above = Number of laboratories whose scores were greater than that laboratory's score. Same = Number of laboratories whose scores were equal to that laboratory's score. Below = Number of laboratories whose scores were less than that laboratory's score.
% SCORE	Percent score calculated using the scoring algorithm.
REPORT DATE	The date that the ILSR was printed. Format (month/day/year).
MATRIX	PEM matrix.
COMPOUND	The name of the compound. Compounds are categorized into 10 catagories. TCL VOLATILE: All TCL volatile (VOA) compounds added to the PEM are listed. TCL SEMIVOLATILE: All TCL semivolatile (SVOA) compounds added to the PEM are listed. TCL PESTICIDE: All TCL pesticide (PEST) compounds added to the PEM are listed. NON-TCL VOLATILE: All non-TCL VOA compounds added to the PEM are listed. NON-TCL SEMIVOLATILE: All non-TCL SVOA compounds added to the PEM are listed. TCL VOLATILE (Contaminants): All TCL VOA contaminants are listed. (For the definition of a TCL contaminant, see "Scoring Procedures Used for Classifying a TCL Compound as a TCL Contaminant".) TCL SEMIVOLATILE (Contaminants): All TCL SVOA contaminants are listed.

Laboratory Data Summary (continued):

Header	Definition
COMPOUND (continued)	TCL PESTICIDE (Contaminants): All TCL PEST contaminants are listed. NON-TCL VOLATILE (Contaminants): All non-TCL VOA contaminants are listed. (For the definition of a non-TCL contaminant, see "Scoring Procedures Used for Classifying a Non-TCL Compound as a Non-TCL Contaminant".) NON-TCL SEMIVOLATILE (Contaminants): All non-TCL SVOA contaminants are listed.
TOLERANCE INTERVALS	Tolerance intervals (TI) calculated for each TCL compound using the statistical procedure. WARNING - Warning limits - LOWER: The lower TI limit. UPPER: The upper TI limit. ACTION - Action limits - LOWER: The lower TI limit. UPPER: The upper TI limit.
LABORATORY DATA	Laboratory-reported values and EMSL-LV qualifiers. CONC - Laboratory-reported concentration. Q - Qualifier codes.
# OF TCL COMPOUNDS NOT-IDENTIFIED	The number of TCL compounds the laboratory did not identify -- points deducted.
# OF TCL COMPOUNDS MIS-QUANTIFIED	The number of TCL compounds the laboratory did not correctly quantify -- points deducted.
# OF TCL CONTAMINANTS	The number of TCL contaminants the laboratory identified -- points deducted.
# OF NON-TCL COMPOUNDS NOT-IDENTIFIED	The number of non-TCL compounds the laboratory did not identify -- points deducted.
# OF NON-TCL CONTAMINANTS	The number of non-TCL contaminants the laboratory identified -- points deducted.

Program Summary Data:

Header	Definition
# LABS MIS-QNT:	The number of laboratories that did not correctly quantify a TCL compound added to the PEM.
# LABS NOT-ID:	The number of laboratories that did not identify the TCL or non-TCL compound.

Program Summary Data (continued):

Header	Definition
# LABS ID-CPD:	The number of laboratories that identified the TCL or non-TCL compound.
TOTAL # LABS:	The number of laboratories that analyzed the PEM.
ILSR CODES:	The following codes are used on the ILSR.

U -- Compound analyzed for but not detected.

& -- Compound not identified -- points deducted for identification.

X -- Compound correctly identified but the reported value is not within the action limit -- points deducted for quantification.

$ -- The reported value for the compound is not within the warning limit but is within the action limit -- points not deducted.

C -- TCL Contaminant -- points deducted.

NS -- Data required but not submitted -- points deducted.

NR -- Data not required.

NU -- Data not used; insufficient amount of usable data for scoring submitted by the laboratories.

REGION 10
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 1 FY 93

LABORATORY: Battelle Pacific NW (WA)
PERFORMANCE: ACCEPTABLE - Response Explaining Deficiency(ies) Required
RANK: Above = 12 Same = 0 Below = 4

% SCORE: 76.4
REPORT DATE: 12/24/9
MATRIX: WATER

COMPOUND	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY DATA CONC	Q	#LABS MIS-QNT	PROGRAM DATA #LABS NOT-ID	#LABS ID-CPD	TOTAL #LABS
TCL VOLATILE										
CHLOROMETHANE	35	71	29	91	58		2	1	58	59
1,1-DICHLOROETHANE	NU	NU	NU	NU	10		0	0	59	59
CHLOROFORM	61	75	59	83	68		1	0	59	59
2-BUTANONE	71	110	66	110	150	X	15	2	57	59
CIS-1,3-DICHLOROPROPENE	66	87	63	98	73		3	1	58	59
BROMOFORM	57	74	54	77	66		8	0	59	59
2-HEXANONE	110	250	92	270	210		3	0	59	59
1,1,2,2-TETRACHLOROETHANE	120	160	110	160	150		5	0	59	59
CHLOROBENZENE	34	41	34	44	36		3	0	59	59
STYRENE	160	200	150	210	180		3	0	59	59
XYLENES (TOTAL)	73	92	70	100	77		2	3	56	59
TCL SEMIVOLATILE										
PHENOL	17	28	16	29	10	X	4	1	58	59
BIS(2-CHLOROETHYL)ETHER	32	46	30	54	45		3	0	59	59
4-METHYLPHENOL	23	34	21	40	21	$	6	0	59	59
HEXACHLOROETHANE	33	60	28	76	35		0	0	59	59
2,4-DIMETHYLPHENOL	17	30	15	38	23		6	2	57	59
BIS(2-CHLOROETHOXY)METHANE	20	25	19	28	24		11	0	59	59
1,2,4-TRICHLOROBENZENE	28	43	26	51	29		2	0	59	59
HEXACHLOROCYCLOPENTADIENE	NU	NU	NU	NU	4		0	31	28	59
2,4,6-TRICHLOROPHENOL	21	31	20	32	23		7	0	59	59
4-NITROPHENOL	41	64	38	67	12	X	11	1	58	59
4-BROMOPHENYL PHENYL ETHER	13	22	12	24	17		0	0	59	59
HEXACHLOROBENZENE	34	44	32	49	40		5	0	59	59
ANTHRACENE	NU	NU	NU	NU	9		0	0	59	59
PYRENE	74	140	65	180	120		3	0	59	59
BUTYL BENZYL PHTHALATE	38	63	35	67	23	X	9	0	59	59
BENZO(A)PYRENE	25	43	22	52	29		5	0	59	59
TCL PESTICIDES										
ALPHA-BHC	0.16	0.22	0.16	0.23	0.15	X	10	1	58	59
BETA-BHC	0.16	0.24	0.14	0.26	0.3	X	4	4	55	59
GAMMA-BHC (LINDANE)	0.15	0.22	0.14	0.23	0.18		6	0	59	59
HEPTACHLOR	0.29	0.43	0.27	0.45	0.32		8	1	58	59
ALDRIN	0.12	0.2	0.11	0.21	0.12		5	0	59	59
HEPTACHLOR EPOXIDE	0.31	0.43	0.29	0.44	0.37		7	1	58	59
ENDOSULFAN I	0.21	0.38	0.19	0.48	0.37		4	1	58	59
ENDOSULFAN II	0.43	0.7	0.39	0.84	0.59		2	1	58	59
ENDOSULFAN SULFATE	0.82	1.3	0.74	1.4	1.1		4	1	58	59
4,4'-DDT	0.95	1.5	0.87	1.5	1.1		6	0	59	59
ENDRIN KETONE	0.68	1.1	0.62	1.1	0.79		6	1	58	59
NON-TCL VOLATILE										
EPICHLOROHYDRIN					0	NR		59	0	59

REGION 10
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QS I FY 93

LABORATORY: Battelle Pacific NW (WA)
PERFORMANCE: ACCEPTABLE - Response Explaining Deficiency(ies) Required
RANK: Above = 12 Same = 0 Below = 4

% SCORE: 76.4
REPORT DATE: 12/24/
MATRIX: WATER

COMPOUND	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY DATA CONC	Q	#LABS MIS-QNT	PROGRAM DATA #LABS NOT-ID	#LABS ID-CPD	TOTAL #LABS
PROPANE,1,2-DIBROMO-3-CHLORO-					0	NR		23	36	59
TOLUENE,2-CHLORO-					0	&		7	52	59
NON-TCL SEMIVOLATILE										
4,4'-DDT					35			15	44	59
TCL VOLATILE (Contaminants)										
ACETONE					11			33	26	59
1,2-DICHLOROPROPANE					1			49	10	59
TCL SEMIVOLATILE (Contaminants)										
BENZYL ALCOHOL					7			57	2	59
NON-TCL SEMIVOLATILE (Contaminants)										
UNKNOWN					12			37	22	59

OF TCL COMPOUNDS NOT-IDENTIFIED: 0
OF TCL COMPOUNDS MIS-QUANTIFIED: 6
OF TCL CONTAMINANTS: 0

OF NON-TCL COMPOUNDS NOT-IDENTIFIED: 1
OF NON-TCL CONTAMINANTS: 0

Battelle
Pacific Northwest Laboratories

Project Number 95116

Internal Distribution

JM Latkovich
SA Schubert
MW Urie
File/LB

Date July 20, 1993

To AG King

From KJ Kuhl-Klinger

Subject Response to USEPA CLP QB3/FY93 Results

Attached, please find a copy of the inorganic response to those deficiencies uncovered from review of the USEPA CLP QB3/FY93 results.

Based upon my review of the raw data I concur with MW Urie's response. To summarize for you, the following are pertinent issues:

1.0 Low level contamination in the ICP sample preparation blank was noted, this has been a recurring issue. Re-evaluation of current cleaning procedures appears to be the only means to identify the source.

2.0 One transcription error and three reporting errors indicate that the analysis and reporting were hurried. It was brought to my attention that instrument failure brought the final analyses up to the deadline for reporting which contributed significantly to rushed final result reporting. The necessity of starting work on these samples immediately upon receipt is obviously a corrective action this office concurs with.

3.0 I am concerned with the discrepancy noted with the sample preparation blank for potassium. There is definitely an instrument performance issue here. I believe MW Urie's approach; to run by flame AA, is well justified since the error produced was significant. It is clear that potassium performance must be improved on the current ICP.

4.0 The issue of ICP configuration can not be easily addressed. It is not felt, however, that the low score was a result of our configuration-related misses. Clearly, our score was based on several different types of failures occurring at the same time. The new ICP should definitely provide greater flexibility in the future and may be enough to render configuration a "non-issue". It was also observed that the soil result, which contained higher levels of analyte, did not have configuration failures. Our performance was quite good on this sample. The soil is also a great deal closer to the matrices we routinely test than the waters.

Although I concur with MW Urie's corrective actions I recommend that we take the following additional actions:

- Include all PEs in our weekly status meetings, this will ensure that concerns and/or issues which develop shall get early attention.

- Push deadline for reporting up two to three days and require QC review. This would be similar to how we handle the majority of samples.

- This office will periodically request updates on the corrective actions identified by Mike Urie. This office will report on the status of all corrective actions via the monthly QA report to management.

I will also attempt (working with Mike) to isolate for your attention, the subtle differences between the way we handle samples (digestion et al) verses commercial laboratories. Please recall that our performance on the last four USEPA WP studies has averaged better than 90 percent for Trace Metals. The WP samples are not digested (except Hg). There may be minor sample handling differences that wouldn't cause failure but could produce enough of a bias to prevent us from routinely scoring 90% and above on CLP PEs.

Please contact me at your earliest convenience should you have any questions or require additional actions on my part.

Battelle
Pacific Northwest Laboratories

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JUL 13 1993
KJ KUHL - KLINGER

Project Number PE-QB93-3

Internal Distribution

A. G. King
S. A. Schubert
File/LB

Date July 12, 1993

To K. J. Kuhl-Klinger

From M. W. Urie

Subject Assessment of QB3/FY93 Performance Failures

Evaluation of the performance on the QB3/FY93 samples identifies three primary operational issues; ICP operating configuration, Cu/Zn/Cd contamination, and GFAA procedural errors. In addition to these issues it is evident that a contributing cause for the QB failure is related to equipment failures and inadequate time allocated to perform the work and technical reviews.

ICP operating configuration:

A) The ICP analyses which failed for Water 1 were Cr, Cu, K, and Zn and for Water 2 were Cr, Mn, and V. The values reported were obtained on the ICP routinely used for analyses of Hanford matrices; the ICP is configured for 46 analytes and the run programs do not use background correction. This ICP is optimized for analysis of samples containing high levels of severely spectral interfering analytes such as U, Ce, Nd, and Th. The lack of background subtraction and the necessity of utilizing IECs to correct for background elevations from analytes such as Ca, Na and K contribute significantly to the high bias noted in the analytes misquantified (except K). The current workload on the ICP makes it impractical to optimize multiple run programs; therefore, the laboratory configures and optimizes the ICP operation to provide the greatest flexibility in the analysis of unique Hanford matrices.

Action: Complete installation and validation of the laboratory's new ICP which is being configured for routine soil and water sample analyses. This system will be used to support analytical requests requiring CLP analytical protocols. Routine Hanford matrixes (other than soil and water) may require analysis utilizing the new ICP, and these analyses will still require performance <u>without</u> background subtraction (since the presence of analytes such as U make it impossible to select background regions for well over half the 52 analytes on the new system). However, by having two systems, the ICP best suited to perform specific analyses can be selected.

B) Potassium on Water 1: The analysis of the K on Water 1 is low by 30%; this is considered to be a significant "miss" since the K is at a very high concentration. Evaluation of the QC results for K do not shed any light on the reason for the low result; however, the process blank for K was significantly negative (instrument blank results, however, were normal). It should be noted that the K channel is considered to be unreliable at times; that is, on at least two instances within the last

E54-1900-001 (10/89)

year the factory service engineer has attempted to improve the channel's performance (specifically, short-term and long-term stability.)

Action: Until the new ICP can be validated or the K channel on the current ICP can be "improved", flame AA analyses will be performed and reported. Also, the use of flame AA analyses will be evaluated for Na, Cu and Zn to provide supporting results for the ICP.

Contamination:

A) Cu and Zn contamination (a recurring problem) appears to be a contributing factor in the higher than acceptable Cu and Zn values for both Water 1 and the Soil sample. Although the contamination is only moderate, the near misses suggest that this is the most plausible cause. All QC related samples passed acceptance criteria for Cu and Zn.

B) Cd contamination is also evident in the ICP processing blank; however, all Cd results were reported from the GFAA analysis and the GFAA processing blank appears to have no significant Cd contamination.

Action: Process blank will be monitored more closely and greater attention will be paid to pre-cleaning operations (specifically, digestion vessels). It should be noted that the levels detected in the PE samples, although above the instrument MDL, are generally much lower than levels of concern for "routine site samples".

GFAA procedural errors:

A) Selenium in Water 1: A transfer error to the reporting sheet was made. The analyzed value was actually 38.8 ug/L not <1.2. The value of 38.8 was within the acceptable range.

Action: Evaluate internal review process; attention to be directed at verifying accurate transfer of final results to the CLP reporting form.

B) Lead in Water 1 and Water 2: Based on preliminary information from the ICP, the samples were diluted 10x for the Pb analysis. The 10x dilutions gave results below the detection limits and should have been reanalyzed at full strength. Although reanalysis is standard protocol under such conditions, immediate reruns were not performed and thus the reported results were incorrect (See Contributing Cause below.) Based on discussion with the analyst, the failure to immediately reanalyze the samples was an oversight which was not discovered during data review.

Action: Reaffirm the rerun protocol with analyst and re-evaluate review process to verify adequacy of the process related to this analysis error.

C) Arsenic in Soil sample: The failure of the As appears to be from poor injection reproducibility resulting from analysis of the soil sample directly after a very high level Pb LCS. There appears to have been a memory effect for the sample; this effect was discovered during routine data review and a decision was made to use only the data from the last injection (See Contributing Cause below).

Action: Reaffirm acceptance criteria for duplicate injections with analyst to assure that all samples are reanalyzed whenever duplicate injection precision is poor. Establish plan for requesting extension whenever equipment failures are encountered.

Contributing Cause:

GFAA instrument failures were experienced during the initial analyses of the QB samples. The results obtained during this time were not considered valid and were not reported. This forced reanalysis to be performed on the day before results were to be reported. Both the As and the Pb failures can be attributed to lack of time for thorough review and/or reanalysis. Although the GFAA results were reported on time, the laboratory initiated a third "re-analysis" to provide verification of the results submitted. The "re-analysis" indicated that the reported Pb and As results were highly suspect; however, no attempt was made to resubmit revised results.

Action: Initiate an operational program which will assure that the PE samples are started immediately upon receipt by the laboratory. This will insure that time is available to recover from instrument failures and provide sufficient time after analysis for thorough technical reviews.

Battelle
Pacific Northwest Laboratories

Project Number 95116

Internal Distribution

Gaylord King
John Latkovich
Steve Schubert
Quarterly File
Project File
File/LB

Date July 14, 1993

To Mike Urie

From Kris Kuhl-Klinger KKK

Subject USEPA CLP Performance Evaluation Results

Attached, please find a copy of the "official" USEPA CLP Performance Evaluation results for QB3/FY93. No changes were noted between this report and the fax transmission we received last week.

As can be seen from the attached, the laboratory scored 54.5% which is clearly unacceptable. Review of the data indicates the following:

- Water 1: Six out of 23 analytes were out of control (Cr,Cu,Pb,K,Se,Zn) and one analyte was outside warning but within control limits (Cd).
- Water 2: Four out of 23 analytes were out of control (Cr,Pb,Mn,V).
- Soil: Two out of 23 analytes were out of control (As,Zn) and one analyte was out of warning but within control limits (Cr).

Please review the attached. Since I have already received your corrective action response, and no results have changed on the official report, I do not expect additional comment from you unless you identify other areas of concern.

Please keep me apprised of the status and results of those corrective actions identified in your response.

I suggest that future PE results be forwarded to my office two to three days ahead of schedule. I would then be able to assist you in the review process.

00-007

E54-1900-001 (10/89)

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 93

LABORATORY NAME: Battelle Pacific Northwest(WA) [S2] (BATTWA)
PERFORMANCE LEVEL: UNACCEPTABLE, Corrective Actions Mandatory
LABORATORY RANK: Above = 23 Same = 0 Below = 1

% Score: 54.5
REPORT DATE: 6/24/1993
MATRIX: SOIL

ELEMENT	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	7540	14000	6840	14700	11600			0	1	0	0	0	25
ANTIMONY	c	c	c	c	0.61	B		0	0	2	18	0	25
ARSENIC	3.4	6.6	3.0	7.0	7.74		X	0	3	0	3	1	25
BARIUM	354	479	341	492	432			0	1	0	1	1	25
BERYLLIUM	d	d	d	d	0.6	B		0	0	1	1	0	25
CADMIUM	c	c	c	c	0.1	U		0	0	3	1	1	25
CALCIUM	19400	23400	18900	23800	20900			0	1	0	0	0	25
CHROMIUM	13.4	25.7	12.1	27.0	26		S	0	1	0	0	0	25
[illegible]	10.0	11.1	10.0	11.7	8.2	B		0	2	0	0	0	25
[illegible]	17.3	26.8	16.3	27.8	23.3	*		0	3	0	0	2	25
IRON	11300	22400	10000	23700	20600			0	4	0	0	1	25
LEAD	15.1	30.6	13.5	32.3	20.7			0	4	0	0	2	25
MAGNESIUM	9110	10900	8920	11100	10100			0	2	0	0	0	25
MANGANESE	425	579	408	596	532			0	1	0	0	0	25
MERCURY	c	c	c	c	0.01	U		0	0	4	0	0	25
NICKEL	12.5	17.8	11.9	18.4	17.6			0	2	0	0	0	25
POTASSIUM	2020	3510	1850	3670	2440			0	0	0	0	0	25
SELENIUM	c	c	c	c	0.88			0	0	2	9	0	25
SILVER	c	c	c	c	0.1	U		0	0	3	2	0	25
SODIUM	d	d	d	d	500	B		0	0	1	0	1	25
THALLIUM	c	c	c	c	0.3	U		0	0	0	1	0	25
VANADIUM	20.1	58.0	16.0	62.1	46.4			0	2	0	0	1	25
ZINC	35.0	49.0	33.5	50.6	51.8		X	0	5	0	0	0	25

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 2
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
SOIL :

[illegible]UPLICATES OUT: 1
: Cu

00-010

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 93

LABORATORY NAME: Battelle Pacific Northwest(WA) [S2] (BATTWA)
PERFORMANCE LEVEL: UNACCEPTABLE, Corrective Actions Mandatory
LABORATORY RANK: Above = 23 Same = 0 Below = 1

% Score: 54.5
REPORT DATE: 6/24/1993
MATRIX: WATER 1

ELEMENT	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	c	c	c	c	69.7	U		0	0	1	0	0	25
ANTIMONY	514	592	506	601	583			0	1	0	0	0	25
ARSENIC	580	736	563	753	673			0	1	0	0	0	25
BARIUM	c	c	c	c	2	U		0	0	0	0	0	25
BERYLLIUM	45.5	51.0	44.9	51.6	47			0	2	0	0	0	25
CADMIUM	41.6	52.5	40.5	53.7	53.1		S	0	2	0	0	0	25
CALCIUM	d	d	d	d	416	B		0	0	0	0	0	25
CHROMIUM	87.1	103	85.4	105	123		X	0	2	0	0	0	25
[illegible]	236	264	234	267	256			0	0	0	0	0	25
[illegible]	233	262	230	265	316	*	X	0	2	0	0	1	25
[illegible]	576	637	569	644	588			0	2	0	0	0	25
LEAD	12.0	18.1	11.4	18.7	1.7	U	X	1	3	0	0	0	25
MAGNESIUM	19200	21700	19000	22000	19600			0	0	0	0	0	25
MANGANESE	c	c	c	c	2	U		0	0	0	0	0	25
MERCURY	4.0	8.0	3.6	8.4	5.66			0	0	0	1	0	25
NICKEL	263	305	259	310	287			0	0	0	0	0	25
POTASSIUM	17400	18800	17200	19000	12700		X	0	3	0	0	0	25
SELENIUM	31.8	40.5	30.8	41.4	1.2	U	X	1	1	0	4	0	25
SILVER	37.5	51.8	36.0	53.4	47.8			0	0	0	0	0	25
SODIUM	d	d	d	d	149	U		0	0	0	0	0	25
THALLIUM	76.6	111	72.8	115	98.8			0	0	0	2	0	25
VANADIUM	c	c	c	c	10	U		0	0	0	0	0	25
ZINC	168	182	166	183	219		X	0	7	0	0	0	25

OF ELEMENTS NOT-IDENTIFIED: 2
OF ELEMENTS MIS-QUANTIFIED: 4
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
WATER :

[illegible] DUPLICATES OUT: 1
[illegible] : Cu

00-011

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 93

LABORATORY NAME: Battelle Pacific Northwest(WA) [S2] (BATTWA)
PERFORMANCE LEVEL: UNACCEPTABLE, Corrective Actions Mandatory
LABORATORY RANK: Above = 23 Same = 0 Below = 1

% Score: 54.5
REPORT DATE: 6/24/1993
MATRIX: WATER 2

ELEMENT	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	923	1070	907	1080	945			1	0	0	0	0	25
ANTIMONY	378	459	369	468	435			0	3	0	0	0	25
ARSENIC	452	535	443	544	530			0	3	0	0	0	25
BARIUM	950	1010	944	1010	1010			1	1	0	0	0	25
BERYLLIUM	40.1	47.2	39.3	48.0	42.9			0	2	0	0	0	25
CADMIUM	22.0	32.0	20.9	33.1	28			0	3	0	0	0	25
CALCIUM	23600	26700	23200	27000	23800			0	3	0	0	0	25
CHROMIUM	54.0	64.8	52.8	66.0	90.8		X	0	4	0	0	0	25
[illegible]	416	465	411	470	463			0	2	0	0	0	25
[illegible]R	c	c	c	c	24.4	B*		0	0	1	0	1	25
IRON	783	840	777	847	813			0	4	0	0	0	25
LEAD	17.0	21.7	16.5	22.2	1.7	U	X	1	3	0	0	0	25
MAGNESIUM	c	c	c	c	56.5	B		0	0	1	0	0	25
MANGANESE	95.9	114	94.0	116	93.2		X	1	1	0	0	0	25
MERCURY	5.6	8.8	5.3	9.2	6.46			0	2	0	1	0	25
NICKEL	c	c	c	c	49.9	U		0	0	1	0	0	25
POTASSIUM	c	c	c	c	1990			0	0	1	0	0	25
SELENIUM	24.8	36.7	23.5	38.0	33			0	2	0	4	0	25
SILVER	48.5	60.8	47.2	62.1	50			0	0	0	0	0	25
SODIUM	19600	21900	19400	22100	20800			1	0	0	0	0	25
THALLIUM	c	c	c	c	1.6	U		0	0	1	2	0	25
VANADIUM	466	514	461	520	454		X	1	1	0	0	0	25
ZINC	c	c	c	c	29.2	U		0	0	2	0	0	25

OF ELEMENTS NOT-IDENTIFIED: 1
OF ELEMENTS MIS-QUANTIFIED: 3
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
WATER :

[illegible]DUPLICATES OUT: 1
WATER : Cu

00-012

Battelle
Pacific Northwest Laboratories

Project Number PE-QB93-1

Internal Distribution

A. G. King
File/LB

Date April 6, 1993

To K. J. Kuhl-Klinger

From M. W. Urie

Subject Assessment of QB-93-1 Performance Failures

Water 1

ICP -- The result for chromium is high. On evaluating the data and reviewing the potentials for the bias high value, the conclusion is that baseline elevation from the very high magnesium was not corrected for adequately. This is the same problem experienced many times on previous PE samples and is primarily the result of not performing true background corrections (i.e., relying on IEC corrections to adequately compensate for large baseline shifts).

Corrective Action: None -- Since the laboratory performs analyses on matrices which prohibit background correction, it is unreasonable to analyze PE samples differently than the samples being analyzed on the same instrument. The laboratory does not consider the slightly high bias on the low chromium value to be significant.

GFAA -- Thallium, Cadmium, and Lead are high. Evaluation of the analysis QC data does not help pin point any potential cause; that is, the QC data (spikes, LCS, etc.) are all good for each of the analytes. Most analytes analyzed by GFAA for both waters and the soil (even considering the potential of low soil leach recoveries) demonstrated a slightly high bias related to the tolerance interval. The analyses for this PE set were performed on the laboratory's new PE-4100ZL GFAA system which has just gone on-line for routine, non-radioactive sample analysis; the QB-93-1 sample were the first sample reported for the instrument. Initial installation provided AC power to the instrument well below the specified requirement and this is suspected of reducing the effectiveness of the Zeeman background correction system (i.e., potentially producing higher than normal net absorbances in the presence of severely interfering analytes).

Corrective Action: The AC power to the PE-400ZL has been upgraded to fully comply with the operating specifications. This was completed immediately after the PE-QB93-1 samples were analyzed since the <u>potential</u> for a power problem was identified and action was taken.

CVAA-Hg -- The warning limit result for the Hg can not be explained. The performance of the Hg for PE sample (QB and WP) has been very good and this isolated low warning is not considered a systematic problem.

Soil

ICP/GFAA -- ICP values for Cr, Fe, K, and V and GFAA values for Pb failed and were bias low. Considering these analytes and others (such as Al) which are acceptable but low, the preparation is considered to be the primary reason for the low recoveries. The result for the GFAA lead is consistent with low Pb recoveries on the LSC-0287. It appears that the 30 minute and final 10 minute digestion steps included the time required to bring the sample/acid to temperature in the water bath. The "time at full temperature" is suspected as being less than the required digestion time; resulting in low leach recoveries. It should be noted that the laboratory routinely digests solid samples longer (i.e., 120 minutes) than the total 50 minutes called for by the CLP procedure; therefore, the problems associated with reduced digestion time is generally not an issue. It is interesting to note, however, that the analytes mis-quantified are also the same elements which were most often mis-quantified by the other participating laboratories.

GFAA -- The result for thallium and selenium are above the warning limit. The thallium recovery is consistent with the LCS-0287 control standard recovery (i.e., 115%); however, the high selenium recovery is inconsistent with the LCS.

ICP/GFAA Corrective Action: Retrain to CLP procedure for QB PE samples to assure adequate digestion times and implement time monitoring and recording as part of the sample preparation activity.

DON'T SAY IT -- *Write It!*

Date: April 15, 1993

To: Kris Kuhl-Klinger

From: GA Ross

Subject: QB 1/93 RESPONSE

There were two points of interest with the QB1 Report:

1) For CLP Target compounds, only our 2-Butanone value reported was higher than the "Average" reported value. This one compound, which is polar and has the lowest RF in our system also exibits even poorer response in dirty systems. Our relatively high response for this compound does not mean our reported value is high compared to the actual value, but is higher than the norm. This is the first time in over a year that a VOA TCL cpd was out of the norm. The RSD for this compound is also the highest. The calibration was OK, and the areas were correct. The quant reports were both at 145PPB at both dilutions, unfortunately the software rounded to 150PPB, (further above the norm). All of the other VOA target compounds were right in the middle of the tolerance intervals.

2) For the TICs, we lost points by reporting "1-Chloro-2-methylbenzene" instead of calling it "o-Chlorotoluene". We deserve the extra points here.

Battelle
Pacific Northwest Laboratories

Project Number _____

Internal Distribution

Date April 16, 1993

To KJ Kuhl-Klinger

From RW Stromatt

Subject QB1/93 Response

EW Hoppe
File/LB

Nearly all the SV analytes were low in this PE sample. The phenols were particularly low. In reviewing the data, I can see no reason as far as the GC/MS analyses were concerned - the calibration was OK and replicates matched. Column and injection port maintenance was performed prior to analysis, the normal cause for low acid recoveries should not have been a factor. The low butylbenzylphthalate was particularly puzzling. The sample chosen for reporting had lower results because of a general tendency for high side results for the last PE's. However, even if the higher results had been chosen, the score would not have been improved.

All that we can do in future PE samples is to continue to carefully perform all extraction and analyses steps, and carefully review the raw data for inconsistencies.

Gross Alpha

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
NP									•
NT	13.0	14.0	14.0	0.58	0.066	13.67	-0.66	-3.91	⇓
O	16.0	17.0	17.0	0.58	0.066	16.67	-0.08	-3.34	⇓
OA	25.0	25.0	26.0	0.58	0.066	25.33	1.59	-1.67	
OB	16.0	16.0	21.0	2.89	0.328	17.67	0.11	-3.14	⇓
OE	10.0	12.0	13.0	1.53	0.197	11.67	-1.04	-4.30	⇓
OF	3.0	3.0	2.0	0.58	0.066	2.67	-2.78	-6.03	⇓
OK									•
OL									•
OS	12.0	14.0	17.0	2.52	0.328	14.33	-0.53	-3.78	⇓
OT									•
OY	24.0	20.0	35.0	7.77	0.984	26.33	1.78	-1.48	
OZ									•
P	9.0	16.0	15.0	3.79	0.459	13.33	-0.72	-3.98	⇓
PA	8.0	9.0	9.0	0.58	0.066	8.67	-1.62	-4.88	⇓
PB	16.0	14.0	15.0	1.00	0.131	15.00	-0.40	-3.66	⇓
PC	2.0	2.0	2.0	0.00	0.000	2.00	-2.90	-6.16	⇓
PE									•
PG	13.0	14.0	14.0	0.58	0.066	13.67	-0.66	-3.91	⇓
PP									•
PQ	17.0	15.0	14.0	1.53	0.197	15.33	-0.34	-3.59	⇓
PR	29.0	30.0	24.0	3.21	0.394	27.67	2.03	-1.22	
PV	12.0	10.0	11.0	1.00	0.131	11.00	-1.17	-4.43	⇓
PW	132.0	119.0	118.0	7.81	0.919	123.00	20.38	17.13	×
Q	61.0	58.0	54.0	3.51	0.459	57.67	7.81	4.55	×
QC	14.0	9.0	17.0	4.04	0.525	13.33	-0.72	-3.98	⇓
QJ	17.0	19.0	16.0	1.53	0.197	17.33	0.05	-3.21	⇓
QK									•
QM	6.0	9.0	6.0	1.73	0.197	7.00	-1.94	-5.20	⇓
QP	3.0	5.0	4.0	1.00	0.131	4.00	-2.52	-5.77	⇓
QQ	16.0	16.0	23.0	4.04	0.459	18.33	0.24	-3.02	⇓
QT	28.0	35.0	30.0	3.61	0.459	31.00	2.68	-0.58	
QU									•
QW									•
QX	8.0	8.0	8.0	0.00	0.000	8.00	-1.75	-5.00	⇓
QZ	29.0	24.0	24.0	2.89	0.328	25.67	1.65	-1.60	
R	142.0	152.0	143.0	5.51	0.656	145.67	24.74	21.49	×
RB	16.0	7.0	8.0	4.93	0.591	10.33	-1.30	-4.55	⇓
RC	16.0	11.0	10.0	3.21	0.394	12.33	-0.92	-4.17	⇓
RD	18.0	18.0	23.0	2.89	0.328	19.67	0.50	-2.76	
RE	17.0	12.0	12.0	2.89	0.328	13.67	-0.66	-3.91	⇓
RG	17.0	18.0	19.0	1.00	0.131	18.00	0.17	-3.08	⇓
RH	9.0	4.0	5.0	2.65	0.328	6.00	-2.14	-5.39	⇓
RI	23.0	15.0	16.0	4.36	0.525	18.00	0.17	-3.08	⇓
RJ	21.0	22.0	25.0	2.08	0.263	22.67	1.07	-2.18	

• ≡ No data submitted
∅ ≡ Insufficient data

TAG SYMBOLS
× ≡ Determined to be an outlier

⇑ ≡ Above control limit
⇓ ≡ Below control limit

Uranium in Water

Intercomparison Study

February 12, 1993

Environmental Protection Agency

Environmental Monitoring Systems Laboratory

Las Vegas, Nevada

00–031

Uranium (Natural)

[illegible]	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
PB	7.0	7.2	7.0	0.12	0.039	7.07	-0.05	-0.31	
PC									•
PP	6.8	7.0	7.1	0.15	0.059	6.97	-0.11	-0.37	
PQ	7.6	7.6	7.6	0.00	0.000	7.60	0.26	0.00	
PV	7.2	5.8	6.3	0.71	0.276	6.43	-0.42	-0.67	
PW									•
PX	8.4	8.4	8.3	0.06	0.020	8.37	0.70	0.44	
PY									•
QJ	7.2	7.4	7.2	0.12	0.039	7.27	0.06	-0.19	
QM	3.7	3.7	3.7	0.00	0.000	3.70	-2.00	-2.25	
QQ	6.4	6.8	7.9	0.78	0.295	7.03	-0.07	-0.33	
QU	4.8	5.2	6.5	0.89	0.335	5.50	-0.96	-1.21	
QZ	6.9	7.0	8.2	0.72	0.256	7.37	0.12	-0.13	
RC	8.2	8.4	8.1	0.15	0.059	8.23	0.62	0.37	
RG	7.4	8.1	7.4	0.40	0.138	7.63	0.27	0.02	
RK	8.6	8.1	7.6	0.50	0.197	8.10	0.54	0.29	
RL									•
RM	7.3	8.5	7.3	0.69	0.236	7.70	0.31	0.06	
RN	6.5	6.5	6.5	0.00	0.000	6.50	-0.38	-0.64	
RP	7.3	7.3	7.3	0.00	0.000	7.30	0.08	-0.17	
[illegible]R	7.2	7.4	7.0	0.20	0.079	7.20	0.02	-0.23	
[illegible]V	7.5	7.9	6.9	0.50	0.197	7.43	0.16	-0.10	
RW	7.3	7.3	7.3	0.00	0.000	7.30	0.08	-0.17	
RZ	7.3	7.7	8.0	0.35	0.138	7.67	0.29	0.04	
S	6.2	6.3	6.9	0.38	0.138	6.47	-0.40	-0.65	
SC	6.5	6.4	7.2	0.44	0.158	6.70	-0.26	-0.52	
SD	6.9	6.6	6.6	0.17	0.059	6.70	-0.26	-0.52	
SF	8.1	8.1	8.1	0.00	0.000	8.10	0.54	0.29	
SL	3.6	2.9	4.3	0.70	0.276	3.60	-2.05	-2.31	
SM	6.7	6.0	6.4	0.35	0.138	6.37	-0.46	-0.71	
SO	7.4	7.3	7.6	0.15	0.059	7.43	0.16	-0.10	
SS	6.1	6.5	6.7	0.31	0.118	6.43	-0.42	-0.67	
ST	6.8	7.2	7.4	0.31	0.118	7.13	-0.01	-0.27	
SW	6.3	7.1	9.1	1.44	0.551	7.50	0.20	-0.06	
SZ	7.0	7.2	7.2	0.12	0.039	7.13	-0.01	-0.27	
T	6.5	5.7	7.0	0.66	0.256	6.40	-0.44	-0.69	
TA	6.3	7.3	6.9	0.50	0.197	6.83	-0.19	-0.44	
TE	5.4	5.4	5.2	0.12	0.039	5.33	-1.05	-1.31	
TG	8.1	6.8	7.0	0.70	0.256	7.30	0.08	-0.17	
TI	7.2	7.2	7.3	0.06	0.020	7.23	0.04	-0.21	
TL	7.4	6.9	6.5	0.45	0.177	6.93	-0.13	-0.38	
TQ	7.1	7.1	6.9	0.12	0.039	7.03	-0.07	-0.33	
[illegible]S									•
[illegible]U	8.2	7.8	8.6	0.40	0.158	8.20	0.60	0.35	
TV									•

• ≡ No data submitted

Ø ≡ Insufficient data

TAG SYMBOLS

× ≡ Determined to be an outlier

⇑ ≡ Above control limit

⇓ ≡ Below control limit

00-035A

Plutonium in Water

Intercomparison Study

January 22, 1993

Environmental Protection Agency

Environmental Monitoring Systems Laboratory

Las Vegas, Nevada

00–039

Plutonium-239

	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
A									•
AH	20.1	19.1	20.6	0.76	0.443	19.93	1.22	-0.06	
AI	16.5	18.2	17.3	0.85	0.502	17.33	-1.03	-2.31	
AZ	19.7	17.6	20.5	1.50	0.856	19.27	0.64	-0.64	
BC	16.1	16.2	15.8	0.21	0.118	16.03	-2.16	-3.44	⇓
BG	18.1	18.1	17.4	0.40	0.207	17.87	-0.57	-1.85	
BG	16.3	16.2	15.8	0.26	0.148	16.10	-2.10	-3.38	⇓
BG	20.4	20.8	19.5	0.67	0.384	20.23	1.48	0.20	
BK	10.3	10.2	10.4	0.10	0.059	10.30	-7.12	-8.40	×
BL	18.0	18.9	18.8	0.49	0.266	18.57	0.03	-1.24	
BO	19.3	19.8	18.9	0.45	0.266	19.33	0.70	-0.58	
CA	18.3	17.6	16.7	0.80	0.473	17.53	-0.86	-2.14	
CJ	17.0	18.0	19.0	1.00	0.591	18.00	-0.46	-1.73	
CK	21.0	18.7	18.5	1.39	0.738	19.40	0.76	-0.52	
CO	17.0	16.6	17.0	0.23	0.118	16.87	-1.44	-2.71	
CS	22.1	23.4	24.0	0.97	0.561	23.17	4.02	2.74	
D	18.6	18.6	19.0	0.23	0.118	18.73	0.18	-1.10	
DO									•
E	18.7	20.1	19.7	0.72	0.413	19.50	0.84	-0.43	
EL	18.2	18.2	19.9	0.98	0.502	18.77	0.21	-1.07	
[illegible]	20.3	19.1	18.9	0.76	0.413	19.43	0.78	-0.49	
[illegible]	15.7	15.9	16.2	0.25	0.148	15.93	-2.25	-3.52	⇓
FZ	20.0	19.0	17.0	1.53	0.886	18.67	0.12	-1.15	
J	18.1	17.4	19.0	0.80	0.473	18.17	-0.31	-1.59	
JE	19.1	20.0	19.6	0.45	0.266	19.57	0.90	-0.38	
JK	14.9	17.5	16.6	1.32	0.768	16.33	-1.90	-3.18	⇓
JP	19.4	19.4	19.7	0.17	0.089	19.50	0.84	-0.43	
JS	16.8	19.9	19.0	1.59	0.916	18.57	0.03	-1.24	
JY	16.9	16.3	15.7	0.60	0.354	16.30	-1.93	-3.20	⇓
KH	19.9	19.1	19.3	0.42	0.236	19.43	0.78	-0.49	
LT	16.8	18.4	17.6	0.80	0.473	17.60	-0.80	-2.08	
MS	19.6	19.9	19.7	0.15	0.089	19.73	1.04	-0.23	
NI	22.0	22.6	19.9	1.42	0.797	21.50	2.57	1.30	
NK	18.6	18.9	18.9	0.17	0.089	18.80	0.24	-1.04	
OA									•
OB	19.7	20.0	19.6	0.21	0.118	19.77	1.07	-0.20	
OK	14.7	17.3	17.6	1.59	0.856	16.53	-1.73	-3.00	
OS	18.4	20.0	19.7	0.85	0.473	19.37	0.73	-0.55	
PE									•
PQ	19.6	20.1	21.0	0.71	0.413	20.23	1.48	0.20	
PV	11.6	6.8	17.0	5.10	4.833	11.80	-5.83	-7.10	×
PW									•
[illegible]J	18.3	19.1	17.5	0.80	0.473	18.30	-0.20	-1.47	
[illegible]Q									•
QU	20.1	19.7	20.5	0.40	0.236	20.10	1.36	0.09	

• ≡ No data submitted

Ø ≡ Insufficient data

TAG SYMBOLS

× ≡ Determined to be an outlier

⇑ ≡ Above control limit

⇓ ≡ Below control limit

00-042A

PERVORMANCE EVALUATION SAMPLE SUMMARY SHEET

Laboratory: TMA/ARLI

PE sample	Number Accepable	Number Analyzed	% Acceptable
WS-031			
Metals	21	21	100.0
Inorganics	10	10	86.4
ERA WP-13			
BNA's	22	22	100.0

PERFORMANCE EVALUATION REPORT

DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

ABORATORY: CA204

NALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
LUMINUM	1	628	65.9	40.1- 100	47.7- 92.6	NOT ACCEPTABLE
	2	555	548	435- 645	462- 619	ACCEPTABLE
RSENIC	1	123	140	113- 168	120- 161	ACCEPTABLE
	2	14.6	15.0	11.1- 19.4	12.2- 18.4	ACCEPTABLE
ERYLLIUM	1	17.5	16.8	12.4- 21.4	13.5- 20.2	ACCEPTABLE
	2	619	609	497- 714	525- 686	ACCEPTABLE
CADMIUM	1	15.9	16.8	12.2- 21.5	13.4- 20.4	ACCEPTABLE
	2	350	380	319- 440	334- 425	ACCEPTABLE
COBALT	1	636	651	566- 724	586- 703	ACCEPTABLE
	2	10	13.3	9.54- 17.0	10.5- 16.0	CHECK FOR ERROR
CHROMIUM	1	642	620	516- 717	541- 691	ACCEPTABLE
	2	8.0	8.11	3.37- 12.3	4.49- 11.2	ACCEPTABLE
COPPER	1	49	6.33	3.68- 8.58	4.30- 7.97	NOT ACCEPTABLE
	2	223	241	213- 267	219- 260	ACCEPTABLE
IRON	1	709	711	625- 800	647- 778	ACCEPTABLE
	2	85	83.0	68.2- 97.7	71.9- 94.0	ACCEPTABLE
MERCURY	1	12.2	8.12	6.26- 10.3	6.77- 9.81	NOT ACCEPTABLE
	2	15.2	13.0	9.49- 16.9	10.4- 15.9	ACCEPTABLE
MANGANESE	1	332	340	303- 373	312- 364	ACCEPTABLE
	2	32	30.6	25.7- 35.6	26.9- 34.3	ACCEPTABLE
NICKEL	1	29	31.7	25.5- 37.4	27.0- 35.9	ACCEPTABLE
	2	550	569	498- 632	515- 616	ACCEPTABLE
LEAD	1	950	959	831- 1080	862- 1050	ACCEPTABLE
	2	1520	1500	1300- 1680	1350- 1630	ACCEPTABLE

* BASED UPON THECRETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: CA204

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	5.3	6.01	3.28- 8.06	3.88- 7.46	ACCEPTABLE
	2	168	170	116- 203	127- 192	ACCEPTABLE
VANADIUM	1	513	490	431- 541	445- 527	ACCEPTABLE
	2	398	38.2	30.6- 46.8	32.7- 44.7	NOT ACCEPTABLE
ZINC	1	21	17.0	11.3- 22.9	12.8- 21.4	ACCEPTABLE
	2	606	612	536- 689	555- 670	ACCEPTABLE
ANTIMONY	3	15	22.0	12.4- 29.9	14.6- 27.6	ACCEPTABLE
	4	103	146	96.6- 182	107- 171	CHECK FOR ERROR
SILVER	3	5.3	5.59	4.20- 7.01	4.56- 6.66	ACCEPTABLE
	4	13.3	14.0	11.1- 16.8	11.8- 16.1	ACCEPTABLE
THALLIUM	3	4.8	5.30	3.45- 7.01	3.92- 6.54	ACCEPTABLE
	4	74	76.2	58.3- 94.0	63.0- 89.4	ACCEPTABLE
MOLYBDENUM	3	45	49.0	38.0- 61.2	41.0- 58.2	ACCEPTABLE
	4	7	7.96	4.27- 12.2	5.31- 11.2	ACCEPTABLE
STRONTIUM	3	13	12.9	10.1- 15.4	10.8- 14.7	ACCEPTABLE
	4	594	61.9	50.3- 71.9	53.2- 69.1	NOT ACCEPTABLE
TITANIUM	3	206	214	185- 237	192- 230	ACCEPTABLE
	4	73	78.0	65.4- 88.2	68.5- 85.2	ACCEPTABLE
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH-UNITS	3	4.38	4.40	4.28- 4.48	4.31- 4.45	ACCEPTABLE
	4	8.00	8.00	7.76- 8.21	7.81- 8.16	ACCEPTABLE
SPEC. COND. (UMHOS/CM AT 25 C)	1	187	182	162- 199	167- 194	ACCEPTABLE
	2	860	812	752- 882	769- 865	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT

DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: CA204

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
TDS AT 180 C	1	112	99.7	64.0- 144	73.9- 134	ACCEPTABLE
	2	468	459	342- 572	370- 543	ACCEPTABLE
TOTAL HARDNESS (AS CACO3)	1	52	46.5	39.6- 51.0	41.0- 49.6	NOT ACCEPTABLE
	2	220	221	203- 237	207- 233	ACCEPTABLE
CALCIUM	1	16	15.0	12.8- 15.9	13.2- 15.5	NOT ACCEPTABLE
	2	56.5	49.0	44.7- 54.1	45.9- 53.0	NOT ACCEPTABLE
MAGNESIUM	1	2.63	2.48	2.07- 2.90	2.17- 2.79	ACCEPTABLE
	2	25	24.0	21.0- 26.9	21.8- 26.2	ACCEPTABLE
SODIUM	1	9.37	9.68	8.19- 11.3	8.59- 10.9	ACCEPTABLE
	2	49	48.4	42.4- 55.2	44.0- 53.6	ACCEPTABLE
POTASSIUM	1	6.2	6.30	5.16- 7.32	5.44- 7.05	ACCEPTABLE
	2	35	34.0	29.1- 38.9	30.3- 37.6	ACCEPTABLE
TOTAL ALKALINITY (AS CACO3)	1	11.4	9.70	6.65- 14.1	7.58- 13.2	ACCEPTABLE
	2	55.1	54.0	47.2- 62.0	49.0- 60.1	ACCEPTABLE
CHLORIDE	1	32.7	33.3	28.8- 36.0	29.7- 35.1	ACCEPTABLE
	2	164	159	143- 171	146- 167	ACCEPTABLE
FLUORIDE	1	0.63	0.460	0.378-0.544	0.399-0.523	NOT ACCEPTABLE
	2	1.97	1.80	1.55- 2.02	1.61- 1.96	CHECK FOR ERROR
SULFATE	1	16.4	17.0	13.2- 20.2	14.1- 19.4	ACCEPTABLE
	2	84.1	84.0	70.1- 93.9	73.1- 90.9	ACCEPTABLE
NUTRIENTS IN MILLIGRAMS PER LITER:						
AMMONIA-NITROGEN	1	0.94	0.960	0.658- 1.25	0.729- 1.18	ACCEPTABLE
	2	0.36	0.350	0.185-0.535	0.227-0.493	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT

DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: CA204

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
NUTRIENTS IN MILLIGRAMS PER LITER:						
NITRATE-NITROGEN	1	0.172	0.170	.0849-0.256	0.105-0.235	ACCEPTABLE
	2	1.30	1.30	1.00- 1.59	1.07- 1.52	ACCEPTABLE
ORTHOPHOSPHATE	1	0.03	0.030	.0116-.0498	.0162-.0452	ACCEPTABLE
	2	0.61	0.670	0.555-0.779	0.582-0.752	ACCEPTABLE
KJELDAHL-NITROGEN	3	3.25	2.40	1.47- 3.36	1.69- 3.13	CHECK FOR ERROR
	4	1.15	0.490	.0120- 1.11	0.144-0.979	NOT ACCEPTABLE
TOTAL PHOSPHORUS	3	6.71	7.02	5.20- 7.72	5.50- 7.42	ACCEPTABLE
	4	0.70	0.713	0.512-0.802	0.546-0.767	ACCEPTABLE
DEMANDS IN MILLIGRAMS PER LITER:						
COD	1	317	304	240- 341	253- 328	ACCEPTABLE
	2	159	157	122- 179	129- 172	ACCEPTABLE
PCB'S IN MICROGRAMS PER LITER:						
PCB-AROCLOR 1248	2	1.89	1.76	0.538- 2.74	0.816- 2.46	ACCEPTABLE
PCB-AROCLOR 1254	1	2.38	2.37	1.41- 2.95	1.60- 2.76	ACCEPTABLE
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
PCB IN OIL- 1016/1242	2	27.99	42.6	8.20- 60.7	14.9- 54.0	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT

DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: CA204

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
PCB IN OIL- 1254	1	27.76	35.2	12.2- 51.4	17.2- 46.4	ACCEPTABLE
PESTICIDES IN MICROGRAMS PER LITER:						
CHLORDANE	3	6.86	6.48	3.59- 8.25	4.19- 7.65	ACCEPTABLE
	4	1.43	1.43	0.764- 1.88	0.907- 1.74	ACCEPTABLE
ALDRIN	1	0.678	0.676	0.179-0.834	0.262-0.751	ACCEPTABLE
	2	0.097	0.126	.0254-0.176	.0446-0.157	ACCEPTABLE
DIELDRIN	1	0.702	0.617	0.309-0.892	0.384-0.817	ACCEPTABLE
	2	0.129	0.137	.0650-0.200	.0823-0.183	ACCEPTABLE
DDD	1	0.933	0.777	0.431- 1.05	0.510-0.973	ACCEPTABLE
	2	0.121	0.129	.0511-0.192	.0690-0.175	ACCEPTABLE
DDE	1	0.568	0.548	0.245-0.785	0.314-0.716	ACCEPTABLE
	2	0.075	0.087	.0352-0.124	.0465-0.112	ACCEPTABLE
DDT	1	0.761	0.674	0.353-0.856	0.416-0.792	ACCEPTABLE
	2	0.137	0.150	.0572-0.210	.0766-0.191	ACCEPTABLE
HEPTACHLOR	1	0.477	0.486	0.168-0.657	0.231-0.594	ACCEPTABLE
	2	0.111	0.129	.0346-0.190	.0545-0.170	ACCEPTABLE
HEPTACHLOR EPOXIDE	1	0.565	0.571	0.312-0.722	0.364-0.670	ACCEPTABLE
	2	0.124	0.143	.0705-0.189	.0855-0.174	ACCEPTABLE
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
1,2 DICHLOROETHANE	1	14	13.8	9.64- 18.6	10.8- 17.4	ACCEPTABLE
	2	59.1	58.5	40.8- 76.1	45.3- 71.6	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: CA204

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
CHLOROFORM	1	8.5	8.40	5.60- 11.2	6.32- 10.5	ACCEPTABLE
	2	37.5	38.3	26.1- 50.9	29.3- 47.8	ACCEPTABLE
1,1,1 TRICHLOROETHANE	1	11.3	12.6	7.58- 17.0	8.77- 15.8	ACCEPTABLE
	2	58.9	63.8	41.9- 83.7	47.2- 78.4	ACCEPTABLE
TRICHLOROETHENE	1	14.5	15.5	10.2- 20.0	11.5- 18.8	ACCEPTABLE
	2	49.7	53.3	36.1- 67.2	40.1- 63.3	ACCEPTABLE
CARBONTETRACHLORIDE	1	9.4	10.7	6.73- 14.8	7.76- 13.8	ACCEPTABLE
	2	51.2	54.5	34.2- 77.3	39.6- 71.9	ACCEPTABLE
TETRACHLOROETHENE	1	13.7	14.9	9.77- 19.5	11.0- 18.3	ACCEPTABLE
	2	42.2	46.2	30.5- 60.2	34.2- 56.5	ACCEPTABLE
BROMODICHLOROMETHANE	1	15.6	16.4	11.1- 21.3	12.4- 20.0	ACCEPTABLE
	2	60.8	62.9	43.6- 82.9	48.6- 77.9	ACCEPTABLE
DIBROMOCHLOROMETHANE	1	10.5	12.5	8.09- 16.6	9.17- 15.6	ACCEPTABLE
	2	40.6	45.4	28.8- 61.3	32.9- 57.2	ACCEPTABLE
BROMOFORM	1	13.9	16.3	7.67- 24.0	9.73- 21.9	ACCEPTABLE
	2	32.7	37.7	22.7- 52.3	26.4- 48.6	ACCEPTABLE
METHYLENE CHLORIDE	1	11.7	12.8	6.66- 19.0	8.22- 17.4	ACCEPTABLE
	2	61.7	65.6	43.6- 91.0	49.5- 85.0	ACCEPTABLE
CHLOROBENZENE	1	9.1	10.3	6.92- 13.5	7.76- 12.7	ACCEPTABLE
	2	51.5	57.2	39.7- 73.8	44.1- 69.5	ACCEPTABLE
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
BENZENE	1	41.9	43.9	30.0- 59.0	33.6- 55.4	ACCEPTABLE
	2	11.8	12.7	9.00- 17.0	10.0- 16.0	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: CA204

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
ETHYLBENZENE	1	44.6	47.7	31.4- 64.3	35.6- 60.2	ACCEPTABLE
	2	7.6	9.71	6.19- 13.0	7.06- 12.2	ACCEPTABLE
TOLUENE	1	55.9	59.7	42.1- 76.7	46.5- 72.3	ACCEPTABLE
	2	15.4	17.2	12.0- 22.0	13.3- 20.8	ACCEPTABLE
1,2-DICHLOROBENZENE	1	50.6	57.1	36.9- 74.5	41.7- 69.7	ACCEPTABLE
	2	12.6	15.4	10.6- 19.7	11.8- 18.5	ACCEPTABLE
1,3-DICHLOROBENZENE	1	43.5	47.0	32.1- 59.6	35.6- 56.2	ACCEPTABLE
	2	13.8	16.5	11.4- 21.2	12.6- 19.9	ACCEPTABLE
1,4-DICHLOROBENZENE	1	47.1	50.0	30.3- 67.8	35.1- 63.0	ACCEPTABLE
	2	13.1	13.3	9.91- 17.8	10.9- 16.8	ACCEPTABLE
MISCELLANEOUS PARAMETERS:						
TOTAL CYANIDE	1	0.044	0.040	.0108-.0592	.0169-.0531	ACCEPTABLE
(IN MG/L)	2	0.095	0.350	0.206-0.461	0.239-0.429	NOT ACCEPTABLE
NON-FILTERABLE RESIDUE	1	15.1	18.0	9.17- 19.8	10.5- 18.4	ACCEPTABLE
(IN MG/L)	2	95.7	93.0	71.8- 98.0	75.1- 94.8	CHECK FOR ERROR
OIL AND GREASE	1	71.3	72.0	43.7- 84.3	48.8- 79.2	ACCEPTABLE
(IN MG/L)	2	29.6	30.0	17.1- 36.7	19.6- 34.2	ACCEPTABLE
TOTAL PHENOLICS	1	1.14	1.06	0.572- 1.55	0.697- 1.42	ACCEPTABLE
(IN MG/L)	2	0.52	0.484	0.258-0.709	0.316-0.651	ACCEPTABLE
TOTAL RESIDUAL CHLORINE	1	4.73	4.80	3.44- 5.46	3.71- 5.20	ACCEPTABLE
(IN MG/L)	2	1.88	1.80	1.23- 2.12	1.35- 2.00	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

PETE WILSON, Governor

DEPARTMENT OF HEALTH SERVICES
2151 BERKELEY WAY
BERKELEY, CA 94704-1011
(510) 540-2800

February 25, 1993

EPA #: CA204

TMA/ARLI
160 TAYLOR STREET
MONROVIA, CA 91016

Enclosed are your laboratory's results for WS031 which ELAP received from USEPA on February 17, 1993. Also, enclosed is a listing of "true value" results for the WS031 study as provided by USEPA. A follow-up letter evaluating your laboratory's performance and requesting your corrective action taken for those analytes found unacceptable, if any, will be issued shortly.

If you have any questions concerning your performance please call at (510) 540-2800.

Sincerely,

Louis B. Pierce

Louis B. Pierce
Research Chemist
Environmental Laboratory
Accreditation Program

Enclosures

LAB ACCREDITATION PROGR
FEB 17 1993
CAL DEPT HEALTH SERVICES

PERFORMANCE EVALUATION REPORT DATE: 2/ 3/93

WATER SUPPLY STUDY NUMBER WS031

LABORATORY CA204

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
ALUMINUM	1	65.2	76.3	62.6- 93.2	ACCEPTABLE
ANTIMONY	2	3.6	4.69	3.28- 6.10	ACCEPTABLE
ARSENIC	1	74	70.2	58.2- 80.2	ACCEPTABLE
BARIUM	2	651	681	579- 783	ACCEPTABLE
BERYLLIUM	1	3.0	3.27	2.79- 3.76	ACCEPTABLE
BORON	2	158	720	652- 814	NOT ACCEPTABLE
CADMIUM	1	13	12.8	10.2- 15.4	ACCEPTABLE
CHROMIUM	1	80.9	81.6	69.4- 93.8	ACCEPTABLE
COPPER	1	104	110	99.0- 121	ACCEPTABLE
LEAD	1	10.0	12.4	8.68- 16.1	ACCEPTABLE
MANGANESE	1	15.9 **	17.0	13.8- 18.7	ACCEPTABLE
MERCURY	1	1.2	0.908	0.636- 1.18	NOT ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT GENERAL METHOD BIAS IS ANTICIPATED FOR THIS RESULT.

PERFORMANCE EVALUATION REPORT DATE: 2/ 3/93

WATER SUPPLY STUDY NUMBER WS031

LABORATORY CA204

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
MOLYBDENUM	2	39.6	42.3	29.2- 54.3	ACCEPTABLE
NICKEL	1	65	68.0	57.8- 78.2	ACCEPTABLE
SELENIUM	1	27	22.9	18.3- 27.5	ACCEPTABLE
SILVER	2	99.7	109	92.4- 123	ACCEPTABLE
THALLIUM	2	1.0	1.48	0.822- 2.26	ACCEPTABLE
VANADIUM	1	23.8	24.2	20.2- 27.5	ACCEPTABLE
ZINC	1	179	179	161- 190	ACCEPTABLE
NITRATE/NITRITE/FLUORIDE IN MILLIGRAMS PER LITER:					
NITRATE AS N	1	6.83	6.50	5.85- 7.15	ACCEPTABLE
NITRITE AS N	1	0.45	0.430	0.366-0.494	ACCEPTABLE
FLUORIDE	1	5.72	5.70	5.13- 6.27	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 2/ 3/93

WATER SUPPLY STUDY NUMBER WS031

LABORATORY CA204

ANALYTES	SAMPLE NUMBER	REPORTED VALUE		TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
MISCELLANEOUS ANALYTES:						
RESIDUAL FREE CHLORINE (MILLIGRAMS PER LITER)	1	0.337	**	0.360	0.160-0.451	ACCEPTABLE
TURBIDITY (NTU'S)	1	2.7		3.00	2.55- 3.57	ACCEPTABLE
TOTAL FILTERABLE RESIDUE (MILLIGRAMS PER LITER)	1	400	**	406	283- 618	ACCEPTABLE
CALCIUM (MG. CACO3/L)	1	230		230	214- 244	ACCEPTABLE
PH-UNITS	1	9.15		9.13	8.94- 9.34	ACCEPTABLE
ALKALINITY (MG. CACO3/L)	1	46.1	**	46.0	43.1- 52.0	ACCEPTABLE
SODIUM (MILLIGRAMS PER LITER)	1	20.8		21.1	19.2- 23.0	ACCEPTABLE
SULFATE (MILLIGRAMS PER LITER)	1	8.34		8.60	6.44- 10.6	ACCEPTABLE
TOTAL CYANIDE (MILLIGRAMS PER LITER)	1	0.227		0.270	0.202-0.337	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT GENERAL METHOD BIAS IS ANTICIPATED FOR THIS RESULT.

Environmental Resource Associates
WatR™ Pollution Statistical Summary

BNAs -- WP 13

Laboratory Code: CA-28

Parameter	Reported Value (ug/l)	ERA Certified Value (ug/l)	Mean Recovery (ug/l)	n	Acceptance Limits (ug/l)	Warning Limits (ug/l)	Performance Evaluation
Acenaphthene	58.2	69.5	54.5	11	32.5 - 76.6	39.9 - 69.2	Acceptable
Anthracene	49.0	61.7	49.8	10	31.5 - 68.0	37.6 - 62.0	Acceptable
Benzo(a)anthracene	21.2	25.3	21.1	11	10.9 - 31.3	14.3 - 27.9	Acceptable
Benzo(g,h,i)perylene	79.4	62.5	59.5	10	25.8 - 93.1	37.1 - 81.9	Acceptable
4-Bromophenyl-phenylether	140	156	131	10	67.8 - 194	88.9 - 173	Acceptable
bis(2-Chloroethyl)ether	47.6	58.4	46.2	10	16.2 - 76.2	26.2 - 66.2	Acceptable
4-Chlorophenyl-phenylether	34.5	44.3	37.4	9	18.0 - 56.9	24.5 - 50.4	Acceptable
Chrysene	47.6	51.1	45.5	12	23.6 - 67.4	30.9 - 60.1	Acceptable
Dibenzo(a,h)anthracene	42.1	36.8	31.2	11	16.7 - 45.8	21.5 - 40.9	Check for Error
Dibenzofuran	103.1	122	92.3	10	60.8 - 124	71.3 - 113	Acceptable
1,2-Dichlorobenzene	82.5	169	107	9	46.7 - 168	66.9 - 148	Acceptable
2,4-Dinitrotoluene	12.6	20.0	14.4	9	4.85 - 24.0	8.05 - 20.8	Acceptable
bis(2-Ethylhexyl)phthalate	84.6	97.4	83.4	10	36.2 - 131	51.9 - 115	Acceptable
Naphthalene	22.7	30.4	25.4	11	8.36 - 42.4	14.0 - 36.7	Acceptable
Pyrene	13.5	14.7	14.0	10	5.30 - 22.7	8.21 - 19.8	Acceptable
1,2,4-Trichlorobenzene	57.1	97.3	66.9	10	20.0 - 114	35.6 - 98.1	Acceptable

Environmental Resource Associates
WatR™ Pollution Statistical Summary

BNAs -- WP 13
page 2

Laboratory Code: CA-28

Parameter	Reported Value (ug/l)	ERA Certified Value (ug/l)	Mean Recovery (ug/l)	n	Acceptance Limits (ug/l)	Warning Limits (ug/l)	Performance Evaluation
4-Chloro-3-methylphenol	92.5	101	82.3	10	58.1 - 107	66.2 - 98.5	Acceptable
2,4-Dichlorophenol	61.3	68.8	55.9	9	38.4 - 73.5	44.2 - 67.6	Acceptable
2-Methyphenol	49.9	59.3	43.3	10	22.1 - 64.5	29.2 - 57.4	Acceptable
3-Methyphenol	87.2	98.4	73.8	9	42.6 - 105	53.0 - 94.5	Acceptable
Pentachlorophenol	121.5	139	102	10	12.5 - 191	42.3 - 161	Acceptable
2,4,6-Trichlorophenol	43.5	50.7	41.7	9	23.9 - 59.5	29.8 - 53.5	Acceptable

The ERA Certified Value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

The Mean Recovery has been determined from all data reported to ERA for the parameter during this study.

The Acceptance Limits are equal to the Mean Recovery plus and minus 3.0 standard deviations.

The Warning Limits are equal to the Mean Recovery plus and minus 2.0 standard deviations.

Acceptable = Reported Result falls within the Acceptance Limits.

Not Acceptable = Reported Result falls outside of the Acceptance Limits.

Check for Error = Reported Result falls within the Acceptance Limits and outside of the Warning Limits.

n = number of data points used to calculate Mean Recovery, Acceptance and Warning Limits.

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: TMA/Norcal

	Accepatable	No. Analyzed	% Acceptable
EML-556	23	23	100

PE Sample	EMSL-LV Acceptance Range (%)	% of EMSL-LV True Value	% of all Participating Laboratory's Grand Average
January 1992			
Ru-106	82.9 to 117.1	98.2	102.4
I-131	82.4 to 117.6	100.5	98.6
February 1992			
Cs-137	82.2 to 117.8	95.2	92.1
Pu-239	82.7 to 117.3	93.3	100.3
June 1992			
Tritium	71.7 to 128.3	95.2	96.2
Co-60	56.5 to 143.5	70.0	67.9
Ru-106	82.8 to 117.2	104.0	105.9
Cs-137	42.0 to 158.0	142.2	132.4
July 1992			
Uranium	- to 230	80.8	81.4
Ra-226	74.3 to 125.7	100.7	103.7
Ra-228	56.3 to 143.7	98.0	100.7
August 1992			
I-131	76.9 to 123.1	112.6	110.4
Pu-239	82.2 to 117.8	96.3	101.0
October 1992			
Tririum	82.7 to 117.3	97.8	97.2
Co-60	13.0 to 187.0	76.7	70.0
Ru-106	82.2 to 117.8	78.1 (LOW)	85.1
Cs-134	- to 208.8	129.1	126.9
Cs-137	- to 208.8	95.9	87.9
November 1992			
Ra-226	74.7 to 125.3	91.6	94.5
Ra-228	54.0 to 146.0	123.4	116.2
January 15, 1993			
Sr-89	42.0 to 158.0	106.7	110.1
Sr-90	13.0 to 187.0	76.7	79.4

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: TMA/Norcal

PE Sample	EMSL-LV Acceptance Range (%)	% of EMSL-LV True Value	% of all Participating Laboratory's Grand Average
January 22, 1993			
Pu-239	82.5 to 117.5	96.4	101.8
January 29, 1993			
Alpha	54.1 to 145.9	42.1 **(LOW)**	83.8
Beta	80.2 to 119.8	89.4	93.7
February 5, 1993			
I-131	82.7 to 117.3	99.3	98.0
February 12, 1993			
Uranium	31.6 to 168.4	89.1	94.6
March 5, 1993			
Ra-226	73.5 to 126.5	98.0	97.9
Ra-228	56.8 to 144.9	110.8	115.1

Norcite

Laboratory Listing

Date	Type	Lab	Isotope	Ser	Reported Value	Reported % Error	EML Value	Ratio Rp/EML	Ratio +/-
93 03	AIR	TN	SR 90	1	0.212E+00	21	0.152E+00	1.39	0.32
93 03	AIR	TN	PU 238	1	0.323E-01	21	0.363E-01	0.89	0.19
93 03	AIR	TN	PU 239	1	0.211E-01	26	0.234E-01	0.90	0.24
93 03	AIR	TN	AM 241	1	0.433E-01	21	0.414E-01	1.05	0.23
93 03	AIR	TN	U UG	1	0.187E+01	9	0.180E+01	1.04	0.10
93 03	SOIL	TN	K 40	1	0.243E+03	17	0.321E+03	0.76	0.14
93 03	SOIL	TN	SR 90	1	0.406E+02	3	0.417E+02	0.97	0.07
93 03	SOIL	TN	CS 137	1	0.802E+03	1	0.923E+03	0.87	0.02
93 03	SOIL	TN	PU 239	1	0.103E+02	24	0.116E+02	0.89	0.23
93 03	SOIL	TN	AM 241	1	0.619E+01	6	0.650E+01	0.95	0.07
93 03	SOIL	TN	U UG	1	0.259E+01	0	0.304E+01	0.85	0.03
93 03	VEGETN	TN	K 40	1	0.342E+03	16	0.383E+03	0.89	0.15
93 03	VEGETN	TN	SR 90	1	0.220E+03	2	0.237E+03	0.93	0.14
93 03	VEGETN	TN	CS 137	1	0.228E+02	16	0.246E+02	0.93	0.16
93 03	VEGETN	TN	PU 238	1	0.125E+01	15	0.114E+01	1.10	0.57
93 03	VEGETN	TN	PU 239	1	0.276E+00	27	0.323E+00	0.85	0.24
93 03	VEGETN	TN	AM 241	1	0.260E+00	38	0.231E+00	1.13	0.44
93 03	WATER	TN	H 3	1	0.107E+03	18	0.970E+02	1.10	0.21
93 03	WATER	TN	SR 90	1	0.129E+01	13	0.103E+01	1.25	0.21
93 03	WATER	TN	PU 238	1	0.524E+00	17	0.494E+00	1.06	0.19
93 03	WATER	TN	PU 239	1	0.921E+00	15	0.828E+00	1.11	0.17
93 03	WATER	TN	AM 241	1	0.535E+00	7	0.440E+00	1.22	0.32
93 03	WATER	TN	U UG	1	0.804E-02	0	0.117E-01	0.69	0.05

NORCAL

TMA

EPA LABORATORY INTERCOMPARISON PROGRAM
Gross Alpha in Water

NORCAL

EPA LABORATORY INTERCOMPARISON PROGRAM
WATER

DATE	ANALYSIS	KNOWN VALUE pCi/L	CONTROL LIMITS +/- pCi/L	GRAND AVERAGE pCi/L	STD DEV PCi/L	TMA VALUE pCi/L	EXPERI-MENTAL SIGMA pCi/L	NORM DEV FROM GRAND	NORM DEV FROM KNOWN
01/29/93	Gross Alpha	34.00	15.60	17.09	7.54	14.33	1.53	-0.53	-3.78
01/29/93	Gross Beta	44.00	8.70	41.99	7.41	39.33	1.53	-0.92	-1.[illegible]
02/05/93	I-131	100.00	17.30	101.36	8.30	99.33	10.07	-0.35	-0.1[illegible]
01/22/93	Pu-239	20.00	3.50	18.53	1.80	19.27	1.50	0.64	-0.6[illegible]
03/05/93	Ra-226	9.80	2.60	9.81	1.26	9.60	0.95	-0.24	-0.[illegible]
03/05/93	Ra-228	18.50	8.00	17.81	3.54	20.50	1.76	1.01	0.7[illegible]
[illegible]/15/93	Sr-89	15.00	8.70	14.53	3.12	16.00	1.00	0.51	0.3[illegible]
01/15/93	Sr-90	10.00	8.70	9.66	2.20	7.67	0.58	-0.69	-0.81
02/12/93	Uranium	7.60	5.20	7.16	1.04	6.77	0.29	-0.23	-0.48

EPA LABORATORY INTERCOMPARISON PROGRAM
Tritium in Water

Date	Known Value (pCi/L)	Control Limits (3σ,n=3)	Grand Ave. and Experiment. σ	TMA Value & Experimental σ	Normalized Dev. Grand Ave.	Normalized Dev. Known	Corrective Action Request
6/92	2125.0	± 602.0	2102. ± 221.	2022. ± 69.	-0.40	-0.52	
10/92	5962.	± 1034.	5997. ± 566.	5830. ± 193.	-0.49	-0.38	

EPA LABORATORY INTERCOMPARISON PROGRAM

Cobalt-60 in Water - Gamma Spec

Date	Known Value (pCi/L)	Control Limits (3σ,n=3)	Grand Ave. and Experiment. σ	TMA Value & Experimental σ	Normalized Grand Ave.	Dev. Known	Corrective Action Request
06/92	20.0	± 8.7	20.61 ± 2.28	14.00 ± 1.00	-2.29	-2.08	
10/92	10.0	± 8.7	10.96 ± 2.10	7.67 ± 0.58	-1.14	-0.81	

EPA LABORATORY INTERCOMPARISON PROGRAM

Ruthenium-106 in Water - Gamma Spec

Date	Known Value (pCi/L)	Control Limits (3σ,n=3)	Grand Ave. and Experiment. σ	TMA Value & Experimental σ	Normalized Dev. Grand Ave.	Normalized Dev. Known	Corrective Action Request
02/92	203.0	± 34.7	194.62 ± 18.29	199.33 ± 35.23	0.41	-0.32	CAR-NSD-284 Reported Late
06/92	141.0	± 24.3	138.47 ± 11.86	146.67 ± 34.82	1.01	0.70	
10/92	175.0	± 31.2	160.69 ± 14.64	136.67 ± 18.34	-2.31	-3.69	NSD-93-1

(1) Forty-three per cent of labs failed.
(2) Reporting error. Should have reported less than 27.66.
(3) Forty-four percent of labs failed.
(4) Sixty-two per cent of labs failed.
(5) Thirty-nine per cent of labs failed.

EPA LABORATORY INTERCOMPARISON PROGRAM
Iodine-131 in Water

Date	Known Value (pCi/L)	Control Limits (3σ,n=3)	Grand Ave. and Experiment. σ	TMA Value & Experimental σ	Normalized Dev. Grand Ave.	Normalized Dev. Known	Corrective Action Request
2/92	59.0	± 10.4	60.16 ± 5.54	59.33 ± 3.06	-0.24	0.10	
8/92	45.0	± 10.4	45.91 ± 3.79	50.67 ± 8.14	1.37	1.64	
2/93	100.0	± 17.3	101.36 ± 8.20	99.33 ± 10.07	-0.35	-0.12	

EPA LABORATORY INTERCOMPARISON PROGRAM

Cesium-134 in Water - Gamma Spec

Date	Known Value (pCi/L)	Control Limits (3σ,n=3)	Grand Ave. and Experiment. σ	TMA Value & Experimental σ	Normalized Dev. Grand Ave.	Normalized Dev. Known	Corrective Action Request
10/92	8.0	± 8.7	8.14 ± 1.64	10.33 ± 1.53	0.76	0.81	

EPA LABORATORY INTERCOMPARISON PROGRAM

Cesium-137 in Water - Gamma Spec

Date	Known Value (pCi/L)	Control Limits (3σ,n=3)	Grand Ave. and Experiment. σ	TMA Value & Experimental σ	Normalized Dev. Grand Ave.	Known	Corrective Action Request
02/92	49.0	± 8.7	50.69 ± 3.69	46.67 ± 0.58	-1.40	-0.81	CAR-NSD-284 Reported Late
06/92	15.0	± 8.7	16.11 ± 3.83	21.33 ± 2.31	1.81	2.19	
10/92	8.0	± 8.7	8.73 ± 1.70	7.67 ± 0.58	-0.37	-0.12	

EPA LABORATORY INTERCOMPARISON PROGRAM
Radium-226 in Water

Date	Known Value pCi/L)	Control Limits (3σ,n=3)	Grand Ave. and Experiment. σ	TMA Value & Experimental σ	Normalized Dev. Grand Ave.	Normalized Dev. Known	Corrective Action Request
3/92	10.1	± 2.6	9.85 ± 0.94	10.03 ± 0.29	0.21	-0.08	
7/92	24.9	± 6.4	24.17 ± 3.60	25.07 ± 1.79	0.42	0.08	
11/92	7.5	± 1.9	7.27 ± 1.06	6.87 ± 0.64	-0.64	-1.00	
3/93	9.8	± 2.6	9.81 ± 1.26	9.60 ± 0.95	-0.24	-0.23	

EPA LABORATORY INTERCOMPARISON PROGRAM
Radium-228 in Water

Date	Known Value (pCi/L)	Control Limits (3σ,n=3)	Grand Ave. and Experiment. σ	TMA Value & Experimental σ	Normalized Dev. Grand Ave.	Normalized Dev. Known	Corrective Action Request
3/92	15.5	± 6.8	14.49 ± 3.70	20.17 ± 5.99	2.52	2.07	
7/92	16.7	± 7.3	16.25 ± 3.27	16.37 ± 1.65	0.05	-0.14	
11/92	5.0	± 2.3	5.31 ± 1.16	6.17 ± 1.35	1.14	1.55	
3/93	18.5	± 8.0	17.81 ± 3.54	20.50 ± 1.76	1.01	0.75	

Plutonium-239 in Water - Alpha Spec

Date	Known Value (pCi/L)	Control Limits (3σ,n=3)	Grand Ave. and Experiment. σ	TMA Value & Experimental σ	Normalized Dev. Grand Ave.	Known	Corrective Action Request
2/92	16.8	± 2.9	15.62 ± 1.66	15.67 ± 0.81	0.05	-1.15	
8/92	9.0	± 1.6	8.58 ± 1.16	8.67 ± 0.25	0.17	-0.64	
1/93	20.0	± 3.5	18.53 ± 1.80	19.27 ± 1.50	0.64	-0.64	

(1) Late submission of results.

(2) Wrong tracer volume used in calculation: 2 mL instead of 1 mL, causing factor of 2 error.

EPA LABORATORY INTERCOMPARISON PROGRAM
Uranium in Water

Date	Known Value (pCi/L)	Control Limits (3σ,n=3)	Grand Ave. and Experiment. σ	TMA Value & Experimental σ	Normalized Dev. Grand Ave.	Normalized Dev. Known	Corrective Action Request
7/92	4.0	± 5.2	3.97 ± 0.72	3.23 ± 0.15	-0.43	-0.44	
2/93	7.6	± 5.2	7.16 ± 1.04	6.77 ± 0.29	-0.23	-0.48	

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: WHC 222S Laboratory

PE Sample	No. Analyzed	No. Acceptable	% Acceptable
Mixed Waste Performance Evaluation Program (MAPEP)			
Metals	21	21	100
Radchem	5	5	100
EML-556	31	24	77.4

	EMSL-LV Acceptance Range (%)	% of EMSL-LV True Value	% of all Participating Laboratory's Grand Average
January 22, 1993			
Pu-239	82.5 to 117.5	97.2	104.8
January 29, 1993			
Alpha	54.1 to 145.9	46.1 **(LOW)**	91.7
Beta	80.2 to 119.8	137.1 **(HIGH)**	143.7
February 12, 1993			
Uranium	32.0 to 168.0	100.0	106.6
April 20, 1993			
Alpha	56.2 to 143.8	93.3	89.8
Uranium	82.0 to 118.0	99.7	104.2
Beta	73.6 to 126.4	124.7	141.9
Cobalt-60	77.7 to 122.3	98.3	97.4
Cesium-134	67.8 to 132.2	92.6	98.4
Cesium-137	72.8 to 127.2	94.8	93.0
June 11, 1993			
Cobalt-60	42.0 to 158.0	102.2	102.9
Zinc-65	83.2 to 116.8	99.3	95.2
Ruthenium-106	82.5 to 117.5	80.4 **(LOW)**	92.1
Cesium-134	- to 274.0	120.0	111.3
Cesium-137	- to 274.0	93.4	81.1
Barium-133	82.5 to 117.5	96.6	98.9

EMSL-LV QB1 FY93	EPA/CLP Score
Metals	90.7
Organics	87.5

EMSL-LV QB3 FY93	
Metals	0*
Metals Remedial Sample	52.3

* Appears EPA sent wrong samples to the laboratory

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: WHC 222S Laboratory

PE Sample	EPA/CLP Score
EMSL-LV QB4 FY93	
Metals	79.7

PE Sample	No. Analyzed	No. Acceptable	% Acceptable
WP-30			
Metals	48	40	83.3
Inorganic	20	10	50.0

DON'T SAY IT --- *Write It!*

DATE: September 23, 1993

TO: Claude Stacey (H4-23)

FROM: L. P. Markel T6-16

Telephone: 373-4131

SUBJECT: MIXED WASTE PERFORMANCE EVALUATION PROGRAM (PILOT PROGRAM)

Attached you will find the results of the first Mixed Analyte Performance Evaluation Program (MAPEP) established by RESL Idaho. This is a DOE mixed waste interlaboratory study that was submitted to the 222-S Laboratory in January of this year. This copy is for your records.

This program was issued in two phases. The first was a liquid matrix. The second phase samples are to be submitted to the laboratory in the near future and will be a soil or sediment matrix.

If there are any questions please call.

C:\WPDATA\HASM.NOT

Laboratory Name: Westinghouse Hanford Company, WA

MAPEP-1 Inorganic Analytes, µg/L

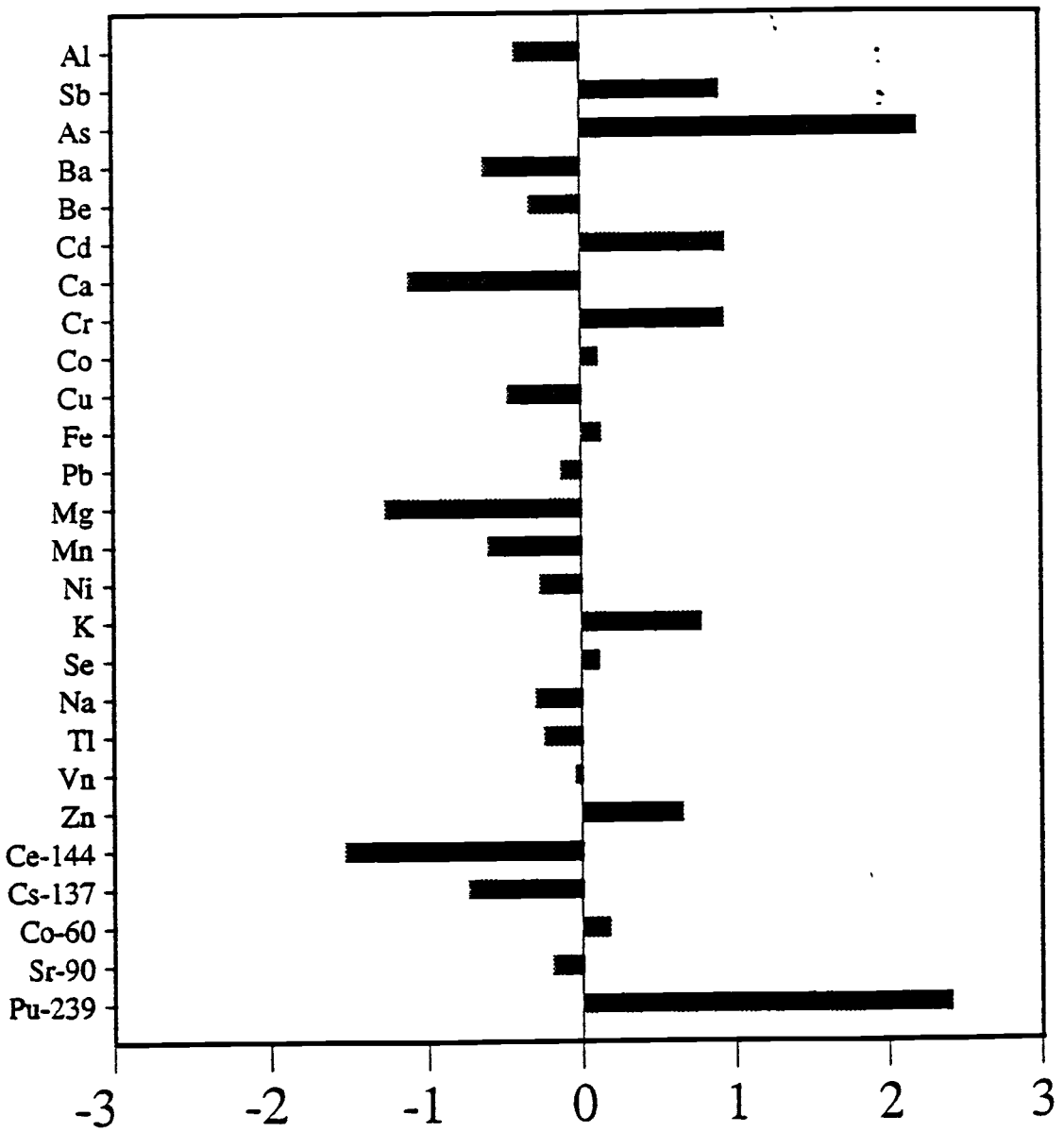
Analyte	Calculated		Grand		Expert		Reported		
	Conc	Unc	Mean	STD	Mean	STD	Mean	STD	Out
Aluminum	209	2	230	28	226	31	218	22	
Antimony	140	1	141	7	138	4	148	6	
Arsenic	69.0	0.7	70.1	5.9	68.2	2.5	83.0	7.0	
Barium	276	3	277	8	280	7	272	5	
Beryllium	138	1	135	7	133	7	133	4	
Cadmium	104	1	104	2	104	2	106	3	
Calcium	27750	280	28500	1200	28700	1300	27200	400	
Chromium	7210	72	7260	190	7340	140	7440	160	
Cobalt	340	19	335	16	332	17	336	13	
Copper	209	2	209	10	208	10	204	3	
Iron	209	2	213	11	215	7	215	6	
Lead	104	1	107	5	108	5	107	5	
Magnesium	19430	190	19300	600	19400	600	18500	400	
Manganese	104	1	107	7	108	8	103	3	
Nickel	220	2	220	13	217	10	216	7	
Potassium	11100	110	11000	400	10900	300	11300	100	
Selenium	2780	28	2720	130	2690	100	2740	130	
Sodium	13880	140	13600	400	13500	400	13400	200	
Thallium	104	1	100	4	99.8	4.0	99.0	4.0	
Vanadium	138	1	140	7	141	4	140	5	
Zinc	221	2	219	6	219	6	222	4	

MAPEP-1 Radiological Analytes, Bq/L

Analyte	Calculated		Grand		Expert		Reported		
	Conc	Unc	Mean	STD	Mean	STD	Mean	STD	Out
Ce-144	215	10	214	14	216	10	193	2	
Cs-137	31.4	1.1	32.1	2.5	32.3	2.7	30.3	0.1	
Co-60	43.4	1.1	43.8	2.0	43.7	2.1	44.1	0.2	
Sr-90†	5.48	0.39	5.42	0.46	5.29	0.41	5.33	0.19	
Pu-239	0.520	0.024	0.516	0.044	0.510	0.029	0.622	0.168	

† The original calculated value for Strontium-90 in the performance evaluation water material was low (2.08 Bq/L ± 4.0%) due to the fact that the Cerium-144 standard solution also contained a considerable amount of Sr-90. Taking this into account, the Sr-90 concentration was re-calculated to be 5.48 Bq/L ± 7.2%.

Westinghouse Hanford Company, WA



EML-556

Laboratory Listing

Date	Type	Lab	Isotope	Ser	Reported Value	% Error	EML Value	Ratio Rp/EML	+/- ?
93 03	AIR	RI	BE 7	1	0.263E+02	15	0.274E+02	0.96	0.15 ±3 Rp/EML
93 03	AIR	RI	CO 57	1	0.219E+01	13	0.271E+01	0.81	0.11
93 03	AIR	RI	CO 60	1	0.186E+01	23	0.170E+01	1.09	0.26
93 03	AIR	RI	SR 90	1	0.232E+00	9	0.152E+00	1.53	0.18
93 03	AIR	RI	CS 134	1	0.229E+01	20	0.196E+01	1.17	0.24
93 03	AIR	RI	CS 137	1	0.336E+01	17	0.307E+01	1.09	0.20
93 03	AIR	RI	CE 144	1	0.141E+02	14	0.193E+02	0.73	0.11
93 03	AIR	RI	PU 238	1	0.380E-01	7	0.363E-01	1.05	0.09
93 03	AIR	RI	PU 239	1	0.311E-01	7	0.234E-01	1.33	0.14
93 03	AIR	RI	AM 241	1	0.685E-01	27	0.414E-01	1.65	0.47
93 03	AIR	RI	U BQ	1	0.543E-01	2	0.460E-01	1.18	0.04
93 03	SOIL	RI	K 40	1	0.437E+03	22	0.321E+03	1.36	0.32
93 03	SOIL	RI	SR 90	1	0.710E+02	5	0.417E+02	1.70	0.14 ✓
93 03	SOIL	RI	CS 137	1	0.107E+04	1	0.923E+03	1.16	0.03 ✓
93 03	SOIL	RI	PU 239	1	0.115E+02	3	0.116E+02	0.99	0.08
93 03	SOIL	RI	U UG	1	0.204E+01	3	0.304E+01	0.67	0.04 ✓
93 03	VEGETN	RI	K 40	1	0.603E+03	21	0.383E+03	1.57	0.34
93 03	VEGETN	RI	SR 90	1	0.115E+03	2	0.237E+03	0.49	0.07 ✓
93 03	VEGETN	RI	CS 137	1	0.252E+02	24	0.246E+02	1.02	0.26
93 03	VEGETN	RI	PU 238	1	0.111E+01	7	0.114E+01	0.97	0.49
93 03	VEGETN	RI	PU 239	1	0.817E+00	8	0.323E+00	2.53	0.26 ✓
93 03	WATER	RI	H 3	1	0.730E+02	6	0.970E+02	0.75	0.05 ✓
93 03	WATER	RI	MN 54	1	0.113E+03	4	0.105E+03	1.08	0.05
93 03	WATER	RI	CO 60	1	0.533E+02	8	0.453E+02	1.18	0.11
93 03	WATER	RI	SR 90	1	0.131E+01	24	0.103E+01	1.27	0.33
93 03	WATER	RI	CS 134	1	0.511E+02	9	0.424E+02	1.21	0.12
93 03	WATER	RI	CS 137	1	0.514E+02	8	0.508E+02	1.01	0.09
93 03	WATER	RI	CE 144	1	0.884E+02	1	0.836E+02	1.06	0.03
93 03	WATER	RI	PU 238	1	0.125E+00	4	0.494E+00	0.25	0.01 ✓
93 03	WATER	RI	PU 239	1	0.877E+00	3	0.828E+00	1.06	0.06
93 03	WATER	RI	U BQ	1	0.144E+00	1	0.289E+00	0.50	0.04

X60 ÷2.22 ÷1000

DON'T SAY IT --- *Write It!*

DATE: May 21, 1993

TO: Claude Stacey (H4-23)

FROM: L. P. Markel T6-16

Telephone: 3-4131

SUBJECT: WHC 222-S LABORATORY - INTERCOMPARISON STUDY

Attached you will find the results of an EMSL Study submitted to the 222-S Laboratory. This abbreviated copy is for your records. The laboratory code given to 222-S is **FJ.**

If there are any questions please call.

C:\WPDATA\HASM.NOT

United States
Environmental Protection
Agency

Environmental Monitoring
Systems Laboratory
P.O. Box 93478
Las Vegas NV 89193-3478

EPA/600/R-93/060
April 1993

5487

Research and Development

EPA

Plutonium in Water Intercomparison Study

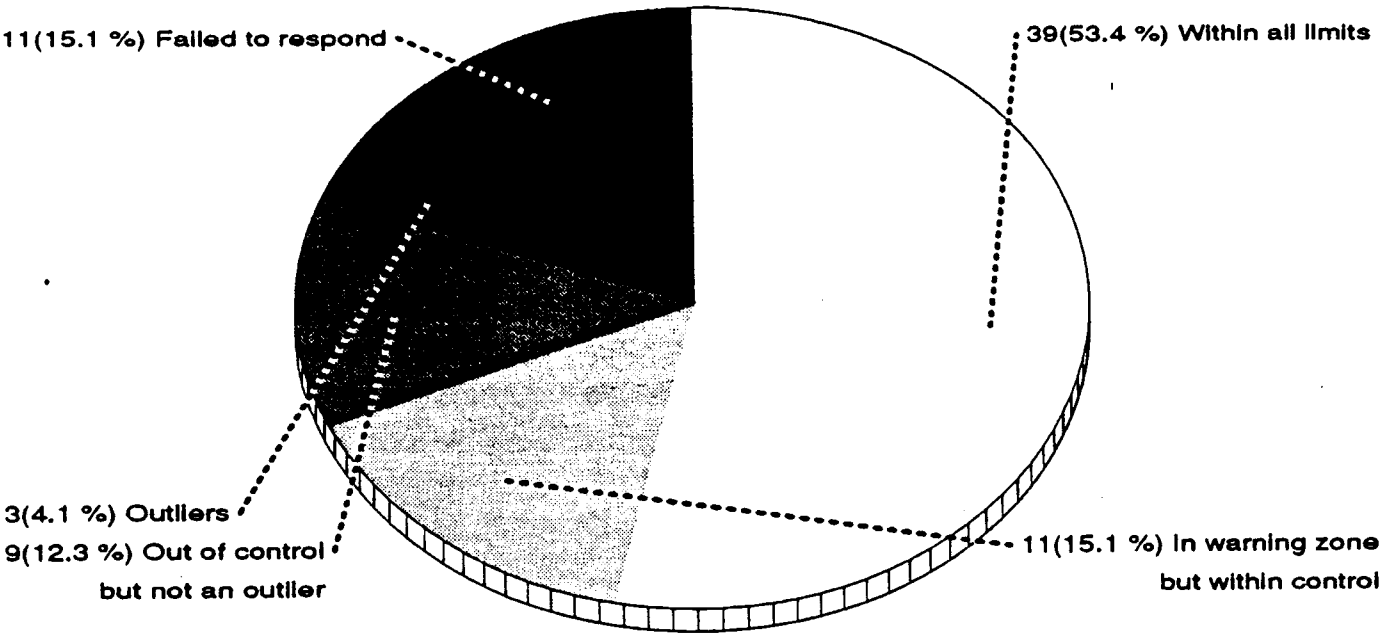
A Statistical Evaluation of the January 22, 1993 Data

APR 1993
RECEIVED
D.A. SEBELIEN

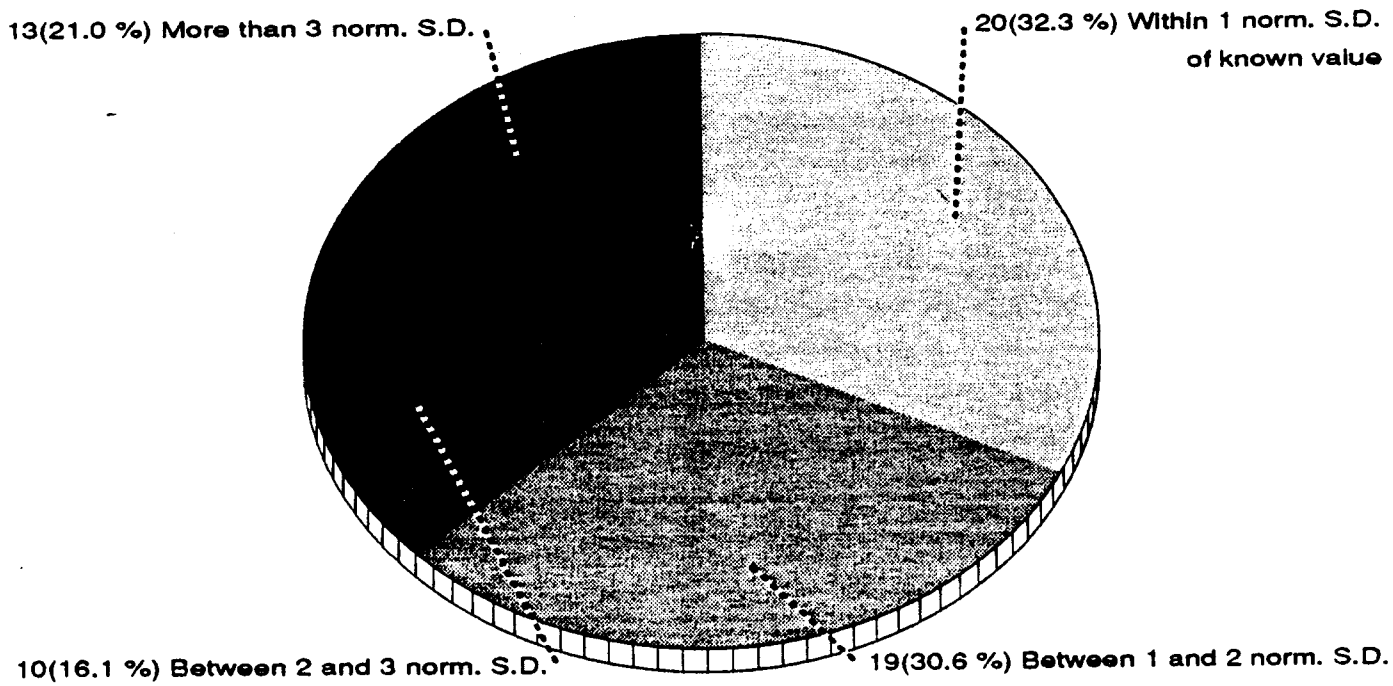
5514GR92NRD.COV-13

Plutonium-239 Statistical Summary 73 Participants

The known value of this nuclide is **20.0 pCi/l** with an expected precision of **2.0**; the control limits are 16.5 to 23.5; the warning regions are 16.5 to 17.7 and 22.3 to 23.5



Statistic	Respondents	Non-outliers
Mean	18.42	**Grand Avg 18.53**
Std. Dev.	2.46	1.80
Variance	6.08	3.23
% Coef. of Var.	13.38	9.70
% deviation of mean from known value	-7.89	-7.36
Norm. dev. of mean from known value	-0.64	-0.82
Median	18.70	18.73
% deviation of median from known value	-6.50	-6.33
Norm. dev. of median from known value	-0.53	-0.71



Plutonium-239

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
A									•
AH	20.1	19.1	20.6	0.76	0.443	19.93	1.22	-0.06	
AI	16.5	18.2	17.3	0.85	0.502	17.33	-1.03	-2.31	
AZ	19.7	17.6	20.5	1.50	0.856	19.27	0.64	-0.64	
BC	16.1	16.2	15.8	0.21	0.118	16.03	-2.16	-3.44	⇓
BG	18.1	18.1	17.4	0.40	0.207	17.87	-0.57	-1.85	
BG	16.3	16.2	15.8	0.26	0.148	16.10	-2.10	-3.38	⇓
BG	20.4	20.8	19.5	0.67	0.384	20.23	1.48	0.20	
BK	10.3	10.2	10.4	0.10	0.059	10.30	-7.12	-8.40	×
BL	18.0	18.9	18.8	0.49	0.266	18.57	0.03	-1.24	
BO	19.3	19.8	18.9	0.45	0.266	19.33	0.70	-0.58	
CA	18.3	17.6	16.7	0.80	0.473	17.53	-0.86	-2.14	
CJ	17.0	18.0	19.0	1.00	0.591	18.00	-0.46	-1.73	
CK	21.0	18.7	18.5	1.39	0.738	19.40	0.76	-0.52	
CO	17.0	16.6	17.0	0.23	0.118	16.87	-1.44	-2.71	
CS	22.1	23.4	24.0	0.97	0.561	23.17	4.02	2.74	
D	18.6	18.6	19.0	0.23	0.118	18.73	0.18	-1.10	
DO									•
E	18.7	20.1	19.7	0.72	0.413	19.50	0.84	-0.43	
EL	18.2	18.2	19.9	0.98	0.502	18.77	0.21	-1.07	
FJ	20.3	19.1	18.9	0.76	0.413	19.43	0.78	-0.49	
FU	15.7	15.9	16.2	0.25	0.148	15.93	-2.25	-3.52	⇓
FZ	20.0	19.0	17.0	1.53	0.886	18.67	0.12	-1.15	
J	18.1	17.4	19.0	0.80	0.473	18.17	-0.31	-1.59	
JE	19.1	20.0	19.6	0.45	0.266	19.57	0.90	-0.38	
JK	14.9	17.5	16.6	1.32	0.768	16.33	-1.90	-3.18	⇓
JP	19.4	19.4	19.7	0.17	0.089	19.50	0.84	-0.43	
JS	16.8	19.9	19.0	1.59	0.916	18.57	0.03	-1.24	
JY	16.9	16.3	15.7	0.60	0.354	16.30	-1.93	-3.20	⇓
KH	19.9	19.1	19.3	0.42	0.236	19.43	0.78	-0.49	
LT	16.8	18.4	17.6	0.80	0.473	17.60	-0.80	-2.08	
MS	19.6	19.9	19.7	0.15	0.089	19.73	1.04	-0.23	
NI	22.0	22.6	19.9	1.42	0.797	21.50	2.57	1.30	
NK	18.6	18.9	18.9	0.17	0.089	18.80	0.24	-1.04	
OA									•
OB	19.7	20.0	19.6	0.21	0.118	19.77	1.07	-0.20	
OK	14.7	17.3	17.6	1.59	0.856	16.53	-1.73	-3.00	
OS	18.4	20.0	19.7	0.85	0.473	19.37	0.73	-0.55	
PE									•
PQ	19.6	20.1	21.0	0.71	0.413	20.23	1.48	0.20	
PV	11.6	6.8	17.0	5.10	4.833	11.80	-5.83	-7.10	×
PW									•
QJ	18.3	19.1	17.5	0.80	0.473	18.30	-0.20	-1.47	
QQ									•
QU	20.1	19.7	20.5	0.40	0.236	20.10	1.36	0.09	

TAG SYMBOLS

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

United States
Environmental Protection
Agency

Environmental Monitoring
Systems Laboratory
P.O. Box 93478
Las Vegas NV 89193-3478

EPA/600/R-93/068
April 1993

5488

Research and Development

EPA

Gross Alpha-Beta in Water Intercomparison Study

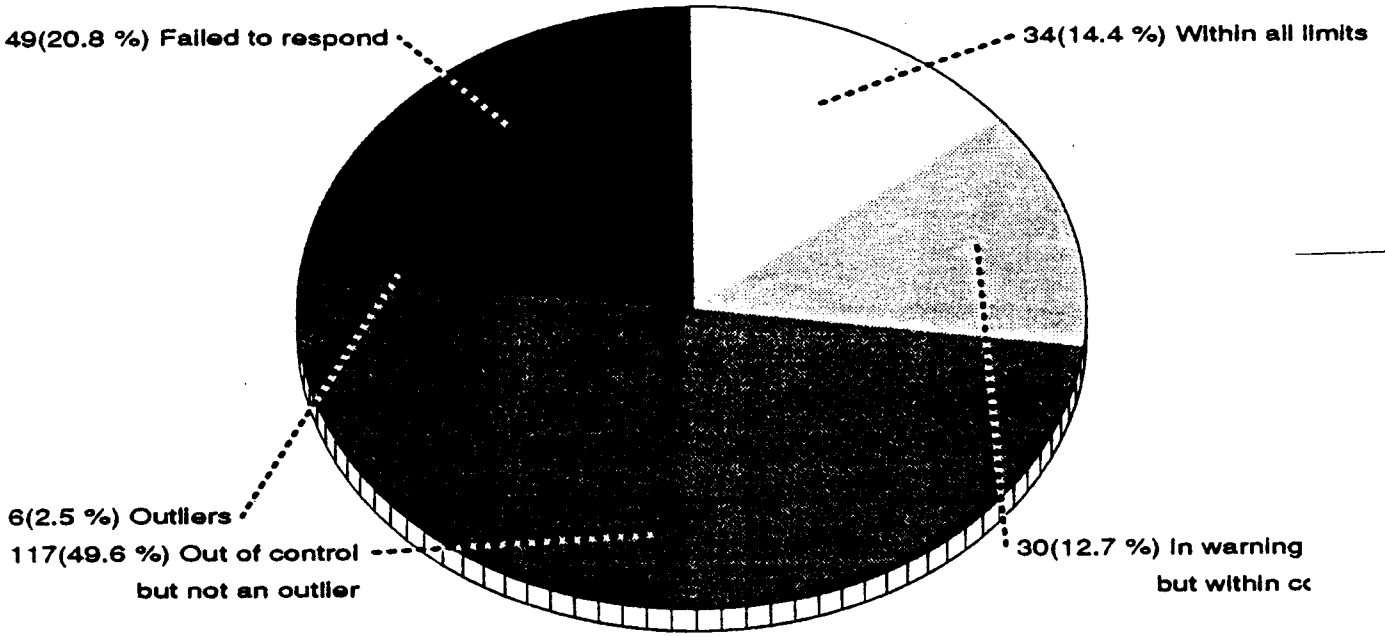
A Statistical Evaluation of the January 29, 1993 Data

MAY 1993
RECEIVED
D.A. SEBELIEN

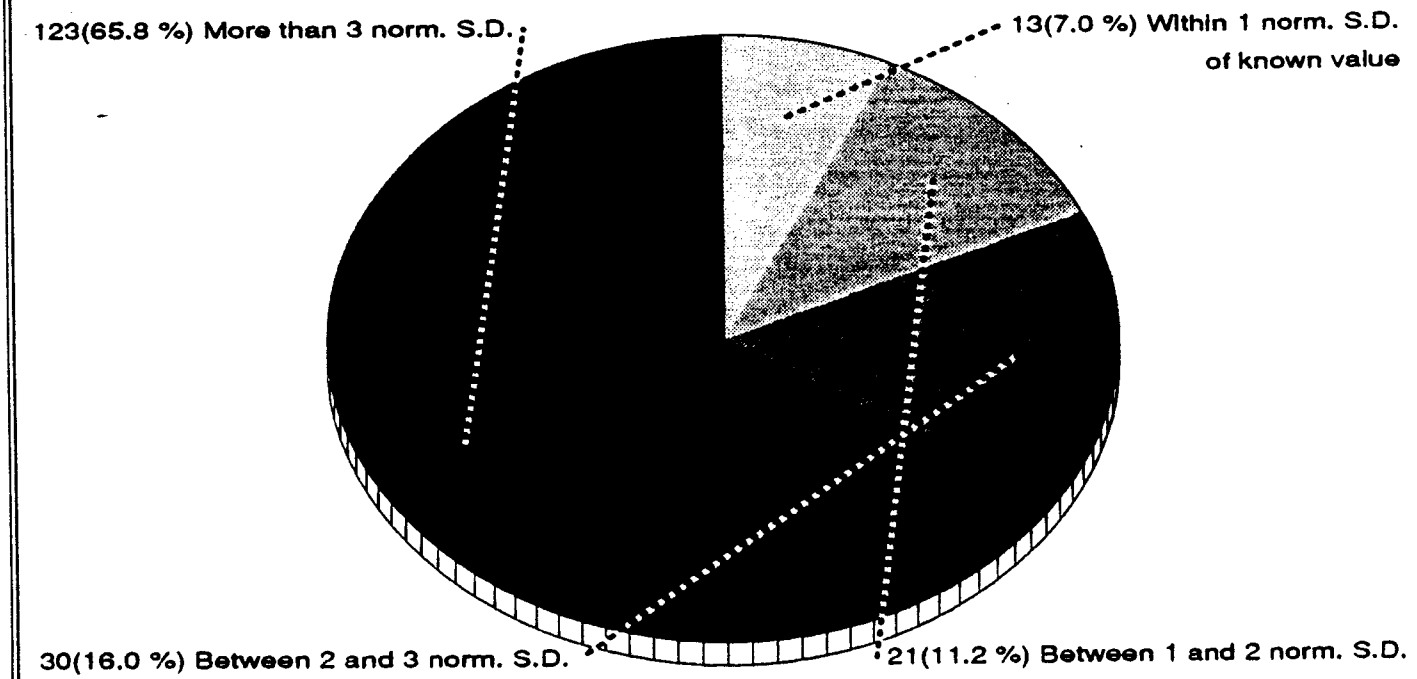
5049 GR93 OPM.COV12

Gross Alpha Statistical Summary 236 Participants

The known value of this nuclide is **34.0 pCi/l** with an expected precision of **9.0**; the control limits are 18.4 to 49.6; the warning regions are 18.4 to 23.6 and 44.4 to 49.6



Statistic	Respondents	Non-outliers
Mean	25.29	**Grand Avg 17.09**
Std. Dev.	82.39	7.54
Variance	6787.81	56.83
% Coef. of Var.	325.81	44.10
% deviation of mean from known value	-25.63	-49.72
Norm. dev. of mean from known value	-0.11	-2.24
Median	17.33	16.67
% deviation of median from known value	-49.02	-50.98
Norm. dev. of median from known value	-0.20	-2.30



Gross Alpha

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	Normalized deviation (known)	Tag
DO	8.0	8.0	8.0	0.00	0.000	8.00	-1.75	-5.00	⇓
DP	11.0	12.0	12.0	0.58	0.066	11.67	-1.04	-4.30	⇓
DR									•
DS	6.0	9.0	6.0	1.73	0.197	7.00	-1.94	-5.20	⇓
DT	16.0	16.0	18.0	1.15	0.131	16.67	-0.08	-3.34	⇓
DX									•
DZ	15.0	17.0	16.0	1.00	0.131	16.00	-0.21	-3.46	⇓
E	18.0	19.0	15.0	2.08	0.263	17.33	0.05	-3.21	⇓
EA	33.0	39.0	37.0	3.06	0.394	36.33	3.70	0.45	
EB	18.0	21.0	22.0	2.08	0.263	20.33	0.62	-2.63	
EH	20.0	14.0	15.0	3.21	0.394	16.33	-0.15	-3.40	⇓
EL									•
EN	22.0	27.0	20.0	3.61	0.459	23.00	1.14	-2.12	
EO	20.0	22.0	21.0	1.00	0.131	21.00	0.75	-2.50	
ER	24.0	25.0	26.0	1.00	0.131	25.00	1.52	-1.73	
ES	27.0	23.0	22.0	2.65	0.328	24.00	1.33	-1.92	
EV	13.0	9.0	8.0	2.65	0.328	10.00	-1.37	-4.62	↓
EW									
FE	18.0	18.0	18.0	0.00	0.000	18.00	0.17	-3.08	⇓
FF	13.0	14.0	16.0	1.53	0.197	14.33	-0.53	-3.78	⇓
FJ	16.0	17.0	14.0	1.53	0.197	15.67	-0.27	-3.53	⇓
FK	4.0	4.0	2.0	1.15	0.131	3.33	-2.65	-5.90	⇓
FL	9.0	12.0	11.0	1.53	0.197	10.67	-1.24	-4.49	⇓
FN	16.0	14.0	15.0	1.00	0.131	15.00	-0.40	-3.66	⇓
FP	19.0	17.0	16.0	1.53	0.197	17.33	0.05	-3.21	⇓
FU	4.0	5.0	5.0	0.58	0.066	4.67	-2.39	-5.65	⇓
FW									•
FZ	26.0	27.0	22.0	2.65	0.328	25.00	1.52	-1.73	
GE									•
GJ	23.0	15.0	14.0	4.93	0.591	17.33	0.05	-3.21	⇓
GQ	16.0	16.0	16.0	0.00	0.000	16.00	-0.21	-3.46	⇓
GT	13.0	13.0	15.0	1.15	0.131	13.67	-0.66	-3.91	⇓
GZ	14.0	17.0	18.0	2.08	0.263	16.33	-0.15	-3.40	⇓
HH	9.0	10.0	8.0	1.00	0.131	9.00	-1.56	-4.81	⇓
HI	4.0	4.0	4.0	0.00	0.000	4.00	-2.52	-5.77	⇓
HK	132.0	156.0	122.0	17.47	3.346	136.67	23.01	19.76	×
HL	18.0	18.0	18.0	0.00	0.000	18.00	0.17	-3.08	⇓
HN	16.0	23.0	19.0	3.51	0.459	19.33	0.43	-2.82	
HP	14.0	16.0	19.0	2.52	0.328	16.33	-0.15	-3.40	⇓
HU									•
HY	26.0	23.0	23.0	1.73	0.197	24.00	1.33	-1.92	
I	26.0	24.0	21.0	2.52	0.328	23.67	1.26	-1.99	
IC	26.0	18.0	25.0	4.36	0.525	23.00	1.14	-2.12	
ID									•
IE	42.0	42.0	47.0	2.89	0.328	43.67	5.11	1.86	

• ≡ No data submitted

∅ ≡ Insufficient data

TAG SYMBOLS

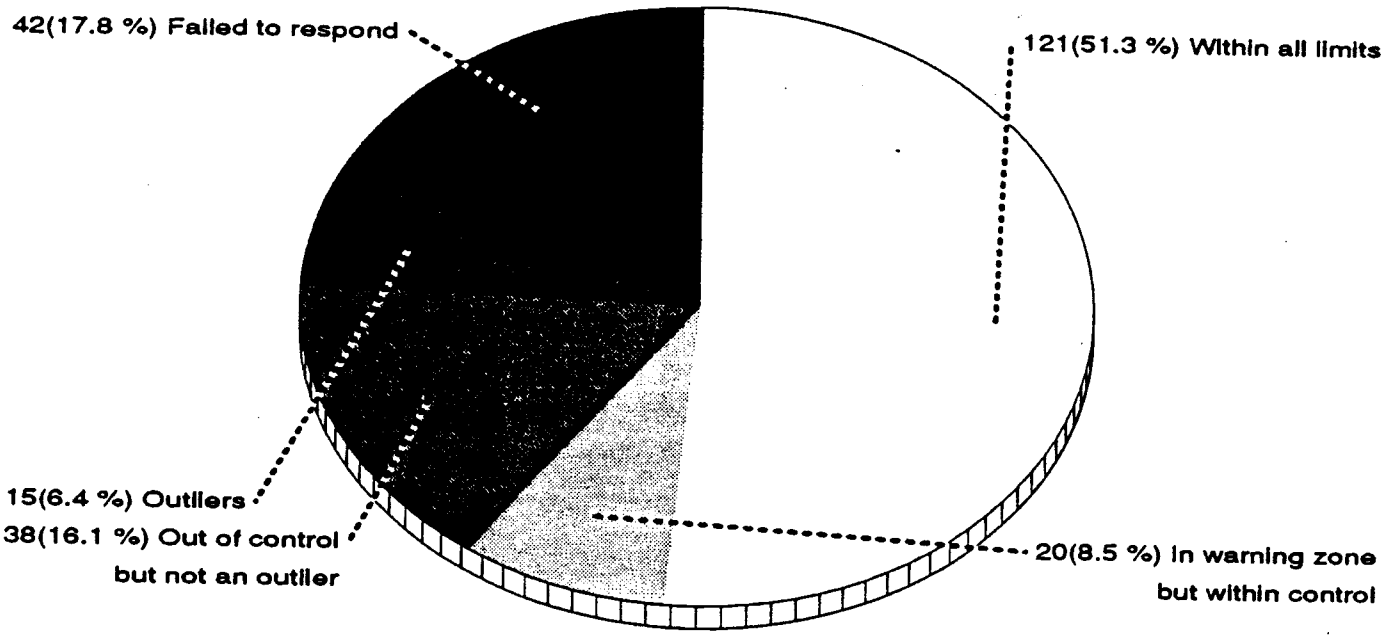
× ≡ Determined to be an outlier

⇑ ≡ Above control limit

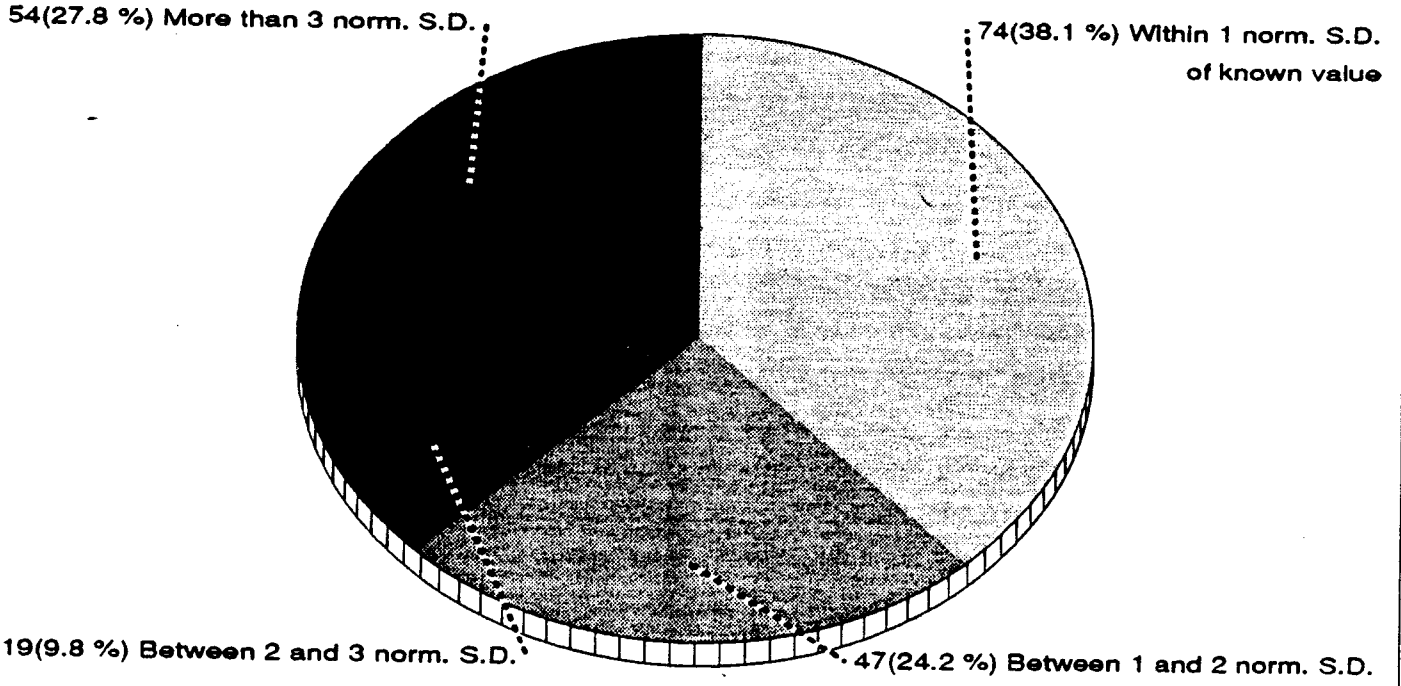
⇓ ≡ Below control limit

Gross Beta Statistical Summary 236 Participants

The known value of this nuclide is **44.0 pCi/l** with an expected precision of **5.0**; the control limits are 35.3 to 52.7; the warning regions are 35.3 to 38.2 and 49.8 to 52.7



Statistic	Respondents	Non-outliers
Mean	44.29	**Grand Avg 41.99**
Std. Dev.	25.92	7.41
Variance	672.05	54.96
% Coef. of Var.	58.53	17.66
% deviation of mean from known value	0.66	-4.57
Norm. dev. of mean from known value	0.01	-0.27
Median	42.67	42.67
% deviation of median from known value	-3.03	-3.03
Norm. dev. of median from known value	-0.05	-0.18



Gross Beta

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DO	42.0	45.0	46.0	2.08	0.473	44.33	0.81	0.12	
DP	44.0	46.0	44.0	1.15	0.236	44.67	0.93	0.23	
DR	42.0	40.0	43.0	1.53	0.354	41.67	-0.11	-0.81	
DS	50.0	45.0	47.0	2.52	0.591	47.33	1.85	1.15	
DT	45.0	38.0	43.0	3.61	0.827	42.00	0.00	-0.69	
DX									•
DZ	40.0	42.0	42.0	1.15	0.236	41.33	-0.23	-0.92	
E	44.0	51.0	46.0	3.61	0.827	47.00	1.74	1.04	
EA	47.0	44.0	48.0	2.08	0.473	46.33	1.50	0.81	
EB	39.0	41.0	42.0	1.53	0.354	40.67	-0.46	-1.15	
EH	42.0	39.0	38.0	2.08	0.473	39.67	-0.80	-1.50	
EL									•
EN	36.0	31.0	29.0	3.61	0.827	32.00	-3.46	-4.16	⇓
EO	45.0	50.0	47.0	2.52	0.591	47.33	1.85	1.15	
ER									•
ES	36.0	37.0	37.0	0.58	0.118	36.67	-1.84	-2.54	
EV	42.0	43.0	49.0	3.79	0.827	44.67	0.93	0.23	
EW	45.0	45.0	51.0	3.46	0.709	47.00	1.74	1.04	
FE	41.0	38.0	37.0	2.08	0.473	38.67	-1.15	-1.85	
FF	38.0	39.0	40.0	1.00	0.236	39.00	-1.04	-1.73	
FJ	62.0	60.0	59.0	1.53	0.354	60.33	6.35	5.66	⇑
FK	120.0	104.0	295.0	105.96	42.073	173.00	45.38	44.69	×
FL	4.0	4.0	4.0	0.00	0.000	4.00	-13.16	-13.86	×
FN	54.0	47.0	47.0	4.04	0.827	49.33	2.54	1.85	
FP	42.0	41.0	42.0	0.58	0.118	41.67	-0.11	-0.81	
FU	35.0	35.0	35.0	0.00	0.000	35.00	-2.42	-3.12	⇓
FW									•
FZ	17.0	28.0	21.0	5.57	1.570	22.00	-6.92	-7.62	⇓
GE	45.0	41.0	42.0	2.08	0.473	42.67	0.23	-0.46	
GJ	246.0	299.0	123.0	90.29	38.698	222.67	62.59	61.89	×
GQ	45.0	45.0	45.0	0.00	0.000	45.00	1.04	0.35	
GT	74.0	118.0	58.0	31.07	12.596	83.33	14.32	13.63	×
GZ	45.0	47.0	48.0	1.53	0.354	46.67	1.62	0.92	
HH	39.0	40.0	41.0	1.00	0.236	40.00	-0.69	-1.39	
HI	35.0	34.0	36.0	1.00	0.236	35.00	-2.42	-3.12	⇓
HK	46.0	47.0	48.0	1.00	0.236	47.00	1.74	1.04	
HL	55.0	55.0	55.0	0.00	0.000	55.00	4.51	3.81	⇑
HN									•
HP	29.0	32.0	30.0	1.53	0.354	30.33	-4.04	-4.73	⇓
HU									•
HY									•
I	47.0	50.0	35.0	7.94	2.470	44.00	0.70	0.00	
IC	49.0	44.0	52.0	4.04	0.945	48.33	2.20	1.50	
ID									•
IE	49.0	42.0	40.0	4.73	1.120	43.67	0.58	-0.12	

TAG SYMBOLS

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

United States
Environmental Protection
Agency

Environmental Monitoring
Systems Laboratory
P.O. Box 93478
Las Vegas NV 89193-3478

EPA/600/R-93/069
April 1993

Research and Development

EPA

Uranium in Water Intercomparison Study

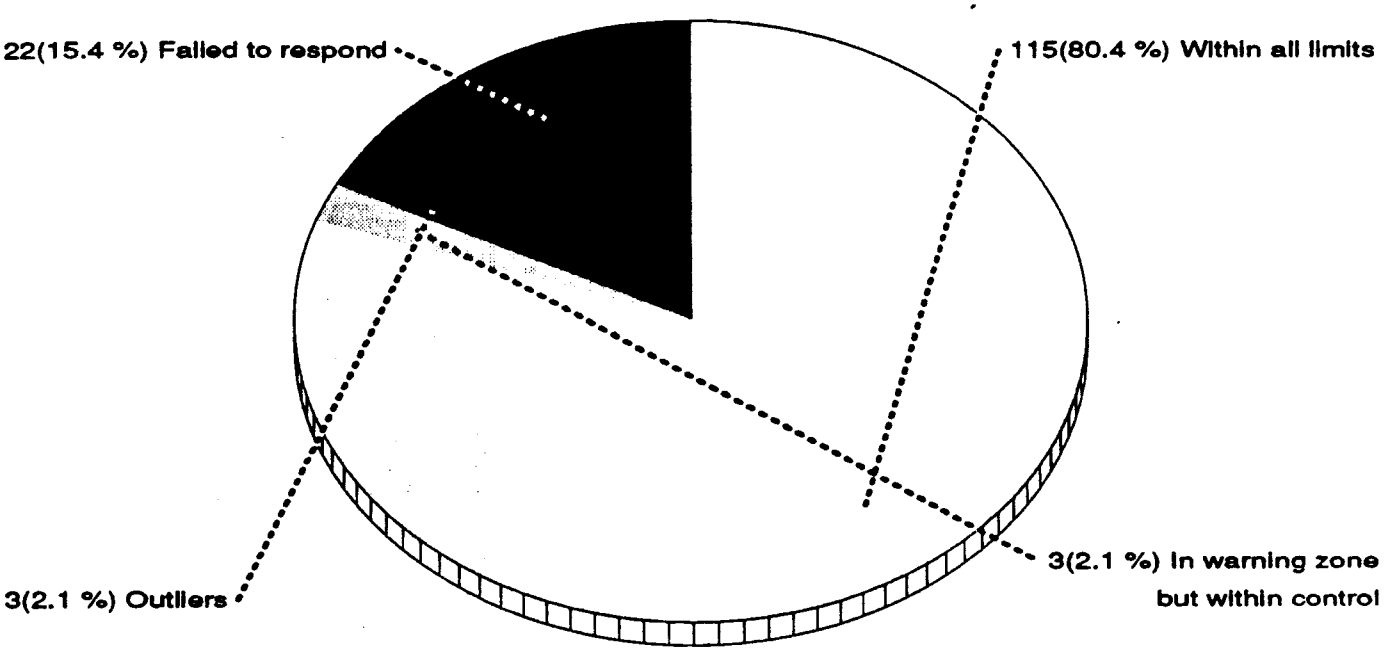
A Statistical Evaluation of the February 12, 1993 Data

APR 1993
RECEIVED
D.A. SEBELIEN

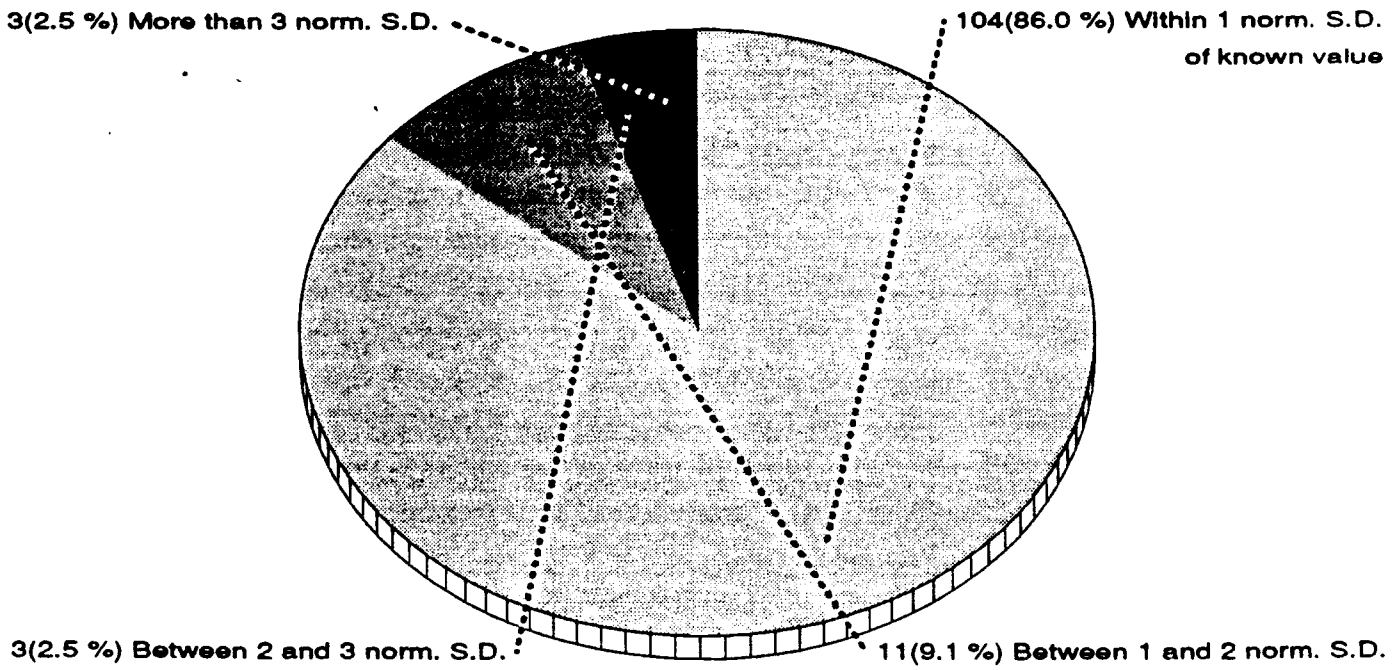
5049 GR93 OPM.COV-18

Uranium (Natural) Statistical Summary 143 Participants

The known value of this nuclide is **7.6 pCi/l** with an expected precision of **3.0**; the control limits are 2.4 to 12.8; the warning regions are 2.4 to 4.1 and 11.1 to 12.8



Statistic	Respondents	Non-outliers
Mean	8.02	**Grand Avg 7.16**
Std. Dev.	7.09	1.04
Variance	50.24	1.08
% Coef. of Var.	88.37	14.51
% deviation of mean from known value	5.53	-5.82
Norm. dev. of mean from known value	0.06	-0.43
Median	7.27	7.27
% deviation of median from known value	-4.39	-4.39
Norm. dev. of median from known value	-0.05	-0.32



Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
A	8.0	8.0	8.0	0.00	0.000	8.00	0.49	0.23	
AA	7.4	7.4	7.4	0.00	0.000	7.40	0.14	-0.12	
AE	4.2	0.9	1.8	1.71	0.650	2.30	-2.80	-3.06	×
AF	8.5	8.7	7.0	0.93	0.335	8.07	0.52	0.27	
AI	7.7	7.6	8.1	0.26	0.098	7.80	0.37	0.12	
AJ	7.9	8.3	7.2	0.56	0.217	7.80	0.37	0.12	
AK	8.2	8.5	9.0	0.40	0.158	8.57	0.81	0.56	
AL	4.9	5.1	4.3	0.42	0.158	4.77	-1.38	-1.64	
AP	7.2	7.0	7.9	0.47	0.177	7.37	0.12	-0.13	
AW	5.5	5.7	5.9	0.20	0.079	5.70	-0.84	-1.10	
AZ	7.1	6.6	6.6	0.29	0.098	6.77	-0.23	-0.48	
BA	7.5	7.7	7.9	0.20	0.079	7.70	0.31	0.06	
BC	7.6	7.5	7.4	0.10	0.039	7.50	0.20	-0.06	
BG	8.0	8.1	8.1	0.06	0.020	8.07	0.52	0.27	
BH	5.3	5.3	6.2	0.52	0.177	5.60	-0.90	-1.15	
BK	6.7	6.8	6.7	0.06	0.020	6.73	-0.24	-0.50	
BM	7.6	6.7	11.1	2.32	0.866	8.47	0.76	0.50	
BN	6.0	6.0	6.1	0.06	0.020	6.03	-0.65	-0.90	
BO	6.4	6.3	5.7	0.38	0.138	6.13	-0.59	-0.85	
C	7.3	8.0	7.2	0.44	0.158	7.50	0.20	-0.06	
CA	6.6	7.4	7.6	0.53	0.197	7.20	0.02	-0.23	
CE	5.5	5.9	5.5	0.23	0.079	5.63	-0.88	-1.14	
CG	7.6	7.4	7.4	0.12	0.039	7.47	0.18	-0.08	
CJ	6.8	6.9	7.1	0.15	0.059	6.93	-0.13	-0.38	
CK	7.1	6.6	7.6	0.50	0.197	7.10	-0.03	-0.29	
CO	6.3	7.3	6.4	0.55	0.197	6.67	-0.28	-0.54	
CS	60.8	61.2	61.2	0.23	0.079	61.07	31.12	30.87	×
D									•
DB	8.0	8.0	8.0	0.00	0.000	8.00	0.49	0.23	
DE	7.1	7.2	7.5	0.21	0.079	7.27	0.06	-0.19	
DO	7.4	8.0	8.3	0.46	0.177	7.90	0.43	0.17	
DP									•
DT	5.7	4.9	5.3	0.40	0.158	5.30	-1.07	-1.33	
DZ	6.9	7.2	7.6	0.35	0.138	7.23	0.04	-0.21	
E	6.9	7.1	7.0	0.10	0.039	7.00	-0.09	-0.35	
EB	6.2	7.4	7.7	0.79	0.295	7.10	-0.03	-0.29	
EH									•
ER	6.3	5.8	5.4	0.45	0.177	5.83	-0.76	-1.02	
FE	7.0	7.2	7.0	0.12	0.039	7.07	-0.05	-0.31	
FJ	7.8	7.3	7.8	0.29	0.098	7.63	0.27	0.02	
FN	7.7	7.9	7.1	0.42	0.158	7.57	0.24	-0.02	
FZ	69.2	67.0	51.3	9.76	5.808	62.50	31.95	31.70	×
GG									•
GN	7.4	7.1	6.8	0.30	0.118	7.10	-0.03	-0.29	
GO	8.5	7.9	8.5	0.35	0.118	8.30	0.66	0.40	

TAG SYMBOLS

• ≡ No data submitted

∅ ≡ Insufficient data

× ≡ Determined to be an outlier

⇑ ≡ Above control limit

⇓ ≡ Below control limit

United States
Environmental Protection
Agency

Environmental Monitoring
Systems Laboratory
P.O. Box 93478
Las Vegas NV 89193-3478

EPA/600/R-93/134A
July 1993
5492

Research and Development

EPA

Performance Evaluation-A Intercomparison Study

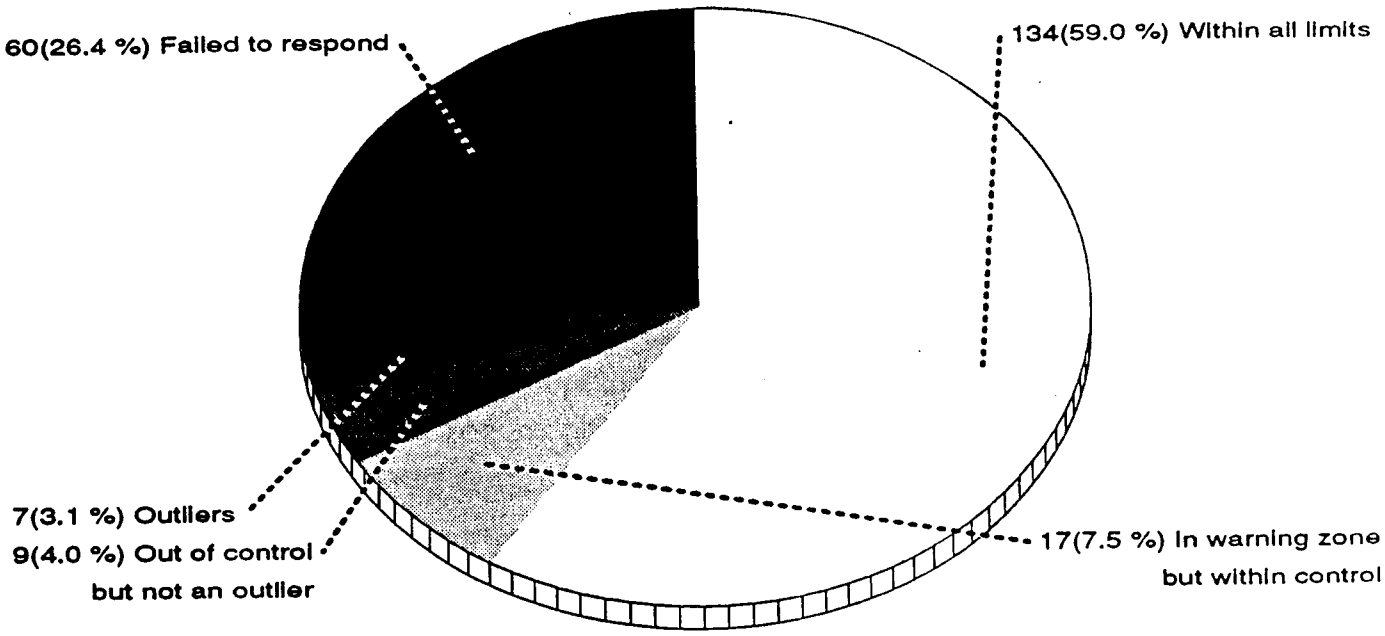
A Statistical Evaluation of the April 20, 1993 Data

AUG 1993
RECEIVED
D.A. SEBELIEN

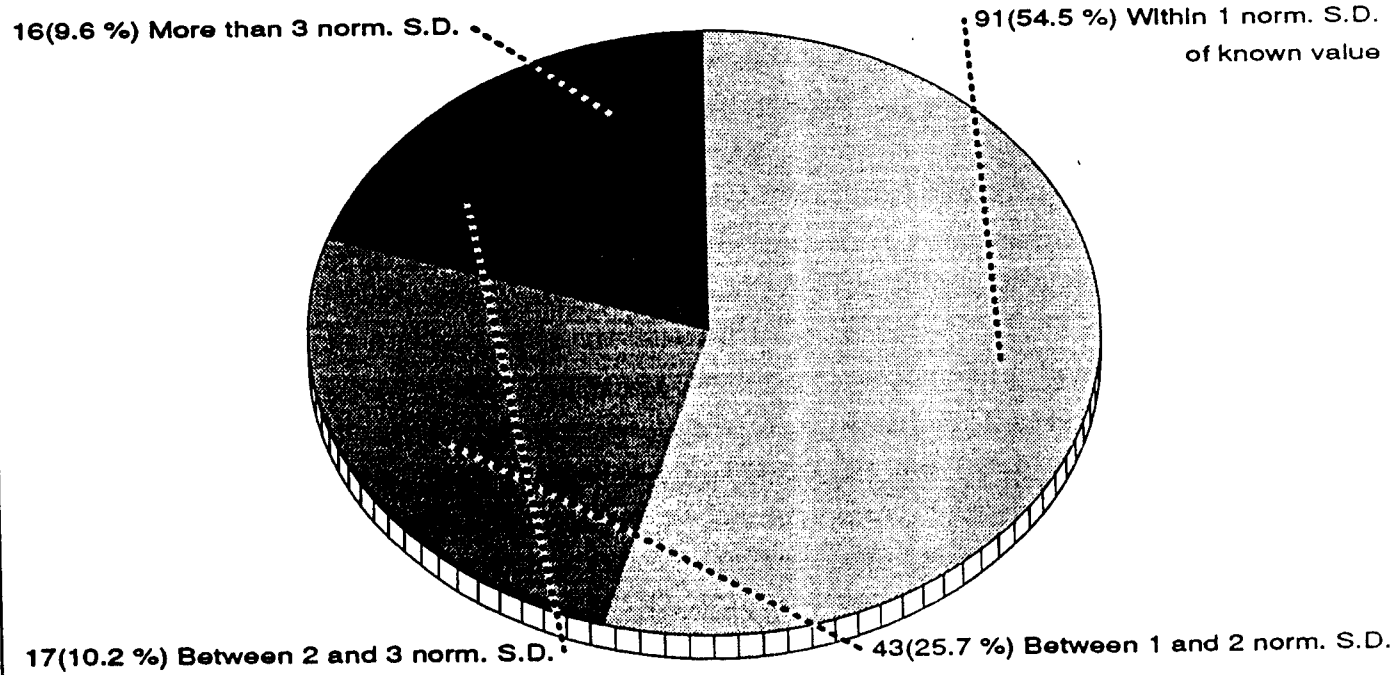
5312GR93NRD.COV22

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
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	161.0	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

Ø ≡ Insufficient data

TAG SYMBOLS

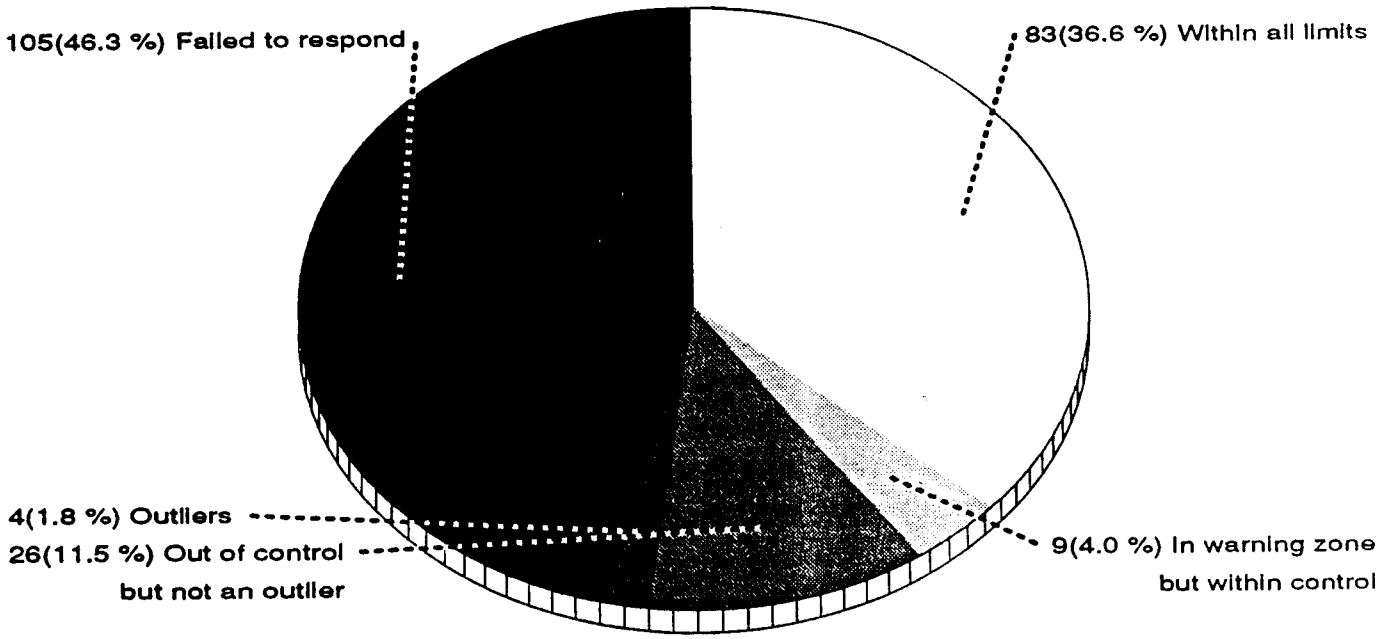
× ≡ Determined to be an outlier

⇑ ≡ Above control limit

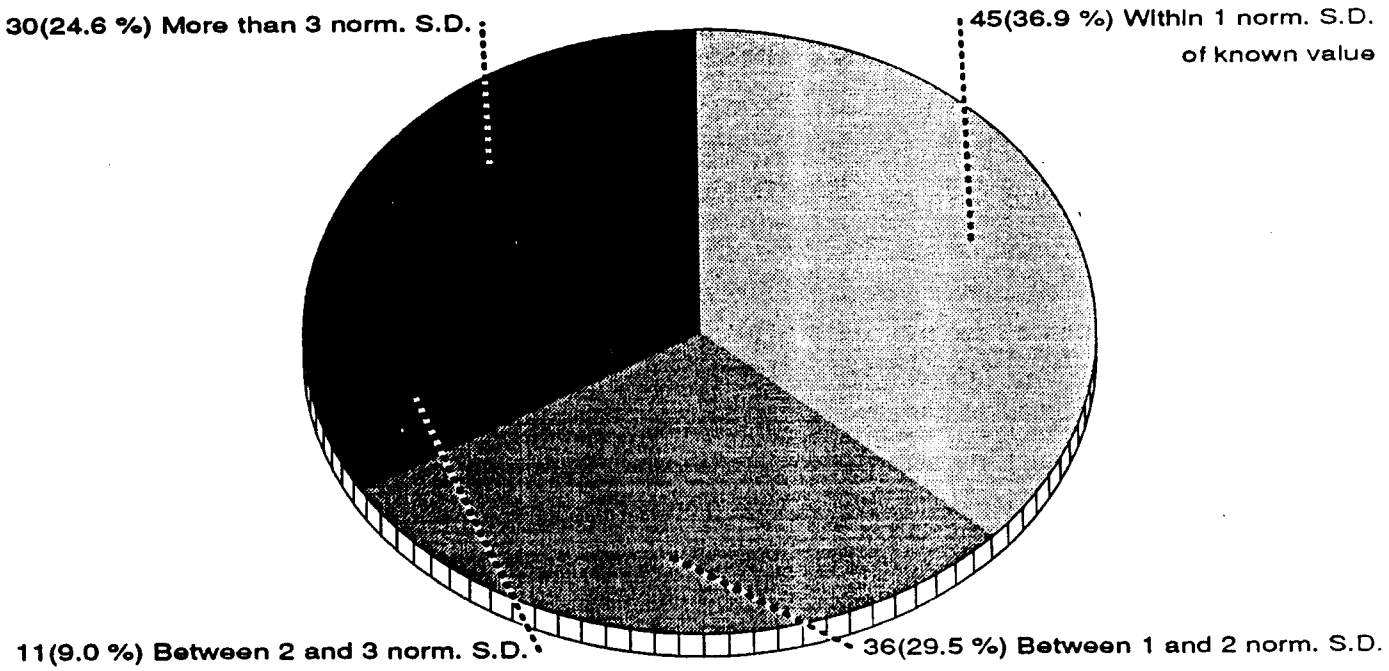
⇓ ≡ Below control limit

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



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
Ø ≡ Insufficient data

TAG SYMBOLS
× ≡ Determined to be an outlier

⇑ ≡ Above control limit
⇓ ≡ Below control limit

United States
Environmental Protection
Agency

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Las Vegas NV 89193-3478

EPA/600/R-93/134B
July 1993
5493

Research and Development

EPA

Performance Evaluation-B Intercomparison Study

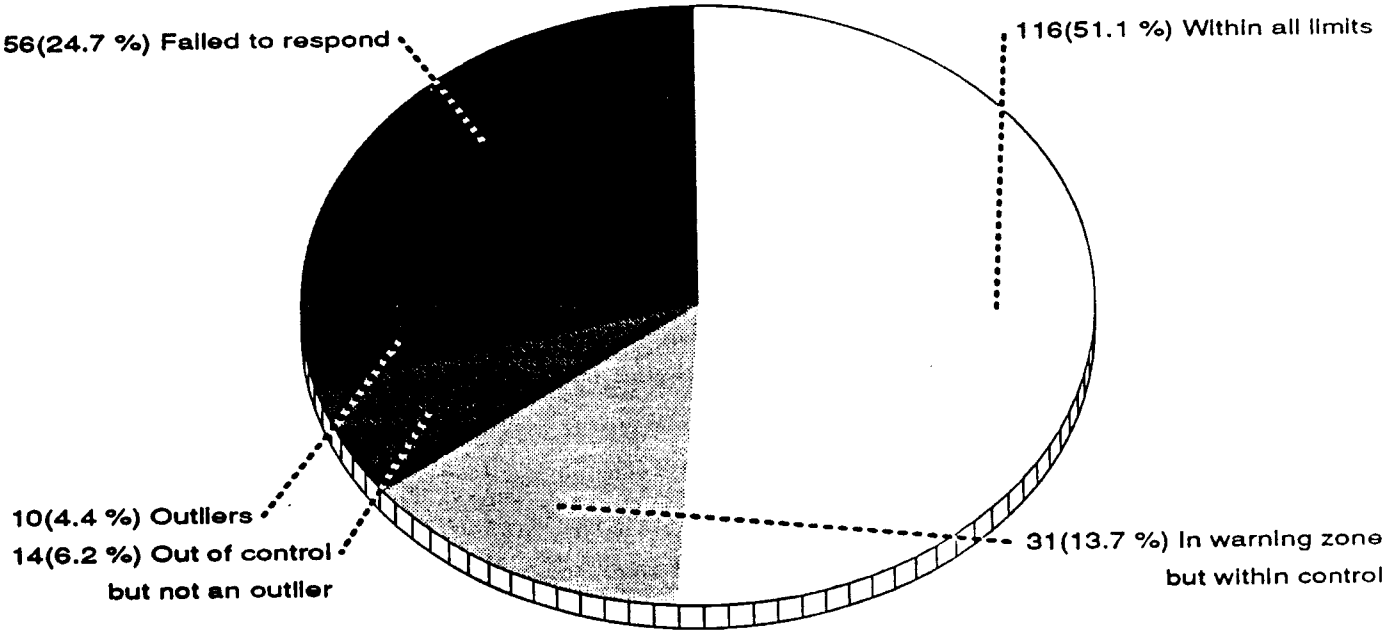
A Statistical Evaluation of the April 20, 1993 Data

4 AUG 1993
RECEIVED
D.A. SEBELIEN

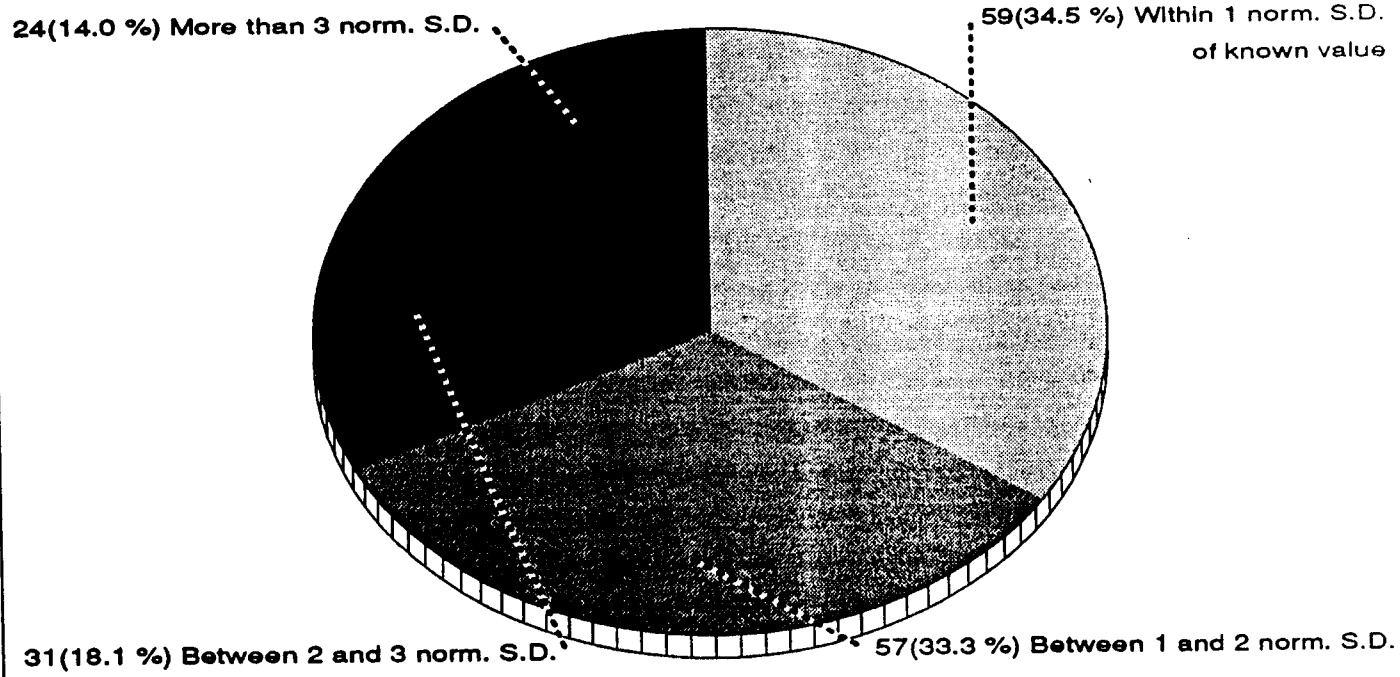
5312GR93NRD.COV23

Gross Beta Statistical Summary 227 Participants

The known value of this nuclide is **177.0 pCi/l** with an expected precision of **27.0**; the control limits are 130.2 to 223.8; the warning regions are 130.2 to 145.7 and 208.3 to 223.8



Statistic	Respondents	Non-outliers
Mean	209.02	**Grand Avg** 155.52
Std. Dev.	665.59	18.41
Variance	443014.07	338.96
% Coef. of Var.	318.44	11.84
% deviation of mean from known value	18.09	-12.14
Norm. dev. of mean from known value	0.05	-1.17
Median	156.67	157.00
% deviation of median from known value	-11.49	-11.30
Norm. dev. of median from known value	-0.03	-1.09



Gross Beta

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DO									•
DS	173.0	162.0	166.0	5.57	0.241	167.00	0.74	-0.64	
DT	171.0	172.0	161.0	6.08	0.241	168.00	0.80	-0.58	
DZ	139.0	141.0	140.0	1.00	0.044	140.00	-1.00	-2.37	
E	169.0	170.0	169.0	0.58	0.022	169.33	0.89	-0.49	
EB	156.0	160.0	159.0	2.08	0.088	158.33	0.18	-1.20	
EH	161.0	160.0	163.0	1.53	0.066	161.33	0.37	-1.01	
EL									•
EO	164.0	166.0	168.0	2.00	0.088	166.00	0.67	-0.71	
ER									•
EV	143.0	152.0	141.0	5.86	0.241	145.33	-0.65	-2.03	
EX									•
FE	179.0	184.0	176.0	4.04	0.175	179.67	1.55	0.17	
FF	142.0	137.0	137.0	2.89	0.109	138.67	-1.08	-2.46	
FJ	232.0	211.0	219.0	10.60	0.459	220.67	4.18	2.80	
FK									•
FL	167.0	138.0	144.0	15.31	0.634	149.67	-0.38	-1.75	
FN	150.0	146.0	142.0	4.00	0.175	146.00	-0.61	-1.99	
FU	141.0	142.0	143.0	1.00	0.044	142.00	-0.87	-2.25	
FW									•
FZ	110.0	120.0	120.0	5.77	0.219	116.67	-2.49	-3.87	⇓
GE	151.0	149.0	146.0	2.52	0.109	148.67	-0.44	-1.82	
GI									•
GQ	159.0	162.0	157.0	2.52	0.109	159.33	0.24	-1.13	
GT	119.0	112.0	113.0	3.79	0.153	114.67	-2.62	-4.00	⇓
GZ	192.0	188.0	212.0	12.86	0.525	197.33	2.68	1.30	
HH	156.0	156.0	155.0	0.58	0.022	155.67	0.01	-1.37	
HI									•
HK	149.0	146.0	146.0	1.73	0.066	147.00	-0.55	-1.92	
HL	172.0	172.0	172.0	0.00	0.000	172.00	1.06	-0.32	
HN									•
HP	134.0	141.0	142.0	4.36	0.175	139.00	-1.06	-2.44	
HU									•
HY	182.0	185.0	180.0	2.52	0.109	182.33	1.72	0.34	
I	156.0	148.0	158.0	5.29	0.219	154.00	-0.10	-1.48	
IA									•
IC	162.0	162.0	169.0	4.04	0.153	164.33	0.57	-0.81	
ID	127.0	130.0	136.0	4.58	0.197	131.00	-1.57	-2.95	
IE	150.0	144.0	145.0	3.21	0.131	146.33	-0.59	-1.97	
II									•
IU									•
J	180.0	180.0	178.0	1.15	0.044	179.33	1.53	0.15	
JE	177.0	168.0	177.0	5.20	0.197	174.00	1.19	-0.19	
JG	161.0	163.0	162.0	1.00	0.044	162.00	0.42	-0.96	
JH	88.0	84.0	78.0	5.03	0.219	83.33	-4.63	-6.01	×

• ≡ No data submitted

Ø ≡ Insufficient data

TAG SYMBOLS

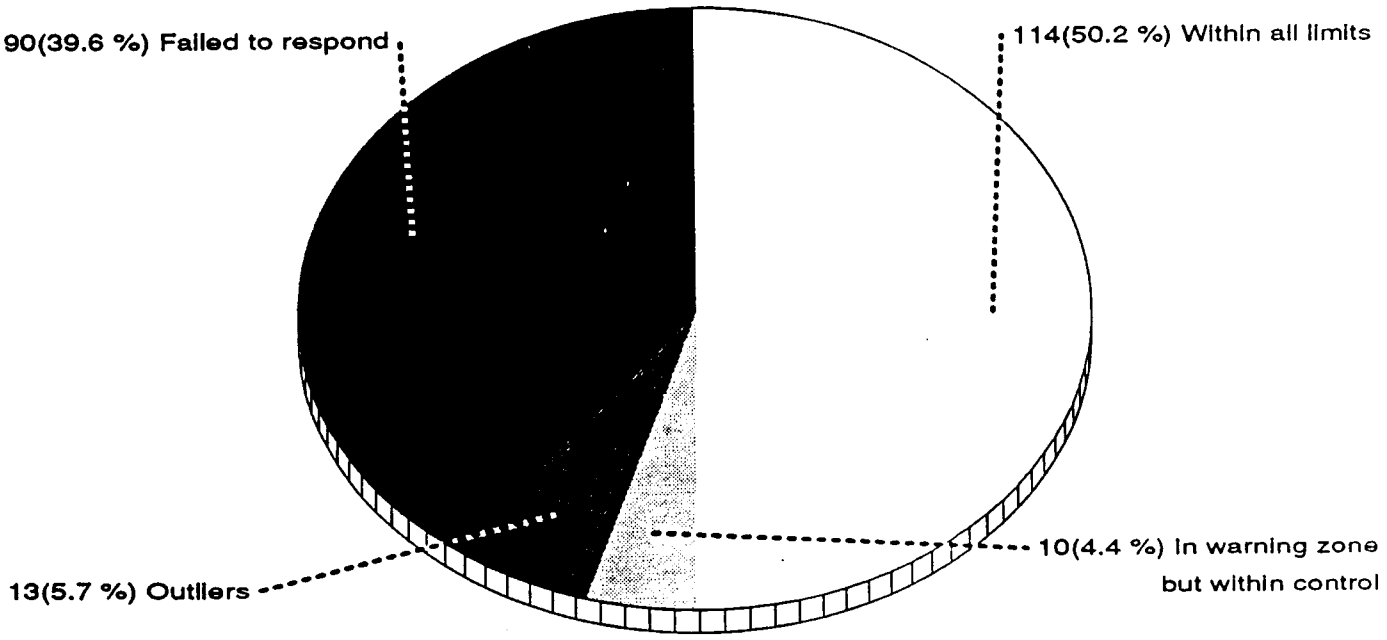
× ≡ Determined to be an outlier

⇑ ≡ Above control limit

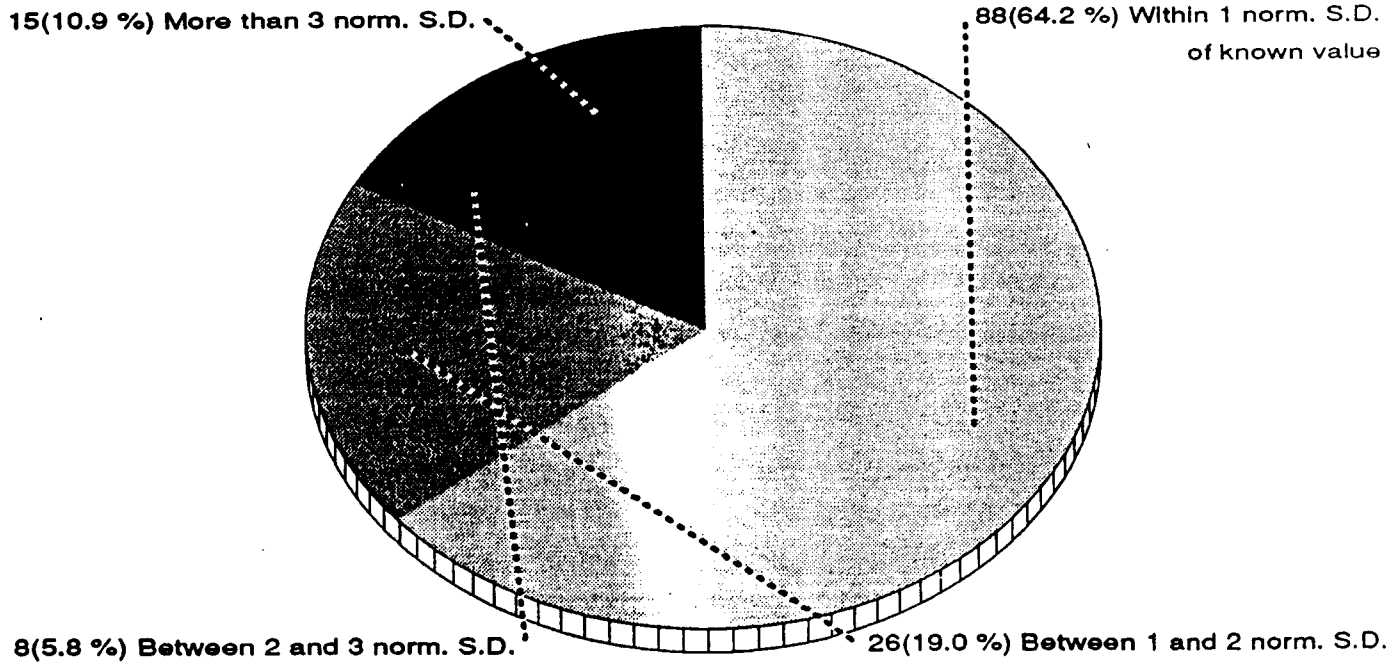
⇓ ≡ Below control limit

Cobalt-60 Statistical Summary 227 Participants

The known value of this nuclide is **39.0 pCi/l** with an expected precision of **5.0**; the control limits are 30.3 to 47.7; the warning regions are 30.3 to 33.2 and 44.8 to 47.7



Statistic	Respondents	Non-outliers
Mean	49.27	**Grand Avg** 39.36
Std. Dev.	75.74	2.90
Variance	5736.53	8.39
% Coef. of Var.	153.74	7.36
% deviation of mean from known value	26.32	0.92
Norm. dev. of mean from known value	0.14	0.12
Median	39.00	39.00
% deviation of median from known value	0.00	0.00
Norm. dev. of median from known value	0.00	0.00



Cobalt-60

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DO	35.0	36.0	37.0	1.00	0.236	36.00	-1.16	-1.04	
DS									•
DT	34.0	38.0	39.0	2.65	0.591	37.00	-0.82	-0.69	
DZ	34.0	36.0	37.0	1.53	0.354	35.67	-1.28	-1.15	
E	38.0	40.0	40.0	1.15	0.236	39.33	-0.01	0.12	
EB	40.0	40.0	40.0	0.00	0.000	40.00	0.22	0.35	
EH	44.0	40.0	43.0	2.08	0.473	42.33	1.03	1.15	
EL	41.0	39.0	36.0	2.52	0.591	38.67	-0.24	-0.12	
EO									•
ER									•
EV									•
EX	44.0	46.0	36.0	5.29	1.345	42.00	0.92	1.04	
FE	36.0	34.0	35.0	1.00	0.236	35.00	-1.51	-1.39	
FF									•
FJ	38.0	38.0	39.0	0.58	0.118	38.33	-0.35	-0.23	
FK									•
FL	42.0	41.0	39.0	1.53	0.354	40.67	0.45	0.58	
FN									•
FU	39.0	41.0	44.0	2.52	0.591	41.33	0.68	0.81	
FW									•
FZ	39.0	47.0	48.0	4.93	1.120	44.67	1.84	1.96	
GE	38.0	37.0	40.0	1.53	0.354	38.33	-0.35	-0.23	
GI	38.0	38.0	37.0	0.58	0.118	37.67	-0.59	-0.46	
GQ									•
GT									•
GZ									•
HH									•
HI									•
HK	38.0	39.0	38.0	0.58	0.118	38.33	-0.35	-0.23	
HL	40.0	40.0	40.0	0.00	0.000	40.00	0.22	0.35	
HN									•
HP	55.0	53.0	54.0	1.00	0.236	54.00	5.07	5.20	×
HU									•
HY									•
I	38.0	43.0	40.0	2.52	0.591	40.33	0.34	0.46	
IA	51.0	45.0	47.0	3.06	0.709	47.67	2.88	3.00	
IC	36.0	42.0	41.0	3.21	0.709	39.67	0.11	0.23	
ID									•
IE									•
II									•
IU									•
J	38.0	39.0	39.0	0.58	0.118	38.67	-0.24	-0.12	
JE	40.0	39.0	33.0	3.79	0.827	37.33	-0.70	-0.58	
JG									•
JH									•

• ≡ No data submitted

∅ ≡ Insufficient data

TAG SYMBOLS

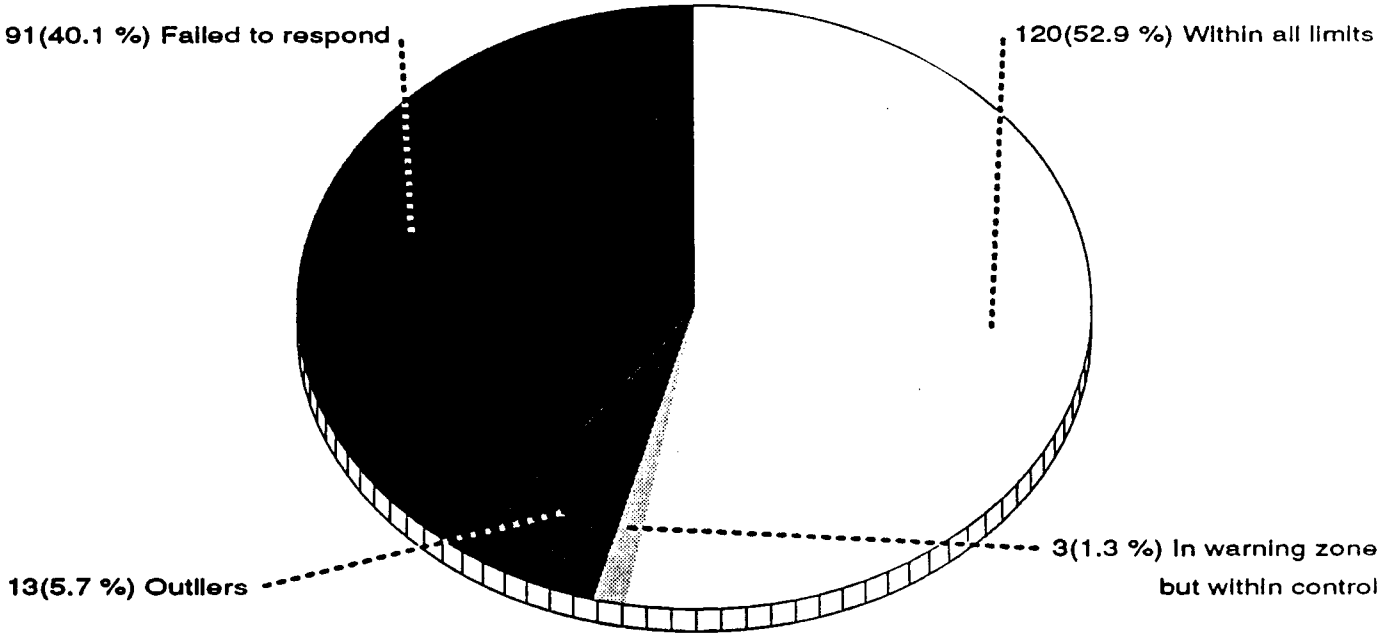
× ≡ Determined to be an outlier

⇑ ≡ Above control limit

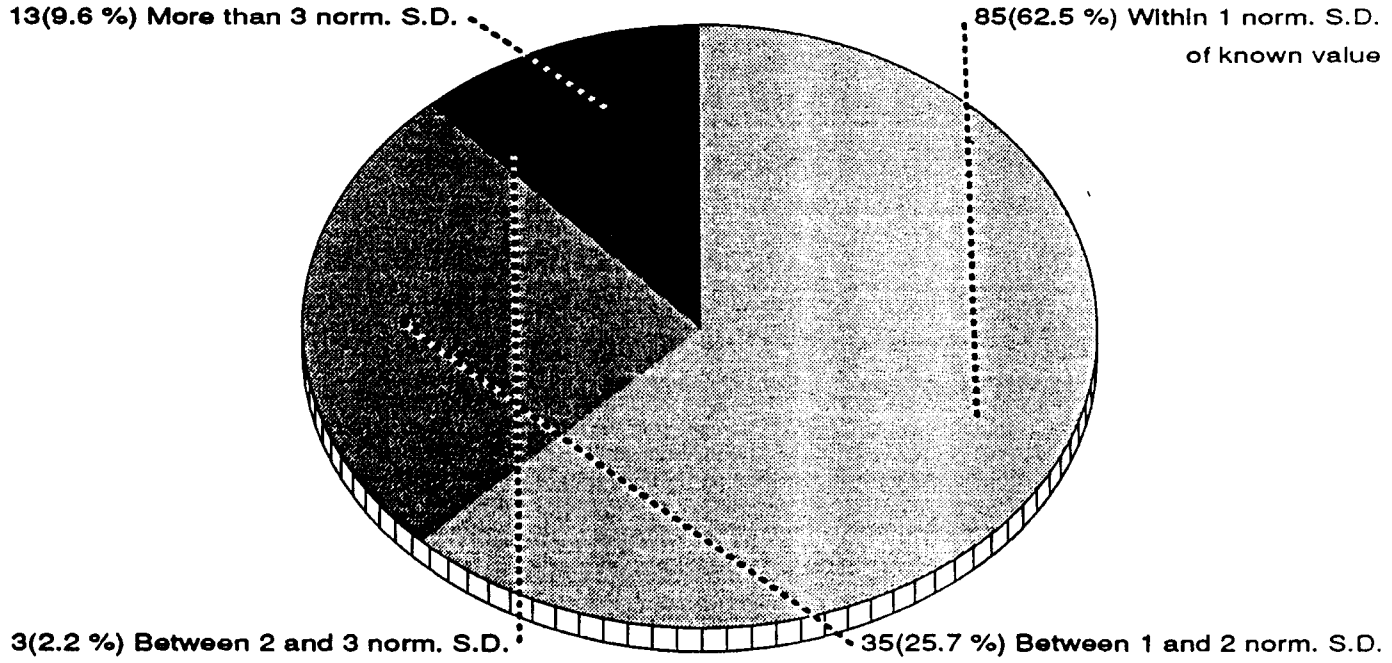
⇓ ≡ Below control limit

Cesium-134 Statistical Summary 227 Participants

The known value of this nuclide is **27.0 pCi/l** with an expected precision of **5.0**; the control limits are 18.3 to 35.7; the warning regions are 18.3 to 21.2 and 32.8 to 35.7



Statistic	Respondents	Non-outliers
Mean	31.75	**Grand Avg 25.40**
Std. Dev.	46.22	2.14
Variance	2136.22	4.58
% Coef. of Var.	145.57	8.42
% deviation of mean from known value	17.59	-5.91
Norm. dev. of mean from known value	0.10	-0.75
Median	25.33	25.00
% deviation of median from known value	-6.17	-7.41
Norm. dev. of median from known value	-0.04	-0.94



Cesium-134

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DO	25.0	28.0	30.0	2.52	0.591	27.67	0.78	0.23	
DS									•
DT	27.0	25.0	28.0	1.53	0.354	26.67	0.44	-0.12	
DZ	15.0	15.0	16.0	0.58	0.118	15.33	-3.49	-4.04	×
E	25.0	25.0	27.0	1.15	0.236	25.67	0.09	-0.46	
EB	25.0	25.0	25.0	0.00	0.000	25.00	-0.14	-0.69	
EH	27.0	27.0	27.0	0.00	0.000	27.00	0.55	0.00	
EL	26.0	27.0	25.0	1.00	0.236	26.00	0.21	-0.35	
EO									•
ER									•
EV									•
EX	34.0	30.0	29.0	2.65	0.591	31.00	1.94	1.39	
FE	24.0	22.0	21.0	1.53	0.354	22.33	-1.06	-1.62	
FF									•
FJ	24.0	27.0	24.0	1.73	0.354	25.00	-0.14	-0.69	
FK									•
FL	28.0	26.0	27.0	1.00	0.236	27.00	0.55	0.00	
FN									•
FU	25.0	26.0	26.0	0.58	0.118	25.67	0.09	-0.46	
FW									•
FZ	28.0	37.0	23.0	7.09	2.245	29.33	1.36	0.81	
GE	23.0	25.0	23.0	1.15	0.236	23.67	-0.60	-1.15	
GI	24.0	24.0	23.0	0.58	0.118	23.67	-0.60	-1.15	
GQ									•
GT									•
GZ									•
HH									•
HI									•
HK	26.0	26.0	26.0	0.00	0.000	26.00	0.21	-0.35	
HL	27.0	27.0	27.0	0.00	0.000	27.00	0.55	0.00	
HN									•
HP	41.0	42.0	43.0	1.00	0.236	42.00	5.75	5.20	×
HU									•
HY									•
I	25.0	24.0	24.0	0.58	0.118	24.33	-0.37	-0.92	
IA	26.0	28.0	29.0	1.53	0.354	27.67	0.78	0.23	
IC	27.0	32.0	30.0	2.52	0.591	29.67	1.48	0.92	
ID									•
IE									•
II									•
IU									•
J	24.0	24.0	25.0	0.58	0.118	24.33	-0.37	-0.92	
JE	23.0	22.0	24.0	1.00	0.236	23.00	-0.83	-1.39	
JG									•
JH									•

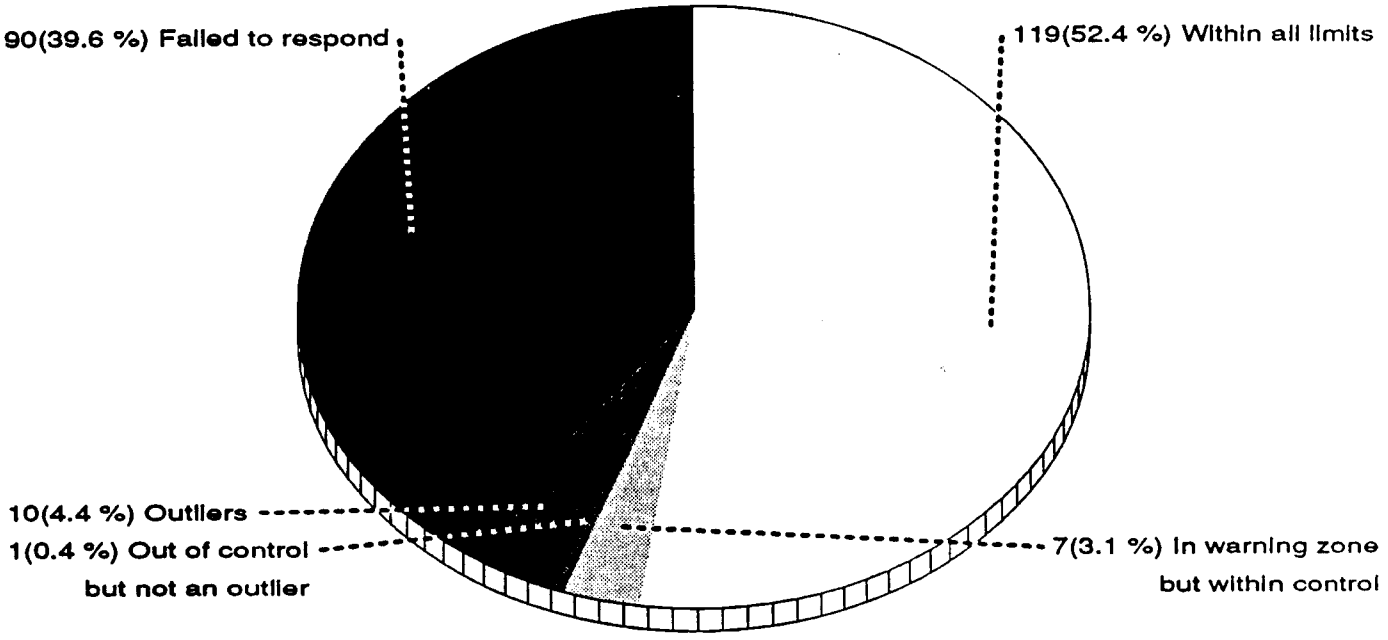
• ≡ No data submitted
∅ ≡ Insufficient data

TAG SYMBOLS
× ≡ Determined to be an outlier

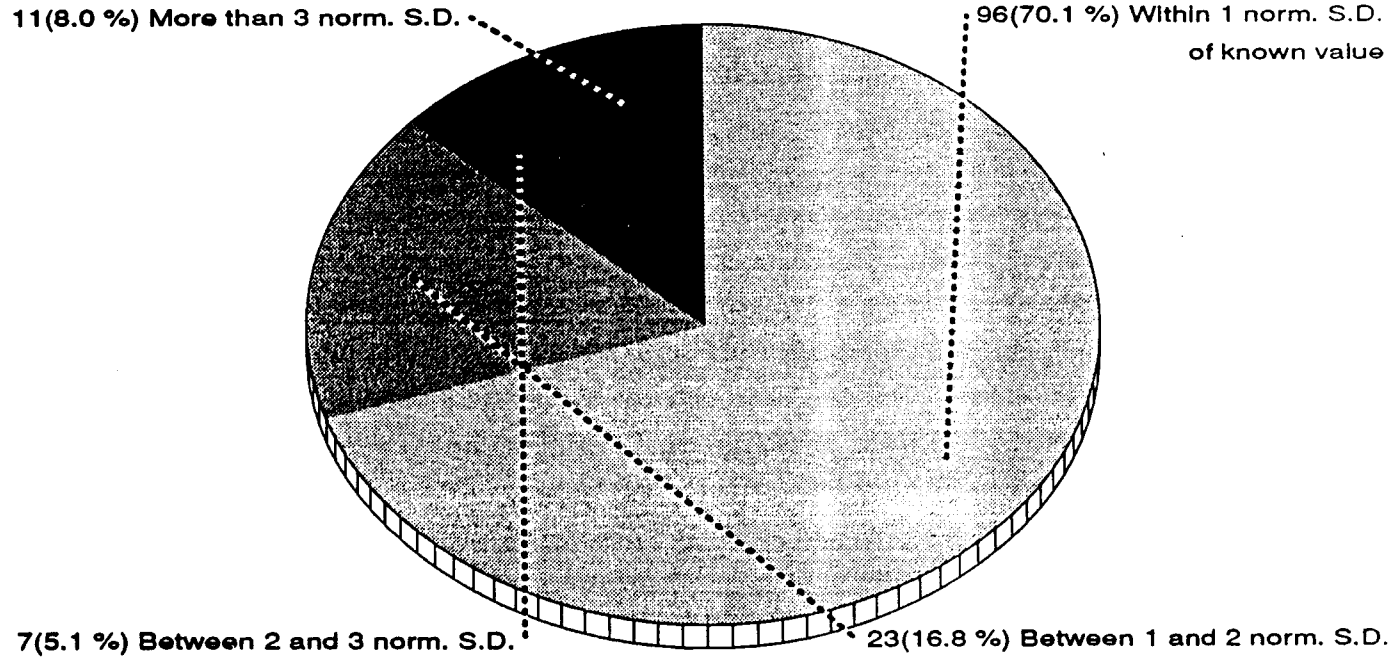
⇑ ≡ Above control limit
⇓ ≡ Below control limit

Cesium-137 Statistical Summary 227 Participants

The known value of this nuclide is **32.0 pCi/l** with an expected precision of **5.0**; the control limits are 23.3 to 40.7; the warning regions are 23.3 to 26.2 and 37.8 to 40.7



Statistic	Respondents	Non-outliers
Mean	39.46	**Grand Avg 32.60**
Std. Dev.	55.82	2.81
Variance	3116.03	7.89
% Coef. of Var.	141.45	8.62
% deviation of mean from known value	23.33	1.86
Norm. dev. of mean from known value	0.13	0.21
Median	32.67	32.33
% deviation of median from known value	2.08	1.04
Norm. dev. of median from known value	0.01	0.12



Cesium-137

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DO	33.0	32.0	30.0	1.53	0.354	31.67	-0.32	-0.12	
DS									•
DT	36.0	35.0	32.0	2.08	0.473	34.33	0.60	0.81	
DZ	24.0	24.0	25.0	0.58	0.118	24.33	-2.86	-2.66	
E	33.0	35.0	33.0	1.15	0.236	33.67	0.37	0.58	
EB	34.0	34.0	34.0	0.00	0.000	34.00	0.49	0.69	
EH	31.0	30.0	31.0	0.58	0.118	30.67	-0.67	-0.46	
EL	32.0	31.0	32.0	0.58	0.118	31.67	-0.32	-0.12	
EO									•
ER									•
EV									•
EX	27.0	33.0	35.0	4.16	0.945	31.67	-0.32	-0.12	
FE	33.0	29.0	39.0	5.03	1.345	33.67	0.37	0.58	
FF									•
FJ	30.0	32.0	29.0	1.53	0.354	30.33	-0.78	-0.58	
FK									•
FL	35.0	33.0	33.0	1.15	0.236	33.67	0.37	0.58	
FN									•
FU	32.0	32.0	33.0	0.58	0.118	32.33	-0.09	0.12	
FW									•
FZ	33.0	38.0	27.0	5.51	1.570	32.67	0.02	0.23	
GE	30.0	32.0	31.0	1.00	0.236	31.00	-0.55	-0.35	
GI	31.0	32.0	30.0	1.00	0.236	31.00	-0.55	-0.35	
GQ									•
GT									•
GZ									•
HH									•
HI									•
HK	32.0	32.0	32.0	0.00	0.000	32.00	-0.21	0.00	
HL	36.0	36.0	36.0	0.00	0.000	36.00	1.18	1.39	
HN									•
HP	32.0	32.0	31.0	0.58	0.118	31.67	-0.32	-0.12	
HU									•
HY									•
I	30.0	32.0	37.0	3.61	0.827	33.00	0.14	0.35	
IA	38.0	34.0	35.0	2.08	0.473	35.67	1.06	1.27	
IC	31.0	33.0	33.0	1.15	0.236	32.33	-0.09	0.12	
ID									•
IE									•
II									•
IU									•
J	32.0	31.0	31.0	0.58	0.118	31.33	-0.44	-0.23	
JE	28.0	33.0	32.0	2.65	0.591	31.00	-0.55	-0.35	
JG									•
JH									•

• ≡ No data submitted
Ø ≡ Insufficient data

TAG SYMBOLS
× ≡ Determined to be an outlier

⇑ ≡ Above control limit
⇓ ≡ Below control limit

United States
Environmental Protection
Agency

Environmental Monitoring
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EPA/600/R-93/143
August 1993
5494

Research and Development

EPA

Gamma in Water Intercomparison Study

AUG 1993
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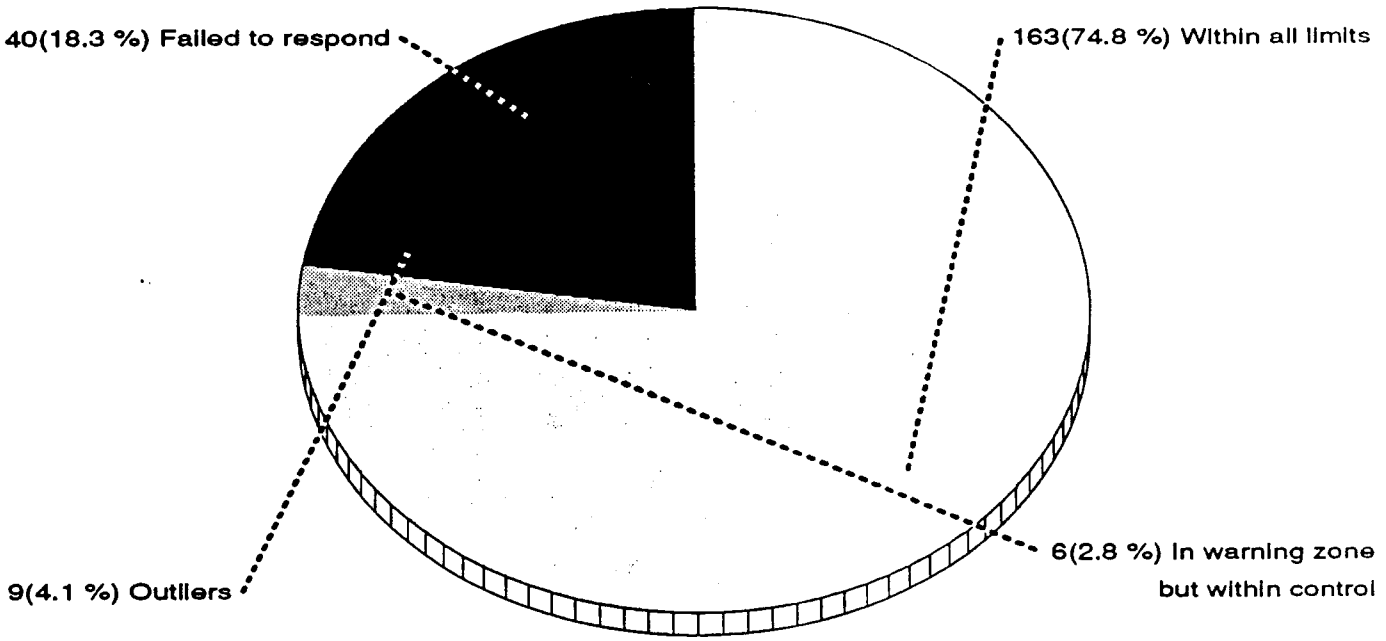
D.A. SEBELIEN

A Statistical Evaluation of the June 11, 1993 Data

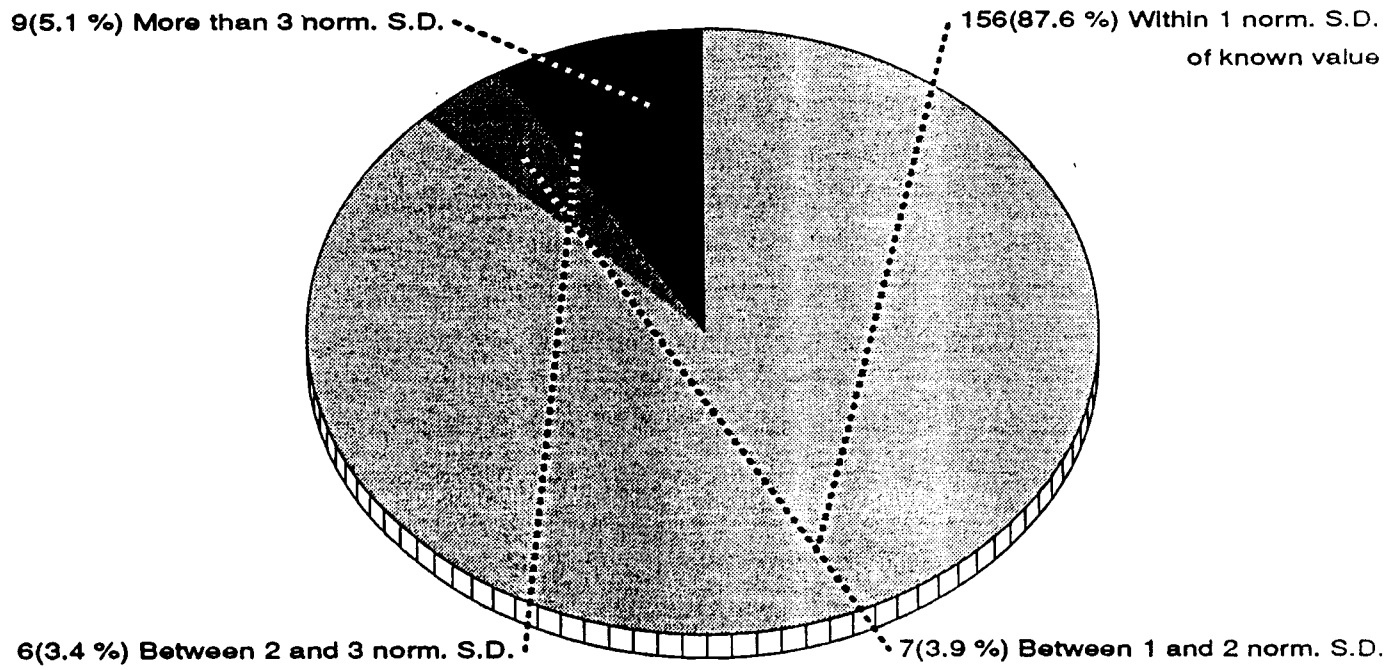
5312GR93NRD.COV-26

Cobalt-60 Statistical Summary 218 Participants

The known value of this nuclide is **15.0 pCi/l** with an expected precision of **5.0**; the control limits are 6.3 to 23.7; the warning regions are 6.3 to 9.2 and 20.8 to 23.7



Statistic	Respondents	Non-outliers
Mean	16.07	**Grand Avg 14.90**
Std. Dev.	11.04	2.08
Variance	121.95	4.32
% Coef. of Var.	68.71	13.96
% deviation of mean from known value	7.15	-0.68
Norm. dev. of mean from known value	0.10	-0.05
Median	15.00	15.00
% deviation of median from known value	0.00	0.00
Norm. dev. of median from known value	0.00	0.00



Cobalt-60

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DL	13.0	14.0	13.0	0.58	0.118	13.33	-0.54	-0.58	
DM	14.0	15.0	17.0	1.53	0.354	15.33	0.15	0.12	
DO	16.0	15.0	21.0	3.21	0.709	17.33	0.84	0.81	
DR									•
DT	14.0	11.0	14.0	1.73	0.354	13.00	-0.66	-0.69	
DY									•
DZ	12.0	11.0	11.0	0.58	0.118	11.33	-1.23	-1.27	
E	16.0	16.0	15.0	0.58	0.118	15.67	0.27	0.23	
EA	15.0	14.0	14.0	0.58	0.118	14.33	-0.20	-0.23	
EB	16.0	16.0	15.0	0.58	0.118	15.67	0.27	0.23	
EH	16.0	15.0	14.0	1.00	0.236	15.00	0.04	0.00	
EL									•
EN									•
EW	15.0	17.0	22.0	3.61	0.827	18.00	1.07	1.04	
EX	18.0	15.0	19.0	2.08	0.473	17.33	0.84	0.81	
EZ	26.0	24.0	30.0	3.06	0.709	26.67	4.08	4.04	×
FE	15.0	14.0	15.0	0.58	0.118	14.67	-0.08	-0.12	
FJ	16.0	15.0	15.0	0.58	0.118	15.33	0.15	0.12	
FK	17.0								∅
FL	15.0	16.0	16.0	0.58	0.118	15.67	0.27	0.23	
FU	14.0	15.0	16.0	1.00	0.236	15.00	0.04	0.00	
FZ	19.0	18.0	16.0	1.53	0.354	17.67	0.96	0.92	
GE	13.0	14.0	13.0	0.58	0.118	13.33	-0.54	-0.58	
GI	15.0	13.0	14.0	1.00	0.236	14.00	-0.31	-0.35	
GL	12.0	16.0	13.0	2.08	0.473	13.67	-0.43	-0.46	
GO	17.0								∅
HE									•
HI	13.0	14.0	19.0	3.21	0.709	15.33	0.15	0.12	
HJ	19.0	18.0	14.0	2.65	0.591	17.00	0.73	0.69	
HK	14.0	14.0	14.0	0.00	0.000	14.00	-0.31	-0.35	
HL	15.0	15.0	15.0	0.00	0.000	15.00	0.04	0.00	
HP	16.0	16.0	17.0	0.58	0.118	16.33	0.50	0.46	
HU	12.0	12.0	13.0	0.58	0.118	12.33	-0.89	-0.92	
I	17.0	18.0	14.0	2.08	0.473	16.33	0.50	0.46	
IA									•
IC	14.0	15.0	15.0	0.58	0.118	14.67	-0.08	-0.12	
II									•
IU	16.0	15.0	15.0	0.58	0.118	15.33	0.15	0.12	
J	15.0	15.0	15.0	0.00	0.000	15.00	0.04	0.00	
JE	14.0	15.0	16.0	1.00	0.236	15.00	0.04	0.00	
JI	14.0	15.0	19.0	2.65	0.591	16.00	0.38	0.35	
JR	16.0	16.0	15.0	0.58	0.118	15.67	0.27	0.23	
JS	16.0	15.0	16.0	0.58	0.118	15.67	0.27	0.23	
JY	16.0	17.0	18.0	1.00	0.236	17.00	0.73	0.69	
K	16.0	14.0	17.0	1.53	0.354	15.67	0.27	0.23	

• ≡ No data submitted

∅ ≡ Insufficient data

TAG SYMBOLS

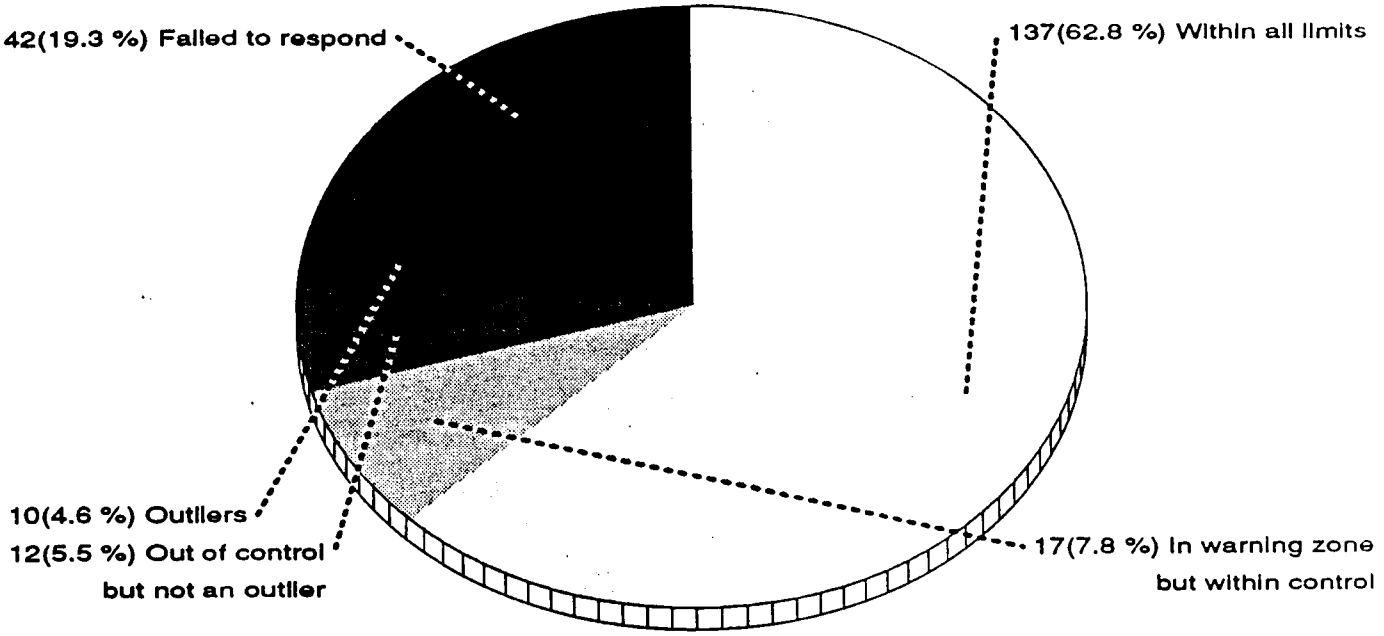
× ≡ Determined to be an outlier

⇑ ≡ Above control limit

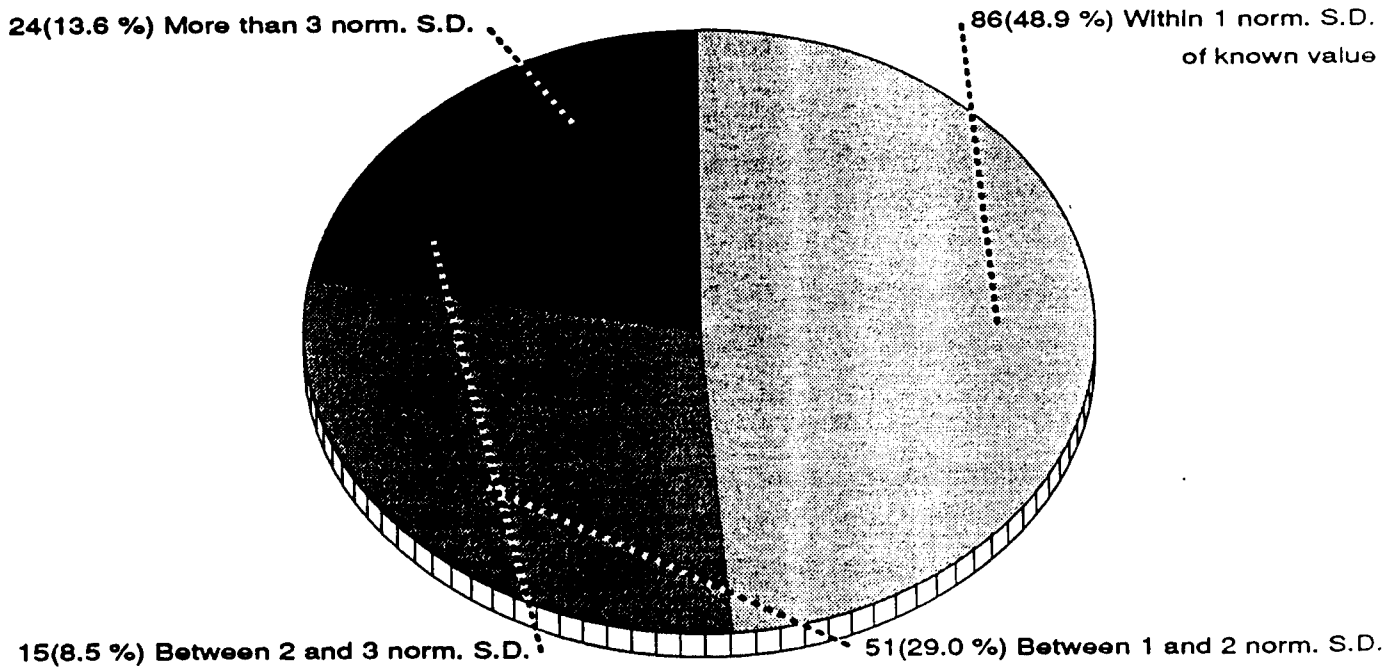
⇓ ≡ Below control limit

Zinc-65 Statistical Summary 218 Participants

The known value of this nuclide is **103.0 pCi/l** with an expected precision of **10.0**; the control limits are 85.7 to 120.3; the warning regions are 85.7 to 91.4 and 114.6 to 120.3



Statistic	Respondents	Non-outliers
Mean	106.02	**Grand Avg 107.54**
Std. Dev.	16.66	7.83
Variance	277.55	61.36
% Coef. of Var.	15.71	7.28
% deviation of mean from known value	2.93	4.41
Norm. dev. of mean from known value	0.18	0.58
Median	107.33	107.33
% deviation of median from known value	4.21	4.21
Norm. dev. of median from known value	0.26	0.55



Zinc-65

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DL	109.0	106.0	98.0	5.69	0.650	104.33	-0.56	0.23	
DM	103.0	103.0	104.0	0.58	0.059	103.33	-0.73	0.06	
DO	105.0	95.0	96.0	5.51	0.591	98.67	-1.54	-0.75	
DR									•
DT	113.0	104.0	111.0	4.73	0.532	109.33	0.31	1.10	
DY									•
DZ	99.0	103.0	94.0	4.51	0.532	98.67	-1.54	-0.75	
E	111.0	117.0	110.0	3.79	0.413	112.67	0.89	1.67	
EA	103.0	103.0	103.0	0.00	0.000	103.00	-0.79	0.00	
EB	116.0	111.0	108.0	4.04	0.473	111.67	0.71	1.50	
EH	105.0	109.0	110.0	2.65	0.295	108.00	0.08	0.87	
EL									•
EN									•
EW	77.0	79.0	100.0	12.74	1.683	85.33	-3.85	-3.06	⇓
EX	105.0	110.0	99.0	5.51	0.650	104.67	-0.50	0.29	
EZ	124.0	126.0	130.0	3.06	0.354	126.67	3.31	4.10	⇑
FE	103.0	109.0	100.0	4.58	0.532	104.00	-0.61	0.17	
FJ	98.0	104.0	105.0	3.79	0.413	102.33	-0.90	-0.12	
FK	124.0								∅
FL	113.0	113.0	114.0	0.58	0.059	113.33	1.00	1.79	
FU	112.0	112.0	112.0	0.00	0.000	112.00	0.77	1.56	
FZ	110.0	110.0	110.0	0.00	0.000	110.00	0.43	1.21	
GE	109.0	106.0	98.0	5.69	0.650	104.33	-0.56	0.23	
GI	110.0	98.0	105.0	6.03	0.709	104.33	-0.56	0.23	
GL	106.0	107.0	109.0	1.53	0.177	107.33	-0.04	0.75	
GO	135.0	141.0	133.0	4.16	0.473	136.33	4.99	5.77	×
HE									•
HI	105.0	94.0	101.0	5.57	0.650	100.00	-1.31	-0.52	
HJ	110.0	110.0	124.0	8.08	0.827	114.67	1.23	2.02	
HK	105.0	111.0	107.0	3.06	0.354	107.67	0.02	0.81	
HL	105.0	105.0	105.0	0.00	0.000	105.00	-0.44	0.35	
HP	121.0	123.0	125.0	2.00	0.236	123.00	2.68	3.46	⇑
HU	87.0	89.0	87.0	1.15	0.118	87.67	-3.44	-2.66	
I	110.0	110.0	107.0	1.73	0.177	109.00	0.25	1.04	
IA									•
IC	112.0	113.0	114.0	1.00	0.118	113.00	0.95	1.73	
II									•
IU	108.0	111.0	108.0	1.73	0.177	109.00	0.25	1.04	
J	110.0	108.0	108.0	1.15	0.118	108.67	0.19	0.98	
JE	105.0	109.0	114.0	4.51	0.532	109.33	0.31	1.10	
JI	102.0	101.0	101.0	0.58	0.059	101.33	-1.08	-0.29	
JR	115.0	111.0	109.0	3.06	0.354	111.67	0.71	1.50	
JS	100.0	105.0	128.0	14.93	2.245	111.00	0.60	1.39	
JY	114.0	111.0	107.0	3.51	0.413	110.67	0.54	1.33	
K	105.0	103.0	112.0	4.73	0.532	106.67	-0.15	0.64	

TAG SYMBOLS

• ≡ No data submitted

∅ ≡ Insufficient data

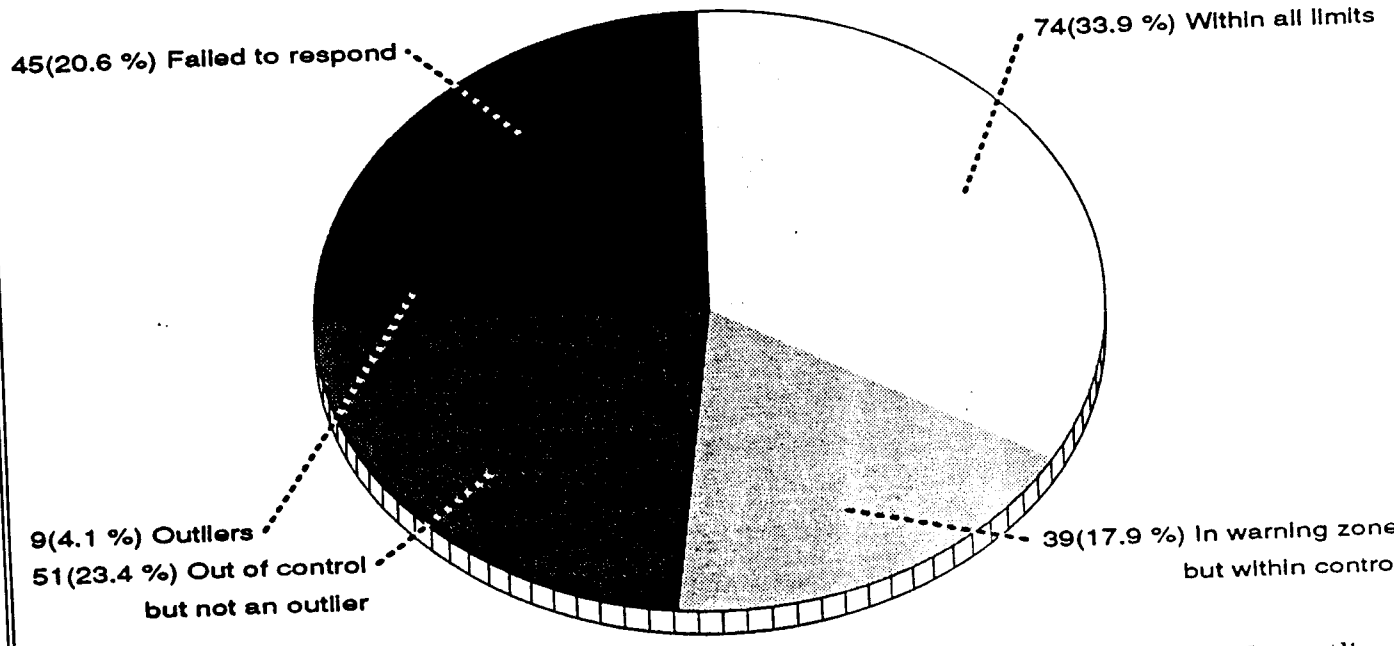
× ≡ Determined to be an outlier

⇑ ≡ Above control limit

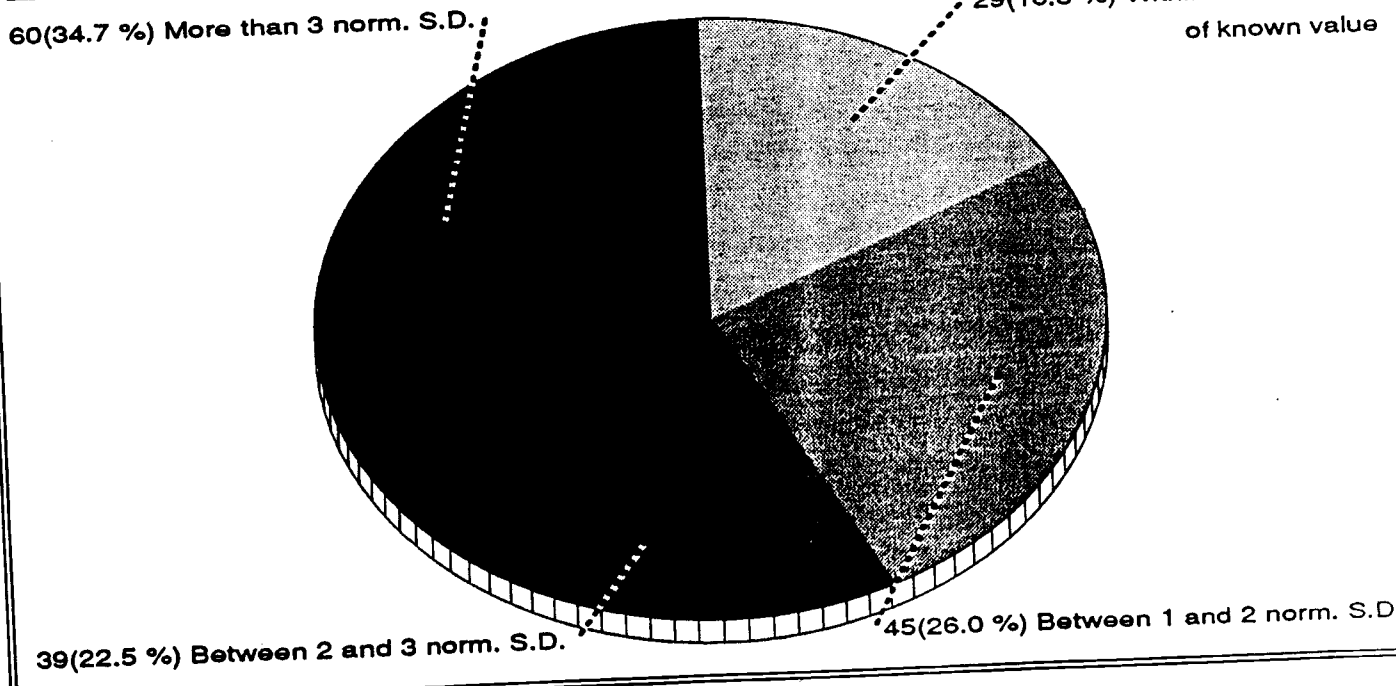
⇓ ≡ Below control limit

Ruthenium-106 Statistical Summary 218 Participants

The known value of this nuclide is **119.0 pCi/l** with an expected precision of **12.0**; the control limits are 98.2 to 139.8; the warning regions are 98.2 to 105.1 and 132.9 to 139.8



Statistic	Respondents		Non-outliers
Mean	104.84	**Grand Avg**	103.87
Std. Dev.	25.58		12.83
Variance	654.41		164.65
% Coef. of Var.	24.40		12.35
% deviation of mean from known value	-11.90		-12.72
Norm. dev. of mean from known value	-0.55		-1.18
Median	103.33		103.50
% deviation of median from known value	-13.17		-13.03
Norm. dev. of median from known value	-0.61		-1.21



Ruthenium-106

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DL	76.0	114.0	102.0	19.43	2.658	97.33	-0.94	-3.13	⇓
DM	107.0	107.0	107.0	0.00	0.000	107.00	0.45	-1.73	
DO	98.0	108.0	85.0	11.53	1.252	97.00	-0.99	-3.18	⇓
DR									•
DT	100.0	124.0	114.0	12.06	1.345	112.67	1.27	-0.91	
DY									•
DZ	109.0	101.0	113.0	6.11	0.591	107.67	0.55	-1.64	
E	116.0	133.0	122.0	8.62	0.837	123.67	2.86	0.67	
EA	105.0	103.0	108.0	2.52	0.246	105.33	0.21	-1.97	
EB	114.0	100.0	117.0	9.07	0.837	110.33	0.93	-1.25	
EH	121.0	117.0	116.0	2.65	0.246	118.00	2.04	-0.14	
EL									•
EN									•
EW	118.0	131.0	112.0	9.71	0.935	120.33	2.38	0.19	
EX	158.0	137.0	139.0	11.59	1.064	144.67	5.89	3.70	⇑
EZ	87.0	71.0	104.0	16.50	2.189	87.33	-2.39	-4.57	⇓
FE	105.0	109.0	104.0	2.65	0.246	106.00	0.31	-1.88	
FJ	106.0	97.0	84.0	11.06	1.158	95.67	-1.18	-3.37	⇓
FK	190.0								∅
FL	118.0	113.0	116.0	2.52	0.246	115.67	1.70	-0.48	
FU	81.0	86.0	87.0	3.21	0.295	84.67	-2.77	-4.96	⇓
FZ	45.0	45.0	45.0	0.00	0.000	45.00	-8.50	-10.68	×
GE	76.0	114.0	102.0	19.43	2.658	97.33	-0.94	-3.13	⇓
GI	110.0	100.0	112.0	6.43	0.591	107.33	0.50	-1.68	
GL	99.0	79.0	94.0	10.41	0.984	90.67	-1.91	-4.09	⇓
GO									•
HE									•
HI	93.0	78.0	100.0	11.24	1.158	90.33	-1.95	-4.14	⇓
HJ	96.0	120.0	115.0	12.66	1.345	110.33	0.93	-1.25	
HK	95.0	95.0	94.0	0.58	0.049	94.67	-1.33	-3.51	⇓
HL	122.0	122.0	122.0	0.00	0.000	122.00	2.62	0.43	
HP	117.0	125.0	121.0	4.00	0.394	121.00	2.47	0.29	
HU	100.0	104.0	104.0	2.31	0.197	102.67	-0.17	-2.36	
I	114.0	97.0	108.0	8.62	0.837	106.33	0.36	-1.83	
IA									•
IC	93.0	99.0	105.0	6.00	0.591	99.00	-0.70	-2.89	
II									•
IU	98.0	80.0	99.0	10.69	0.935	92.33	-1.66	-3.85	⇓
J	107.0	109.0	90.0	10.44	0.935	102.00	-0.27	-2.45	
JE	82.0	94.0	92.0	6.43	0.591	89.33	-2.10	-4.28	⇓
JI	127.0	91.0	119.0	18.90	2.470	112.33	1.22	-0.96	
JR	99.0	102.0	105.0	3.00	0.295	102.00	-0.27	-2.45	
JS	87.0	93.0	78.0	7.55	0.738	86.00	-2.58	-4.76	⇓
JY	163.0	142.0	82.0	42.04	6.690	129.00	3.63	1.44	
K	90.0	94.0	94.0	2.31	0.197	92.67	-1.62	-3.80	⇓

• ≡ No data submitted

∅ ≡ Insufficient data

TAG SYMBOLS

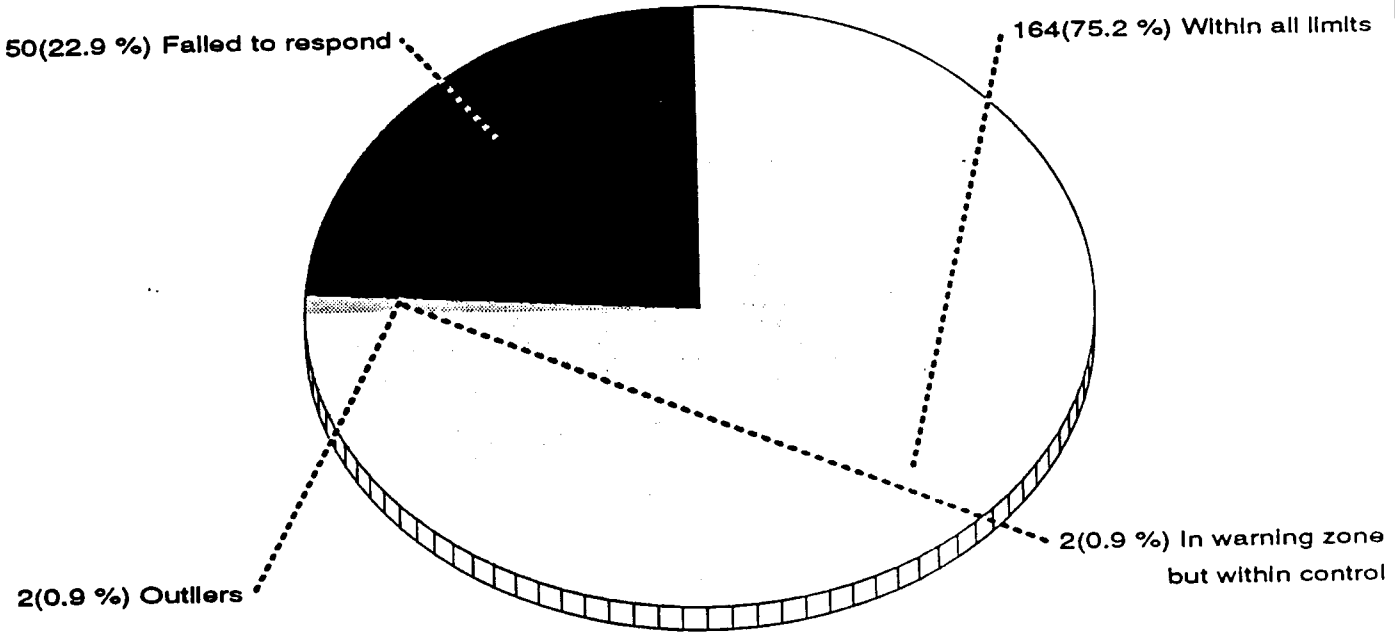
× ≡ Determined to be an outlier

⇑ ≡ Above control limit

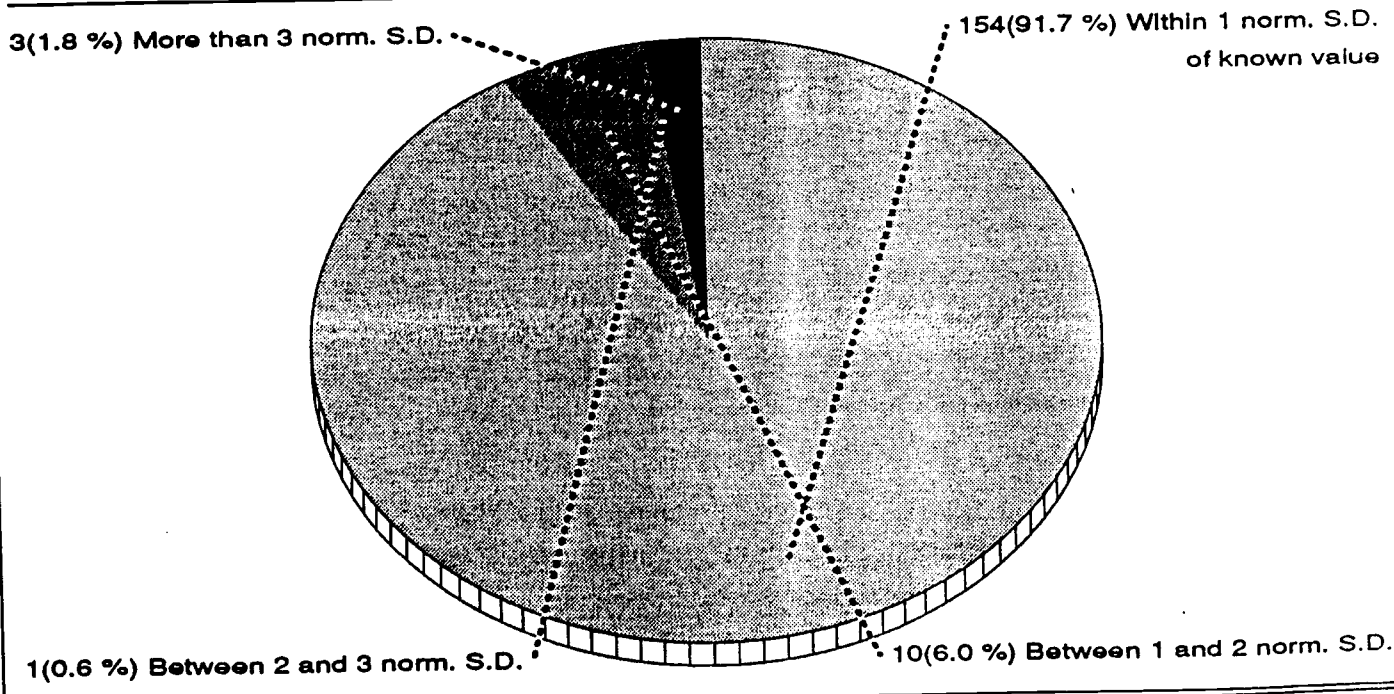
⇓ ≡ Below control limit

Cesium-134 Statistical Summary 218 Participants

The known value of this nuclide is **5.0 pCi/l** with an expected precision of **5.0**; the control limits are 0.0 to 13.7; the warning regions are 0.0 to 0.0 and 10.8 to 13.7



Statistic	Respondents	Non-outliers
Mean	5.71	**Grand Avg 5.39**
Std. Dev.	3.40	1.57
Variance	11.58	2.46
% Coef. of Var.	59.60	29.14
% deviation of mean from known value	14.21	7.71
Norm. dev. of mean from known value	0.21	0.25
Median	5.00	5.00
% deviation of median from known value	0.00	0.00
Norm. dev. of median from known value	0.00	0.00



Cesium-134

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DL	4.0	4.0	5.0	0.58	0.118	4.33	-0.36	-0.23	
DM	6.0	6.0	6.0	0.00	0.000	6.00	0.21	0.35	
DO									•
DR									•
DT	6.0	5.0	3.0	1.53	0.354	4.67	-0.25	-0.12	
DY									•
DZ	7.0	6.0	6.0	0.58	0.118	6.33	0.33	0.46	
E	6.0	5.0	6.0	0.58	0.118	5.67	0.10	0.23	
EA	5.0	5.0	5.0	0.00	0.000	5.00	-0.13	0.00	
EB	5.0	5.0	5.0	0.00	0.000	5.00	-0.13	0.00	
EH	5.0	5.0	5.0	0.00	0.000	5.00	-0.13	0.00	
EL									•
EN									•
EW	7.0	3.0	11.0	4.00	0.945	7.00	0.56	0.69	
EX	7.0	8.0	8.0	0.58	0.118	7.67	0.79	0.92	
EZ	6.0	12.0	13.0	3.79	0.827	10.33	1.71	1.85	
FE	5.0	5.0	5.0	0.00	0.000	5.00	-0.13	0.00	
FJ	6.0	6.0	6.0	0.00	0.000	6.00	0.21	0.35	
FK	6.0								Ø
FL	5.0	5.0	5.0	0.00	0.000	5.00	-0.13	0.00	
FU	4.0	5.0	5.0	0.58	0.118	4.67	-0.25	-0.12	
FZ	6.0	9.0	7.0	1.53	0.354	7.33	0.67	0.81	
GE	4.0	4.0	5.0	0.58	0.118	4.33	-0.36	-0.23	
GI	5.0	5.0	5.0	0.00	0.000	5.00	-0.13	0.00	
GL	4.0	4.0	6.0	1.15	0.236	4.67	-0.25	-0.12	
GO									•
HE									•
HI									•
HJ	8.0	6.0	6.0	1.15	0.236	6.67	0.44	0.58	
HK	4.0	5.0	6.0	1.00	0.236	5.00	-0.13	0.00	
HL	5.0	5.0	5.0	0.00	0.000	5.00	-0.13	0.00	
HP	2.0	2.0	2.0	0.00	0.000	2.00	-1.17	-1.04	
HU	5.0	5.0	5.0	0.00	0.000	5.00	-0.13	0.00	
I	4.0	6.0	7.0	1.53	0.354	5.67	0.10	0.23	
IA									•
IC	5.0	4.0	4.0	0.58	0.118	4.33	-0.36	-0.23	
II									•
IU	5.0	7.0	6.0	1.00	0.236	6.00	0.21	0.35	
J	5.0	5.0	5.0	0.00	0.000	5.00	-0.13	0.00	
JE	5.0	4.0	5.0	0.58	0.118	4.67	-0.25	-0.12	
JI	5.0	6.0	6.0	0.58	0.118	5.67	0.10	0.23	
JR	6.0	7.0	6.0	0.58	0.118	6.33	0.33	0.46	
JS	6.0	6.0	5.0	0.58	0.118	5.67	0.10	0.23	
JY	7.0	6.0	5.0	1.00	0.236	6.00	0.21	0.35	
K	4.0	5.0	4.0	0.58	0.118	4.33	-0.36	-0.23	

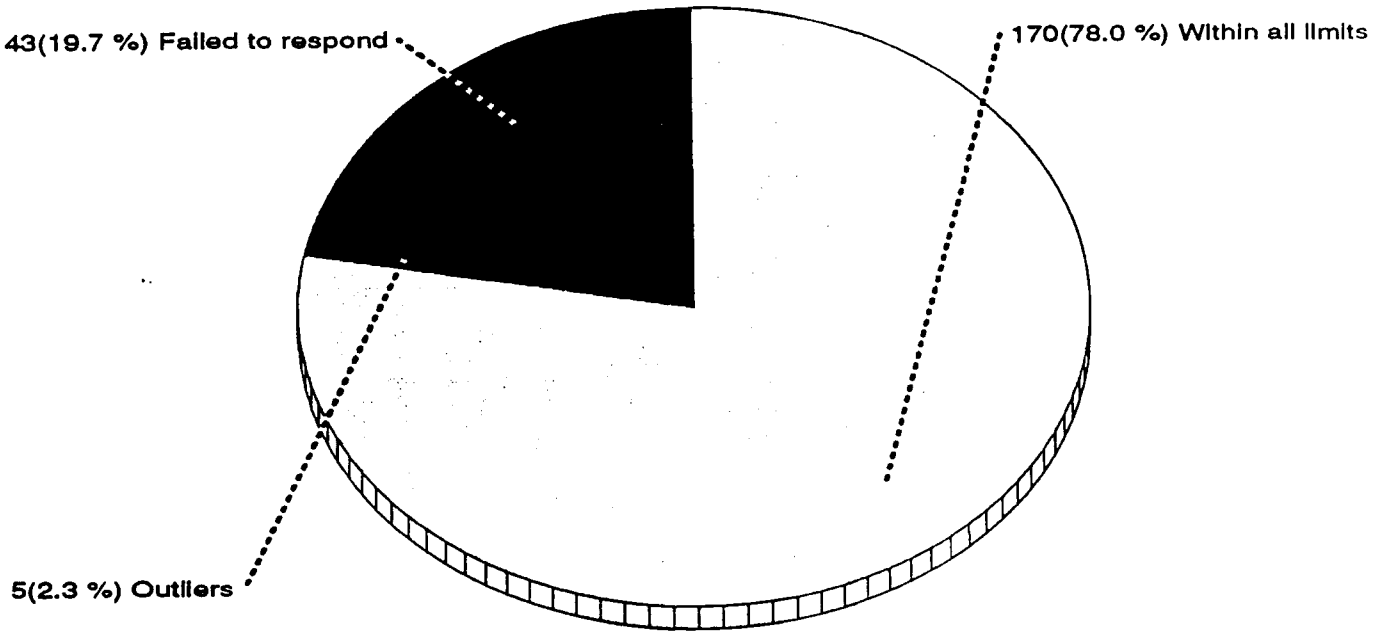
• ≡ No data submitted
Ø ≡ Insufficient data

TAG SYMBOLS
× ≡ Determined to be an outlier

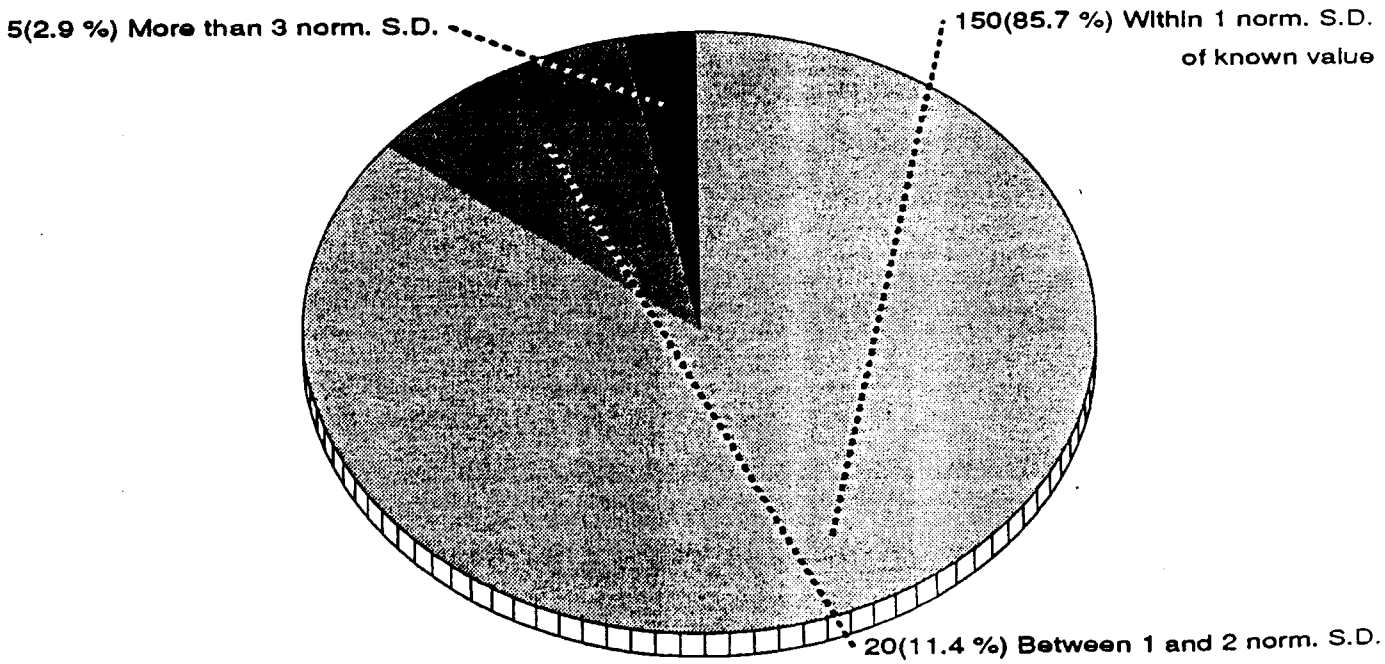
⇑ ≡ Above control limit
⇓ ≡ Below control limit

Cesium-137 Statistical Summary 218 Participants

The known value of this nuclide is **5.0 pCi/l** with an expected precision of **5.0**; the control limits are 0.0 to 13.7; the warning regions are 0.0 to 0.0 and 10.8 to 13.7



Statistic	Respondents	Non-outliers
Mean	14.23	**Grand Avg 5.76**
Std. Dev.	106.03	1.47
Variance	11242.71	2.16
% Coef. of Var.	745.20	25.50
% deviation of mean from known value	184.57	15.29
Norm. dev. of mean from known value	0.09	0.52
Median	5.33	5.33
% deviation of median from known value	6.67	6.67
Norm. dev. of median from known value	0.00	0.23



Cesium-137

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	Normalized deviation (known)	Tag
DL	6.0	5.0	5.0	0.58	0.118	5.33	-0.15	0.12	
DM	5.0	6.0	7.0	1.00	0.236	6.00	0.08	0.35	
DO									•
DR									•
DT	4.0	2.0	8.0	3.06	0.709	4.67	-0.38	-0.12	
DY									•
DZ	6.0	6.0	6.0	0.00	0.000	6.00	0.08	0.35	
E	5.0	7.0	6.0	1.00	0.236	6.00	0.08	0.35	
EA	5.0	5.0	5.0	0.00	0.000	5.00	-0.26	0.00	
EB	6.0	6.0	6.0	0.00	0.000	6.00	0.08	0.35	
EH	4.0	6.0	5.0	1.00	0.236	5.00	-0.26	0.00	
EL									•
EN									•
EW	8.0	10.0	11.0	1.53	0.354	9.67	1.35	1.62	
EX	5.0	8.0	14.0	4.58	1.120	9.00	1.12	1.39	
EZ	9.0	12.0	10.0	1.53	0.354	10.33	1.58	1.85	
FE	5.0	7.0	5.0	1.15	0.236	5.67	-0.03	0.23	
FJ	5.0	5.0	4.0	0.58	0.118	4.67	-0.38	-0.12	
FK	5.0								∅
FL	5.0	5.0	6.0	0.58	0.118	5.33	-0.15	0.12	
FU	4.0	5.0	6.0	1.00	0.236	5.00	-0.26	0.00	
FZ	6.0	6.0	4.0	1.15	0.236	5.33	-0.15	0.12	
GE	6.0	5.0	5.0	0.58	0.118	5.33	-0.15	0.12	
GI	5.0	5.0	5.0	0.00	0.000	5.00	-0.26	0.00	
GL	7.0	5.0	7.0	1.15	0.236	6.33	0.20	0.46	
GO									•
HE									•
HI	4.0	8.0	5.0	2.08	0.473	5.67	-0.03	0.23	
HJ	10.0	8.0	10.0	1.15	0.236	9.33	1.24	1.50	
HK	5.0	6.0	5.0	0.58	0.118	5.33	-0.15	0.12	
HL	7.0	7.0	7.0	0.00	0.000	7.00	0.43	0.69	
HP	10.0	9.0	9.0	0.58	0.118	9.33	1.24	1.50	
HU	7.0	7.0	7.0	0.00	0.000	7.00	0.43	0.69	
I	7.0	7.0	5.0	1.15	0.236	6.33	0.20	0.46	
IA									•
IC	6.0	5.0	5.0	0.58	0.118	5.33	-0.15	0.12	
IT									•
IU	5.0	5.0	5.0	0.00	0.000	5.00	-0.26	0.00	
J	5.0	6.0	5.0	0.58	0.118	5.33	-0.15	0.12	
JE	5.0	5.0	5.0	0.00	0.000	5.00	-0.26	0.00	
JI	7.0	5.0	8.0	1.53	0.354	6.67	0.31	0.58	
JR	8.0	6.0	6.0	1.15	0.236	6.67	0.31	0.58	
JS	5.0	6.0	5.0	0.58	0.118	5.33	-0.15	0.12	
JY	7.0	5.0	8.0	1.53	0.354	6.67	0.31	0.58	
K	6.0	9.0	7.0	1.53	0.354	7.33	0.54	0.81	

• ≡ No data submitted

∅ ≡ Insufficient data

TAG SYMBOLS

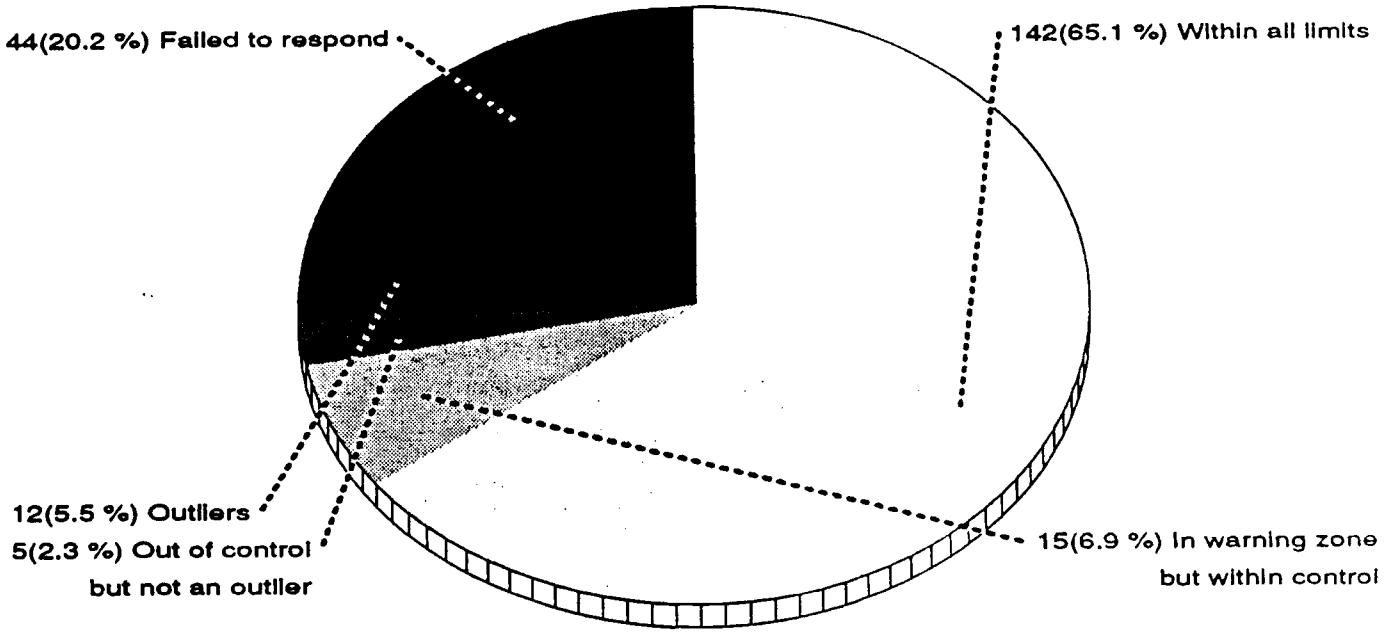
× ≡ Determined to be an outlier

⇑ ≡ Above control limit

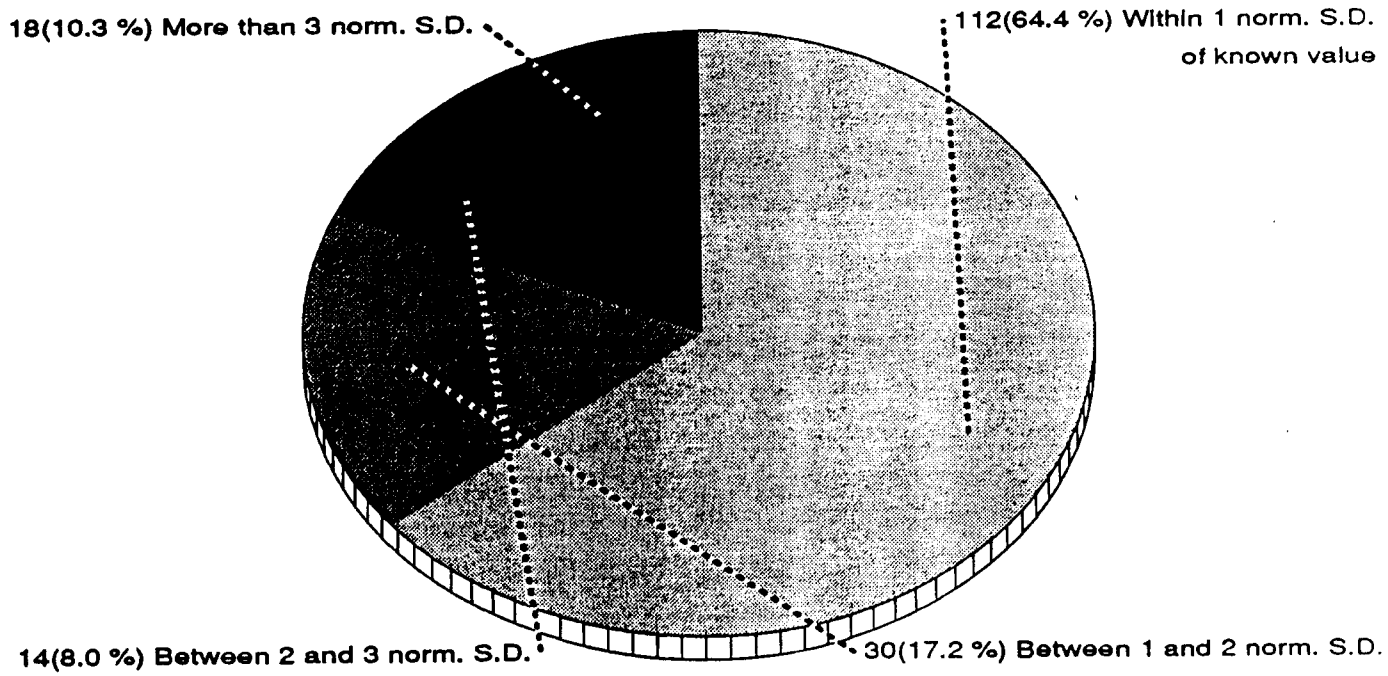
⇓ ≡ Below control limit

Barium-133 Statistical Summary 218 Participants

The known value of this nuclide is **99.0 pCi/l** with an expected precision of **10.0**; the control limits are 81.7 to 116.3; the warning regions are 81.7 to 87.4 and 110.6 to 116.3



Statistic	Respondents	Non-outliers
Mean	95.16	**Grand Avg 96.74**
Std. Dev.	14.34	6.87
Variance	205.73	47.19
% Coef. of Var.	15.07	7.10
% deviation of mean from known value	-3.87	-2.28
Norm. dev. of mean from known value	-0.27	-0.33
Median	97.00	97.00
% deviation of median from known value	-2.02	-2.02
Norm. dev. of median from known value	-0.14	-0.29



Barium-133

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DL	99.0	97.0	90.0	4.73	0.532	95.33	-0.24	-0.64	
DM	102.0	102.0	102.0	0.00	0.000	102.00	0.91	0.52	
DO	91.0	98.0	98.0	4.04	0.413	95.67	-0.19	-0.58	
DR									•
DT	101.0	99.0	105.0	3.06	0.354	101.67	0.85	0.46	
DY									•
DZ	84.0	84.0	84.0	0.00	0.000	84.00	-2.21	-2.60	
E	97.0	97.0	94.0	1.73	0.177	96.00	-0.13	-0.52	
EA	97.0	99.0	98.0	1.00	0.118	98.00	0.22	-0.17	
EB	103.0	103.0	103.0	0.00	0.000	103.00	1.08	0.69	
EH	95.0	96.0	95.0	0.58	0.059	95.33	-0.24	-0.64	
EL									•
EN									•
EW	128.0	130.0	116.0	7.57	0.827	124.67	4.84	4.45	×
EX	94.0	97.0	92.0	2.52	0.295	94.33	-0.42	-0.81	
EZ	103.0	94.0	103.0	5.20	0.532	100.00	0.56	0.17	
FE	99.0	95.0	97.0	2.00	0.236	97.00	0.04	-0.35	
FJ	95.0	94.0	98.0	2.08	0.236	95.67	-0.19	-0.58	
FK	105.0								∅
FL	105.0	99.0	100.0	3.21	0.354	101.33	0.79	0.40	
FU	96.0	99.0	100.0	2.08	0.236	98.33	0.28	-0.12	
FZ	100.0	91.0	100.0	5.20	0.532	97.00	0.04	-0.35	
GE	99.0	97.0	90.0	4.73	0.532	95.33	-0.24	-0.64	
GI	104.0	91.0	93.0	7.00	0.768	96.00	-0.13	-0.52	
GL	97.0	102.0	101.0	2.65	0.295	100.00	0.56	0.17	
GO	15.0	16.0	11.0	2.65	0.295	14.00	-14.33	-14.72	×
HE									•
HI	94.0	99.0	95.0	2.65	0.295	96.00	-0.13	-0.52	
HJ	97.0	101.0	102.0	2.65	0.295	100.00	0.56	0.17	
HK	93.0	94.0	93.0	0.58	0.059	93.33	-0.59	-0.98	
HL	99.0	99.0	99.0	0.00	0.000	99.00	0.39	0.00	
HP	150.0	118.0	134.0	16.00	2.695	134.00	6.45	6.06	×
HU	77.0	76.0	76.0	0.58	0.059	76.33	-3.54	-3.93	⇓
I	100.0	99.0	98.0	1.00	0.118	99.00	0.39	0.00	
IA									•
IC	107.0	98.0	99.0	4.93	0.532	101.33	0.79	0.40	
II									•
IU	94.0	100.0	96.0	3.06	0.354	96.67	-0.01	-0.40	
J	99.0	97.0	99.0	1.15	0.118	98.33	0.28	-0.12	
JE	90.0	95.0	96.0	3.21	0.354	93.67	-0.53	-0.92	
JI	103.0	94.0	96.0	4.73	0.532	97.67	0.16	-0.23	
JR	84.0	84.0	84.0	0.00	0.000	84.00	-2.21	-2.60	
JS	104.0	95.0	93.0	5.86	0.650	97.33	0.10	-0.29	
JY	100.0	108.0	106.0	4.16	0.473	104.67	1.37	0.98	
K	97.0	89.0	89.0	4.62	0.473	91.67	-0.88	-1.27	

TAG SYMBOLS

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

REGION 10
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 1 FY 93

MAY 1993
RECEIVED
L.P. MARKEL

LABORATORY: Westinghouse Hanford (WA)
PERFORMANCE: ACCEPTABLE - Response Explaining Deficiency(ies) Required
RANK: Above = 3 Same = 0 Below = 13

% SCORE: 87.5
REPORT DATE: 12/24/92
MATRIX: WATER

COMPOUND	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY DATA CONC	Q	#LABS MIS-QNT	PROGRAM DATA #LABS NOT-ID	#LABS ID-CPD	TOTAL #LABS
TCL VOLATILE										
CHLOROMETHANE	35	71	29	91	52		2	1	58	59
1,1-DICHLOROETHANE	NU	NU	NU	NU	10		0	0	59	59
CHLOROFORM	61	75	59	83	67		1	0	59	59
2-BUTANONE	71	110	66	110	59	X	15	2	57	59
CIS-1,3-DICHLOROPROPENE	66	87	63	98	82		3	1	58	59
BROMOFORM	57	74	54	77	71		8	0	59	59
2-HEXANONE	110	250	92	270	160		3	0	59	59
1,1,2,2-TETRACHLOROETHANE	120	160	110	160	160		5	0	59	59
CHLOROBENZENE	34	41	34	44	39		3	0	59	59
STYRENE	160	200	150	210	200		3	0	59	59
XYLENES (TOTAL)	73	92	70	100	86		2	3	56	59
TCL SEMIVOLATILE										
PHENOL	17	28	16	29	0	NR	4	1	58	59
BIS(2-CHLOROETHYL)ETHER	32	46	30	54	0	NR	3	0	59	59
4-METHYLPHENOL	23	34	21	40	0	NR	6	0	59	59
HEXACHLOROETHANE	33	60	28	76	0	NR	0	0	59	59
2,4-DIMETHYLPHENOL	17	30	15	38	0	NR	6	2	57	59
BIS(2-CHLOROETHOXY)METHANE	20	25	19	28	0	NR	11	0	59	59
1,2,4-TRICHLOROBENZENE	28	43	26	51	0	NR	2	0	59	59
HEXACHLOROCYCLOPENTADIENE	NU	NU	NU	NU	0	NR	0	31	28	59
2,4,6-TRICHLOROPHENOL	21	31	20	32	0	NR	7	0	59	59
4-NITROPHENOL	41	64	38	67	0	NR	11	1	58	59
4-BROMOPHENYL PHENYL ETHER	13	22	12	24	0	NR	0	0	59	59
HEXACHLOROBENZENE	34	44	32	49	0	NR	5	0	59	59
ANTHRACENE	NU	NU	NU	NU	0	NR	0	0	59	59
PYRENE	74	140	65	180	0	NR	3	0	59	59
BUTYL BENZYL PHTHALATE	38	63	35	67	0	NR	9	0	59	59
BENZO(A)PYRENE	25	43	22	52	0	NR	5	0	59	59
TCL PESTICIDES										
ALPHA-BHC	0.16	0.22	0.16	0.23	0	NR	10	1	58	59
BETA-BHC	0.16	0.24	0.14	0.26	0	NR	4	4	55	59
GAMMA-BHC (LINDANE)	0.15	0.22	0.14	0.23	0	NR	6	0	59	59
HEPTACHLOR	0.29	0.43	0.27	0.45	0	NR	8	1	58	59
ALDRIN	0.12	0.2	0.11	0.21	0	NR	5	0	59	59
HEPTACHLOR EPOXIDE	0.31	0.43	0.29	0.44	0	NR	7	1	58	59
ENDOSULFAN I	0.21	0.38	0.19	0.48	0	NR	4	1	58	59
ENDOSULFAN II	0.43	0.7	0.39	0.84	0	NR	2	1	58	59
ENDOSULFAN SULFATE	0.82	1.3	0.74	1.4	0	NR	4	1	58	59
4,4'-DDT	0.95	1.5	0.87	1.5	0	NR	6	0	59	59
ENDRIN KETONE	0.68	1.1	0.62	1.1	0	NR	6	1	58	59
NON-TCL VOLATILE										
EPICHLOROHYDRIN					0	NR		59	0	59

REGION 10
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 1 FY 93

LABORATORY: Westinghouse Hanford (WA)
PERFORMANCE: ACCEPTABLE - Response Explaining Deficiency(ies) Required
RANK: Above = 3 Same = 0 Below = 13

% SCORE: 87.5
REPORT DATE: 12/24/92
MATRIX: WATER

COMPOUND	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY DATA CONC	Q	#LABS MIS-QNT	PROGRAM DATA #LABS NOT-ID	#LABS ID-CPD	TOTAL #LABS
PROPANE,1,2-DIBROMO-3-CHLORO-					17			23	36	59
TOLUENE,2-CHLORO-					71			7	52	59
NON-TCL SEMIVOLATILE										
4,4'-DDT					0	NR		15	44	59
TCL VOLATILE (Contaminants)										
1,1,1-TRICHLOROETHANE					0.3			57	2	59
TRICHLOROETHENE					1			28	31	59
TRANS-1,3-DICHLOROPROPENE					0.7			53	6	59
NON-TCL VOLATILE (Contaminants)										
UNKNOWN					11			52	7	59
UNKNOWN					28			57	2	59
2-PROPANOL					70			23	36	59
PROPANOIC ACID,2-METHYL-,1					9			58	1	59

OF TCL COMPOUNDS NOT-IDENTIFIED: 0
OF TCL COMPOUNDS MIS-QUANTIFIED: 1
OF TCL CONTAMINANTS: 0

OF NON-TCL COMPOUNDS NOT-IDENTIFIED: 0
OF NON-TCL CONTAMINANTS: 0

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 1 FY 93

MAY 1993
RECEIVED
L.P. MARKEL

LABORATORY NAME: Westinghouse Hanford Co. (WA) [G1] (WHC)
PERFORMANCE LEVEL: ACCEPTABLE
LABORATORY RANK: Above = 21 Same = 0 Below = 14

% Score: 90.7
REPORT DATE: 12/9/1992
MATRIX: SOIL

ELEMENT	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	11400	23000	10200	24200	17300			0	0	0	0	2	36
ANTIMONY	c	c	c	c	6.6	B		0	0	0	30	0	36
ARSENIC	80.2	105	77.5	108	101			0	2	0	0	0	36
BARIUM	170	212	166	217	194			0	2	0	0	0	36
BERYLLIUM	1.0	1.5	1.0	1.6	0.62	U		0	1	0	0	0	36
CADMIUM	33.3	44.6	32.1	45.8	43.7			0	0	0	1	0	36
CALCIUM	18900	21700	18600	22000	18100	E	X	0	4	0	0	0	36
CHROMIUM	15.6	21.6	15.0	22.2	21.9		$	0	12	0	1	2	36
COBALT	10.0	10.7	10.0	11.2	7.8	B		0	0	0	0	0	36
[illegible]ER	96.6	116	94.5	118	113			0	3	0	1	0	36
[illegible]	16800	22600	16100	23300	21700			0	6	0	0	2	36
LEAD	999	1200	977	1220	1130			0	4	0	0	0	36
MAGNESIUM	6280	8250	6070	8460	7180			0	0	0	0	0	36
MANGANESE	444	539	434	550	522			0	1	0	0	0	36
MERCURY	4.0	8.4	3.5	8.9	5.6			0	1	0	2	0	36
NICKEL	12.1	19.0	11.3	19.8	16.9			0	1	0	0	0	36
POTASSIUM	3020	5320	2770	5570	4370			0	3	0	0	0	36
SELENIUM	1.0	1.6	1.0	1.8	0.83	U		2	4	0	17	1	36
SILVER	2.7	5.3	2.4	5.5	4.1			0	1	0	5	0	36
SODIUM	d	d	d	d	266	B		0	0	0	0	0	36
THALLIUM	0.86	2.0	2.0	2.2	1.7	B		0	1	0	9	0	36
VANADIUM	31.9	47.8	30.2	49.5	47			0	10	0	1	1	36
ZINC	275	337	268	344	335			0	2	0	0	0	36

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 1
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 3
SOIL : Sb, Se, Tl

DUPLICATES OUT: 0
[illegible] :

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 1 FY 93

LABORATORY NAME: Westinghouse Hanford Co. (WA) [G1] (WHC)
PERFORMANCE LEVEL: ACCEPTABLE
LABORATORY RANK: Above = 21 Same = 0 Below = 14

% Score: 90.7
REPORT DATE: 12/9/1992
MATRIX: WATER 1

ELEMENT	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	1070	1140	1060	1150	1110			0	7	0	0	0	36
ANTIMONY	346	401	340	407	373			0	1	0	1	1	36
ARSENIC	58.3	76.5	56.3	78.5	63.7			0	0	0	3	1	36
BARIUM	c	c	c	c	3	U		0	0	0	0	0	36
BERYLLIUM	63.5	74.3	62.3	75.5	70			0	1	0	0	0	36
CADMIUM	38.8	42.6	38.4	43.0	42.8		$	0	10	0	0	0	36
CALCIUM	28100	31300	27700	31700	27600		X	0	3	0	0	0	36
CHROMIUM	64.1	78.2	62.6	79.7	70.2			0	2	0	0	0	36
COBALT	185	214	182	217	207			0	0	0	0	0	36
[illegible]PER	228	261	224	265	251			0	1	0	1	0	36
[illegible]	379	448	372	455	427			0	1	0	0	0	36
[illegible]AD	11.7	17.0	11.1	17.6	16.8			0	3	0	1	1	36
MAGNESIUM	21300	23500	21000	23800	21800			0	1	0	0	0	36
MANGANESE	c	c	c	c	5.5	B		0	0	0	0	0	36
MERCURY	2.4	7.8	1.8	8.4	3.2			0	7	0	2	0	36
NICKEL	227	286	221	292	259			0	0	0	0	0	36
POTASSIUM	c	c	c	c	133	U		0	0	0	0	0	36
SELENIUM	49.2	65.0	47.5	66.7	56.1			0	3	0	2	1	36
SILVER	46.9	53.7	46.2	54.4	60		X	0	5	0	3	0	36
SODIUM	d	d	d	d	106	B		0	0	0	0	0	36
THALLIUM	83.4	110	80.4	113	107			0	5	0	5	0	36
VANADIUM	c	c	c	c	11	U		0	0	0	0	0	36
ZINC	226	274	220	279	260			0	1	0	0	0	36

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 2
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
WATER :

[illegible] DUPLICATES OUT: 0
[illegible]R :

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 1 FY 93

LABORATORY NAME: Westinghouse Hanford Co. (WA) [G1] (WHC)
PERFORMANCE LEVEL: ACCEPTABLE
LABORATORY RANK: Above = 21 Same = 0 Below = 14

% Score: 90.7
REPORT DATE: 12/9/1992
MATRIX: WATER 2

ELEMENT	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q	PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	c	c	c	c	34	U	0	0	0	0	0	36
ANTIMONY	270	559	239	590	370		0	0	0	1	1	36
ARSENIC	35.0	59.2	32.3	61.9	40.7		0	2	0	3	1	36
BARIUM	827	1470	757	1540	997		0	0	0	0	0	36
BERYLLIUM	36.2	64.6	33.2	67.7	43.8		0	0	0	0	0	36
CADMIUM	13.2	29.2	11.5	30.9	17.9		0	0	0	0	0	36
CALCIUM	c	c	c	c	154	B	0	0	0	0	0	36
CHROMIUM	77.7	136	71.3	142	95.8		0	0	0	0	0	36
COBALT	311	528	288	551	367		0	1	0	0	0	36
[illegible]ER	c	c	c	c	6	U	0	0	1	1	0	36
[illegible]	554	871	519	906	641		0	5	0	0	0	36
LEAD	18.0	34.1	16.3	35.9	25.9		0	4	0	1	1	36
MAGNESIUM	c	c	c	c	9	B	0	0	0	0	0	36
MANGANESE	108	173	101	180	125		0	1	0	0	0	36
MERCURY	0.2	1.6	0.2	1.7	0.3		0	1	0	2	0	36
NICKEL	c	c	c	c	18	U	0	0	0	0	0	36
POTASSIUM	15400	29200	13800	30700	20400		0	0	0	0	0	36
SELENIUM	24.2	51.0	21.3	53.9	34.5		0	0	0	2	1	36
SILVER	43.3	82.5	39.0	86.8	58.3		0	0	0	3	0	36
SODIUM	19800	34201	18200	35801	23600		0	0	0	0	0	36
THALLIUM	c	c	c	c	2	U	0	0	0	5	0	36
VANADIUM	389	663	359	693	472		0	0	0	0	0	36
ZINC	c	c	c	c	25	U	0	0	0	0	0	36

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 0
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
WATER :

[illegible]DUPLICATES OUT: 0
[illegible] :

Claude

Copies to Route: TQO Staff Return

DON'T SAY IT --- *Write It!*

DATE: July 13, 1993

TO: R. Paul Carter

FROM: Curtis R. Stroup B2-23

Telephone: 372-0816

CC: M. L. Bell
M. Carter
G. A. King
K. Kuhl-Klinger
G. J. Kosiancic
L. P. Markel
C. G. Mooers
B Newberry
K. N. Pool
D. M. Wanek

JUL 1993 RECEIVED

SUBJECT:

Meeting Minutes, 222-S Inorganic PE Results, July 13, 1993

- Attendees

Cary Seidel	WHC
William (Bill) Winters	WHC
Curtis Stroup	WHC
Harold Vincent	EPA EMSL-LV
Bob Newberry	DOE-HQ
Mike Carter	DOE-HQ

- Location: Crystal City, Virginia
  Hyatt Regency Hotel

- Curtis Stroup, Bill Winters, and Cary Seidel discussed (drafts attached) the 222-S PE QB3-93 results and WHC's belief that an administrative error had occurred prior to WHC receipt of the PE sample. Discussions included:

  - 222-S and 325 had not officially received the PE results from EPA.

  - Water I appeared to be the correct sample and that WHC was biased high.

  - Water I and water II appeared to be the same sample.

  - The soil appeared not to be QB3-93, but could be QB3-92

- Harold Vincent stated that Larry Butler EPA EMSL-LV sends out the PE results and that he would check to see why we hadn't received them.

- Harold acknowledged WHC's belief may be correct and that EPA EMSL-LV would investigate. Bob Newberry and Mike Carter agreed. Harold requested that WHC further review and transmit to EPA transportation and bottle labeling records for names and times. WHC said they would conduct further review and transmit any new information to EPA EMSL-LV.

- Bob Newberry stated that 222-S latest WP results were excellent and that in WHC's response to EPA they should include a table of 222-S performance on all PE's (PE's and WP's) over the past year. Harold Vincent agreed.

- Harold Vincent stated that WHC's response should be transmitted (after receipt of the official results) to Larry Butler EPA EMSL-LV.

- Harold Vincent stated according to EPA records that official PE results are sent to Larry Markel at 222-S and Lee Daniel at 325. Curtis Stroup stated that 325 needs to, if they haven't already requested, change to Kris Kuhl-Klinger.

- Curtis Stroup stated that Hanford treats the PE program seriously and is investigating when laboratory operations should be placed on hold. Curtis asked Harold Vincent and Bob Newberry how EPA was conducting their program and if they had any documentation or specifications on halting laboratory operations.

- Harold Vincent stated that the PE results are one indicator but not the sole indicator on how well a laboratory is performing. EPA uses the PE results as an indicator as to when a laboratory needs further assessment/auditing. Harold stated that Jim Barron of EPA AOB HQ was in charge of determining when laboratory operations should be halted. Harold stated that Jim Barron was at our meeting (EPA 9th Annual Waste Testing and Quality Assurance Symposium) and that he would introduce us to him.

- Harold Vincent and Bob Newberry agreed to send WHC any information on EPA systems in place to assess PE results and whether lab operations should be continued. Bob Newberry said he may discuss any information he can obtain at Hanford the week of July 28, 1993.

- Curtis asked that Paul Carter DOE Richland Operations Office be copied on future EPA PE results transmittals to DOE-HQ. Harold and Bob agreed.

- Both Harold and Bob stated that WHC performance on inorganic PE's and WP's has been very good over the past year and if EPA made a mistake that they would made the necessary internal and external corrections. (The external correction would be to delete WHC's score on Inorganic QB3-93).

EPA QB3-93 Performance Evaluation Sample Results

WATER I (ppb)

ANALYTE	222-S	Weather Station	EPA Action Limit		222-S West 1&2	True West 1&2	W. Sta WP204-1 *	True WP204-1
Aluminum	37.0 U	ND	ND		962.6	1000.0	92	107.00
Antimony	723	540	509-604					
Arsenic	659	680	594-758		1034.3	1000.0	30.7	26.70
Barium	3.0 U	ND	ND		1009.1	1000.0		
Beryllium	53.7	49	44.2 - 51.8		1037.4	1000.0	27.8	29.00
Cadmium	51.8	62	39.3 - 55.5		1040.0	1000.0	10.5	9.10
Calcium	33.3 U	ND	ND		1008.0	1000.0		
Chromium	111	96.	84.8-108		1068.1	1000.0	6.8	6.80
Cobalt	254	251	235 - 273		1033.0	1000.0	42.6	42.60
Copper	268	251	237 - 264		1038.6	1000.0	8.7	8.90
Iron	645	599	572 - 656		1046.3	1000.0	20.7	20.90
Lead	20.3	ND	10.5 - 19.4				42.3	42.70
Magnesium	20700	21300	19100-22400		1018.4	1000.0		
Manganese	3.0 U	ND	ND		1004.4	1000.0	12.8	12.9
Mercury	4.4		4.0 - 8.6					0.67
Nickel	307	287	278 - 300		1033.0	1000.0	17.4	17.10
Potassium	19900	18400	17400-19000		10743.5	10000.0		
Selenium	38.4	ND	30.8 - 42.1					10.90
Silver	53.1	45	35.4 - 53.1		899.4	1000.0		
Sodium	62.0 U	ND	ND		906.8	1000.0		
Thallium	98.8	ND	83.9 - 123					
Vanadium	10.0 U	ND	ND		1061.5	1000.0	130.2	129.00
Zinc	195	178	164 - 186		1057.2	1000.0	9.8	9.80

ND - Non-detectable

* - True values were not available, calculated results based on reported % Recovery

WATER II (ppb)

ANALYTE	222-S	Weather Station	EPA Action Limit		222-S WP284-2	True WP284-2	%Recovered
Aluminum	37.0 U	ND	933 - 1080		774	745.00	103.9
Antimony	717	590	389 - 455				
Arsenic	687	654	464 - 548		243	234.00	103.8
Barium	3.0 U	ND	934 - 1030				
Beryllium	54.6	49	39.3 - 47.3		247	232.00	106.5
Cadmium	50.8	57	22.6 - 32.5		46.5	36.90	126.0
Calcium	18.9 B	ND	23200-28000				
Chromium	115	96	55.5 - 63.2		305	258.00	118.2
Cobalt	269	253	394 - 498		280	259.00	108.1
Copper	269	254	ND		370	335.00	110.5
Iron	652	599	766 - 867		857	789.00	108.6
Lead	22.1	ND	16.0 - 22.1		455	430.00	105.8
Magnesium	21200	21300	ND				
Manganese	3.0 U	ND	99.5 - 113		359	346	103.8
Mercury	4.8		5.6 - 8.9				
Nickel	321	286	ND		225	206.00	109.2
Potassium	20100	18500	ND				
Selenium	41.7	ND	24.2 - 39.6				
Silver	58.5	45	47.6 - 63.2				
Sodium	62.0 U	ND	19400-22400				
Thallium	103	ND	ND				
Vanadium	10.0 U	ND	475 - 510		910	864.00	105.3
Zinc	200	181	ND		447	415.00	107.7

SOIL (mg/kg)

ANALYTE	222-S	Weather Station	EPA Action Limit		222-S LCSS *	True LCSS *	W. Sta. ERA 208 +	True ERA 208	W. Sta. ERA 210 +	True ERA 210
Aluminum	4900	4490	6430 - 15600		12124.9	9510.0	9918	11400	9571	9900
Antimony	16	9.2	ND		253.5	211.0		32		27
Arsenic	926	492	2.9 - 7.4		189.6	203.0		40	32.5	203
Barium	748	1410	276 - 573		196.5	210.0	360.1	372	156	190
Beryllium	0.61 U	0.6	ND		51.0	52.0	13.1	13	41.3	52
Cadmium	260	251	ND		75.0	70.0	47.8	52	60	70
Calcium	47200	65400	10900-24100		7800.9	7520.0	7728	8310	6828.2	7520
Chromium	177	162	12.2 - 28.2		57.6	52.0	52.8	58	41	52
Cobalt	20.3	19.2	10.0 - 11.4		36.3	30.0	23.7	27	28	32
Copper	6500	5940	17.5 - 27.9		225.6	219.0	195	201	185.9	219
Iron	61100	56200	10800-23600		17990.0	15500.0	13497	16400	13996	15500
Lead	12500	12400	11.9 - 30.6		114.1	82.0	33.9	38	94.5	90
Magnesium	28600	34400	8780 - 11400		4390.0	3700.0	3591	4090	3709	3800
Manganese	5000	5880	406 - 612		338.8	315.0	310	320	280	315
Mercury	1.5	NR	ND		1.4	1.4		1.4		5.5
Nickel	40.7	36.4	11.8 - 19.4		227.4	215.0	153	160	187.9	215
Potassium	2450	1050	2000 - 3740		4567.3	3520.0	3680	3680	3511	3700
Selenium	3.8	ND	ND		48.1	39.2		38		11
Silver	8.8	ND	ND		86.7	75.0	25.2	74	61.5	75
Sodium	5300	4890	ND		560.6 B	485.0	494.1	524	402.1	485
Thallium	3.8 U	ND	ND		29.6	39.0	7.17	10	24.7	29
Vanadium	1560	1480	16.5 - 61.7		57.8	51.0	35.9	57	39.3	51
Zinc	11700	11000	41.2 - 47.2		327.1	298.0	305.5	325	269	298

ND - Non-detectable
* - LCSS for ICP - ERA Lot# 209
* - LCSS for GFAA - ICF Tech. Lot# 0207
* - LCSS for Hg - ERA Lot# 208
+ - True values were not available, calculated results based on reported % Recovery

SOIL (mg/kg) compared to SOIL QB3-92

ANALYTE	222-S QB3-93	Analytes "Out"	QB3-92 EPA Action Limit	222-S QB3-92	Analytes "Out"
Aluminum	4900		2020 - 7960	5780	
Antimony	16		12.0 - 41.8	14.2	
Arsenic	926		809 - 1010	877	
Barium	748		40.0 - 2340	2240	
Beryllium	0.61 U		1.0 - 9.9	0.95	
Cadmium	260		209 - 274	251	
Calcium	47200	X	58101-72801	45300	X
Chromium	177	X	130 - 171	172	X
Cobalt	20.3		10.0 - 28.7	21.1	
Copper	6500		4700 - 8030	7510	
Iron	61100		47101-67801	57100	
Lead	12500		10500-13700	11400	
Magnesium	28600	X	29300-35401	29400	$
Manganese	5980		5170 - 6310	6110	
Mercury	1.5		0.61 - 2.2	1.4	
Nickel	40.7		29.0 - 41.8	52.8	X
Potassium	2450		1070 - 3300	2600	
Selenium	3.8	X	1.0 - 3.4	2	
Silver	8.8		5.2 - 24.4	6.7	
Sodium	5300		3830 - 6870	6870	
Thallium	3.8 U		2.3 - 5.7	6.5	
Vanadium	1560		1250 - 1710	1510	
Zinc	11700		9220 - 13200	11800	

C. STACEY

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 - FTS 545-2100)

JUL 08 1993

JUL 1993
RECEIVED
L.P. MARKEL

Westinghouse - Hanford
Mr. Thomas Ibsen
22-South Building, 200 West Area
Richland, WA 99352

Dear Mr. Ibsen:

The Individual Laboratory Summary Report (ILSR) summarizing your laboratory's results for the most recent Quarterly Blind (QB) Performance Evaluation (PE) Sample (QB3, FY93) is enclosed for your information and review. Please review your score as listed on the ILSR to determine the actions which are required to correct any deficiencies. The wording of these Performance Categories below was established by your contract and the Administrative Project Officers of the National Program Office:

- o <u>Acceptable, No Response Required</u> (Score greater than or equal to 90 percent):

  Data meets most or all of the scoring criteria. No response is required.

- o <u>Acceptable, Response Explaining Deficiency(ies) Required</u> (Score greater than or equal to 75 percent but less than 90 percent):

  Deficiencies exist in the Contractor's performance.

Within 14 days of receipt of this notification from EPA, the Contractor shall describe the deficiency(ies) and the action(s) taken to correct the deficiency(ies) in a letter to the Administrative Project Officer, the Technical Project Officer and the Environmental Monitoring Systems Laboratory-Las Vegas (EMSL-LV)

- o <u>Unacceptable, Response Explaining Deficiency(ies) Required</u> (Score less than 75 percent):

  Deficiencies exist in the Contractor's performance to the extent that the National Program Office has determined that the Contractor has not demonstrated the capability to meet the contract requirements.

Within 14 days of receipt of notification from EPA, the Contractor shall describe the deficiency(ies) and the action)s) taken to correct the deficiency(ies) in a letter to the Administrative Project Officer, the Technical Project Officer, and EMSL-LV.

The Contractor shall be notified by the Technical Project Officer or Administrative Project Officer concerning the remedy for their unacceptable performance. A Contractor may expect, but the Agency is not limited to, the following actions: reduction of the number of samples sent under the contract, suspension of sample shipment to the Contractor, an On-Site laboratory evaluation, GC/MS tape audit, data package audit, remedial laboratory evaluation sample, and/or a contract sanction, such as a Cure Notice.

Note: A Contractor's prompt response demonstrating that corrective actions have been taken to ensure the Contractor's capability to meet contract requirements may facilitate continuation of full sample delivery.

Your initial response, if any, to this letter should be to your Regional EPA Technical Project Officer for your contract.

Sincerely,

Larry C. Butler
Research Chemist
Quality Assurance Research Branch, QAD

Enclosures

Individual Laboratory Summary Report
Performance Evaluation Material Preparation Instructions
Performance Evaluation Material Scoring Procedure
Description of the Individual Laboratory Summary Report

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 93

LABORATORY NAME: Westinghouse Hanford Co. (WA) [J1] (WHC)
PERFORMANCE LEVEL: UNACCEPTABLE, Corrective Actions Mandatory
LABORATORY RANK: Above = 24 Same = 0 Below = 0

% Score: 0
REPORT DATE: 6/24/1993
MATRIX: SOIL

ELEMENT	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	7540	14000	6840	14700	4900		X	0	1	0	0	0	25
ANTIMONY	c	c	c	c	16	N	#	0	0	2	18	0	25
ARSENIC	3.4	6.6	3.0	7.0	926		X	0	3	0	3	1	25
BARIUM	354	479	341	492	748	N*	X	0	1	0	1	1	25
BERYLLIUM	d	d	d	d	0.61	UN		0	0	1	1	0	25
CADMIUM	c	c	c	c	260	E	#	0	0	3	1	1	25
CALCIUM	19400	23400	18900	23800	47200	E	X	0	1	0	0	0	25
CHROMIUM	13.4	25.7	12.1	27.0	177		X	0	1	0	0	0	25
COBALT	10.0	11.1	10.0	11.7	20.3		X	0	2	0	0	0	25
[illegible]ER	17.3	26.8	16.3	27.8	6500	*	X	0	3	0	0	2	25
[illegible]	11300	22400	10000	23700	61100	E	X	0	4	0	0	1	25
LEAD	15.1	30.6	13.5	32.3	12500		X	0	4	0	0	2	25
MAGNESIUM	9110	10900	8920	11100	28600	E	X	0	2	0	0	0	25
MANGANESE	425	579	408	596	5980		X	0	1	0	0	0	25
MERCURY	c	c	c	c	1.5		#	0	0	4	0	0	25
NICKEL	12.5	17.8	11.9	18.4	40.7		X	0	2	0	0	0	25
POTASSIUM	2020	3510	1850	3670	2450			0	0	0	0	0	25
SELENIUM	c	c	c	c	3.8		#	0	0	2	9	0	25
SILVER	c	c	c	c	8.8		#	0	0	3	2	0	25
SODIUM	d	d	d	d	5300	*	#	0	0	1	0	1	25
THALLIUM	c	c	c	c	3.8	U		0	0	0	1	0	25
VANADIUM	20.1	58.0	16.0	62.1	1560		X	0	2	0	0	1	25
ZINC	35.0	49.0	33.5	50.6	11700		X	0	5	0	0	0	25

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 14
OF FALSE POSITIVES: 6

OF MATRIX SPIKES OUT: 3
SOIL : Sb, Ba, Be

OF DUPLICATES OUT: 3
[illegible] : Ba, Cu, Na

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 93

LABORATORY NAME: Westinghouse Hanford Co. (WA) [J1] (WHC)
PERFORMANCE LEVEL: UNACCEPTABLE, Corrective Actions Mandatory
LABORATORY RANK: Above = 24 Same = 0 Below = 0

% Score: 0
REPORT DATE: 6/24/1993
MATRIX: WATER 1

ELEMENT	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	c	c	c	c	37	U		0	0	1	0	0	25
ANTIMONY	514	592	506	601	723		X	0	1	0	0	0	25
ARSENIC	580	736	563	753	659			0	1	0	0	0	25
BARIUM	c	c	c	c	3	U		0	0	0	0	0	25
BERYLLIUM	45.5	51.0	44.9	51.6	53.7		X	0	2	0	0	0	25
CADMIUM	41.6	52.5	40.5	53.7	51.8			0	2	0	0	0	25
CALCIUM	d	d	d	d	33.3	B		0	0	0	0	0	25
CHROMIUM	87.1	103	85.4	105	111		X	0	2	0	0	0	25
COBALT	236	264	234	267	254			0	0	0	0	0	25
[illegible]	233	262	230	265	266		X	0	2	0	0	1	25
[illegible]	576	637	569	644	645		X	0	2	0	0	0	25
LEAD	12.0	18.1	11.4	18.7	20.3		X	1	3	0	0	0	25
MAGNESIUM	19200	21700	19000	22000	20700			0	0	0	0	0	25
MANGANESE	c	c	c	c	3	U		0	0	0	0	0	25
MERCURY	4.0	8.0	3.6	8.4	4.4			0	0	0	1	0	25
NICKEL	263	305	259	310	307		S	0	0	0	0	0	25
POTASSIUM	17400	18800	17200	19000	19900		X	0	3	0	0	0	25
SELENIUM	31.8	40.5	30.8	41.4	38.4			1	1	0	4	0	25
SILVER	37.5	51.8	36.0	53.4	53.1		S	0	0	0	0	0	25
SODIUM	d	d	d	d	62	U		0	0	0	0	0	25
THALLIUM	76.6	111	72.8	115	98.8			0	0	0	2	0	25
VANADIUM	c	c	c	c	10	U		0	0	0	0	0	25
ZINC	168	182	166	183	195		X	0	7	0	0	0	25

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 8
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
WATER :

OF DUPLICATES OUT: 0
[illegible]:

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 93

LABORATORY NAME: Westinghouse Hanford Co. (WA) [J1] (WHC)
PERFORMANCE LEVEL: UNACCEPTABLE, Corrective Actions Mandatory
LABORATORY RANK: Above = 24 Same = 0 Below = 0

% Score: 0
REPORT DATE: 6/24/1993
MATRIX: WATER 2

ELEMENT	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	923	1070	907	1080	37	U	X	1	0	0	0	0	25
ANTIMONY	378	459	369	468	717		X	0	3	0	0	0	25
ARSENIC	452	535	443	544	687		X	0	3	0	0	0	25
BARIUM	950	1010	944	1010	3	U	X	1	1	0	0	0	25
BERYLLIUM	40.1	47.2	39.3	48.0	54.6		X	0	2	0	0	0	25
CADMIUM	22.0	32.0	20.9	33.1	50.8		X	0	3	0	0	0	25
CALCIUM	23600	26700	23200	27000	18.9	B	X	0	3	0	0	0	25
CHROMIUM	54.0	64.8	52.8	66.0	115		X	0	4	0	0	0	25
COBALT	416	465	411	470	269		X	0	2	0	0	0	25
COPPER	c	c	c	c	269		#	0	0	1	0	1	25
[illegible]	783	840	777	847	652		X	0	4	0	0	0	25
[illegible]	17.0	21.7	16.5	22.2	22.1		$	1	3	0	0	0	25
MAGNESIUM	c	c	c	c	21200		#	0	0	1	0	0	25
MANGANESE	95.9	114	94.0	116	3	U	X	1	1	0	0	0	25
MERCURY	5.6	8.8	5.3	9.2	4.8		X	0	2	0	1	0	25
NICKEL	c	c	c	c	321		#	0	0	1	0	0	25
POTASSIUM	c	c	c	c	20100		#	0	0	1	0	0	25
SELENIUM	24.8	36.7	23.5	38.0	41.7		X	0	2	0	4	0	25
SILVER	48.5	60.8	47.2	62.1	58.5			0	0	0	0	0	25
SODIUM	19600	21900	19400	22100	62	U	X	1	0	0	0	0	25
THALLIUM	c	c	c	c	103		#	0	0	1	2	0	25
VANADIUM	466	514	461	520	10	U	X	1	1	0	0	0	25
ZINC	c	c	c	c	200		#	0	0	2	0	0	25

OF ELEMENTS NOT-IDENTIFIED: 5
OF ELEMENTS MIS-QUANTIFIED: 10
OF FALSE POSITIVES: 6

OF MATRIX SPIKES OUT: 0
WATER :

OF DUPLICATES OUT: 0
[illegible]R :

NON-CLP
SUMMARY OF LABORATORY SCORES
QB 3 FY 93

Sample Sent: April 19, 1993
Data Due: May 24, 1993
PI Set: June 24, 1993

NAME	CODE	SCORE	NOT-ID	MIS-QUANT	FALSE POS	MSPK OUT	DUP OUT	DAYS LATE
ATEC	J2	74.3	0	8	0	4	0	17
CH2MAL	O2	99.5	0	0	0	1	0	0
CH2MCA	A2	96.7	0	0	1	0	2	0
EMS	N1	93.1	0	1	2	2	0	4
ESAT7	Y1	-	-	-	-	-	-	*
ICF	V1	85.4	0	5	0	0	0	8
ILEPA	S1	87.1	0	4	0	3	0	10
ITMWL	G2	96.8	0	0	2	1	0	1
ITSTU	D1	-	-	-	-	-	-	*
LESAT	U1	86.1	0	4	0	1	2	4
MORCOL	P1	-	-	-	-	-	-	*
REG1	M2	-	-	-	-	-	-	*
REG10	F1	-	-	-	-	-	-	*
REG2	B2	-	-	-	-	-	-	*
REG3	B1	-	-	-	-	-	-	*
REG4	A1	-	-	-	-	-	-	*
REG5	Q1	-	-	-	-	-	-	*
REG6	Q2	88.1	0	4	0	0	0	0
REG7	H1	82.3	0	5	2	0	0	11
REG8	K1	-	-	-	-	-	-	*
REG9	D2	87.2	0	3	2	3	0	0

* No data submitted as of June 24, 1993

INORGANIC QUARTERLY BLIND PERFORMANCE EVALUATION SAMPLE

ILSR EXPLANATION

c PREDICTION INTERVALS (PI) WERE NOT SET SINCE 40 % OR MORE OF THE LABORATORIES SUBMITTED A VALUE BELOW THE CONTRACT REQUIRED DETECTION LIMIT (CRDL).
d PI NOT USED. SEE SCORING NOTES, PROCEDURE FOR GRADING U-VALUES NO. 4.
U ANALYZED FOR BUT NOT DETECTED.
B INDICATES A VALUE LESS THAN THE CRDL BUT GREATER THAN OR EQUAL TO THE INSTRUMENT DETECTION LIMIT (IDL).
E INDICATES AN ESTIMATED VALUE DUE TO THE POSSIBLE PRESENCE OF INTERFERENCE.
W INDICATES A POST DIGESTION SPIKE FOR GRAPHITE FURNACE ATOMIC ABSORPTION (GFAA) IS OUT OF CRITERIA.
S INDICATES VALUE DETERMINED BY THE METHOD OF STANDARD ADDITION.
+ CORRELATION COEFFICIENT FOR THE MSA IS LESS THAN 0.995.
X VALUE WAS OUTSIDE BOTH THE WARNING AND THE ACTION LIMIT. POINTS DEDUCTED.
$ VALUE WAS OUTSIDE THE WARNING LIMIT ONLY. NO POINTS DEDUCTED.
UX ELEMENT WAS NOT IDENTIFIED (FALSE NEGATIVE). POINTS DEDUCTED.
# INDICATES A FALSE POSITIVE WITH VALUE GREATER THAN THE CRDL. POINTS DEDUCTED.
& VALUE WAS NOT SUBMITTED.
? BEST ESTIMATE OF VALUE AND/OR QUALIFIER. POOR COPY AND/OR ILLEGIBLE VALUE SUBMITTED.
@ ANALYSIS OF ELEMENT NOT REQUIRED.

SCORING NOTES:

$$\% \text{ Score} = 100 - \left[\frac{\sum_{i=1}^{n}(10A_i + B_i + 4C_i)}{n}\right] - 0.5S - D$$

where A = Number of elements that were not identified

$$B = \left[1 - \left[\frac{T-X}{T}\right]^{1.5}\right] \times 100$$

T = Total number of elements for which PIs have been established
x = Number of mis-quantitations + number of elements that were not identified
n = Number of samples
C = Number of false positives
S = Number of matrix spikes outside the criteria
D = Number of duplicates outside the criteria

PREDICTION INTERVALS (PI) WERE DERIVED FROM LABORATORY SUBMITTED VALUES. LESS THAN VALUES (<x), U-VALUES, AND NON-SUBMITTED VALUES (-) WERE NOT USED IN THE CALCULATION OF THE PI.

PROCEDURE FOR GRADING U-VALUES

1. ANY U-VALUE RESPONSE (INSTRUMENT DETECTION LIMIT) > CRDL FOR THE APPROPRIATE DILUTION, EVEN IF IT IS IN THE ACTION PREDICTION INTERVAL, CAUSES A POINT DEDUCTION. IF 25 % OR MORE OF THE LABORATORIES REPORT A U-VALUE OVER THE CRDL, NO POINTS ARE DEDUCTED FOR ANY LABORATORY, POSSIBLY INDICATING A MATRIX INTERFERENCE IN THE SAMPLE.

2. IF CRDL < LOWER PI, THEN USE PI AS SET.

3. IF LOWER PI < CRDL AND CRDL < UPPER PI, THEN SET LOWER PI TO CRDL. NO POINTS DEDUCTED FOR IDENTIFICATION OR QUANTITATION LESS THAN OR EQUAL TO THE CRDL.

4. IF CRDL > LOWER AND UPPER PI, THEN NO PI USED. PARAMETER DROPPED FROM THE SCORING. NO POINTS DEDUCTED FOR IDENTIFICATIONS OR QUANTITATIONS. FALSE POSITIVES POSSIBLE.

OCT 1993
RECEIVED
L.P. MARKEL

REMEDIAL
INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 93

LABORATORY NAME: Westinghouse Hanford Company (WA)
PERFORMANCE LEVEL: Unacceptable - Corrective Action Mandatory
LABORATORY RANK: Above = 1 Same = 0 Below = 0

% Score: 52.3
REPORT DATE: 09/27/93
MATRIX: SOIL

ELEMENT	PREDICTION INTERVAL LOWER	PREDICTION INTERVAL UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	3310	9520	6350								2
ANTIMONY	12	27.5	8.2	B	X						2
ARSENIC	893.5	1013	944								2
BARIUM	123.5	1092	1800		X						2
BERYLLIUM	0.5	4.4	0.61	U							2
CADMIUM	107.5	134	130								2
CALCIUM	30461	36676	35400								2
CHROMIUM	71.4	101	93.4								2
COBALT	15.2	26.7	21.8								2
COPPER	3295	4940	4000								2
IRON	40251	56401	51300								2
LEAD	5403	6707	6210								2
MAGNESIUM	15405	18096	17400								2
MANGANESE	2729	3230	3060								2
MERCURY	0.4	1.2	0.72								2
NICKEL	21.6	30.1	27.9								2
POTASSIUM	1945	4550	3380								2
SELENIUM	1	3.5	2.1								2
SILVER	6.5	15.6	1.6	B	X						2
SODIUM	2050	3305	2620								2
THALLIUM	1.3	2.7	1.1	U	X						2
VANADIUM	650	843	747								2
ZINC	4807	6431	5540								2

OF ELEMENTS NOT-IDENTIFIED: 1
OF ELEMENTS MIS-QUANTIFIED: 3
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 2
SOIL: Sb, Se

OF DUPLICATES OUT: 1
SOIL: Ag

REMEDIAL
INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 93

LABORATORY NAME: Westinghouse Hanford Company (WA)
PERFORMANCE LEVEL: Unacceptable - Corrective Action Mandatory
LABORATORY RANK: Above = 1 Same = 0 Below = 0

% Score: 52.3
REPORT DATE: 09/27/93
MATRIX: WATER1

ELEMENT	PREDICTION INTERVAL LOWER	PREDICTION INTERVAL UPPER	LABORATORY REPORTED VALUE	Q	#LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
					PROGRAM DATA					
ALUMINUM	535	570	588	X						2
ANTIMONY	308	366	373	X						2
ARSENIC	54.9	68.5	63.5							2
BARIUM	c	c	3.0	U						2
BERYLLIUM	59	68	64.4							2
CADMIUM	27.8	32.9	29.4							2
CALCIUM	27000	30950	24700	X						2
CHROMIUM	70.7	86.1	80.8							2
COBALT	251	292	276	E						2
[illegible]PPER	235	267	253							2
[illegible]N	419	492	440							2
[illegible]AD	12.6	17	20.7	X						2
MAGNESIUM	19900	22500	19500	X						2
MANGANESE	c	c	3.0	U						2
MERCURY	5.5	9.3	3.9	X						2
NICKEL	252	303	258							2
POTASSIUM	c	c	123	B						2
SELENIUM	49.1	65.2	48.2	X						2
SILVER	45.8	54.4	52.5							2
SODIUM	d	d	88.0	B						2
THALLIUM	82.4	108	105							2
VANADIUM	c	c	6.0	U						2
ZINC	228	273	400	X						2

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 8
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
WATER:

OF DUPLICATES OUT: 1
[illegible]TER: Zn

REMEDIAL
INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 93

LABORATORY NAME: Westinghouse Hanford Company (WA)
PERFORMANCE LEVEL: Unacceptable - Corrective Action Mandatory
LABORATORY RANK: Above = 1 Same = 0 Below = 0

% Score: 52.3
REPORT DATE: 09/27/93
MATRIX: WATER2

ELEMENT	PREDICTION INTERVAL LOWER	PREDICTION INTERVAL UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	585	710	576		X						2
ANTIMONY	309	483	446								2
ARSENIC	32.8	52.1	40.8								2
BARIUM	880	1255	928								2
BERYLLIUM	40.2	60.3	40.5								2
CADMIUM	17.3	29.1	21.9								2
CALCIUM	c	c	78.8	B							2
CHROMIUM	86.7	126	77.6		X						2
COBALT	346	482	290	E	X						2
COPPER	c	c	3.0	U							2
IRON	594	799	669								2
LEAD	20.3	34.7	33.9								2
MAGNESIUM	c	c	3.0	U							2
MANGANESE	124	166	110		X						2
MERCURY	4.6	6.6	5.1								2
NICKEL	c	c	11.0	U							2
POTASSIUM	16800	25450	19000								2
SELENIUM	25.2	40.8	30.3								2
SILVER	31.3	78.5	32.1								2
SODIUM	21550	30351	22200								2
THALLIUM	c	c	5.2	U							2
VANADIUM	443	603	432		X						2
ZINC	c	c	3.0	U							2

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 5
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
WATER:

OF DUPLICATES OUT: 0
WATER:

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 4 FY 93

LABORATORY NAME: Westinghouse Hanford Co. (WA) [U1] (WHCWA)
PERFORMANCE LEVEL: ACCEPTABLE - Corrective Actions Necessary
LABORATORY RANK: Above = 25 Same = 0 Below = 3

% Score: 79.7
REPORT DATE: 9/16/1993
MATRIX: SOIL

ELEMENT	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	2970	7560	2470	8060	5390			0	0	0	1	0	29
ANTIMONY	12.0	15.2	12.0	17.0	8.4	BE		1	7	0	21	0	29
ARSENIC	136	203	129	210	167			0	4	0	1	0	29
BARIUM	d	d	d	d	35	B		0	0	0	0	0	29
BERYLLIUM	d	d	d	d	0.63	U		0	0	2	0	0	29
CADMIUM	5.4	22.1	3.6	23.9	44.3		X	1	4	0	2	1	29
CALCIUM	38101	48901	36901	50001	44000			0	0	0	0	0	29
CHROMIUM	6.8	17.4	5.6	18.5	20.4		X	1	3	0	0	0	29
[illegible]T	15.6	31.5	13.8	33.2	22.3			0	0	0	0	0	29
[illegible]R	1180	1450	1150	1480	1490		X	0	6	0	1	0	29
IRON	130000	183000	124000	189000	162000			0	0	0	0	0	29
LEAD	806	1030	781	1060	899			0	2	0	1	0	29
MAGNESIUM	1180	1800	1110	1870	1480			0	0	0	0	0	29
MANGANESE	706	974	677	1000	872			0	0	0	0	0	29
MERCURY	0.097	0.32	0.074	0.34	0.23			0	2	0	3	1	29
NICKEL	8.0	9.0	8.0	9.6	7.7	B		0	1	0	0	0	29
POTASSIUM	1000.0	1450	1000.0	1520	1150			1	0	0	0	0	29
SELENIUM	1.0	3.2	1.0	3.4	1.3	BE		2	1	0	10	0	29
SILVER	50.1	77.4	47.1	80.3	67.1			0	2	0	1	0	29
SODIUM	d	d	d	d	271	BE		0	0	0	0	0	29
THALLIUM	d	d	d	d	1.1	U		0	0	2	4	0	29
VANADIUM	10.0	56.0	10.0	61.4	27.2			0	0	0	0	1	29
ZINC	4520	6370	4320	6570	5990			0	1	0	1	0	29

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 3
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 2
SOIL : Se, Sb

[illegible] DUPLICATES OUT: 0
[illegible] :

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 4 FY 93

LABORATORY NAME: Westinghouse Hanford Co. (WA) [U1] (WHCWA)
PERFORMANCE LEVEL: ACCEPTABLE - Corrective Actions Necessary
LABORATORY RANK: Above = 25 Same = 0 Below = 3

% Score: 79.7
REPORT DATE: 9/16/1993
MATRIX: WATER 1

ELEMENT	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	c	c	c	c	22	U		0	0	1	1	0	29
ANTIMONY	435	510	427	518	554		X	0	2	0	0	0	29
ARSENIC	583	734	567	750	642			0	2	0	1	0	29
BARIUM	821	920	810	930	864			0	4	0	0	0	29
BERYLLIUM	31.6	38.3	30.9	39.0	36.8			0	2	0	0	0	29
CADMIUM	33.7	39.0	33.1	39.6	36.3			0	2	0	0	0	29
CALCIUM	c	c	c	c	23.5	B		0	0	0	1	0	29
CHROMIUM	48.0	61.2	46.6	62.6	53			0	0	0	0	0	29
COBALT	139	165	137	167	157			0	0	0	1	0	29
[illegible]R	283	339	277	345	324			0	1	0	0	0	29
[illegible]	458	545	448	555	510			0	0	0	0	0	29
LEAD	11.1	14.1	10.8	14.4	15.8		X	0	6	0	1	0	29
MAGNESIUM	c	c	c	c	3	U		0	0	0	0	0	29
MANGANESE	48.4	59.0	47.2	60.1	52.9			0	1	0	0	0	29
MERCURY	8.0	10.8	7.6	11.1	8.5			0	4	0	1	0	29
NICKEL	180	215	176	218	191			0	1	0	0	0	29
POTASSIUM	c	c	c	c	107	B		0	0	0	0	0	29
SELENIUM	37.8	53.7	36.1	55.4	54.3		$	1	1	0	2	1	29
SILVER	31.1	39.2	30.2	40.1	33.3			0	3	0	2	0	29
SODIUM	d	d	d	d	32.3	B		0	0	0	0	0	29
THALLIUM	c	c	c	c	5.2	U		0	0	0	0	0	29
VANADIUM	339	383	334	388	385		$	0	2	0	1	0	29
ZINC	259	294	256	298	285	E		0	1	0	0	1	29

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 2
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
WATER :

[illegible] DUPLICATES OUT: 0
[illegible]R :

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 4 FY 93

LABORATORY NAME: Westinghouse Hanford Co. (WA) [U1] (WHCWA)
PERFORMANCE LEVEL: ACCEPTABLE - Corrective Actions Necessary
LABORATORY RANK: Above = 25 Same = 0 Below = 3

% Score: 79.7
REPORT DATE: 9/16/1993
MATRIX: WATER 2

ELEMENT	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q		PROGRAM DATA #LABS NOT-ID	#LABS MIS-QUANT	#LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	1160	1470	1130	1510	1340			0	1	0	1	0	29
ANTIMONY	272	346	264	354	363		X	0	2	0	0	0	29
ARSENIC	201	282	192	291	244			0	1	0	1	0	29
BARIUM	c	c	c	c	3	U		0	0	0	0	0	29
BERYLLIUM	45.0	52.8	44.1	53.6	50.9			0	1	0	0	0	29
CADMIUM	25.6	30.8	25.0	31.4	27			0	3	0	0	0	29
CALCIUM	14400	17000	14100	17200	15700			0	0	0	1	0	29
CHROMIUM	87.7	95.6	86.8	96.5	95.8		$	0	8	0	0	0	29
[illegible]LT	138	158	136	160	154			0	1	0	1	0	29
[illegible]R	c	c	c	c	3	U		0	0	0	0	0	29
[illegible]	828	939	816	951	906			0	0	0	0	0	29
LEAD	11.5	16.3	11.0	16.8	20.1		X	0	5	0	1	0	29
MAGNESIUM	d	d	d	d	2590	B		0	0	0	0	0	29
MANGANESE	c	c	c	c	10	B		0	0	0	0	0	29
MERCURY	5.2	9.5	4.7	10.0	7.4			0	1	0	1	0	29
NICKEL	c	c	c	c	11	U		0	0	0	0	0	29
POTASSIUM	18400	21500	18000	21800	19100			0	0	0	0	0	29
SELENIUM	38.5	61.0	36.1	63.5	58.8			1	0	0	2	1	29
SILVER	38.7	49.7	37.5	50.8	46.2			0	2	0	2	0	29
SODIUM	28500	32300	28100	32700	30000			0	4	0	0	0	29
THALLIUM	70.0	101	66.7	105	86.8			0	1	0	0	0	29
VANADIUM	c	c	c	c	6	U		0	0	0	1	0	29
ZINC	c	c	c	c	3	UE		0	0	2	0	1	29

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 2
OF FALSE POSITIVES: 0

OF MATRIX SPIKES OUT: 0
WATER :

[illegible] DUPLICATES OUT: 0
[illegible]R :

AUG 4 1993

PERFORMANCE EVALUATION REPORT DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: WA156

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
ALUMINUM	1	1180	1100	898- 1300	949- 1250	ACCEPTABLE
	2	4170	4000	3370- 4570	3520- 4410	ACCEPTABLE
ARSENIC	1	274	280	225- 334	238- 320	ACCEPTABLE
BERYLLIUM	1	60.3	63.0	51.1- 74.5	54.1- 71.5	ACCEPTABLE
CADMIUM	1	6.48	8.12	6.30- 10.3	6.80- 9.79	CHECK FOR ERROR
	2	97.6	93.9	78.3- 110	82.2- 106	ACCEPTABLE
COBALT	1	458	480	416- 536	431- 521	ACCEPTABLE
	2	248	240	206- 275	214- 266	ACCEPTABLE
CHROMIUM	1	67.8	62.0	49.2- 73.7	52.3- 70.6	ACCEPTABLE
	2	492	460	378- 533	397- 514	ACCEPTABLE
COPPER	1	63.8	62.0	53.5- 69.8	55.6- 67.8	ACCEPTABLE
	2	425	410	365- 462	377- 450	ACCEPTABLE
IRON	1	3640	3800	3350- 4230	3460- 4120	ACCEPTABLE
	2	898	860	755- 963	781- 937	ACCEPTABLE
MERCURY	1	0.975	0.983	0.620- 1.42	0.719- 1.32	ACCEPTABLE
	2	2.07	2.10	1.57- 2.75	1.72- 2.61	ACCEPTABLE
MANGANESE	1	2020	2200	1950- 2450	2010- 2380	ACCEPTABLE
	2	219	221	196- 244	202- 238	ACCEPTABLE
NICKEL	1	132	130	111- 150	116- 145	ACCEPTABLE
	2	1340	1300	1160- 1450	1200- 1420	ACCEPTABLE
LEAD	1	85.8	79.2	62.7- 97.1	67.0- 92.8	ACCEPTABLE
	2	451	450	393- 513	408- 498	ACCEPTABLE

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RATORY: WA156

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	22.4	23.0	14.3- 29.1	16.1- 27.3	ACCEPTABLE
	2	69.2	78.1	52.8- 94.6	58.1- 89.3	ACCEPTABLE
VANADIUM	1	7610	8000	7110- 8830	7330- 8610	ACCEPTABLE
	2	15400	15000	12700-17400	13300-16800	ACCEPTABLE
ZINC	1	1060	1100	961- 1220	993- 1190	ACCEPTABLE
	2	0.254	240	209- 271	216- 263	NOT ACCEPTABLE
ANTIMONY	3	63.8	116	79.4- 140	87.2- 133	NOT ACCEPTABLE
	4	11.6	14.0	7.01- 20.4	8.73- 18.7	ACCEPTABLE
SILVER	3	9.32	2.39	1.80- 2.96	1.95- 2.82	NOT ACCEPTABLE
	4	8.46	9.75	7.80- 11.5	8.25- 11.0	ACCEPTABLE
THALLIUM	3	94.8	90.2	70.7- 108	75.5- 103	ACCEPTABLE
	4	9.39	9.00	6.71- 11.3	7.29- 10.7	ACCEPTABLE
MOLYBDENUM	3	9.21	6.48	3.34- 8.82	4.04- 8.12	NOT ACCEPTABLE
	4	38.6	39.0	30.3- 47.9	32.6- 45.6	ACCEPTABLE
STRONTIUM	3	44.2	4.01	3.01- 4.99	3.26- 4.73	NOT ACCEPTABLE
	4	52.8	51.0	41.4- 60.1	43.8- 57.7	ACCEPTABLE
TITANIUM	3	68.8	66.0	51.5- 76.5	54.7- 73.3	ACCEPTABLE
	4	184	182	149- 205	156- 198	ACCEPTABLE
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH-UNITS	3	8.77	8.70	8.31- 9.05	8.40- 8.96	ACCEPTABLE
	4	6.23	6.10	5.96- 6.22	5.99- 6.19	NOT ACCEPTABLE
SPEC. COND. (UMHOS/CM AT 25 C)	1	254	253	226- 274	232- 268	ACCEPTABLE
	2	842	868	819- 916	831- 904	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: WA156

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MINERALS IN MILLIGRAMS ~~PER~~ LITER: (EXCEPT AS NOTED)						
TOTAL HARDNESS	1	69.3	75.6	66.7- 84.1	68.8- 82.0	ACCEPTABLE
(AS CACO3)	2	182	225	209- 242	213- 238	NOT ACCEPTABLE
CALCIUM	1	3.44	3.69	3.00- 4.47	3.18- 4.29	ACCEPTABLE
	2	65.0	80.9	73.4- 90.2	75.5- 88.1	NOT ACCEPTABLE
MAGNESIUM	1	14.8	16.1	14.0- 18.1	14.5- 17.6	ACCEPTABLE
	2	4.69	5.64	4.84- 6.32	5.03- 6.13	NOT ACCEPTABLE
SODIUM	1	15.2	15.9	14.0- 17.9	14.5- 17.4	ACCEPTABLE
	2	55.5	65.6	59.6- 72.0	61.2- 70.4	NOT ACCEPTABLE
POTASSIUM	1	2.70	2.60	2.05- 3.22	2.19- 3.08	ACCEPTABLE
	2	17.0	19.0	16.2- 21.9	16.9- 21.1	ACCEPTABLE
CHLORIDE	1	62.3	54.3	48.2- 59.1	49.6- 57.8	NOT ACCEPTABLE
	2	188	178	166- 191	170- 188	ACCEPTABLE
FLUORIDE	1	2.50	2.40	2.09- 2.65	2.16- 2.58	ACCEPTABLE
	2	0.352	0.230	0.175-0.286	0.189-0.272	NOT ACCEPTABLE
SULFATE	1	9.32	9.10	6.48- 11.4	7.10- 10.8	ACCEPTABLE
	2	40.7	42.0	35.2- 48.1	36.8- 46.5	ACCEPTABLE
NUTRIENTS IN MILLIGRAMS PER LITER:						
NITRATE-NITROGEN	1	217	34.0	27.5- 40.2	29.0- 38.7	NOT ACCEPTABLE
	2	32.0	7.10	5.70- 8.43	6.03- 8.10	NOT ACCEPTABLE
ORTHOPHOSPHATE	1	2.61	0.830	0.692-0.961	0.724-0.929	NOT ACCEPTABLE
	2	<0.830	0.090	.0617-0.122	.0689-0.115	UNUSABLE DATA

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTA LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
DEMANDS IN MILLIGRAMS PER LITER:						
TOC	1	4.68	8.61	7.22- 10.2	7.61- 9.80	NOT ACCEPTABLE
	2	8.25	14.0	11.9- 16.3	12.5- 15.7	NOT ACCEPTABLE
PCB'S IN MICROGRAMS PER LITER:						
PCB-AROCLOR 1016/1242	2	4.06	4.29	1.86- 5.71	2.35- 5.22	ACCEPTABLE
PCB-AROCLOR 1232	1	0.828	1.43	0.657- 1.79	0.800- 1.64	ACCEPTABLE
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
PCB IN OIL- 1016/1242	1	21.2	21.5	5.04- 27.6	7.92- 24.7	ACCEPTABLE
PCB IN OIL- 1260	2	28.9	36.6	7.82- 57.8	14.2- 51.4	ACCEPTABLE
PESTICIDES IN MICROGRAMS PER LITER:						
CHLORDANE	3	0.993	0.964	0.469- 1.32	0.575- 1.21	ACCEPTABLE
	4	11.3	9.48	5.38- 12.4	6.26- 11.5	ACCEPTABLE
ALDRIN	1	0.115	0.159	.0344-0.214	.0572-0.191	ACCEPTABLE
	2	0.321	0.444	.0957-0.577	0.156-0.517	ACCEPTABLE
DIELDRIN	1	0.131	0.121	.0572-0.163	.0704-0.150	ACCEPTABLE
	2	0.447	0.553	0.270-0.750	0.330-0.690	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
PESTICIDES IN MICROGRAMS PER LITER:						
DDD	1	0.192	0.216	.0863-0.317	0.115-0.288	ACCEPTABLE
	2	0.530	0.626	0.334-0.865	0.400-0.799	ACCEPTABLE
DDE	1	0.133	0.131	.0562-0.171	.0706-0.157	ACCEPTABLE
	2	0.389	0.495	0.228-0.699	0.288-0.639	ACCEPTABLE
DDT	1	0.167	0.186	.0628-0.294	.0905-0.257	ACCEPTABLE
	2	0.417	0.576	0.252-0.844	0.326-0.770	ACCEPTABLE
HEPTACHLOR	1	0.145	0.157	.0488-0.221	.0706-0.199	ACCEPTABLE
	2	0.422	0.514	0.180-0.715	0.247-0.648	ACCEPTABLE
HEPTACHLOR EPOXIDE	1	.0819	0.087	.0427-0.120	.0526-0.110	ACCEPTABLE
	2	0.293	0.375	0.199-0.513	0.229-0.473	ACCEPTABLE
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
1,2 DICHLOROETHANE	1	46.2	48.6	34.5- 62.8	38.0- 59.2	ACCEPTABLE
	2	9.51	10.2	7.28- 13.8	8.11- 12.9	ACCEPTABLE
CHLOROFORM	1	40.8	45.7	31.6- 59.5	35.1- 56.0	ACCEPTABLE
	2	12.6	13.8	9.42- 18.0	10.5- 16.9	ACCEPTABLE
1,1,1 TRICHLOROETHANE	1	43.3	52.0	32.3- 67.9	36.8- 63.4	ACCEPTABLE
	2	7.68	9.34	5.56- 12.6	6.46- 11.7	ACCEPTABLE
TRICHLOROETHENE	1	34.0	38.8	26.8- 49.1	29.6- 46.2	ACCEPTABLE
	2	8.68	9.91	6.52- 13.0	7.34- 12.2	ACCEPTABLE
CARBONTETRACHLORIDE	1	38.4	46.3	29.8- 63.7	34.1- 59.4	ACCEPTABLE
	2	10.9	13.5	8.93- 18.2	10.1- 17.0	ACCEPTABLE
TETRACHLOROETHENE	1	48.0	57.2	39.7- 71.9	43.8- 67.8	ACCEPTABLE
	2	13.8	16.2	10.9- 21.1	12.2- 19.8	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
BROMODICHLOROMETHANE	1	45.0	49.5	34.2- 64.3	38.0- 60.5	ACCEPTABLE
	2	6.30	7.75	4.88- 10.5	5.59- 9.86	ACCEPTABLE
DIBROMOCHLOROMETHANE	1	36.7	42.2	30.0- 54.4	33.1- 51.3	ACCEPTABLE
	2	13.3	16.4	10.9- 21.5	12.2- 20.2	ACCEPTABLE
BROMOFORM	1	48.8	53.7	33.5- 73.7	38.6- 68.6	ACCEPTABLE
	2	9.25	11.9	6.48- 17.1	7.83- 15.7	ACCEPTABLE
METHYLENE CHLORIDE	1	35.0	37.3	24.1- 53.2	27.7- 49.6	ACCEPTABLE
	2	9.15	8.77	4.21- 13.5	5.39- 12.3	ACCEPTABLE
CHLOROBENZENE	1	39.3	43.2	30.8- 55.0	33.9- 51.9	ACCEPTABLE
	2	11.7	12.9	8.99- 16.7	9.97- 15.7	ACCEPTABLE
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
BENZENE	1	9.42	10.3	7.34- 13.4	8.11- 12.6	ACCEPTABLE
	2	48.8	54.1	37.7- 70.8	41.9- 66.6	ACCEPTABLE
ETHYLBENZENE	1	10.0	11.3	7.71- 14.7	8.60- 13.8	ACCEPTABLE
	2	47.0	52.4	36.2- 68.5	40.3- 64.4	ACCEPTABLE
TOLUENE	1	12.4	13.9	9.86- 17.7	10.9- 16.7	ACCEPTABLE
	2	30.1	33.9	24.0- 43.1	26.4- 40.7	ACCEPTABLE
1,2-DICHLOROBENZENE	1	11.1	12.1	8.47- 15.4	9.37- 14.5	ACCEPTABLE
	2	48.3	52.0	36.1- 66.4	40.0- 62.5	ACCEPTABLE
1,3-DICHLOROBENZENE	1	8.90	9.43	6.17- 12.1	6.92- 11.4	ACCEPTABLE
	2	45.5	47.8	33.6- 61.2	37.2- 57.6	ACCEPTABLE
1,4-DICHLOROBENZENE	1	10.6	11.7	7.95- 15.2	8.86- 14.2	ACCEPTABLE
	2	54.3	58.1	39.1- 76.5	43.9- 71.7	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: WA156

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MISCELLANEOUS PARAMETERS:						
TOTAL CYANIDE	1	0.220	0.250	0.138-0.341	0.164-0.316	ACCEPTABLE
(IN MG/L)	2	0.110	0.130	.0821-0.169	.0932-0.158	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: TMA/Eberline

PE Sample	No. Analyzed	No. Acceptable	% Acceptable
EML-556	39	36	92.3

	EMSL-LV Acceptance Range (%)	% of EMSL-LV True Value	% of all Participating Laboratory's Grand Average
January 15, 1993			
Sr-89	66.7 to 133.3	71.1	
Sr-90	50.0 to 150.0	86.7	
January 22, 1993			
Pu-239	82.5 to 117.5	80.2 **(LOW)**	86.5
January 29, 1993			
Alpha	54.1 to 145.9	50.9 **(LOW)**	101.9
Beta	80.2 to 119.8	85.6	89.7
February 05, 1993			
I-131	90.0 to 110.0	111.3 (High)	
February 12, 1993			
Uranium	32.0 to 168.0	98.7	104.7
March 3, 1993			
Ra-226	84.7 to 115.3	115.0	
Ra-228	75.1 to 124.9	106.9	

TMA
Thermo Analytical Inc.

TMA/Eberline Albuquerque Laboratory
7021 Pan American Hwy. NE
Albuquerque, NM 87109
(505) 345-3461 • FAX # (505) 761-5416

USEPA-TMA/Eberline CROSS CHECK PROGRAM

Sample Type	Analysis	Study Date	TMA/E pCi/l	EPA pCi/l	Deviation (known)
Water	Sr-89	01-15-93	10.67 ± 0.06	15.0 ± 5.0	-1.50
Water	Sr-90	01-15-93	8.67 ± 0.58	10.0 ± 5.0	-0.46
Water	Pu-239	01-22-93	16.03 ± 0.21	20.0 ± 2.0	-3.44*
Water	I-131	02-05-93	111.33 ± 0.58	100.0 ± 10.0	+1.96
Water	U(nat)	02-12-93	7.50 ± 0.10	7.6 ± 3.0	-0.06
Water	Alpha	01-29-93	17.33 ± 1.15	34.0 ± 9.0	-3.21**
Water	Beta	01-29-93	37.67 ± 0.58	44.0 ± 5.0	-2.19
Water	Ra-226	03-03-93	11.27 ± 0.46	9.8 ± 1.5	+1.69
Water	Ra-228	03-03-93	19.77 ± 0.61	18.5 ± 4.6	+0.48

* Corrective Action Request issued.

** Th-230 was used by EPA. Th-230 has a 50 % lower counting efficiency than Am-241, which is the EPA recommended isotope for alpha absorbtion efficiency curves. Correction for the 50% gives an acceptable value.

USDOE/EML-TMA/EBERLINE QUALITY ASSESSMENT PROGRAM (3/93)

Sample Type	Analysis	TMA/E	EML	Units	Ratio	+/-
Air Filter	Be-7	357	274	Bq/filter	1.30	0.16
Air Filter	Mn-54	14.8	11.7	Bq/filter	1.26	0.09
Air Filter	Co-57	3.22	2.71	Bq/filter	1.19	0.10
Air Filter	Co-60	1.91	1.70	Bq/filter	1.12	0.18
Air Filter	Sr-90	0.277	0.152	Bq/filter	1.82*	0.62
Air Filter	Cs-134	2.27	1.96	Bq/filter	1.16	0.14
Air Filter	Cs-137	4.04	3.07	Bq/filter	1.32	0.14
Air Filter	Ce-144	21.4	19.3	Bq/filter	1.11	0.08
Air Filter	Pu-238	0.0307	0.0363	Bq/filter	0.85	0.15
Air Filter	Pu-239	0.0230	0.0234	Bq/filter	0.98	0.20
Air Filter	Am-241	0.0373	0.0414	Bq/filter	0.90	0.14
Air Filter	U-234	0.0346	0.0220	Bq/filter	1.57*	0.40
Air Filter	U-238	0.0223	0.0240	Bq/filter	0.93	0.34
Soil	K-40	202	321	Bq/kg	0.63	0.08
Soil	Sr-90	41.4	41.7	Bq/kg	0.99	0.19
Soil	Cs-137	647	923	Bq/kg	0.70	0.04
Soil	Pu-239	10.3	11.6	Bq/kg	0.89	0.17
Soil	Am-241	4.74	6.50	Bq/kg	0.73	0.18
Soil	U-234	38.9	37.8	Bq/kg	1.03	0.16
Soil	U-238	35.6	37.6	Bq/kg	0.95	0.16
Vegetation	K-40	279	383	Bq/kg	0.73	0.13
Vegetation	Sr-90	503	237	Bq/kg	2.12*	0.43
Vegetation	Cs-137	19.6	24.6	Bq/kg	0.80	0.13
Vegetation	Pu-238	1.24	1.14	Bq/kg	1.09	0.60
Vegetation	Pu-239	0.370	0.323	Bq/kg	1.15	0.46
Vegetation	Am-241	0.315	0.231	Bq/kg	1.36	0.65
Water	H-3	101	97.0	Bq/l	1.04	0.16
Water	Mn-54	111	105	Bq/l	1.06	0.06
Water	Fe-55	28.5	52.9	Bq/l	1.20	0.14
Water	Co-60	48.7	45.3	Bq/l	1.08	0.08
Water	Sr-90	1.45	1.03	Bq/l	1.41	0.38
Water	Cs-134	46.1	42.4	Bq/l	1.09	0.08
Water	Cs-137	56.0	50.8	Bq/l	1.10	0.07
Water	Ce-144	90.5	83.6	Bq/l	1.08	0.08
Water	Pu-238	0.507	0.494	Bq/l	1.03	0.15
Water	Pu-239	0.893	0.828	Bq/l	1.08	0.14
Water	Am-241	0.478	0.440	Bq/l	1.09	0.30
Water	U-234	0.166	0.151	Bq/l	1.10	0.43
Water	U-238	0.141	0.147	Bq/l	0.96	0.47

*Corrective Action Request has been issued.

Prepared by: Kathy Burnham
Kathy Burnham, QC Representative

Date: 7-15-93

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: Martin Marietta K-25 Laboratory

PE Sample	EMSL-LV Acceptance Range (%)	% of EMSL-LV True Value	% of all Participating Laboratory's Grand Average
October 20, 1992			
Alpha	58.3 to 141.7	104.6	106.7
Beta	67.4 to 132.6	88.0	100.3
Uranium	49.0 to 151.0	77.7	81.4
Co-60	42.0 to 158.0	95.5	93.6
Cs-134	0.0 to 274.0	66.6	62.5
Cs-137	0.0 to 208.8	83.4	75.3
November 13, 1992			
Uranium	65.8 to 134.2	63.8 (low)	67.2
February 12, 1993			
Uranium	32.0 to 168.0	113.2	120.1

	Total Acceptable	Total Analyzed	% Acceptable
APG Feb. 1993	92	92	100
APG May 1993	89	92	96.7
WP 29			
Metals	48	50	96.0
Inorganics	37	40	92.5

EMSL-LV QB1 FY93	EPA/CLP Score
Organics	79.9

Performance Evaluation-A

Intercomparison Study

October 20, 1992

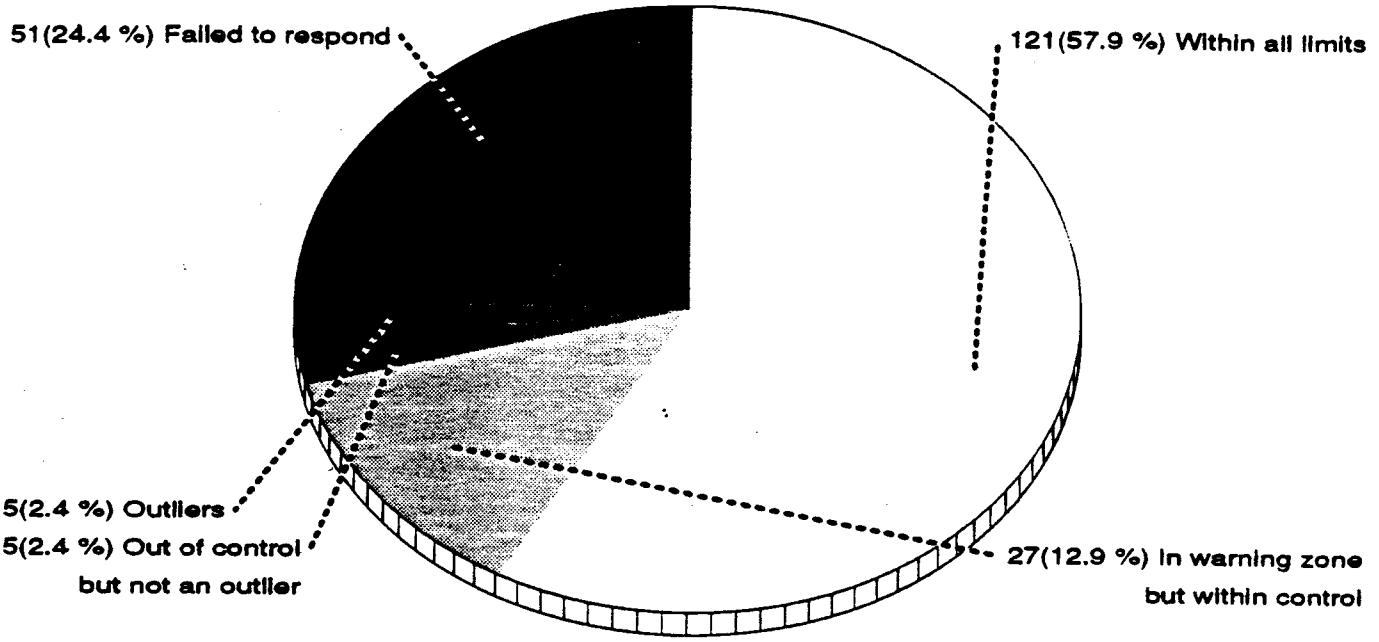
Environmental Protection Agency

Environmental Monitoring Systems Laboratory

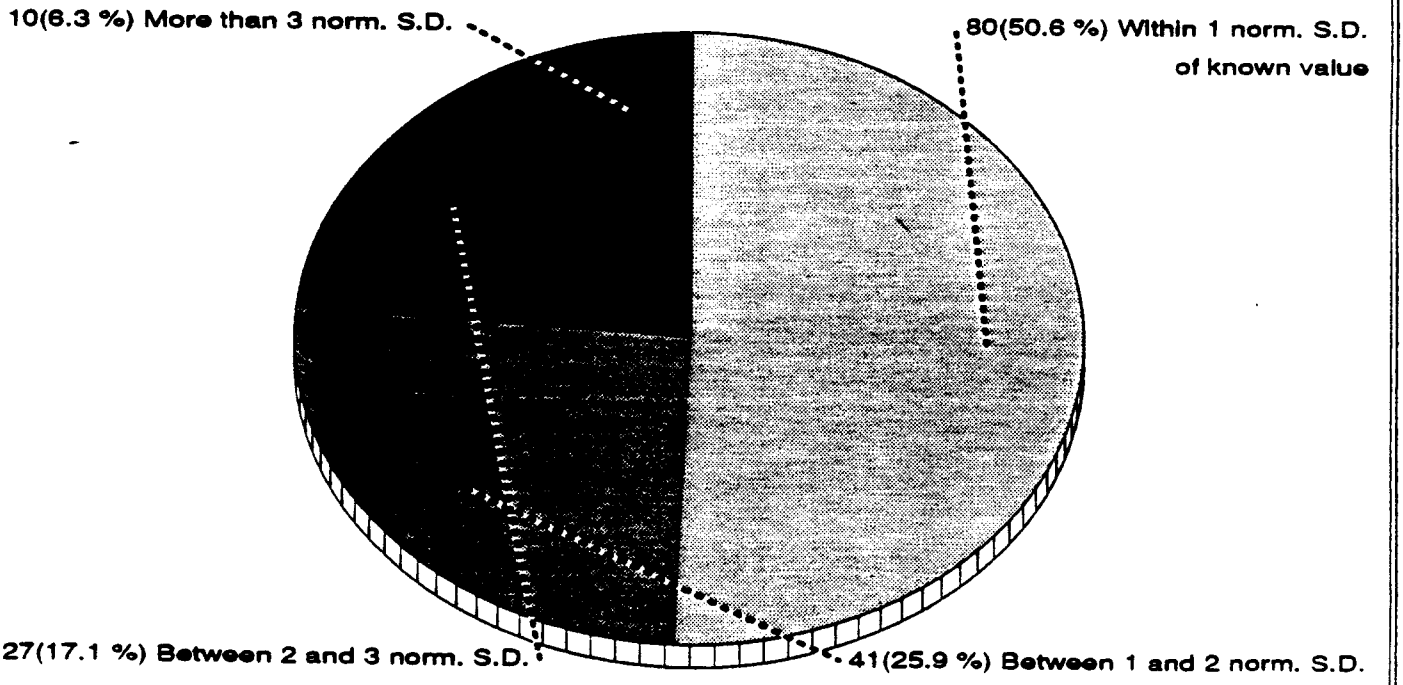
Las Vegas, Nevada

Gross Alpha Statistical Summary 209 Participants

The known value of this nuclide is **29.0 pCi/l** with an expected precision of **7.0**; the control limits are 16.9 to 41.1; the warning regions are 16.9 to 20.9 and 37.1 to 41.1



Statistic	Respondents	Non-outliers
Mean	30.19	**Grand Avg 28.42**
Std. Dev.	17.39	6.07
Variance	302.24	36.87
% Coef. of Var.	57.59	21.37
% deviation of mean from known value	4.09	-2.01
Norm. dev. of mean from known value	0.07	-0.10
Median	28.17	28.00
% deviation of median from known value	-2.87	-3.45
Norm. dev. of median from known value	-0.05	-0.16



Gross Alpha

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
[illegible]E	50.0	49.0	47.0	1.53	0.253	48.67	5.01	4.87	⇑
[illegible]T	29.0	30.0	30.0	0.58	0.084	29.67	0.31	0.16	
KX	27.0	31.0	31.0	2.31	0.338	29.67	0.31	0.16	
KZ	31.0	32.0	32.0	0.58	0.084	31.67	0.80	0.66	
L	27.0	30.0	30.0	1.73	0.253	29.00	0.14	0.00	
LE	22.0	21.0	19.0	1.53	0.253	20.67	-1.92	-2.06	
LF	25.0	28.0	26.0	1.53	0.253	26.33	-0.52	-0.66	
LG									•
LM									•
LR	26.0	21.0	23.0	2.52	0.422	23.33	-1.26	-1.40	
LT	24.0	26.0	25.0	1.00	0.169	25.00	-0.85	-0.99	
M	25.0	26.0	25.0	0.58	0.084	25.33	-0.76	-0.91	
MA									•
ME	37.0	32.0	34.0	2.52	0.422	34.33	1.46	1.32	
MN									•
MO									•
MP									•
MQ	21.0	22.0	22.0	0.58	0.084	21.67	-1.67	-1.81	
MS	18.0	19.0	20.0	1.00	0.169	19.00	-2.33	-2.47	
MV	28.0	33.0	30.0	2.52	0.422	30.33	0.47	0.33	
MY									•
N									•
[illegible]A	28.0	29.0	30.0	1.00	0.169	29.00	0.14	0.00	
[illegible]G									•
NH	22.0	19.0	19.0	1.73	0.253	20.00	-2.08	-2.23	
NJ	27.0	25.0	30.0	2.52	0.422	27.33	-0.27	-0.41	
NK	31.0	31.0	29.0	1.15	0.169	30.33	0.47	0.33	
NO	22.0	23.0	21.0	1.00	0.169	22.00	-1.59	-1.73	
NT	36.0	36.0	36.0	0.00	0.000	36.00	1.88	1.73	
NZ									•
O	31.0	33.0	34.0	1.53	0.253	32.67	1.05	0.91	
OE	24.0	25.0	26.0	1.00	0.169	25.00	-0.85	-0.99	
OF	75.0	74.0	72.0	1.53	0.253	73.67	11.20	11.05	×
OK									•
OL									•
OM									•
OS	31.0	30.0	29.0	1.00	0.169	30.00	0.39	0.25	
OX	20.0	18.0	19.0	1.00	0.169	19.00	-2.33	-2.47	
OY	42.0	48.0	42.0	3.46	0.506	44.00	3.86	3.71	⇑
OZ									•
P	25.0	29.0	39.0	7.21	1.345	31.00	0.64	0.49	
PA	18.0	20.0	12.0	4.16	0.675	16.67	-2.91	-3.05	⇓
PB	35.0	37.0	36.0	1.00	0.169	36.00	1.88	1.73	
PC									•
[illegible]									•

• ≡ No data submitted

∅ ≡ Insufficient data

TAG SYMBOLS

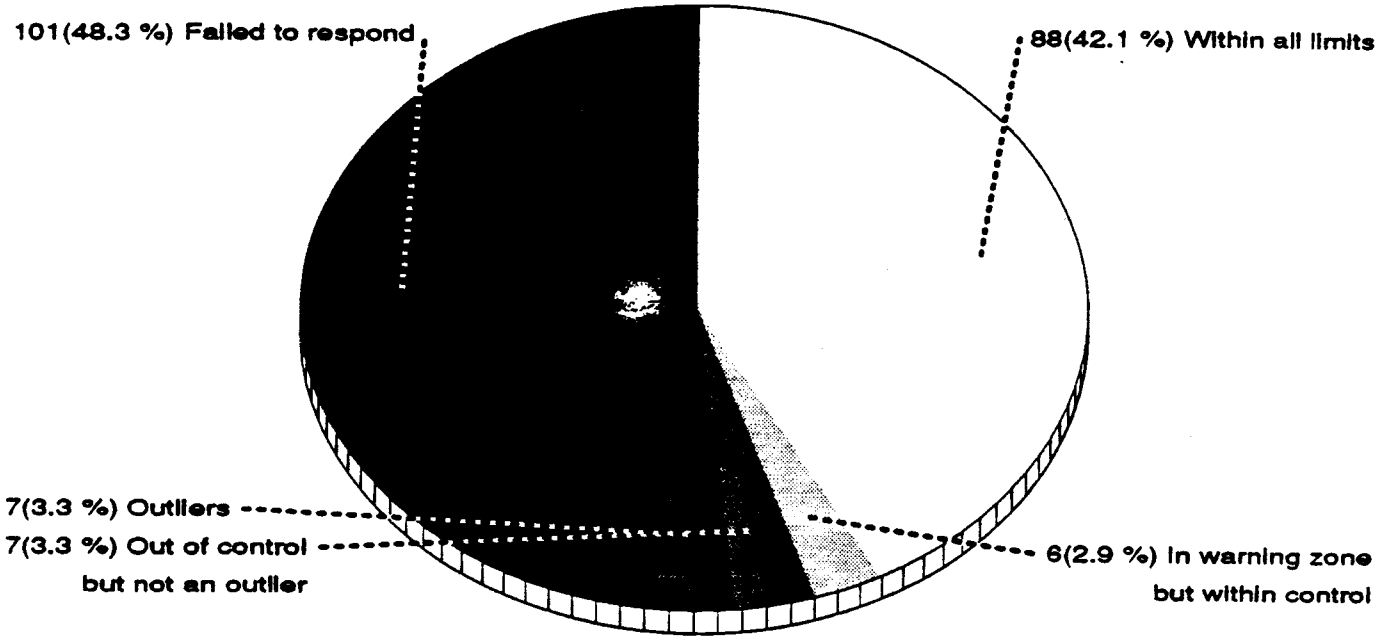
× ≡ Determined to be an outlier

⇑ ≡ Above control limit

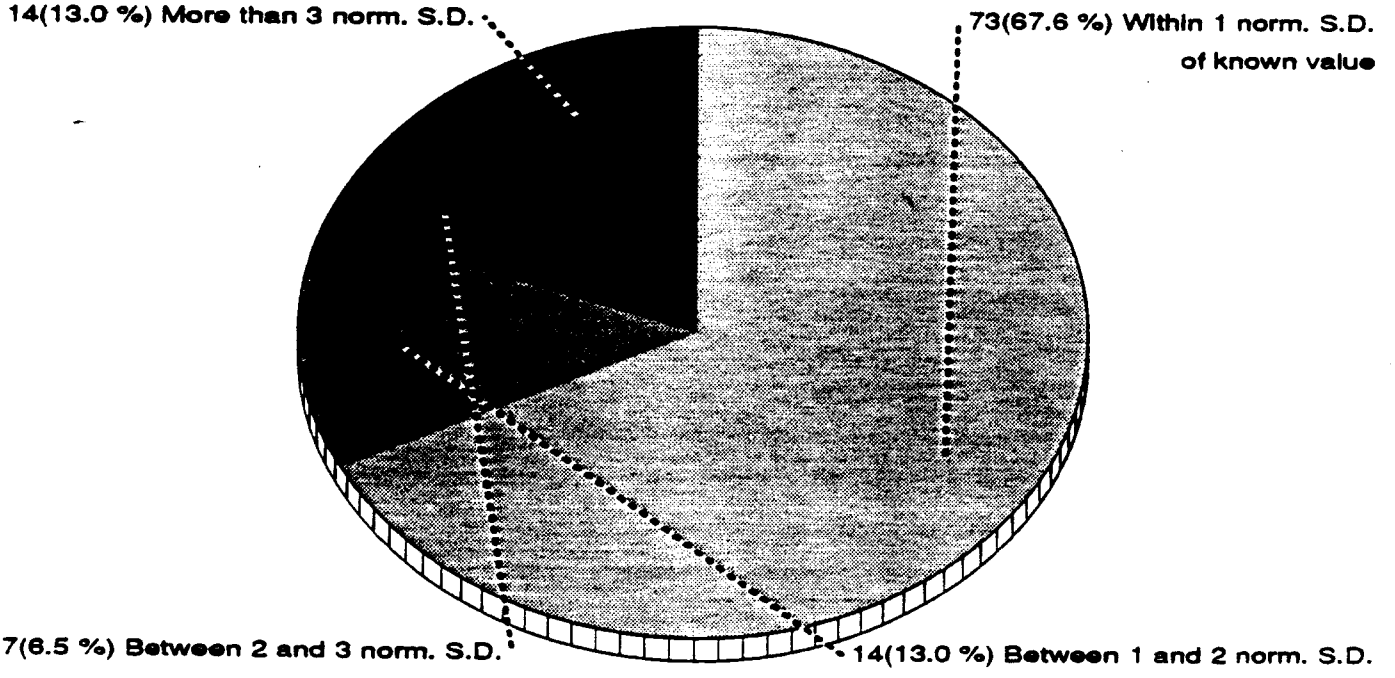
⇓ ≡ Below control limit

Uranium (Natural) Statistical Summary 209 Participants

The known value of this nuclide is 10.2 pCi/l with an expected precision of 3.0; the control limits are 5.0 to 15.4; the warning regions are 5.0 to 6.7 and 13.7 to 15.4



Statistic	Respondents	Non-outliers
Mean	11.03	Grand Avg 9.74
Std. Dev.	6.77	2.17
Variance	45.86	4.72
% Coef. of Var.	61.42	22.31
% deviation of mean from known value	8.09	-4.49
Norm. dev. of mean from known value	0.12	-0.21
Median	10.00	10.00
% deviation of median from known value	-1.96	-1.96
Norm. dev. of median from known value	-0.03	-0.09



Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
[illegible]									•
KT	3.8	4.0	3.9	0.10	0.039	3.90	-3.37	-3.64	⇓
KX									•
KZ									•
L	11.5	11.5	10.9	0.35	0.118	11.30	0.90	0.64	
LE									•
LF									•
LG									•
LM									•
LR									•
LT	11.9	11.5	11.7	0.20	0.079	11.70	1.13	0.87	
M									•
MA									•
ME	9.8	9.2	10.0	0.42	0.158	9.67	-0.04	-0.31	
MN									•
MO									•
MP									•
MQ									•
MS	9.5	9.6	9.7	0.10	0.039	9.60	-0.08	-0.35	
MV									•
MY									•
N									•
[illegible]	9.0	10.0	11.0	1.00	0.394	10.00	0.15	-0.12	
NG									•
NH	11.0	11.1	10.2	0.49	0.177	10.77	0.59	0.33	
NJ	9.1	8.3	9.2	0.49	0.177	8.87	-0.51	-0.77	
NK	8.1	8.1	7.6	0.29	0.098	7.93	-1.04	-1.31	
NO	8.6	9.2	10.5	0.97	0.374	9.43	-0.18	-0.44	
NT	10.1	12.6	11.4	1.25	0.492	11.37	0.94	0.67	
NZ									•
O									•
OE									•
OF	14.2	14.2	12.6	0.92	0.315	13.67	2.27	2.00	
OK									•
OL									•
OM									•
OS	9.6	10.3	10.3	0.40	0.138	10.07	0.19	-0.08	
OX									•
OY	11.0	11.1	11.4	0.21	0.079	11.17	0.82	0.56	
OZ	9.9	9.6	10.3	0.35	0.138	9.93	0.11	-0.15	
P	6.1	2.0	3.0	2.14	0.807	3.70	-3.49	-3.75	⇓
PA									•
PB	11.2	10.8	11.0	0.20	0.079	11.00	0.73	0.46	
[illegible]	45.4	45.3	44.0	0.78	0.276	44.90	20.30	20.03	×
									•

• ≡ No data submitted

∅ ≡ Insufficient data

TAG SYMBOLS

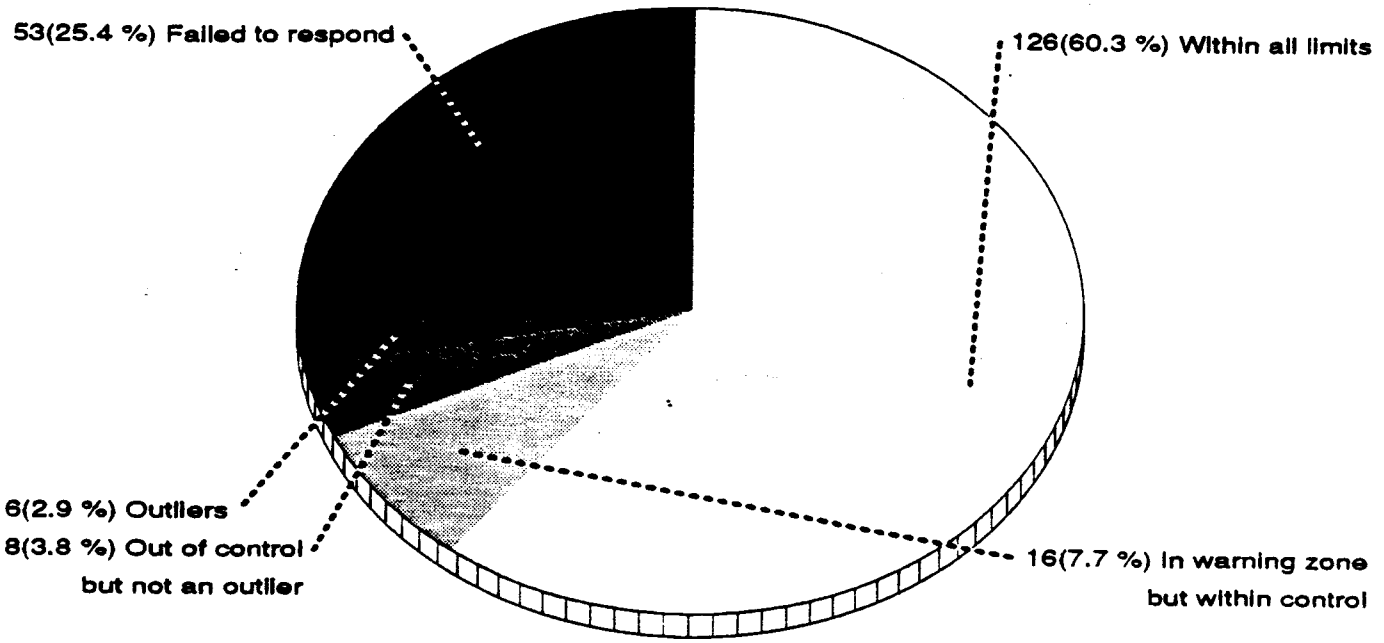
× ≡ Determined to be an outlier

⇑ ≡ Above control limit

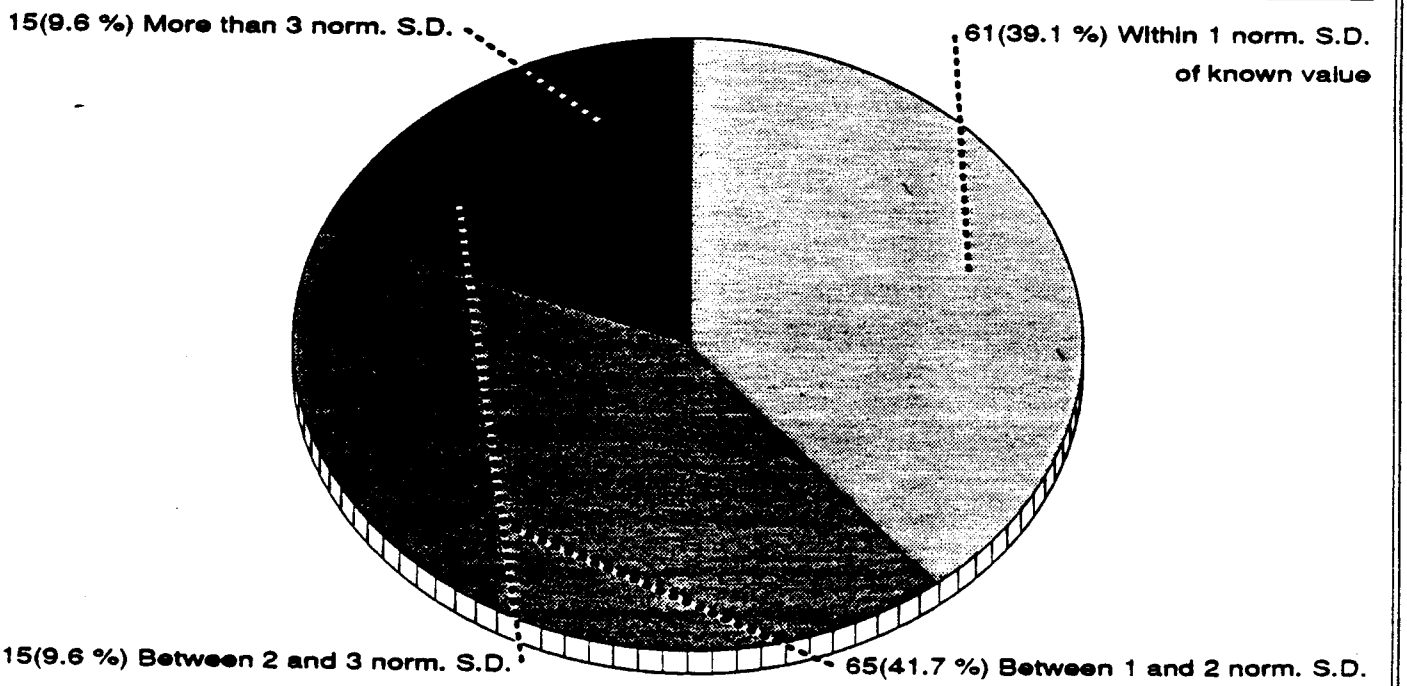
⇓ ≡ Below control limit

Gross Beta Statistical Summary 209 Participants

The known value of this nuclide is **53.0 pCi/l** with an expected precision of **10.0**; the control limits are 35.7 to 70.3; the warning regions are 35.7 to 41.4 and 64.6 to 70.3



Statistic	Respondents	Non-outliers
Mean	47.44	**Grand Avg 46.53**
Std. Dev.	9.19	6.55
Variance	84.52	42.96
% Coef. of Var.	19.38	14.09
% deviation of mean from known value	-10.49	-12.21
Norm. dev. of mean from known value	-0.60	-0.99
Median	46.83	46.67
% deviation of median from known value	-11.64	-11.95
Norm. dev. of median from known value	-0.67	-0.97



Gross Beta

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
KE	70.0	74.0	73.0	2.08	0.236	72.33	4.47	3.35	×
KT	67.0	67.0	68.0	0.58	0.059	67.33	3.60	2.48	
KX	49.0	47.0	50.0	1.53	0.177	48.67	0.37	-0.75	
KZ	59.0	60.0	60.0	0.58	0.059	59.67	2.28	1.15	
L	44.0	43.0	47.0	2.08	0.236	44.67	-0.32	-1.44	
LE	47.0	47.0	51.0	2.31	0.236	48.33	0.31	-0.81	
LF	44.0	45.0	44.0	0.58	0.059	44.33	-0.38	-1.50	
LG									•
LM									•
LR	52.0	48.0	45.0	3.51	0.413	48.33	0.31	-0.81	
LT	44.0	50.0	46.0	3.06	0.354	46.67	0.02	-1.10	
M	62.0	62.0	63.0	0.58	0.059	62.33	2.74	1.62	
MA	44.0	42.0	44.0	1.15	0.118	43.33	-0.55	-1.67	
ME	50.0	49.0	51.0	1.00	0.118	50.00	0.60	-0.52	
MN									•
MO									•
MP									•
MQ	46.0	46.0	49.0	1.73	0.177	47.00	0.08	-1.04	
MS	20.0	19.0	19.0	0.58	0.059	19.33	-4.71	-5.83	×
MV	51.0	48.0	52.0	2.08	0.236	50.33	0.66	-0.46	
MY									•
[illegible]									•
NA	59.0	60.0	62.0	1.53	0.177	60.33	2.39	1.27	
NG									•
NH	42.0	44.0	46.0	2.00	0.236	44.00	-0.44	-1.56	
NJ	51.0	55.0	55.0	2.31	0.236	53.67	1.24	0.12	
NK	46.0	47.0	47.0	0.58	0.059	46.67	0.02	-1.10	
NO	37.0	40.0	44.0	3.51	0.413	40.33	-1.07	-2.19	
NT	54.0	52.0	53.0	1.00	0.118	53.00	1.12	0.00	
NZ									•
O	47.0	49.0	51.0	2.00	0.236	49.00	0.43	-0.69	
OE	42.0	43.0	44.0	1.00	0.118	43.00	-0.61	-1.73	
OF	49.0	46.0	54.0	4.04	0.473	49.67	0.54	-0.58	
OK									•
OL									•
OM									•
OS	60.0	59.0	59.0	0.58	0.059	59.33	2.22	1.10	
OX	44.0	42.0	44.0	1.15	0.118	43.33	-0.55	-1.67	
OY	45.0	44.0	48.0	2.08	0.236	45.67	-0.15	-1.27	
OZ									•
P	52.0	48.0	48.0	2.31	0.236	49.33	0.49	-0.64	
PA	48.0	46.0	46.0	1.15	0.118	46.67	0.02	-1.10	
PB	57.0	61.0	58.0	2.08	0.236	58.67	2.10	0.98	
[illegible]									•
PE									•

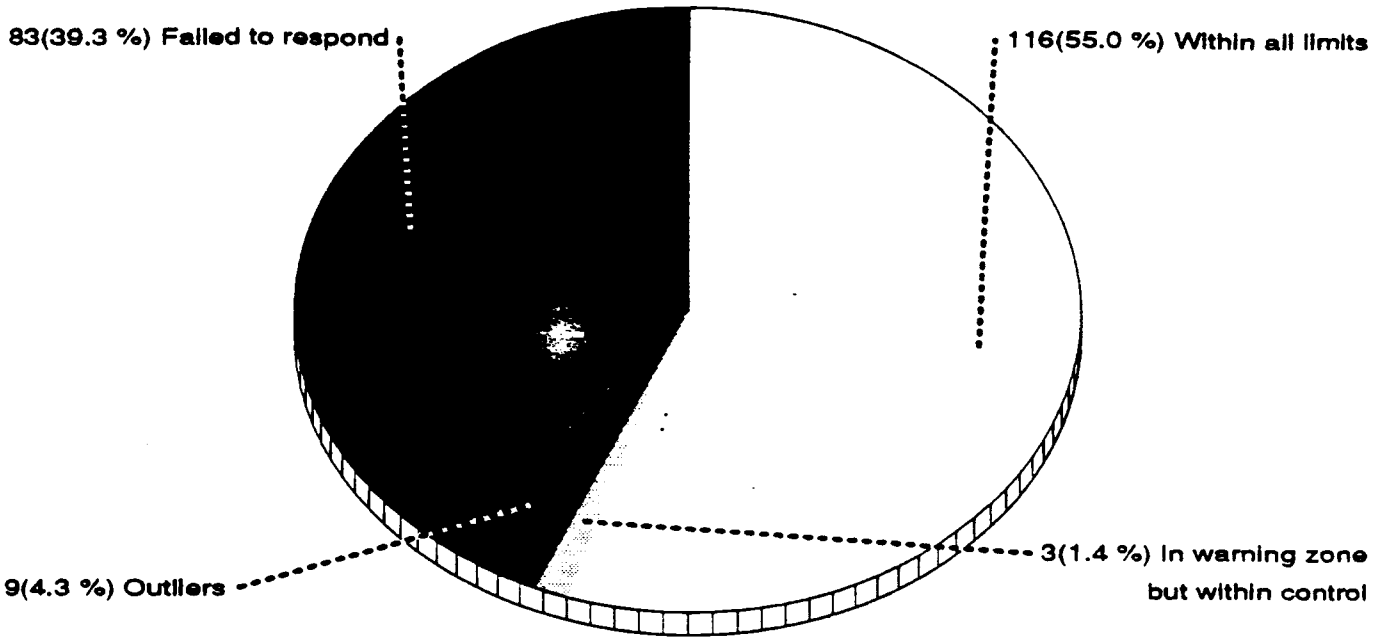
• ≡ No data submitted
Ø ≡ Insufficient data

TAG SYMBOLS
× ≡ Determined to be an outlier

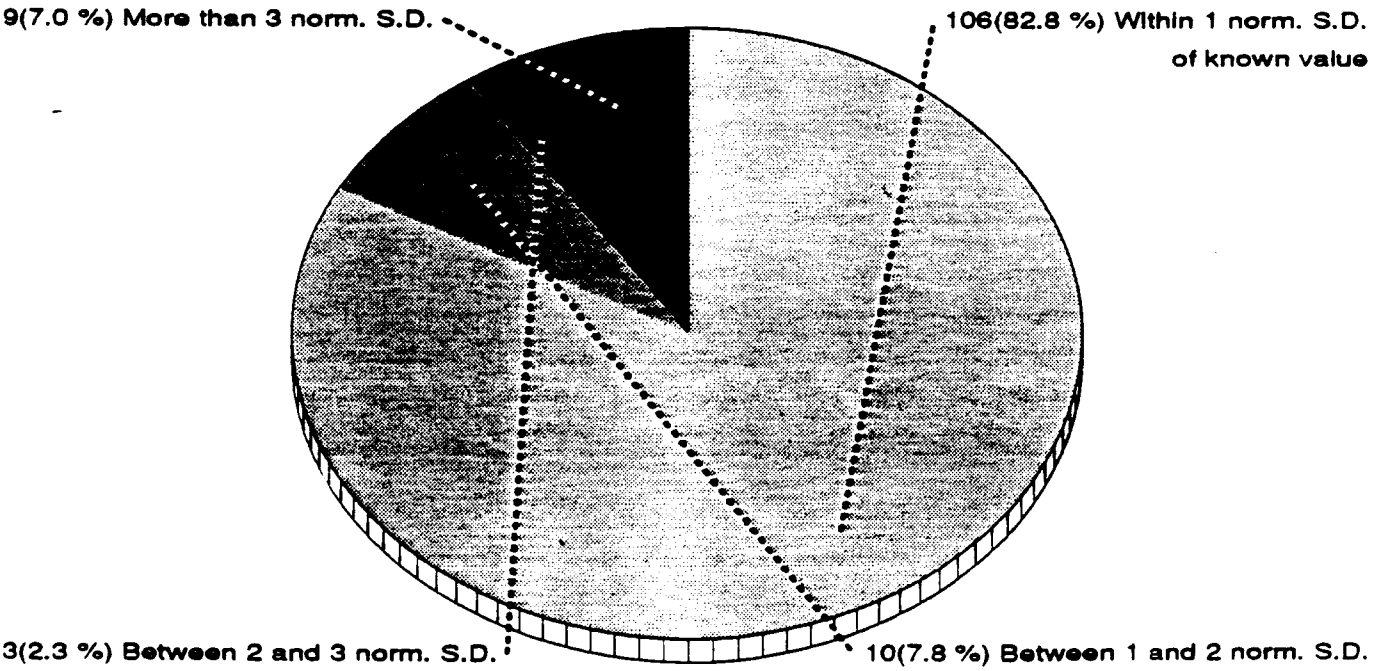
⇑ ≡ Above control limit
⇓ ≡ Below control limit

Cobalt-60 Statistical Summary 211 Participants

The known value of this nuclide is **15.0 pCi/l** with an expected precision of **5.0**; the control limits are 6.3 to 23.7; the warning regions are 6.3 to 9.2 and 20.8 to 23.7



Statistic	Respondents	Non-outliers
Mean	17.50	**Grand Avg 15.31**
Std. Dev.	18.95	1.97
Variance	359.21	3.89
% Coef. of Var.	108.30	12.88
% deviation of mean from known value	16.67	2.07
Norm. dev. of mean from known value	0.13	0.16
Median	15.00	15.00
% deviation of median from known value	0.00	0.00
Norm. dev. of median from known value	0.00	0.00



Cobalt-60

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
KE									•
KT									•
KX	15.0	16.0	16.0	0.58	0.118	15.67	0.12	0.23	
KZ									•
L	16.0	15.0	15.0	0.58	0.118	15.33	0.01	0.12	
LE	32.0	26.0	14.0	9.17	3.146	24.00	3.01	3.12	×
LF	16.0	15.0	16.0	0.58	0.118	15.67	0.12	0.23	
LG									•
LM									•
LR	14.0	26.0	19.0	6.03	1.795	19.67	1.51	1.62	
LT	14.0	14.0	14.0	0.00	0.000	14.00	-0.45	-0.35	
M	14.0	14.0	14.0	0.00	0.000	14.00	-0.45	-0.35	
MA	16.0	16.0	15.0	0.58	0.118	15.67	0.12	0.23	
ME	14.0	16.0	15.0	1.00	0.236	15.00	-0.11	0.00	
MN									•
MO									•
MP	14.0	15.0	16.0	1.00	0.236	15.00	-0.11	0.00	
MQ	20.0	20.0	19.0	0.58	0.118	19.67	1.51	1.62	
MS	16.0	16.0	16.0	0.00	0.000	16.00	0.24	0.35	
MV	24.0	21.0	22.0	1.53	0.354	22.33	2.43	2.54	
MY									•
[illegible]									•
[illegible]A									•
NG									•
NH	13.0	16.0	14.0	1.53	0.354	14.33	-0.34	-0.23	
NJ	15.0	14.0	14.0	0.58	0.118	14.33	-0.34	-0.23	
NK	14.0	15.0	14.0	0.58	0.118	14.33	-0.34	-0.23	
NO									•
NT									•
NZ									•
O	16.0	16.0	16.0	0.00	0.000	16.00	0.24	0.35	
OE									•
OF									•
OK	223.0	222.0	227.0	2.65	0.591	224.00	72.29	72.40	×
OL									•
OM									•
OS									•
OX									•
OY									•
OZ	17.0	22.0	20.0	2.52	0.591	19.67	1.51	1.62	
P	12.0	14.0	13.0	1.00	0.236	13.00	-0.80	-0.69	
PA									•
[illegible]	12.0	13.0	13.0	0.58	0.118	12.67	-0.92	-0.81	
[illegible]	17.0	16.0	16.0	0.58	0.118	16.33	0.35	0.46	
PE									•

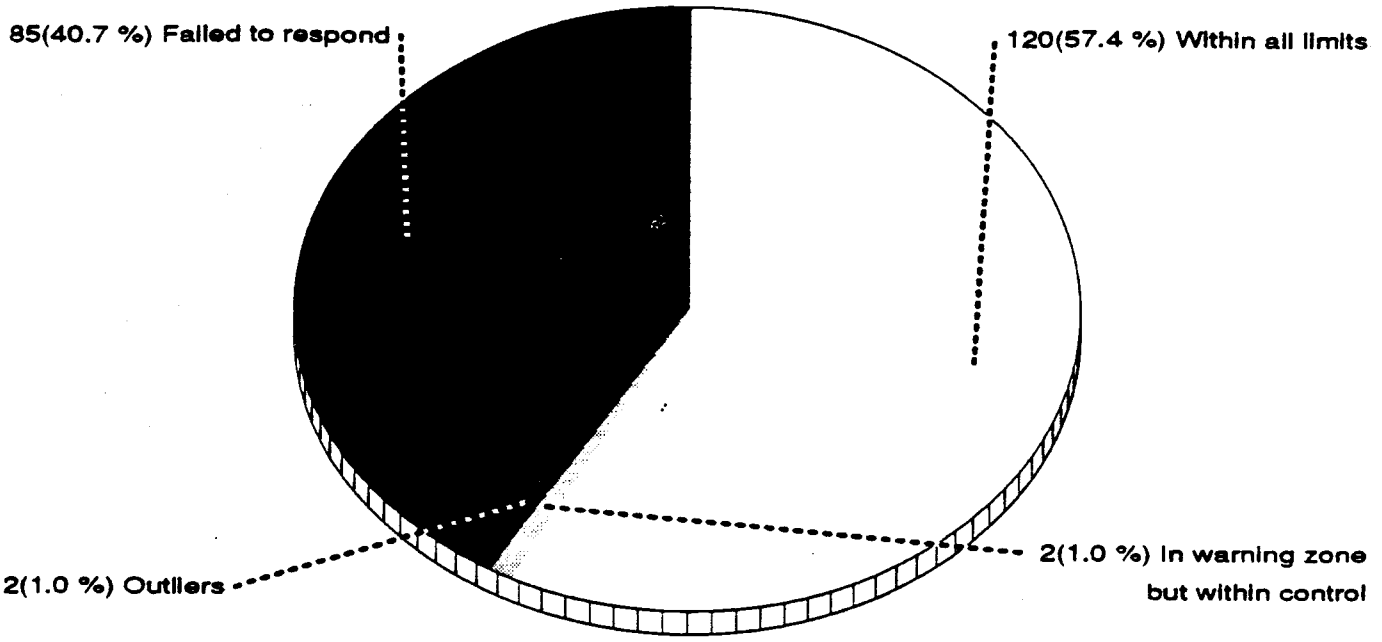
• ≡ No data submitted
∅ ≡ Insufficient data

TAG SYMBOLS
× ≡ Determined to be an outlier

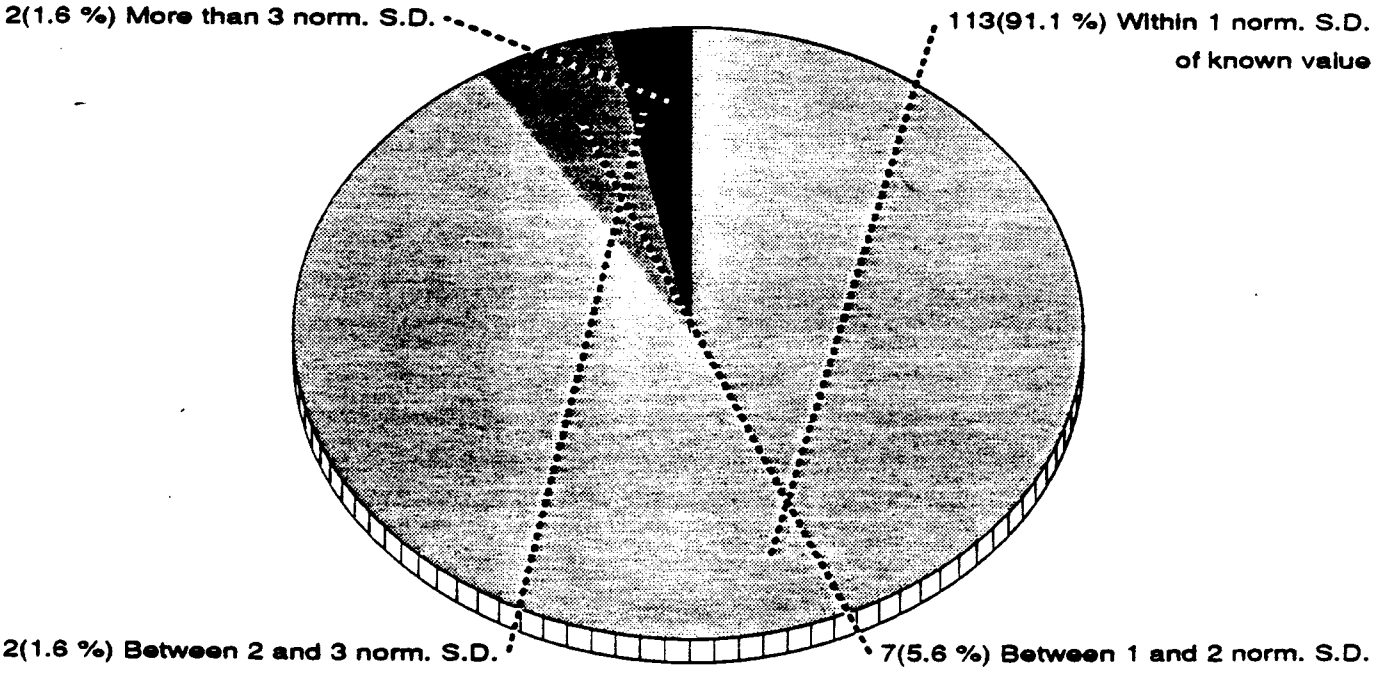
⇑ ≡ Above control limit
⇓ ≡ Below control limit

Cesium-134 Statistical Summary 209 Participants

The known value of this nuclide is **5.0 pCi/l** with an expected precision of **5.0**; the control limits are 0.0 to 13.7; the warning regions are 0.0 to 0.0 and 10.8 to 13.7



Statistic	Respondents	Non-outliers
Mean	6.31	**Grand Avg** 5.33
Std. Dev.	9.19	1.45
Variance	84.45	2.12
% Coef. of Var.	145.65	27.29
% deviation of mean from known value	26.18	6.61
Norm. dev. of mean from known value	0.14	0.23
Median	5.00	5.00
% deviation of median from known value	0.00	0.00
Norm. dev. of median from known value	0.00	0.00



Cesium-134

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	Normalized deviation (known)	Tag
KE									•
KT									•
KX	7.0	6.0	6.0	0.58	0.118	6.33	0.35	0.46	
KZ									•
L	5.0	5.0	5.0	0.00	0.000	5.00	-0.11	0.00	
LE									•
LF	4.0	5.0	4.0	0.58	0.118	4.33	-0.35	-0.23	
LG									•
LM									•
LR	9.0	8.0	10.0	1.00	0.236	9.00	1.27	1.39	
LT	5.0	5.0	5.0	0.00	0.000	5.00	-0.11	0.00	
M	5.0	6.0	5.0	0.58	0.118	5.33	0.00	0.12	
MA	5.0	5.0	4.0	0.58	0.118	4.67	-0.23	-0.12	
ME	5.0	6.0	5.0	0.58	0.118	5.33	0.00	0.12	
MN									•
MO									•
MP	5.0	3.0	5.0	1.15	0.236	4.33	-0.35	-0.23	
MQ	8.0	5.0	6.0	1.53	0.354	6.33	0.35	0.46	
MS	5.0	5.0	5.0	0.00	0.000	5.00	-0.11	0.00	
MV	6.0	5.0	6.0	0.58	0.118	5.67	0.12	0.23	
MY									•
[illegible]									•
NA									•
NG									•
NH	6.0	2.0	2.0	2.31	0.473	3.33	-0.69	-0.58	
NJ	4.0	4.0	5.0	0.58	0.118	4.33	-0.35	-0.23	
NK	3.0	4.0	3.0	0.58	0.118	3.33	-0.69	-0.58	
NO									•
NT									•
NZ									•
O	6.0	5.0	5.0	0.58	0.118	5.33	0.00	0.12	
OE									•
OF									•
OK	104.0	100.0	108.0	4.00	0.945	104.00	34.18	34.29	×
OL									•
OM									•
OS									•
OX									•
OY									•
OZ	5.0	6.0	7.0	1.00	0.236	6.00	0.23	0.35	
P	4.0	5.0	2.0	1.53	0.354	3.67	-0.58	-0.46	
PA									•
[illegible]	7.0	10.0	7.0	1.73	0.354	8.00	0.92	1.04	
[illegible]	5.0	7.0	6.0	1.00	0.236	6.00	0.23	0.35	
PE									•

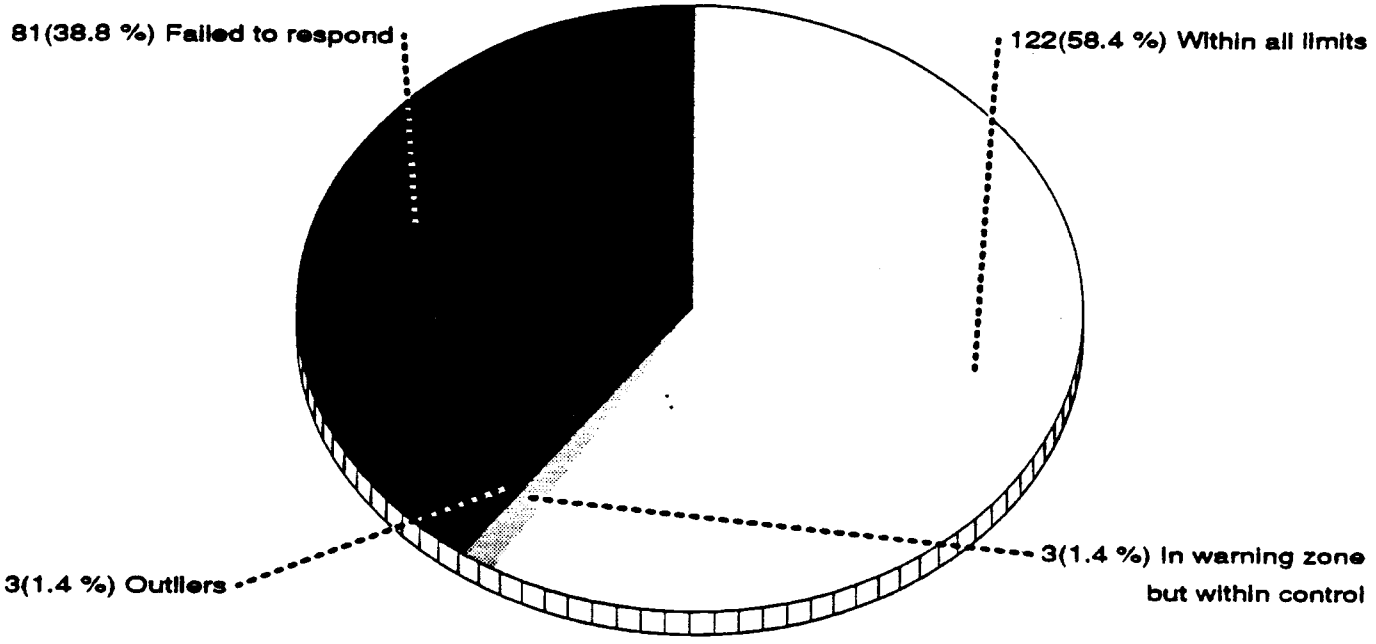
• ≡ No data submitted
∅ ≡ Insufficient data

TAG SYMBOLS
× ≡ Determined to be an outlier

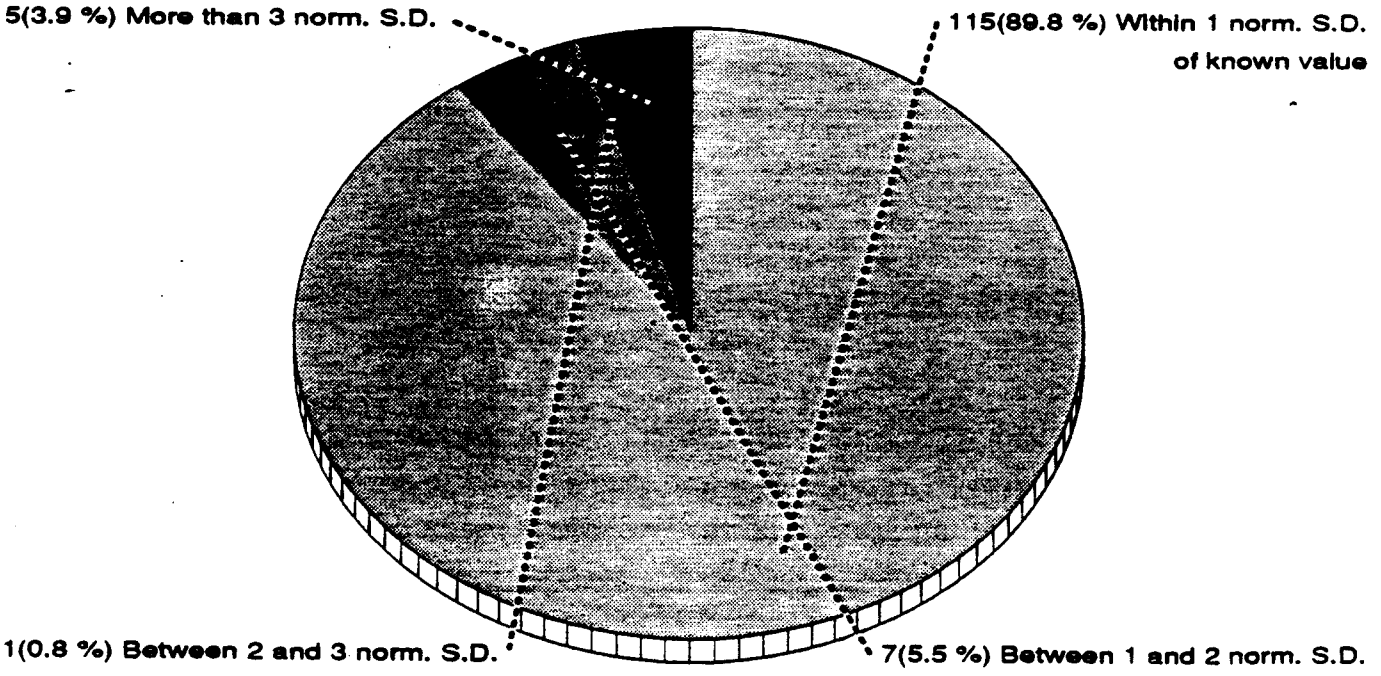
⇑ ≡ Above control limit
⇓ ≡ Below control limit

Cesium-137 Statistical Summary 209 Participants

The known value of this nuclide is **8.0 pCi/l** with an expected precision of **5.0**; the control limits are 0.0 to 16.7; the warning regions are 0.0 to 2.2 and 13.8 to 16.7



Statistic	Respondents	Non-outliers
Mean	10.32	**Grand Avg 8.86**
Std. Dev.	14.75	1.76
Variance	217.61	3.10
% Coef. of Var.	142.94	19.87
% deviation of mean from known value	29.00	10.73
Norm. dev. of mean from known value	0.16	0.49
Median	8.67	8.67
% deviation of median from known value	8.33	8.33
Norm. dev. of median from known value	0.05	0.38



Cesium-137

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
KE									•
KT									•
KX	8.0	9.0	9.0	0.58	0.118	8.67	-0.07	0.23	
KZ									•
L	9.0	7.0	7.0	1.15	0.236	7.67	-0.41	-0.12	
LE	15.0	6.0	11.0	4.51	1.120	10.67	0.63	0.92	
LF	8.0	8.0	9.0	0.58	0.118	8.33	-0.18	0.12	
LG									•
LM									•
LR	11.0	17.0	10.0	3.79	0.827	12.67	1.32	1.62	
LT	9.0	9.0	9.0	0.00	0.000	9.00	0.05	0.35	
M	10.0	10.0	9.0	0.58	0.118	9.67	0.28	0.58	
MA	9.0	9.0	9.0	0.00	0.000	9.00	0.05	0.35	
ME	9.0	8.0	10.0	1.00	0.236	9.00	0.05	0.35	
MN									•
MO									•
MP	8.0	8.0	9.0	0.58	0.118	8.33	-0.18	0.12	
MQ	8.0	13.0	9.0	2.65	0.591	10.00	0.40	0.69	
MS	8.0	8.0	9.0	0.58	0.118	8.33	-0.18	0.12	
MV	9.0	11.0	12.0	1.53	0.354	10.67	0.63	0.92	
MY									•
[illegible]									•
NA									•
NG									•
NH	8.0	9.0	7.0	1.00	0.236	8.00	-0.30	0.00	
NJ	10.0	10.0	10.0	0.00	0.000	10.00	0.40	0.69	
NK	7.0	6.0	7.0	0.58	0.118	6.67	-0.76	-0.46	
NO									•
NT									•
NZ									•
O	9.0	9.0	9.0	0.00	0.000	9.00	0.05	0.35	
OE									•
OF									•
OK	179.0	165.0	178.0	7.81	2.245	174.00	57.21	57.50	×
OL									•
OM									•
OS									•
OX									•
OY									•
OZ	10.0	10.0	10.0	0.00	0.000	10.00	0.40	0.69	
P	6.0	6.0	4.0	1.15	0.236	5.33	-1.22	-0.92	
PA									•
[illegible]	9.0	8.0	9.0	0.58	0.118	8.67	-0.07	0.23	
[illegible]	12.0	8.0	10.0	2.00	0.473	10.00	0.40	0.69	
PE									•

• ≡ No data submitted
∅ ≡ Insufficient data

TAG SYMBOLS
× ≡ Determined to be an outlier

⇑ ≡ Above control limit
⇓ ≡ Below control limit

Uranium in Water

Intercomparison Study

November 13, 1992

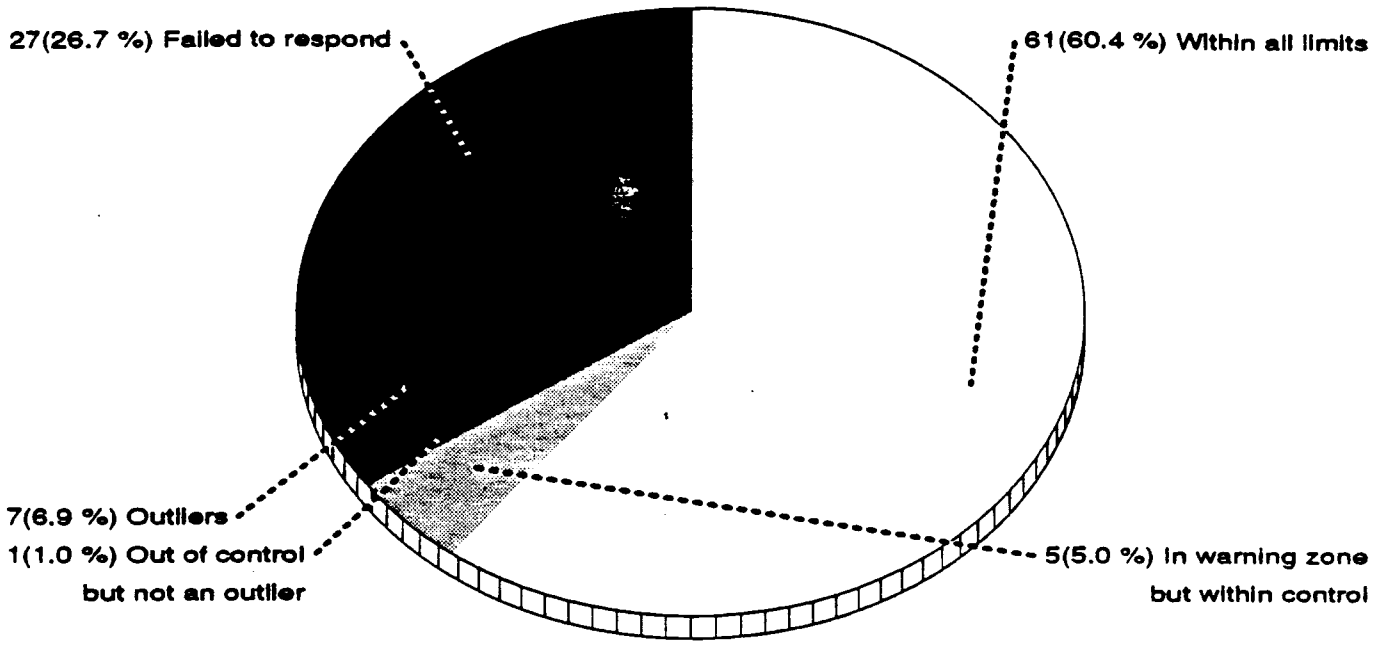
Environmental Protection Agency

Environmental Monitoring Systems Laboratory

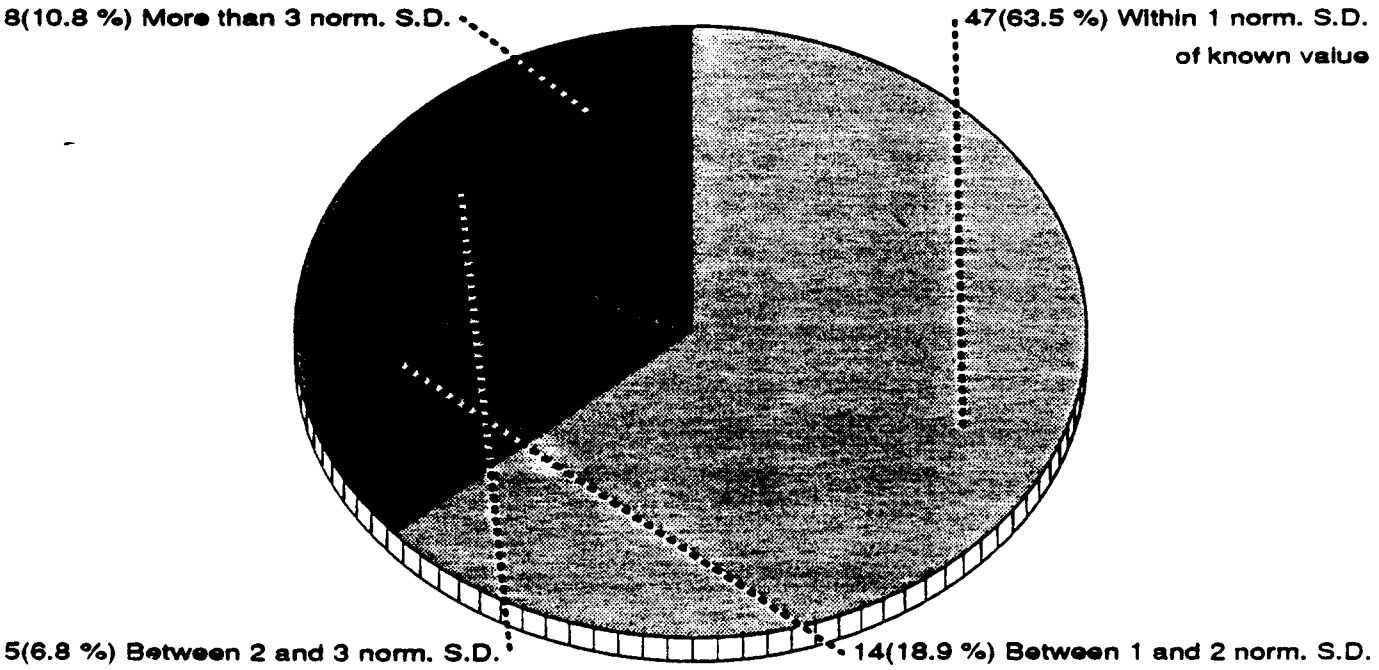
Las Vegas, Nevada

Uranium (Natural) Statistical Summary 101 Participants

The known value of this nuclide is **15.2 pCi/l** with an expected precision of **3.0**; the control limits are 10.0 to 20.4; the warning regions are 10.0 to 11.7 and 18.7 to 20.4



Statistic	Respondents	Non-outliers
Mean	15.40	**Grand Avg 14.44**
Std. Dev.	7.29	1.74
Variance	53.08	3.04
% Coef. of Var.	47.31	12.07
% deviation of mean from known value	1.31	-5.02
Norm. dev. of mean from known value	0.03	-0.44
Median	14.68	14.67
% deviation of median from known value	-3.40	-3.51
Norm. dev. of median from known value	-0.07	-0.31



Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
MS	11.0	11.1	11.0	0.06	0.020	11.03	-1.97	-2.41	
N									•
NA	15.0	16.0	17.0	1.00	0.394	16.00	0.90	0.46	
NK	9.7	9.9	9.5	0.20	0.079	9.70	-2.74	-3.18	⇓
NO	13.8	14.2	14.7	0.45	0.177	14.23	-0.12	-0.56	
NT	15.9	15.7	15.5	0.20	0.079	15.70	0.73	0.29	
OA									•
OM									•
OS	9.6	10.3	10.3	0.40	0.138	10.07	-2.52	-2.96	
OY	16.0	15.5	15.6	0.26	0.098	15.70	0.73	0.29	
OZ	16.6	16.8	16.4	0.20	0.079	16.60	1.25	0.81	
PB	15.8	15.5	15.2	0.30	0.118	15.50	0.61	0.17	
PC									•
PE									•
PL									•
PP	15.3	15.1	16.0	0.47	0.177	15.47	0.59	0.15	
PV	11.1	11.7	12.9	0.92	0.354	11.90	-1.46	-1.91	
PW	69.0	68.9	71.6	1.53	0.532	69.83	31.98	31.54	×
PX	17.3	17.0	16.9	0.21	0.079	17.07	1.52	1.08	
PY									•
QJ	12.8	12.7	12.7	0.06	0.020	12.73	-0.98	-1.42	
QQ	11.1	10.2	10.6	0.45	0.177	10.63	-2.20	-2.64	
QU									•
QZ	13.3	13.5	14.2	0.47	0.177	13.67	-0.44	-0.89	
RC									•
RG									•
RK	33.7	29.8	21.3	6.34	3.746	28.27	7.98	7.54	×
RM	13.5	9.9	10.0	2.05	0.709	11.13	-1.91	-2.35	
RN	11.9	13.3	12.9	0.72	0.276	12.70	-1.00	-1.44	
RP	15.8	15.8	15.8	0.00	0.000	15.80	0.79	0.35	
RR	14.6	14.7	14.5	0.10	0.039	14.60	0.09	-0.35	
RV									•
RW	13.9	13.6	13.7	0.15	0.059	13.73	-0.41	-0.85	
RZ	14.7	14.2	15.1	0.45	0.177	14.67	0.13	-0.31	
S	13.5	13.4	15.9	1.42	0.492	14.27	-0.10	-0.54	
SC									•
SD	12.7	12.9	12.9	0.12	0.039	12.83	-0.93	-1.37	
SL									•
SO	14.5	14.4	14.4	0.06	0.020	14.43	0.00	-0.44	
SS	14.4	14.5	14.2	0.15	0.059	14.37	-0.04	-0.48	
ST									•
SZ	16.4	15.0	14.5	0.98	0.374	15.30	0.50	0.06	
TA									•
TD									•
TE	31.0	26.7	28.9	2.15	0.847	28.87	8.33	7.89	×

• ≡ No data submitted

Ø ≡ Insufficient data

TAG SYMBOLS

× ≡ Determined to be an outlier

⇑ ≡ Above control limit

⇓ ≡ Below control limit

Plutonium in Water

Intercomparison Study

January 22, 1993

Environmental Protection Agency

Environmental Monitoring Systems Laboratory

Las Vegas, Nevada

Plutonium-239

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
A									•
AH	20.1	19.1	20.6	0.76	0.443	19.93	1.22	-0.06	
AI	16.5	18.2	17.3	0.85	0.502	17.33	-1.03	-2.31	
AZ	19.7	17.6	20.5	1.50	0.856	19.27	0.64	-0.64	
BC	16.1	16.2	15.8	0.21	0.118	16.03	-2.16	-3.44	⇓
BG	18.1	18.1	17.4	0.40	0.207	17.87	-0.57	-1.85	
BG	16.3	16.2	15.8	0.26	0.148	16.10	-2.10	-3.38	⇓
BG	20.4	20.8	19.5	0.67	0.384	20.23	1.48	0.20	
BK	10.3	10.2	10.4	0.10	0.059	10.30	-7.12	-8.40	×
BL	18.0	18.9	18.8	0.49	0.266	18.57	0.03	-1.24	
BO	19.3	19.8	18.9	0.45	0.266	19.33	0.70	-0.58	
CA	18.3	17.6	16.7	0.80	0.473	17.53	-0.86	-2.14	
CJ	17.0	18.0	19.0	1.00	0.591	18.00	-0.46	-1.73	
CK	21.0	18.7	18.5	1.39	0.738	19.40	0.76	-0.52	
CO	17.0	16.6	17.0	0.23	0.118	16.87	-1.44	-2.71	
CS	22.1	23.4	24.0	0.97	0.561	23.17	4.02	2.74	
D	18.6	18.6	19.0	0.23	0.118	18.73	0.18	-1.10	
DO									•
E	18.7	20.1	19.7	0.72	0.413	19.50	0.84	-0.43	
EL	18.2	18.2	19.9	0.98	0.502	18.77	0.21	-1.07	
FJ	20.3	19.1	18.9	0.76	0.413	19.43	0.78	-0.49	
FU	15.7	15.9	16.2	0.25	0.148	15.93	-2.25	-3.52	⇓
FZ	20.0	19.0	17.0	1.53	0.886	18.67	0.12	-1.15	
J	18.1	17.4	19.0	0.80	0.473	18.17	-0.31	-1.59	
JE	19.1	20.0	19.6	0.45	0.266	19.57	0.90	-0.38	
JK	14.9	17.5	16.6	1.32	0.768	16.33	-1.90	-3.18	⇓
JP	19.4	19.4	19.7	0.17	0.089	19.50	0.84	-0.43	
JS	16.8	19.9	19.0	1.59	0.916	18.57	0.03	-1.24	
JY	16.9	16.3	15.7	0.60	0.354	16.30	-1.93	-3.20	⇓
KH	19.9	19.1	19.3	0.42	0.236	19.43	0.78	-0.49	
LT	16.8	18.4	17.6	0.80	0.473	17.60	-0.80	-2.08	
MS	19.6	19.9	19.7	0.15	0.089	19.73	1.04	-0.23	
NI	22.0	22.6	19.9	1.42	0.797	21.50	2.57	1.30	
NK	18.6	18.9	18.9	0.17	0.089	18.80	0.24	-1.04	
OA									•
OB	19.7	20.0	19.6	0.21	0.118	19.77	1.07	-0.20	
OK	14.7	17.3	17.6	1.59	0.856	16.53	-1.73	-3.00	
OS	18.4	20.0	19.7	0.85	0.473	19.37	0.73	-0.55	
PE									•
PQ	19.6	20.1	21.0	0.71	0.413	20.23	1.48	0.20	
PV	11.6	6.8	17.0	5.10	4.833	11.80	-5.83	-7.10	×
PW									•
QJ	18.3	19.1	17.5	0.80	0.473	18.30	-0.20	-1.47	
QQ									•
QU	20.1	19.7	20.5	0.40	0.236	20.10	1.36	0.09	

• ≡ No data submitted

TAG SYMBOLS

⇑ ≡ Above control limit

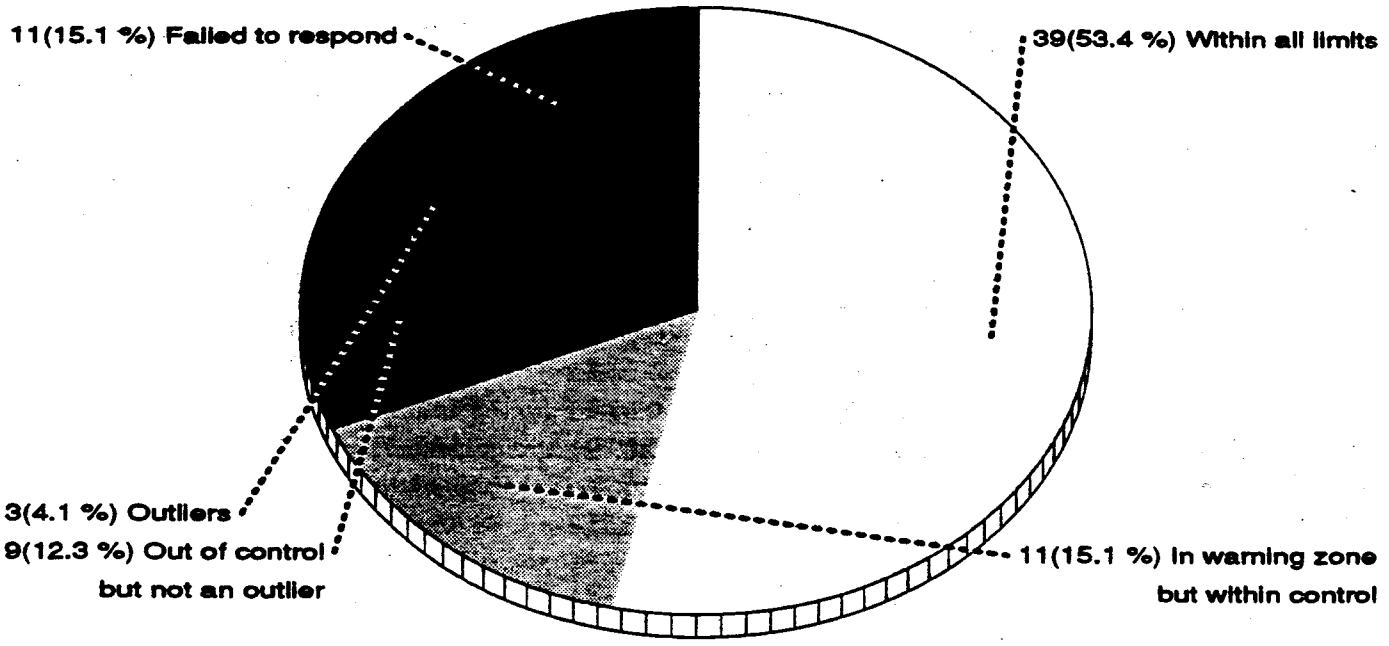
∅ ≡ Insufficient data

× ≡ Determined to be an outlier

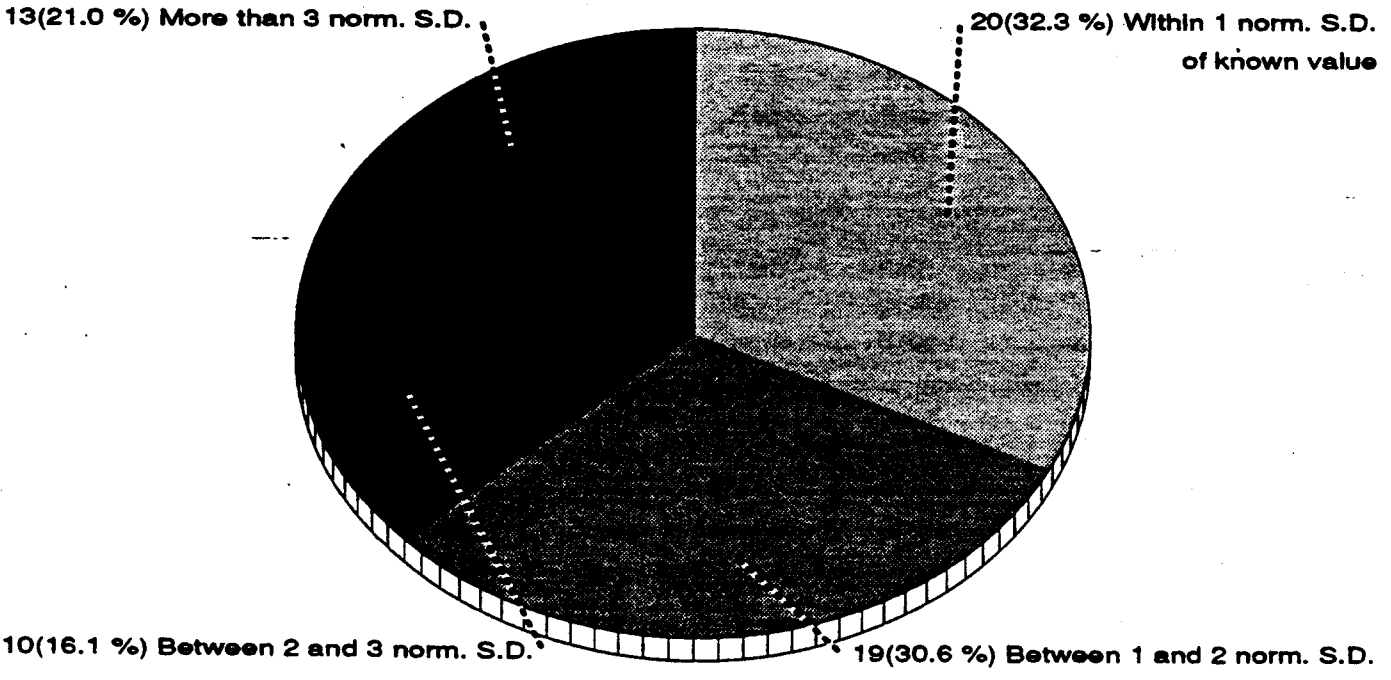
⇓ ≡ Below control limit

Plutonium-239 Statistical Summary 73 Participants

The known value of this nuclide is 20.0 pCi/l with an expected precision of 2.0; the control limits are 16.5 to 23.5; the warning regions are 16.5 to 17.7 and 22.3 to 23.5



Statistic	Respondents	Non-outliers
Mean	18.42	**Grand Avg 18.53**
Std. Dev.	2.46	1.80
Variance	6.08	3.23
% Coef. of Var.	13.38	9.70
% deviation of mean from known value	-7.89	-7.36
Norm. dev. of mean from known value	-0.64	-0.82
Median	18.70	18.73
% deviation of median from known value	-6.50	-6.33
Norm. dev. of median from known value	-0.53	-0.71



Uranium in Water

Intercomparison Study

February 12, 1993

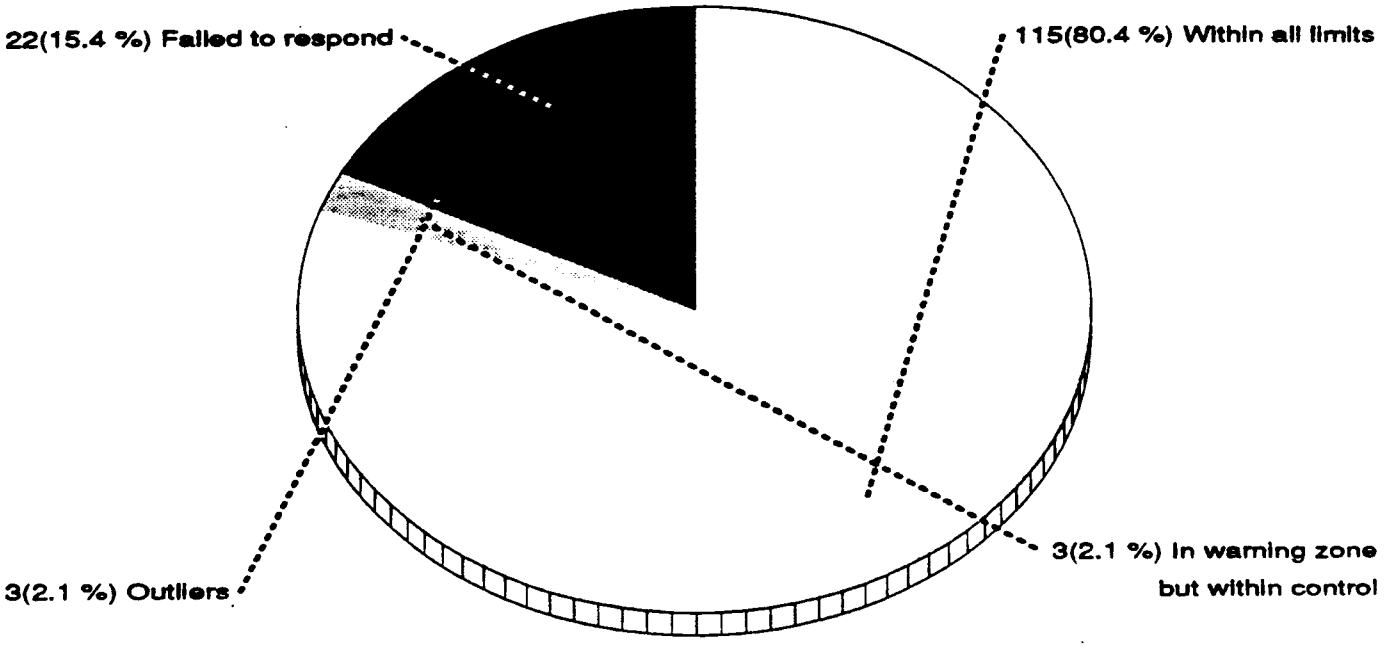
Environmental Protection Agency

Environmental Monitoring Systems Laboratory

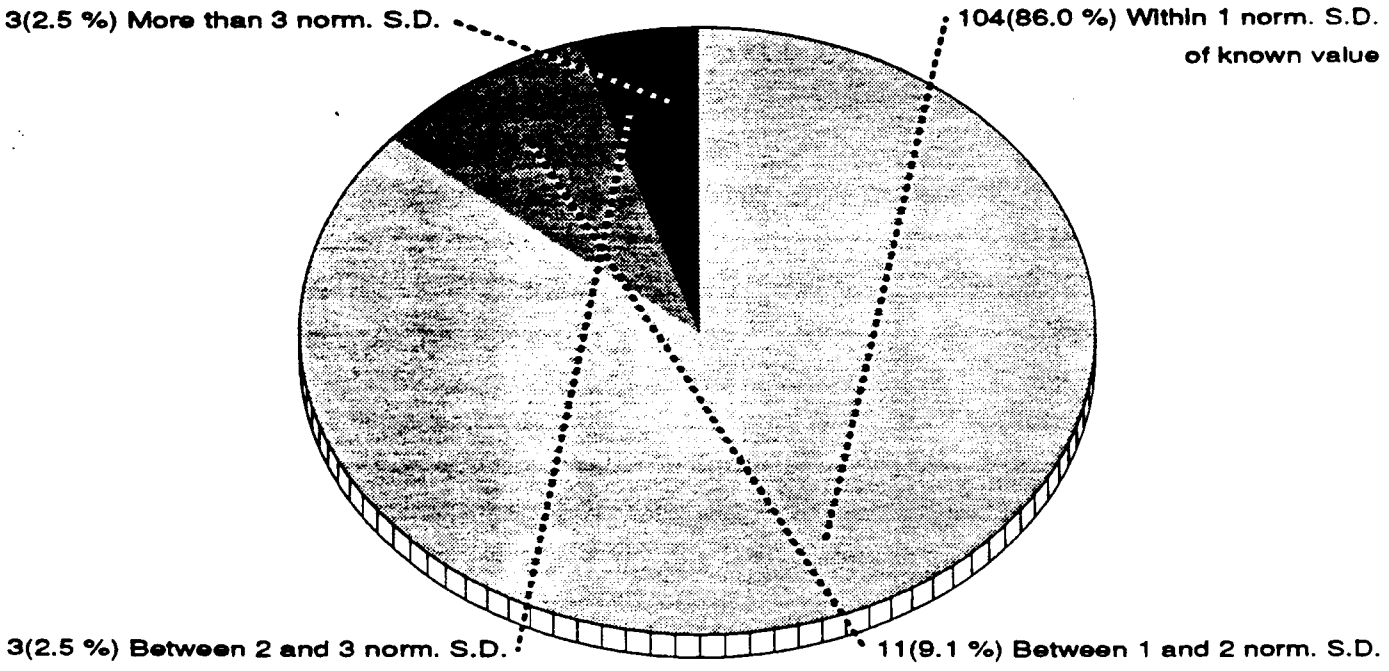
Las Vegas, Nevada

Uranium (Natural) Statistical Summary 143 Participants

The known value of this nuclide is 7.6 pCi/l with an expected precision of 3.0; the control limits are 2.4 to 12.8; the warning regions are 2.4 to 4.1 and 11.1 to 12.8



Statistic	Respondents	Non-outliers
Mean	8.02	**Grand Avg 7.16**
Std. Dev.	7.09	1.04
Variance	50.24	1.08
% Coef. of Var.	88.37	14.51
% deviation of mean from known value	5.53	-5.82
Norm. dev. of mean from known value	0.06	-0.43
Median	7.27	7.27
% deviation of median from known value	-4.39	-4.39
Norm. dev. of median from known value	-0.05	-0.32



Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
GQ	6.8	6.7	7.5	0.44	0.158	7.00	-0.09	-0.35	
GZ									•
HE	7.8	7.8	7.8	0.00	0.000	7.80	0.37	0.12	
HK	7.3	7.4	7.9	0.32	0.118	7.53	0.22	-0.04	
HL	8.2	8.1	8.7	0.32	0.118	8.33	0.68	0.42	
HP	8.2	8.1	8.8	0.38	0.138	8.37	0.70	0.44	
HU									•
HY	7.7	7.0	7.0	0.40	0.138	7.23	0.04	-0.21	
I	7.5	7.4	6.7	0.44	0.158	7.20	0.02	-0.23	
ID	6.1	6.0	6.3	0.15	0.059	6.13	-0.59	-0.85	
IE	6.3	6.0	6.1	0.15	0.059	6.13	-0.59	-0.85	
J	7.9	7.9	7.8	0.06	0.020	7.87	0.41	0.15	
JE	6.8	7.8	7.4	0.50	0.197	7.33	0.10	-0.15	
JK	6.6	7.3	7.8	0.60	0.236	7.23	0.04	-0.21	
JN									•
JP	8.3	7.8	8.1	0.25	0.098	8.07	0.52	0.27	
JS	7.2	7.2	7.2	0.00	0.000	7.20	0.02	-0.23	
JU									•
JY	5.2	4.7	5.0	0.25	0.098	4.97	-1.26	-1.52	
K	7.4	7.9	7.7	0.25	0.098	7.67	0.29	0.04	
KH	7.3	7.5	7.4	0.10	0.039	7.40	0.14	-0.12	
L	6.7	6.6	6.9	0.15	0.059	6.73	-0.24	-0.50	
LB	2.1	3.4	3.1	0.68	0.256	2.87	-2.48	-2.73	
LH	9.0	9.0	9.0	0.00	0.000	9.00	1.06	0.81	
LM									•
LS									•
LT	9.4	9.4	9.3	0.06	0.020	9.37	1.28	1.02	
LZ	7.7	7.8	7.9	0.10	0.039	7.80	0.37	0.12	
ME	7.0	7.7	7.5	0.36	0.138	7.40	0.14	-0.12	
MN									•
MS	7.8	7.7	7.8	0.06	0.020	7.77	0.35	0.10	
N	8.2	7.9	7.4	0.40	0.158	7.83	0.39	0.13	
NA	8.0	8.0	7.0	0.58	0.197	7.67	0.29	0.04	
NH	7.7	9.1	8.9	0.76	0.276	8.57	0.81	0.56	
NK	9.4	8.0	8.4	0.72	0.276	8.60	0.83	0.58	
NO	6.6	6.8	7.0	0.20	0.079	6.80	-0.21	-0.46	
NT	7.4	7.5	7.6	0.10	0.039	7.50	0.20	-0.06	
OA									•
OB	6.8	6.7	6.5	0.15	0.059	6.67	-0.28	-0.54	
OF	7.3	7.6	7.9	0.30	0.118	7.60	0.26	0.00	
OK									•
OS	6.9	6.9	7.6	0.40	0.138	7.13	-0.01	-0.27	
OY	6.7	6.5	6.7	0.12	0.039	6.63	-0.30	-0.56	
OZ	7.4	7.0	7.4	0.23	0.079	7.27	0.06	-0.19	
P	9.9	9.7	10.0	0.15	0.059	9.87	1.56	1.31	

• ≡ No data submitted
∅ ≡ Insufficient data

TAG SYMBOLS
× ≡ Determined to be an outlier

⇑ ≡ Above control limit
⇓ ≡ Below control limit

APG Analytical Products Group, Inc.

Proficiency Environmental Testing

Program Report

February 1993

Prepared for

Martin Marietta Energy Systems
Plant K-25
Hwy 58 at Blair Rd
Oak Ridge, TN 37831

8254

92/92 = 100% Acceptable

Calcium Level 2 - Warning Rating

Analytical Products Group, Inc.

2730 Washington Blvd.
Belpre, Ohio 45714

INTRODUCTION

The Proficiency Environmental Testing Program is designed to evaluate your laboratory's performance against other participating laboratories on the same set of standards. Standard levels have been chosen to assist you in ensuring that the procedure is in-control. In most cases, standard levels are not designed to challenge the detection limits of the method.

The following information is provided to assist you in the evaluation of the report. All statistical measures have been calculated based upon generally accepted formulae.

Your Result: Every effort has been made to insure correct data entry. Should you find a data entry error please notify Analytical Products Group and we will adjust the data and reissue the report.

Reference Value: The reported Reference Value is the calculated True Value of the standard based upon the actual composition of the standard.

Mean of Reporting Laboratories: This value is the Mean value of all reporting laboratories after Outliers have been removed. Please note the normalization of Solids data discussed below.

Standard Deviation: This parameter is also calculated on the data set after Outliers have been removed.

Outliers: Outliers are evaluated based upon the ASTM recommended t Test at the 0.05 significance level. Outliers are marked in the report for rapid identification. APG will provide additional information on Outliers as requested. Outliers do not necessarily indicate poor performance. They can be caused by a faulty standard, calculation errors, or a dilution error. However, a review each element of the analytical process is indicated. If we can assist you in determination of why a value was an Outlier, please contact APG.

Solids Standards: Solids standards are individually prepared gravimetrically and each standard has a unique Reference Value. In order to allow comparison between laboratories, the reported Means and Standard Deviation have been normalized based upon the following formula:

X = (Reference Value-Your Result)/Reference Value

The resulting statistics are therefore reported as relative values. The Relative Error is related to the Mean Recovery and the Relative Deviation is related to the Standard Deviation.

Deviation from the Mean: This result is an expression of how far your reported value was from the Mean of all reporting laboratories in terms of number of Standard Deviations. As a point of reference, EPA Warning Limits are 1.96 deviations from the Mean and EPA Acceptance Limits are 2.58 deviations from the Mean.

Comment Line: Following the Deviation from the Mean for each parameter is a Comment line. The Comment line may have one of the four entries:

Entry	Description
Unreported	No data was submitted
Warning	Data between 1.97 and 2.58 Deviations Data outside 95% Confidence Interval
Unacceptable	Data more than 2.58 Deviations Data outside 99% Confidence Interval
Blank	Data within 95% Confidence Interval

These notations can be used as a guideline in evaluating your performance.

Comment Section: This section contains comments submitted to Analytical Products Group by program participants. It also contains comments from APG to participants concerning unusual characteristics of the data set or problems with standards which could influence the interpretation of the data.

Organic Standards: The analysis of environmental samples for organic compounds requires complex methodologies. The Organics report is divided into two sections. The first section is a summary of your performance on the samples based upon the compounds which were spiked into the standards. The spiked value is the theoretical true value of the sample based upon the gravimetric preparation and the dilution instructions included with the sample. The Mean and Standard Deviation are calculated using generally accepted procedures.

The second section of the report covers compounds which you reported, but which were not intentionally added to the sample. Rather than make a judgement as to whether this data represents false positives or actual contamination of the sample, APG has provided an analysis of laboratories reporting the same compound.

Submitted: March 19, 1993

Thomas V. Coyner
General Manager

APG Analytical Products Group, Inc.

February 1993

Prepared for

Martin Marietta Energy Systems
Plant K-25
Hwy 58 at Blair Rd
Oak Ridge, TN 37831

8254

2730 Washington Blvd. Belpre, Ohio 45714 (614) 423-4200

Performance Evaluation Summary

Customer Code: 8254 February, 1993 Page: 1

Parameter	Level	Reported	Reference Value	Mean	Standard Deviation	Acceptance Range	Comment
Standard: Demand							
Biochemical Oxygen Demand	1	196.4	207.100	193.918	30.494	115.243 - 272.592	
Biochemical Oxygen Demand	2	19.3	18.290	17.128	3.152	8.995 - 25.261	
Chemical Oxygen Demand	1	323	333.400	317.033	17.039	273.073 - 360.994	
Chemical Oxygen Demand	2	23	29.450	29.264	6.585	12.274 - 46.254	
Total Organic Carbon	1	132	125.500	125.079	8.324	103.604 - 146.555	
Total Organic Carbon	2	11	11.090	11.289	0.805	9.213 - 13.365	
Standard: Nutrients							
Ammonia Nitrogen as N	1	0.43	0.431	0.441	0.091	0.206 - 0.676	
Ammonia Nitrogen as N	2	5.80	6.053	6.084	0.481	4.843 - 7.325	
Nitrate Nitrogen as N	1	0.49	0.579	0.608	0.131	0.269 - 0.946	
Nitrate Nitrogen as N	2	2.87	3.496	3.417	0.469	2.206 - 4.628	
Orthophosphate as P	1	0.33	0.304	0.305	0.024	0.243 - 0.367	
Orthophosphate as P	2	6.98	6.619	6.465	0.638	4.820 - 8.111	
Total Kjeldahl Nitrogen	1	NA	0.538	0.627	0.164	0.204 - 1.050	Unreported
Total Kjeldahl Nitrogen	2	NA	5.000	4.828	1.548	0.834 - 8.821	Unreported
Total Phosphorus as P	1	0.42	0.390	0.400	0.058	0.249 - 0.550	
Total Phosphorus as P	2	7.34	6.786	6.750	0.614	5.166 - 8.334	
Standard: Solids							
Total Suspended Solids	1	38	44.200	38.976	3.018	31.190 - 46.761	
Total Suspended Solids	2	172	203.000	186.824	12.891	153.565 - 220.083	
Total Dissolved Solids	1	157	143.100	148.429	24.715	84.664 - 212.193	
Total Dissolved Solids	2	455	422.500	428.791	36.516	334.579 - 523.003	

Customer Code: 8254 February, 1993 Page: 2

Parameter	Level	Reported	Reference Value	Mean	Standard Deviation	Acceptance Range	Comment
Standard: Oil & Grease							
Oil & Grease	1	15.6	15.810	14.014	2.765	6.880 - 21.148	
Oil & Grease	2	43.7	45.140	37.925	7.397	18.840 - 57.009	
Standard: Minerals							
Alkalinity as CaCO3	1	45	46.190	45.128	3.046	37.270 - 52.986	
Alkalinity as CaCO3	2	53	56.880	55.344	2.127	49.857 - 60.832	
Calcium	1	2.58	2.277	2.290	0.138	1.934 - 2.646	Warning
Calcium	2	5.11	4.694	4.650	0.289	3.905 - 5.395	
Chloride	1	45.35	46.650	46.681	2.628	39.902 - 53.461	
Chloride	2	47.85	47.940	47.619	2.329	41.611 - 53.627	
Conductivity umho/cm	1	313	314.700	311.546	15.154	272.449 - 350.642	
Conductivity umho/cm	2	318	323.700	317.969	16.884	274.407 - 361.530	
Magnesium	1	2.28	2.101	2.084	0.102	1.820 - 2.348	
Magnesium	2	2.52	2.344	2.330	0.135	1.980 - 2.679	
Potassium	1	45.0	40.190	40.697	3.033	32.873 - 48.521	
Potassium	2	40.6	36.130	36.293	3.006	28.538 - 44.048	
Sodium	1	35.9	31.390	31.271	2.384	25.119 - 37.422	
Sodium	2	37.7	33.860	33.765	2.428	27.501 - 40.029	
Sulfate	1	19.8	21.490	21.855	2.584	15.187 - 28.523	
Sulfate	2	14.992	16.520	17.001	2.330	10.989 - 23.012	
Total Hardness as CaCO3	1	16	14.340	14.970	2.233	9.209 - 20.732	
Total Hardness as CaCO3	2	23	21.370	21.185	1.886	16.320 - 26.050	
Standard: pH							
pH	1	7.10	6.930	6.888	0.227	6.302 - 7.475	

Customer Code: 8254 February, 1993

Parameter	Level	Reported	Reference Value	Mean	Standard Deviation	Acceptance Range	Comment
pH	2	8.87	8.640	8.698	0.196	8.193 - 9.204	
Standard: Trace Metals							
Aluminum	1	79.2	71.630	75.463	12.523	43.152 - 107.773	
Aluminum	2	170	153.500	159.259	23.839	97.754 - 220.764	
Antimony	1	167	168.800	174.245	38.181	75.738 - 272.752	
Antimony	2	951	844.200	881.476	124.862	559.332 - 1203.620	
Arsenic	1	72.2	75.930	75.679	5.919	60.409 - 90.950	
Arsenic	2	147	151.900	154.936	12.400	122.942 - 186.929	
Barium	1	257	247.600	246.650	13.636	211.470 - 281.830	
Barium	2	1270	1237.900	1221.164	52.704	1085.187 - 1357.141	
Beryllium	1	63.0	62.810	61.722	2.918	54.193 - 69.251	
Beryllium	2	124	125.600	123.967	7.563	104.455 - 143.479	
Boron	1	93.8	98.300	96.537	7.089	78.248 - 114.827	
Boron	2	287	295.000	290.975	13.077	257.237 - 324.713	
Cadmium	1	29.0	29.460	29.272	2.077	23.914 - 34.631	
Cadmium	2	116	117.800	116.378	6.629	99.274 - 133.482	
Chromium	1	35.0	34.670	35.002	5.120	21.792 - 48.212	
Chromium	2	119	108.300	109.628	11.451	80.085 - 139.171	
Cobalt	1	41.7	41.740	40.594	3.585	31.343 - 49.844	
Cobalt	2	263	260.900	260.832	11.444	231.308 - 290.357	
Copper	1	73.8	75.790	75.593	3.808	65.768 - 85.418	
Copper	2	113	113.700	114.362	7.178	95.843 - 132.880	
Iron	1	39.1	41.530	42.422	6.590	25.421 - 59.423	
Iron	2	211	207.700	209.350	14.285	172.495 - 246.205	
Lead	1	108	111.500	110.203	12.807	77.160 - 143.247	
Lead	2	213	223.000	222.174	14.343	185.170 - 259.178	
Manganese	1	61.0	56.010	56.150	4.574	44.349 - 67.951	
Manganese	2	145	140.000	140.642	10.383	113.855 - 167.429	
Mercury	1	1.02	0.950	0.970	0.183	0.497 - 1.443	
Mercury	2	4.91	4.770	4.559	0.707	2.735 - 6.383	

Customer Code: 8254 February, 1993 Page: 4

Parameter	Level	Reported	Reference Value	Mean	Standard Deviation	Acceptance Range	Comment
Molybdenum	1	115	120.600	115.435	10.343	88.749 - 142.121	
Molybdenum	2	301	301.500	292.627	11.831	262.104 - 323.151	
Nickel	1	85.0	76.280	75.753	6.368	59.324 - 92.181	
Nickel	2	169	152.600	152.611	12.705	119.833 - 185.390	
Selenium	1	21.8	23.600	23.592	4.337	12.402 - 34.782	
Selenium	2	62.4	65.600	68.321	11.835	37.785 - 98.856	
Silver	1	46.5	46.200	46.133	3.461	37.204 - 55.062	
Silver	2	121	128.300	130.874	9.117	107.351 - 154.396	
Thallium	1	70.5	67.180	68.283	5.919	53.012 - 83.553	
Thallium	2	273	268.700	270.047	24.907	205.787 - 334.306	
Vanadium	1	70.3	67.980	68.408	3.247	60.032 - 76.784	
Vanadium	2	1070	1062.300	1089.256	55.889	945.062 - 1233.450	
Zinc	1	75.0	71.530	71.465	6.999	53.408 - 89.521	
Zinc	2	240	238.400	237.082	16.020	195.751 - 278.413	
Standard: Phenol							
Phenol	1	0.205	0.200	0.198	0.020	0.146 - 0.250	
Phenol	2	2.348	2.321	2.306	0.220	1.739 - 2.873	
Standard: Cyanide							
Cyanide	1	0.680	0.639	0.626	0.085	0.405 - 0.846	
Cyanide	2	3.664	3.586	3.486	0.499	2.198 - 4.774	
Standard: Residual Chlorine							
Residual Chlorine	1	0.46	0.469	0.448	0.055	0.305 - 0.590	
Residual Chlorine	2	6.5	6.729	6.494	0.681	4.735 - 8.252	

Customer Code: 8254 February, 1993 Page: 5

Parameter	Level	Reported	Reference Value	Mean	Standard Deviation	Acceptance Range	Comment
Standard: Fluoride							
Fluoride	1	1.50	1.500	1.514	0.164	1.092 - 1.936	
Fluoride	2	6.74	6.750	6.863	0.432	5.748 - 7.979	
Standard: Hexavalent Chromium							
Hexavalent Chromium	1	NA	0.069	0.067	0.005	0.053 - 0.081	Unreported
Hexavalent Chromium	2	NA	0.130	0.131	0.014	0.095 - 0.168	Unreported
Standard: Uranium							
Uranium	1	79.6	80.080	78.133	2.412	71.910 - 84.357	
Uranium	2	542	580.600	545.050	40.891	439.551 - 650.549	

APG Analytical Products Group, Inc.

Customer Code: 8254

Parameter: Biochemical Oxygen Demand

	mg/L Level 1	Level 2
Your Result:	196.4	19.3
Reference Value:	207.100	18.290
Mean of Reporting Laboratories:	193.918	17.128
Actual Standard Deviation:	30.494	3.152
Number Reporting:	98	97
Average % Recovery:	93.635	93.647
Your % Recovery:	94.833	105.522
Deviation from Mean - z Score:	0.081	0.689

Comment:

Parameter: Chemical Oxygen Demand

	mg/L Level 1	Level 2
Your Result:	323	23
Reference Value:	333.400	29.450
Mean of Reporting Laboratories:	317.033	29.264
Actual Standard Deviation:	17.039	6.585
Number Reporting:	50	54
Average % Recovery:	95.091	99.367
Your % Recovery:	96.881	78.098
Deviation from Mean - z Score:	0.350	0.951

Comment:

Parameter: Total Organic Carbon

	mg/L Level 1	Level 2
Your Result:	132	11
Reference Value:	125.500	11.090
Mean of Reporting Laboratories:	125.079	11.289
Actual Standard Deviation:	8.324	0.805
Number Reporting:	29	33
Average % Recovery:	99.665	101.795
Your % Recovery:	105.179	99.188
Deviation from Mean - z Score:	0.831	0.359

Comment:

2730 Washington Blvd. Belpre, Ohio 45714 (614) 423-4200

Customer Code: 8254

Parameter: Ammonia Nitrogen as N

	mg/L Level 1	Level 2
Your Result:	0.43	5.80
Reference Value:	0.431	6.053
Mean of Reporting Laboratories:	0.441	6.084
Actual Standard Deviation:	0.091	0.481
Number Reporting:	69	69
Average % Recovery:	102.320	100.518
Your % Recovery:	99.768	95.820
Deviation from Mean - z Score:	0.121	0.591

Comment:

Parameter: Nitrate Nitrogen as N

	mg/L Level 1	Level 2
Your Result:	0.49	2.87
Reference Value:	0.579	3.496
Mean of Reporting Laboratories:	0.608	3.417
Actual Standard Deviation:	0.131	0.469
Number Reporting:	46	40
Average % Recovery:	104.960	97.744
Your % Recovery:	84.629	82.094
Deviation from Mean - z Score:	0.897	1.165

Comment:

Parameter: Orthophosphate as P

	mg/L Level 1	Level 2
Your Result:	0.33	6.98
Reference Value:	0.304	6.619
Mean of Reporting Laboratories:	0.305	6.465
Actual Standard Deviation:	0.024	0.638
Number Reporting:	40	41
Average % Recovery:	100.257	97.679
Your % Recovery:	108.553	105.454
Deviation from Mean - z Score:	1.049	0.807

Comment:

Customer Code: 8254

Parameter: Total Kjeldahl Nitrogen

	mg/L Level 1	Level 2
Your Result:	NA	NA
Reference Value:	0.538	5.000
Mean of Reporting Laboratories:	0.627	4.828
Actual Standard Deviation:	0.164	1.548
Number Reporting:	36	39
Average % Recovery:	116.527	96.557
Your % Recovery:		
Deviation from Mean - z Score:	0.000	0.000
Comment:	Unreported	Unreported

Parameter: Total Phosphorus as P

	mg/L Level 1	Level 2
Your Result:	0.42	7.34
Reference Value:	0.390	6.786
Mean of Reporting Laboratories:	0.400	6.750
Actual Standard Deviation:	0.058	0.614
Number Reporting:	52	51
Average % Recovery:	102.519	99.470
Your % Recovery:	107.692	108.164
Deviation from Mean - z Score:	0.346	0.961
Comment:		

Parameter: Total Suspended Solids

	mg/L Level 1	Level 2
Your Result:	38	172
Reference Value:	44.200	203.000
Relative Error % :	11.820	7.969
Relative Deviation % :	6.827	6.350
Number Reporting:	135	135
Average % Recovery:	88.180	92.031
Your % Recovery:	85.973	84.729
Deviation from Mean - z Score:	0.323	1.150
Comment:		

Customer Code: 8254

Parameter: Total Dissolved Solids

	mg/L Level 1	Level 2
Your Result:	157	455
Reference Value:	143.100	422.500
Relative Error % :	3.724	1.489
Relative Deviation % :	17.271	8.643
Number Reporting:	52	54
Average % Recovery:	103.724	101.489
Your % Recovery:	109.713	107.692
Deviation from Mean - z Score:	0.347	0.718

Comment:

Parameter: Oil & Grease

	mg/L Level 1	Level 2
Your Result:	15.6	43.7
Reference Value:	15.810	45.140
Mean of Reporting Laboratories:	14.014	37.925
Actual Standard Deviation:	2.765	7.397
Number Reporting:	56	57
Average % Recovery:	88.642	84.015
Your % Recovery:	98.672	96.810
Deviation from Mean - z Score:	0.573	0.781

Comment:

Parameter: Alkalinity as CaCO3

	mg/L Level 1	Level 2
Your Result:	45	53
Reference Value:	46.190	56.880
Mean of Reporting Laboratories:	45.128	55.344
Actual Standard Deviation:	3.046	2.127
Number Reporting:	47	45
Average % Recovery:	97.701	97.300
Your % Recovery:	97.424	93.179
Deviation from Mean - z Score:	0.042	1.102

Comment:

Customer Code: 8254

Parameter: Calcium

	mg/L Level 1	Level 2
Your Result:	2.58	5.11
Reference Value:	2.277	4.694
Mean of Reporting Laboratories:	2.290	4.650
Actual Standard Deviation:	0.138	0.289
Number Reporting:	34	38
Average % Recovery:	100.586	99.061
Your % Recovery:	113.307	108.862
Deviation from Mean - z Score:	2.098	1.594
Comment:	Warning	

Parameter: Chloride

	mg/L Level 1	Level 2
Your Result:	45.35	47.85
Reference Value:	46.650	47.940
Mean of Reporting Laboratories:	46.681	47.619
Actual Standard Deviation:	2.628	2.329
Number Reporting:	45	46
Average % Recovery:	100.067	99.330
Your % Recovery:	97.213	99.812
Deviation from Mean - z Score:	0.507	0.099
Comment:		

Parameter: Conductivity umho/cm

	umhos/cm Level 1	Level 2
Your Result:	313	318
Reference Value:	314.700	323.700
Mean of Reporting Laboratories:	311.546	317.969
Actual Standard Deviation:	15.154	16.884
Number Reporting:	46	48
Average % Recovery:	98.998	98.229
Your % Recovery:	99.460	98.239
Deviation from Mean - z Score:	0.096	0.002
Comment:		

Customer Code: 8254

Parameter: Magnesium

	mg/L Level 1	Level 2
Your Result:	2.28	2.52
Reference Value:	2.101	2.344
Mean of Reporting Laboratories:	2.084	2.330
Actual Standard Deviation:	0.102	0.135
Number Reporting:	29	33
Average % Recovery:	99.211	99.395
Your % Recovery:	108.520	107.509
Deviation from Mean - z Score:	1.912	1.404

Comment:

Parameter: Potassium

	mg/L Level 1	Level 2
Your Result:	45.0	40.6
Reference Value:	40.190	36.130
Mean of Reporting Laboratories:	40.697	36.293
Actual Standard Deviation:	3.033	3.006
Number Reporting:	31	31
Average % Recovery:	101.262	100.450
Your % Recovery:	111.968	112.372
Deviation from Mean - z Score:	1.419	1.433

Comment:

Parameter: Sodium

	mg/L Level 1	Level 2
Your Result:	35.9	37.7
Reference Value:	31.390	33.860
Mean of Reporting Laboratories:	31.271	33.765
Actual Standard Deviation:	2.384	2.428
Number Reporting:	36	38
Average % Recovery:	99.619	99.720
Your % Recovery:	114.368	111.341
Deviation from Mean - z Score:	1.942	1.621

Comment:

Customer Code: 8254

Parameter: Sulfate

	mg/L Level 1	Level 2
Your Result:	19.8	14.992
Reference Value:	21.490	16.520
Mean of Reporting Laboratories:	21.855	17.001
Actual Standard Deviation:	2.584	2.330
Number Reporting:	40	42
Average % Recovery:	101.697	102.909
Your % Recovery:	92.136	90.751
Deviation from Mean - z Score:	0.795	0.862

Comment:

Parameter: Total Hardness as CaCO3

	mg/L Level 1	Level 2
Your Result:	16	23
Reference Value:	14.340	21.370
Mean of Reporting Laboratories:	14.970	21.185
Actual Standard Deviation:	2.233	1.886
Number Reporting:	42	44
Average % Recovery:	104.397	99.133
Your % Recovery:	111.576	107.628
Deviation from Mean - z Score:	0.461	0.963

Comment:

Parameter: pH

	Units Level 1	Level 2
Your Result:	7.10	8.87
Reference Value:	6.930	8.640
Mean of Reporting Laboratories:	6.888	8.698
Actual Standard Deviation:	0.227	0.196
Number Reporting:	122	115
Average % Recovery:	99.401	100.675
Your % Recovery:	102.453	102.662
Deviation from Mean - z Score:	0.931	0.876

Comment:

2730 Washington Blvd. Belpre, Ohio 45714 (614) 423-4200

Customer Code: 8254

Parameter: Aluminum

	ug/L Level 1	Level 2
Your Result:	79.2	170
Reference Value:	71.630	153.500
Mean of Reporting Laboratories:	75.463	159.259
Actual Standard Deviation:	12.523	23.839
Number Reporting:	35	34
Average % Recovery:	105.351	103.752
Your % Recovery:	110.568	110.749
Deviation from Mean - z Score:	0.298	0.451

Comment:

Parameter: Antimony

	ug/L Level 1	Level 2
Your Result:	167	951
Reference Value:	168.800	844.200
Mean of Reporting Laboratories:	174.245	881.476
Actual Standard Deviation:	38.181	124.862
Number Reporting:	33	33
Average % Recovery:	103.226	104.416
Your % Recovery:	98.934	112.651
Deviation from Mean - z Score:	0.190	0.557

Comment:

Parameter: Arsenic

	ug/L Level 1	Level 2
Your Result:	72.2	147
Reference Value:	75.930	151.900
Mean of Reporting Laboratories:	75.679	154.936
Actual Standard Deviation:	5.919	12.400
Number Reporting:	44	45
Average % Recovery:	99.670	101.998
Your % Recovery:	95.088	96.774
Deviation from Mean - z Score:	0.588	0.640

Comment:

Customer Code: 8254

Parameter: Barium

	ug/L Level 1	Level 2
Your Result:	257	1270
Reference Value:	247.600	1237.900
Mean of Reporting Laboratories:	246.650	1221.164
Actual Standard Deviation:	13.636	52.704
Number Reporting:	41	39
Average % Recovery:	99.616	98.648
Your % Recovery:	103.796	102.593
Deviation from Mean - z Score:	0.759	0.927

Comment:

Parameter: Beryllium

	ug/L Level 1	Level 2
Your Result:	63.0	124
Reference Value:	62.810	125.600
Mean of Reporting Laboratories:	61.722	123.967
Actual Standard Deviation:	2.918	7.563
Number Reporting:	40	42
Average % Recovery:	98.268	98.700
Your % Recovery:	100.302	98.726
Deviation from Mean - z Score:	0.438	0.004

Comment:

Parameter: Boron

	ug/L Level 1	Level 2
Your Result:	93.8	287
Reference Value:	98.300	295.000
Mean of Reporting Laboratories:	96.537	290.975
Actual Standard Deviation:	7.089	13.077
Number Reporting:	16	16
Average % Recovery:	98.207	98.636
Your % Recovery:	95.422	97.288
Deviation from Mean - z Score:	0.386	0.304

Comment:

Customer Code: 8254

Parameter: Cadmium

	ug/L Level 1	Level 2
Your Result:	29.0	116
Reference Value:	29.460	117.800
Mean of Reporting Laboratories:	29.272	116.378
Actual Standard Deviation:	2.077	6.629
Number Reporting:	57	61
Average % Recovery:	99.363	98.793
Your % Recovery:	98.439	98.472
Deviation from Mean - z Score:	0.131	0.057

Comment:

Parameter: Chromium

	ug/L Level 1	Level 2
Your Result:	35.0	119
Reference Value:	34.670	108.300
Mean of Reporting Laboratories:	35.002	109.628
Actual Standard Deviation:	5.120	11.451
Number Reporting:	57	65
Average % Recovery:	100.958	101.227
Your % Recovery:	100.952	109.880
Deviation from Mean - z Score:	0.000446	0.818

Comment:

Parameter: Cobalt

	ug/L Level 1	Level 2
Your Result:	41.7	263
Reference Value:	41.740	260.900
Mean of Reporting Laboratories:	40.594	260.832
Actual Standard Deviation:	3.585	11.444
Number Reporting:	31	34
Average % Recovery:	97.253	99.974
Your % Recovery:	99.904	100.805
Deviation from Mean - z Score:	0.309	0.189

Comment:

Customer Code: 8254

Parameter: Copper

	ug/L Level 1	Level 2
Your Result:	73.8	113
Reference Value:	75.790	113.700
Mean of Reporting Laboratories:	75.593	114.362
Actual Standard Deviation:	3.808	7.178
Number Reporting:	63	71
Average % Recovery:	99.740	100.582
Your % Recovery:	97.374	99.384
Deviation from Mean - z Score:	0.471	0.190

Comment:

Parameter: Iron

	ug/L Level 1	Level 2
Your Result:	39.1	211
Reference Value:	41.530	207.700
Mean of Reporting Laboratories:	42.422	209.350
Actual Standard Deviation:	6.590	14.285
Number Reporting:	45	56
Average % Recovery:	102.148	100.794
Your % Recovery:	94.149	101.589
Deviation from Mean - z Score:	0.504	0.116

Comment:

Parameter: Lead

	ug/L Level 1	Level 2
Your Result:	108	213
Reference Value:	111.500	223.000
Mean of Reporting Laboratories:	110.203	222.174
Actual Standard Deviation:	12.807	14.343
Number Reporting:	63	61
Average % Recovery:	98.837	99.630
Your % Recovery:	96.861	95.516
Deviation from Mean - z Score:	0.172	0.640

Comment:

Customer Code: 8254

Parameter: Manganese

	ug/L Level 1	Level 2
Your Result:	61.0	145
Reference Value:	56.010	140.000
Mean of Reporting Laboratories:	56.150	140.642
Actual Standard Deviation:	4.574	10.383
Number Reporting:	50	52
Average % Recovery:	100.250	100.459
Your % Recovery:	108.909	103.571
Deviation from Mean - z Score:	1.060	0.420

Comment:

Parameter: Mercury

	ug/L Level 1	Level 2
Your Result:	1.02	4.91
Reference Value:	0.950	4.770
Mean of Reporting Laboratories:	0.970	4.559
Actual Standard Deviation:	0.183	0.707
Number Reporting:	43	45
Average % Recovery:	102.117	95.573
Your % Recovery:	107.368	102.935
Deviation from Mean - z Score:	0.272	0.497

Comment:

Parameter: Molybdenum

	ug/L Level 1	Level 2
Your Result:	115	301
Reference Value:	120.600	301.500
Mean of Reporting Laboratories:	115.435	292.627
Actual Standard Deviation:	10.343	11.831
Number Reporting:	23	22
Average % Recovery:	95.717	97.057
Your % Recovery:	95.357	99.834
Deviation from Mean - z Score:	0.042	0.708

Comment:

Customer Code: 8254

Parameter: Nickel

	ug/L Level 1	Level 2
Your Result:	85.0	169
Reference Value:	76.280	152.600
Mean of Reporting Laboratories:	75.753	152.611
Actual Standard Deviation:	6.368	12.705
Number Reporting:	59	62
Average % Recovery:	99.309	100.008
Your % Recovery:	111.432	110.747
Deviation from Mean - z Score:	1.452	1.290

Comment:

Parameter: Selenium

	ug/L Level 1	Level 2
Your Result:	21.8	62.4
Reference Value:	23.600	65.600
Mean of Reporting Laboratories:	23.592	68.321
Actual Standard Deviation:	4.337	11.835
Number Reporting:	46	43
Average % Recovery:	99.966	104.148
Your % Recovery:	92.373	95.122
Deviation from Mean - z Score:	0.413	0.500

Comment:

Parameter: Silver

	ug/L Level 1	Level 2
Your Result:	46.5	121
Reference Value:	46.200	128.300
Mean of Reporting Laboratories:	46.133	130.874
Actual Standard Deviation:	3.461	9.117
Number Reporting:	47	53
Average % Recovery:	99.854	102.006
Your % Recovery:	100.649	94.310
Deviation from Mean - z Score:	0.106	1.083

Comment:

Customer Code: 8254

Parameter: Thallium

	ug/L Level 1	Level 2
Your Result:	70.5	273
Reference Value:	67.180	268.700
Mean of Reporting Laboratories:	68.283	270.047
Actual Standard Deviation:	5.919	24.907
Number Reporting:	27	31
Average % Recovery:	101.641	100.501
Your % Recovery:	104.942	101.600
Deviation from Mean - z Score:	0.375	0.119

Comment:

Parameter: Vanadium

	ug/L Level 1	Level 2
Your Result:	70.3	1070
Reference Value:	67.980	1062.300
Mean of Reporting Laboratories:	68.408	1089.256
Actual Standard Deviation:	3.247	55.889
Number Reporting:	26	32
Average % Recovery:	100.629	102.538
Your % Recovery:	103.413	100.725
Deviation from Mean - z Score:	0.583	0.345

Comment:

Parameter: Zinc

	ug/L Level 1	Level 2
Your Result:	75.0	240
Reference Value:	71.530	238.400
Mean of Reporting Laboratories:	71.465	237.082
Actual Standard Deviation:	6.999	16.020
Number Reporting:	62	63
Average % Recovery:	99.908	99.447
Your % Recovery:	104.851	100.671
Deviation from Mean - z Score:	0.505	0.182

Comment:

Customer Code: 8254

Parameter: Phenol

	mg/L Level 1	Level 2
Your Result:	0.205	2.348
Reference Value:	0.200	2.321
Mean of Reporting Laboratories:	0.198	2.306
Actual Standard Deviation:	0.020	0.220
Number Reporting:	36	36
Average % Recovery:	99.097	99.357
Your % Recovery:	102.500	101.163
Deviation from Mean - z Score:	0.339	0.191

Comment:

Parameter: Cyanide

	mg/L Level 1	Level 2
Your Result:	0.680	3.664
Reference Value:	0.639	3.586
Mean of Reporting Laboratories:	0.626	3.486
Actual Standard Deviation:	0.085	0.499
Number Reporting:	33	32
Average % Recovery:	97.932	97.210
Your % Recovery:	106.416	102.175
Deviation from Mean - z Score:	0.635	0.357

Comment:

Parameter: Residual Chlorine

	mg/L Level 1	Level 2
Your Result:	0.46	6.5
Reference Value:	0.469	6.729
Mean of Reporting Laboratories:	0.448	6.494
Actual Standard Deviation:	0.055	0.681
Number Reporting:	63	56
Average % Recovery:	95.443	96.500
Your % Recovery:	98.081	96.597
Deviation from Mean - z Score:	0.225	0.010

Comment:

Customer Code: 8254

Parameter: Fluoride

	mg/L Level 1	Level 2
Your Result:	1.50	6.74
Reference Value:	1.500	6.750
Mean of Reporting Laboratories:	1.514	6.863
Actual Standard Deviation:	0.164	0.432
Number Reporting:	33	34
Average % Recovery:	100.937	101.679
Your % Recovery:	100.000	99.852
Deviation from Mean - z Score:	0.086	0.285

Comment:

Parameter: Hexavalent Chromium

	mg/L Level 1	Level 2
Your Result:	NA	NA
Reference Value:	0.069	0.130
Mean of Reporting Laboratories:	0.067	0.131
Actual Standard Deviation:	0.005	0.014
Number Reporting:	23	23
Average % Recovery:	96.799	101.137
Your % Recovery:		
Deviation from Mean - z Score:	0.000	0.000
Comment:	Unreported	Unreported

Parameter: Uranium

	ug/L Level 1	Level 2
Your Result:	79.6	542
Reference Value:	80.080	580.600
Mean of Reporting Laboratories:	78.133	545.050
Actual Standard Deviation:	2.412	40.891
Number Reporting:	6	6
Average % Recovery:	97.569	93.877
Your % Recovery:	99.401	93.352
Deviation from Mean - z Score:	0.608	0.075

Comment:

Dem[illegible]		Level 1	Level 2	Test Method
[illegible]mical Oxygen Demand	mg/L	196.4	19.3	EPA-405.1
Chemical Oxygen Demand	mg/L	323	23	EPA-410.4
Total Organic Carbon	mg/L	132	11	EPA-415.1

Nutrients

Ammonia Nitrogen as N	mg/L	0.43	5.80	EPA-350.3
Nitrate Nitrogen as N	mg/L	0.49	2.87	EPA-300
Orthophosphate as P	mg/L	0.33	6.98	SM-424
Total Kjeldahl Nitrogen	mg/L	Not Analyzed		
Total Phosphorus as P	mg/L	0.42	7.34	SM-422

Solids

Total Suspended Solids	mg/L	38	172	EPA-160.2
Total Dissolved Solids	mg/L	157	455	EPA-160.1

Oil & Grease

Oil & Grease	mg/L	15.6	43.7	EPA-413.1

Minerals

Alkalinity as CaC03	mg/L	45	53	EPA-310.1
Calcium	mg/L	2.58	5.11	EPA-200.7
Chloride	mg/L	45.35	47.85	EPA-325.3
Conductivity	umho/cm	313	318	EPA-120.1
Magnesium	mg/L	2.28	2.52	EPA-200.7
Potassium	mg/L	45.0	40.6	EPA-200.7
Sodium	mg/L	35.9	37.7	EPA-200.7
Sulfate	mg/L	19.8	14.992	EPA-300.0
Total Hardness as CaC02	mg/L	16	23	SM-314

pH

pH	units	7.10	8.87	EPA-150.1

Report ALL results as mg/L except as indicated

8254 FEB 1993

Trace Metals		Level 1	Level 2	[illegible] Method
Aluminum	ug/L	79.2	170	EPA-200.7
Antimony	ug/L	167	951	EPA-200.7
Arsenic	ug/L	72.2	147	EPA-206.2
Barium	ug/L	257	1270	EPA-200.7
Beryllium	ug/L	63.0	124	EPA-200.7
Boron	ug/L	93.8	287	EPA-200.7
Cadmium	ug/L	29.0	116	EPA-200.7
Chromium	ug/L	35.0	119	EPA-200.7
Cobalt	ug/L	41.7	263	EPA-200.7
Copper	ug/L	73.8	113	EPA-200.7
Iron	ug/L	39.1	211	EPA-200.7
Lead	ug/L	108	213	EPA-239.2
Manganese	ug/L	61.0	145	EPA-200.7
Mercury	ug/L	1.02	4.91	EPA-245.1
Molybdenum	ug/L	115	301	EPA-200.7
Nickel	ug/L	85.0	169	EPA-200.7
Selenium	ug/L	21.8	62.4	EPA-270.2
Silver	ug/L	46.5	121	EPA-200.7
Thallium	ug/L	70.5	273	EPA-279.2
Vanadium	ug/L	70.3	1070	EPA-200.7
Zinc	ug/L	75.0	240	EPA-200.7

Phenol	mg/L	0.205	2.348	EPA-420.1
Cyanide	mg/L	0.680	3.664	EPA-355.2
Residual Chlorine	mg/L	0.46	6.5	SM-408C
Aluminum High Level	mg/L	Not Analyzed		
Fluoride	mg/L	1.50	6.74	EPA-340.2
Total Organic Halides (TOX)	ug/L	Not Analyzed		
Hexavalent Chromium	mg/L			
Uranium	ug/L	79.6	542	EC-1910

FEB 1993 8254

APG Analytical Products Group, Inc.

Proficiency Environmental Testing

Program Report

May 1993

Prepared for

Martin Marietta Energy Systems
Plant K-25
Hwy 58 at Blair Rd
Oak Ridge, TN 37831

8254

89/92= 96.7% Acceptable

Analyte	Reported Value	True Value	Rating
Sodium 1	41.2 mg/L	37.83 mg/L	Warning
Sodium 2	36.7 mg/L	32.620 mg/L	Warning
Total Hardness 2	61 mg/L	67.670 mg/L	Unacceptable
Silver 2	267 ug/L	385.00 ug/L	Unacceptable
Uranium 2	994 ug/L	900.9 ug/L	Unacceptable

Analytical Products Group, Inc.

2730 Washington Blvd.
Belpre, Ohio 45714

INTRODUCTION

The Proficiency Environmental Testing Program is designed to evaluate your laboratory's performance against other participating laboratories on the same set of standards. Standard levels have been chosen to assist you in ensuring that the procedure is in-control. In most cases, standard levels are not designed to challenge the detection limits of the method.

The following information is provided to assist you in the evaluation of the report. All statistical measures have been calculated based upon generally accepted formulae.

Your Result: Every effort has been made to insure correct data entry. Should you find a data entry error please notify Analytical Products Group and we will adjust the data and reissue the report.

Reference Value: The reported Reference Value is the calculated True Value of the standard based upon the actual composition of the standard.

Mean of Reporting Laboratories: This value is the Mean value of all reporting laboratories after Outliers have been removed. Please note the normalization of Solids data discussed below.

Standard Deviation: This parameter is also calculated on the data set after Outliers have been removed.

Outliers: Outliers are evaluated based upon the ASTM recommended t Test at the 0.05 significance level. Outliers are marked in the report for rapid identification. APG will provide additional information on Outliers as requested. Outliers do not necessarily indicate poor performance. They can be caused by a faulty standard, calculation errors, or a dilution error. However, a review each element of the analytical process is indicated. If we can assist you in determination of why a value was an Outlier, please contact APG.

Solids Standards: Solids standards are individually prepared gravimetrically and each standard has a unique Reference Value. In order to allow comparison between laboratories, the reported Means and Standard Deviation have been normalized based upon the following formula:

X = (Reference Value-Your Result)/Reference Value

The resulting statistics are therefore reported as relative values. The Relative Error is related to the Mean Recovery and the Relative Deviation is related to the Standard Deviation.

Deviation from the Mean or z score: This result is an expression of how far your reported value was from the Mean of all reporting laboratories in terms of number of Standard Deviations. As a point of reference, EPA Warning Limits are 1.96 deviations from the Mean and EPA Acceptance Limits are 2.58 deviations from the Mean.

Comment Line: Following the Deviation from the Mean for each parameter is a Comment line. The Comment line may have one of the four entries:

Entry	Description
Unreported	No data was submitted
Warning	Data between 1.97 and 2.58 Deviations Data outside 95% Confidence Interval
Unacceptable	Data more than 2.58 Deviations Data outside 99% Confidence Interval
Blank	Data within 95% Confidence Interval

These notations can be used as a guideline in evaluating your performance.

Comment Section: This section contains comments submitted to Analytical Products Group by program participants. It also contains comments from APG to participants concerning unusual characteristics of the data set or problems with standards which could influence the interpretation of the data.

Organic Standards: The analysis of environmental samples for organic compounds requires complex methodologies. The Organics report is divided into two sections. The first section is a summary of your performance on the samples based upon the compounds which were spiked into the standards. The spiked value is the theoretical true value of the sample based upon the gravimetric preparation and the dilution instructions included with the sample. The Mean and Standard Deviation are calculated using generally accepted procedures.

The second section of the report covers compounds which you reported, but which were not intentionally added to the sample. Rather than make a judgement as to whether this data represents false positives or actual contamination of the sample, APG has provided an analysis of laboratories reporting the same compound.

Performances Evaluation Summary: The section summarizes performance data in a format similar to the USEPA DMR-QA Report. Detailed information on each parameter is included in the main report.

Submitted: June 18, 1993

Thomas V. Coyner
General Manager

2730 Washington Blvd. Belpre, Ohio 45714 (614) 423-4200

APG Analytical Products Group, Inc.

Comments

May 1993

1. **Total Kjeldahl Nitrogen Level 1**

   Overall performance on this parameter appears to be inconsistent with previous studies. The relative standard deviation for this month was 38% and the average percent recovery was 122%. The data distribution is shown on the attached graph.

2. **Aluminum Level 1**

   Although the average percent recovery was 105% the relative deviation was again high on this sample. The RSD for level 1 was 25.6% versus 8% for the level 2 standard. Again, the distribution is attached for your review.

3. **Fuels Program**

   The data from the first month of the trial has been included in normal PET formats. A separate report on the program will isolate performance by method.

   Several comments on the initial trial have been received. The instructions for the handling and dilution of the Gasoline samples have been revised for the second month of the trial to reflect typical purge and trap methods. Likewise, comments regarding samples ranges will be built into the July sample set and two distinct ranges will be provided.

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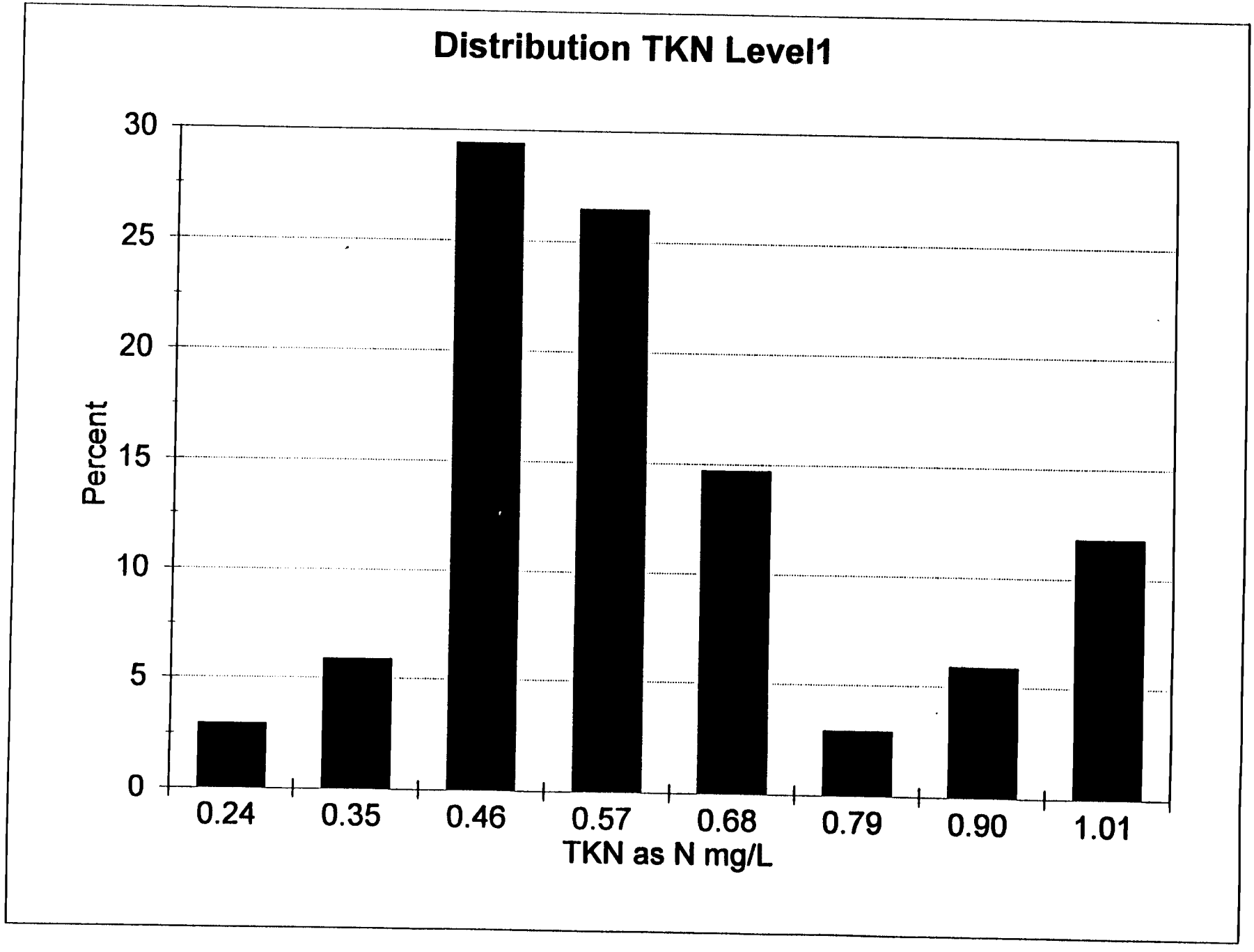
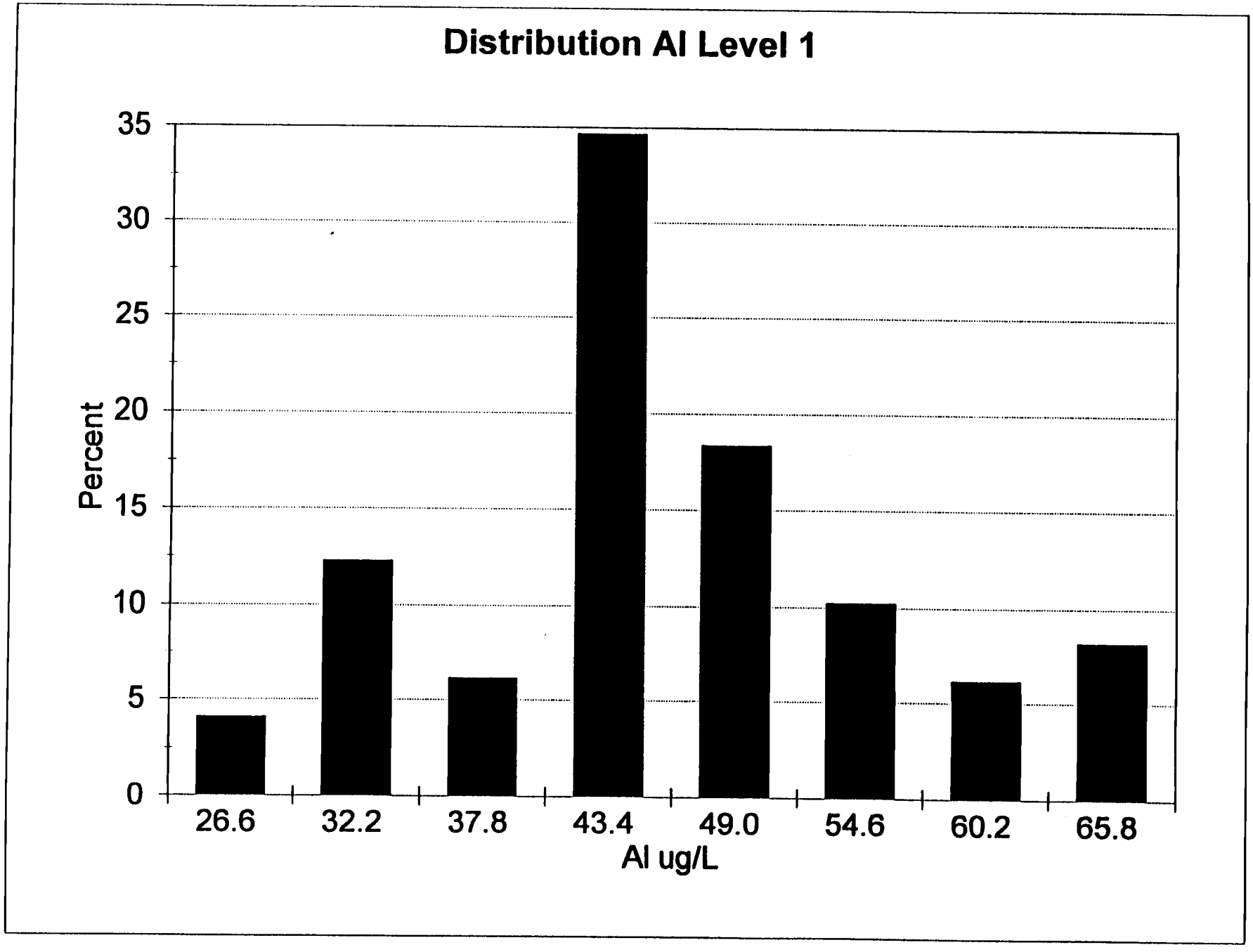

Distribution TKN Level1
Percent
30
25
20
15
10
5
0
0.24
0.35
0.46
0.57
0.68
0.79
0.90
1.01
TKN as N mg/L


Distribution Al Level 1
35
30
25
20
15
10
5
0
Percent
26.6
32.2
37.8
43.4
49.0
54.6
60.2
65.8
Al ug/L

Performance Evaluation Summary

Customer Code: 8254 | May, 1993 | Page: 1

Parameter	Level	Reported	Reference Value	Mean	Standard Deviation	Acceptance Range	Comment
Standard: Demand mg/L							
Biochemical Oxygen Demand	1	229.1	234.000	217.811	38.997	117.200 - 318.422	
Biochemical Oxygen Demand	2	6.23	6.660	6.657	1.876	1.818 - 11.496	
Chemical Oxygen Demand	1	360	376.800	359.880	24.277	297.245 - 422.514	
Chemical Oxygen Demand	2	7	10.740	11.313	3.768	1.592 - 21.034	
Total Organic Carbon	1	146	141.900	139.393	13.044	105.740 - 173.047	
Total Organic Carbon	2	3.9	4.040	4.228	0.784	2.205 - 6.251	
Standard: Nutrients mg/L							
Ammonia Nitrogen as N	1	0.174	0.241	0.276	0.092	0.040 - 0.513	
Ammonia Nitrogen as N	2	2.77	2.757	2.725	0.264	2.044 - 3.405	
Nitrate Nitrogen as N	1	0.80	0.943	0.925	0.083	0.711 - 1.138	
Nitrate Nitrogen as N	2	8.24	9.781	9.548	0.700	7.741 - 11.355	
Orthophosphate as P	1	0.46	0.458	0.465	0.024	0.402 - 0.528	
Orthophosphate as P	2	8.22	7.925	7.968	0.382	6.982 - 8.954	
Total Kjeldahl Nitrogen	1	NA	0.468	0.571	0.218	0.010 - 1.133	Unreported
Total Kjeldahl Nitrogen	2	NA	1.707	1.770	0.316	0.953 - 2.587	Unreported
Total Phosphorus as P	1	0.44	0.419	0.421	0.047	0.300 - 0.541	
Total Phosphorus as P	2	4.04	3.566	3.560	0.359	2.634 - 4.485	
Standard: Solids mg/L							
Total Suspended Solids	1	53	60.800	53.040	4.846	40.537 - 65.544	
Total Suspended Solids	2	311	321.500	291.815	28.689	217.797 - 365.832	
Total Dissolved Solids	1	159	139.600	147.298	21.162	92.701 - 201.895	
Total Dissolved Solids	2	536	502.800	510.044	30.373	431.681 - 588.408	

Customer Code: 8254

May, 1993

Parameter	Level	Reported	Reference Value	Mean	Standard Deviation	Acceptance Range	Comment
Standard: Oil & Grease mg/L							
Oil & Grease	1	7.9	8.990	8.046	2.903	0.555 - 15.536	
Oil & Grease	2	28.2	34.970	31.783	4.647	19.795 - 43.772	
Standard: Minerals mg/L							
Alkalinity as CaCO3	1	48	47.620	47.052	3.113	39.019 - 55.084	
Alkalinity as CaCO3	2	29	29.980	30.284	2.397	24.100 - 36.468	
Calcium	1	40.3	38.080	38.416	2.410	32.200 - 44.633	
Calcium	2	23.8	21.100	21.372	1.836	16.635 - 26.109	
Chloride	1	116	117.970	117.332	6.916	99.488 - 135.176	
Chloride	2	86	87.160	86.705	3.719	77.110 - 96.299	
Conductivity umho/cm	1	568	569.700	554.600	26.850	485.326 - 623.874	
Conductivity umho/cm	2	466	471.300	452.860	24.813	388.842 - 516.879	
Magnesium	1	11.3	10.860	10.681	0.461	9.490 - 11.871	
Magnesium	2	3.93	3.640	3.539	0.228	2.949 - 4.128	
Potassium	1	21.2	19.840	19.617	1.106	16.762 - 22.471	
Potassium	2	46.7	42.470	42.088	2.874	34.673 - 49.503	
Sodium	1	41.2	37.830	37.837	1.354	34.343 - 41.331	Warning
Sodium	2	36.7	32.620	32.677	1.896	27.784 - 37.569	Warning
Sulfate	1	32	33.280	33.031	2.299	27.099 - 38.963	
Sulfate	2	39	39.130	39.554	3.717	29.964 - 49.144	
Total Hardness as CaCO3	1	129	139.790	138.565	5.037	125.569 - 151.561	
Total Hardness as CaCO3	2	61	67.670	67.072	2.313	61.103 - 73.040	Unacceptable
Standard: pH Units							
pH	1	3.8	3.840	3.793	0.135	3.445 - 4.141	

Customer Code: 8254

May, 1993

Parameter	Level	Reported	Reference Value	Mean	Standard Deviation	Acceptance Range	Comment
pH	2	9.7	9.640	9.460	0.233	8.858 - 10.061	
Standard: Trace Metals ug/L							
Aluminum	1	53.1	40.930	43.369	11.123	14.672 - 72.067	
Aluminum	2	551	511.700	505.218	40.260	401.349 - 609.088	
Antimony	1	484	440.700	453.345	49.007	326.907 - 579.782	
Antimony	2	760	661.100	697.340	66.237	526.449 - 868.231	
Arsenic	1	18.5	18.980	18.669	1.987	13.541 - 23.796	
Arsenic	2	370	379.700	376.295	38.923	275.874 - 476.715	
Barium	1	811	796.200	782.980	35.997	690.106 - 875.853	
Barium	2	1220	1194.400	1176.084	54.342	1035.883 - 1316.285	
Beryllium	1	23.7	25.120	24.611	1.545	20.625 - 28.598	
Beryllium	2	180	188.400	186.284	8.500	164.355 - 208.212	
Boron	1	164	157.900	153.250	20.227	101.064 - 205.436	
Boron	2	292	296.000	291.317	23.176	231.523 - 351.112	
Cadmium	1	62.0	58.910	58.389	3.448	49.492 - 67.285	
Cadmium	2	154	147.300	146.496	8.394	124.839 - 168.152	
Chromium	1	23.5	22.310	22.803	3.338	14.190 - 31.416	
Chromium	2	301	278.900	276.578	18.462	228.946 - 324.209	
Cobalt	1	49.6	46.960	45.668	3.035	37.838 - 53.499	
Cobalt	2	214	208.700	207.374	13.600	172.287 - 242.462	
Copper	1	79.5	75.790	76.013	5.922	60.733 - 91.293	
Copper	2	162	151.600	151.251	10.792	123.408 - 179.094	
Iron	1	62.1	58.880	57.990	7.825	37.802 - 78.179	
Iron	2	674	630.800	631.653	29.121	556.521 - 706.784	
Lead	1	33.8	33.450	32.897	3.187	24.673 - 41.120	
Lead	2	268	278.700	275.158	23.652	214.136 - 336.180	
Manganese	1	29.9	28.010	28.408	1.926	23.440 - 33.377	
Manganese	2	121	112.000	113.513	6.270	97.335 - 129.691	
Mercury	1	1.63	1.670	1.691	0.254	1.036 - 2.346	
Mercury	2	3.54	3.580	3.703	0.484	2.455 - 4.951	

Customer Code: 8254 May, 1993

Parameter	Level	Reported	Reference Value	Mean	Standard Deviation	Acceptance Range	Comment
Molybdenum	1	174	180.900	175.558	17.559	130.255 - 220.860	
Molybdenum	2	308	301.500	296.018	35.609	204.145 - 387.890	
Nickel	1	35.8	30.470	30.892	4.024	20.510 - 41.273	
Nickel	2	173	152.400	152.935	12.650	120.298 - 185.572	
Selenium	1	26.3	26.230	25.335	3.491	16.328 - 34.342	
Selenium	2	129	131.100	128.590	9.427	104.268 - 152.912	
Silver	1	39.2	35.940	36.740	3.744	27.079 - 46.400	
Silver	2	267	385.000	385.132	20.912	331.180 - 439.084	Unacceptable
Thallium	1	130	136.420	132.716	11.714	102.493 - 162.939	
Thallium	2	659	682.100	658.055	63.728	493.637 - 822.472	
Vanadium	1	96.1	95.050	95.359	5.807	80.377 - 110.342	
Vanadium	2	1170	1140.700	1127.629	79.560	922.364 - 1332.894	
Zinc	1	28.6	29.860	29.848	4.822	17.407 - 42.288	
Zinc	2	205	199.000	199.878	14.640	162.106 - 237.650	
Standard: Phenol mg/L							
Phenol	1	0.322	0.320	0.298	0.060	0.142 - 0.453	
Phenol	2	3.318	3.320	3.164	0.422	2.076 - 4.253	
Standard: Cyanide mg/L							
Cyanide	1	0.444	0.432	0.434	0.051	0.303 - 0.565	
Cyanide	2	2.639	2.561	2.551	0.464	1.355 - 3.747	
Standard: Residual Chlorine mg/L							
Residual Chlorine	1	0.55	0.506	0.482	0.051	0.351 - 0.613	
Residual Chlorine	2	1.66	1.681	1.635	0.189	1.148 - 2.122	

Customer Code: 8254

May, 1993

Parameter	Level	Reported	Reference Value	Mean	Standard Deviation	Acceptance Range	Comment
Standard: Fluoride mg/L							
Fluoride	1	0.449	0.450	0.446	0.043	0.336 - 0.556	
Fluoride	2	7.4	7.440	7.340	0.410	6.282 - 8.398	
Standard: Hexavalent Chromium mg/L							
Hexavalent Chromium	1	NA	0.084	0.081	0.007	0.062 - 0.100	Unreported
Hexavalent Chromium	2	NA	0.363	0.367	0.026	0.299 - 0.434	Unreported
Standard: Uranium ug/L							
Uranium	1	99.3	100.100	98.533	2.638	91.727 - 105.339	
Uranium	2	994	900.900	877.667	28.891	803.129 - 952.204	Unacceptable

APG Analytical Products Group, Inc.

Customer Code: 8254

Parameter: Biochemical Oxygen Demand

	mg/L Level 1	Level 2
Your Result:	229.1	6.23
Reference Value:	234.000	6.660
Mean of Reporting Laboratories:	217.811	6.657
Actual Standard Deviation:	38.997	1.876
Number Reporting:	91	86
Average % Recovery:	93.082	99.959
Your % Recovery:	97.906	93.544
Deviation from Mean - z Score:	0.289	0.228

Comment:

Parameter: Chemical Oxygen Demand

	mg/L Level 1	Level 2
Your Result:	360	7
Reference Value:	376.800	10.740
Mean of Reporting Laboratories:	359.880	11.313
Actual Standard Deviation:	24.277	3.768
Number Reporting:	48	43
Average % Recovery:	95.509	105.338
Your % Recovery:	95.541	65.177
Deviation from Mean - z Score:	0.005	1.145

Comment:

Parameter: Total Organic Carbon

	mg/L Level 1	Level 2
Your Result:	146	3.9
Reference Value:	141.900	4.040
Mean of Reporting Laboratories:	139.393	4.228
Actual Standard Deviation:	13.044	0.784
Number Reporting:	36	41
Average % Recovery:	98.233	104.658
Your % Recovery:	102.889	96.535
Deviation from Mean - z Score:	0.506	0.419

Comment:

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Customer Code: 8254

Parameter: Ammonia Nitrogen as N

	mg/L Level 1	Level 2
Your Result:	0.174	2.77
Reference Value:	0.241	2.757
Mean of Reporting Laboratories:	0.276	2.725
Actual Standard Deviation:	0.092	0.264
Number Reporting:	67	66
Average % Recovery:	114.572	98.832
Your % Recovery:	72.199	100.472
Deviation from Mean - z Score:	1.114	0.171

Comment:

Parameter: Nitrate Nitrogen as N

	mg/L Level 1	Level 2
Your Result:	0.80	8.24
Reference Value:	0.943	9.781
Mean of Reporting Laboratories:	0.925	9.548
Actual Standard Deviation:	0.083	0.700
Number Reporting:	44	43
Average % Recovery:	98.078	97.614
Your % Recovery:	84.836	84.245
Deviation from Mean - z Score:	1.509	1.867

Comment:

Parameter: Orthophosphate as P

	mg/L Level 1	Level 2
Your Result:	0.46	8.22
Reference Value:	0.458	7.925
Mean of Reporting Laboratories:	0.465	7.968
Actual Standard Deviation:	0.024	0.382
Number Reporting:	39	37
Average % Recovery:	101.461	100.539
Your % Recovery:	100.437	103.722
Deviation from Mean - z Score:	0.193	0.660

Comment:

Customer Code: 8254

Parameter: Total Kjeldahl Nitrogen

	mg/L Level 1	Level 2
Your Result:	NA	NA
Reference Value:	0.468	1.707
Mean of Reporting Laboratories:	0.571	1.770
Actual Standard Deviation:	0.218	0.316
Number Reporting:	34	33
Average % Recovery:	122.053	103.691
Your % Recovery:		
Deviation from Mean - z Score:	0.000	0.000
Comment:	Unreported	Unreported

Parameter: Total Phosphorus as P

	mg/L Level 1	Level 2
Your Result:	0.44	4.04
Reference Value:	0.419	3.566
Mean of Reporting Laboratories:	0.421	3.560
Actual Standard Deviation:	0.047	0.359
Number Reporting:	45	44
Average % Recovery:	100.391	99.826
Your % Recovery:	105.012	113.292
Deviation from Mean - z Score:	0.414	1.339
Comment:		

Parameter: Total Suspended Solids

	mg/L Level 1	Level 2
Your Result:	53	311
Reference Value:	60.800	321.500
Relative Error % :	12.762	9.233
Relative Deviation % :	7.971	8.923
Number Reporting:	127	123
Average % Recovery:	87.238	90.767
Your % Recovery:	87.171	96.734
Deviation from Mean - z Score:	0.008	0.669
Comment:		

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Customer Code: 8254

Parameter: Total Dissolved Solids

	mg/L Level 1	Level 2
Your Result:	159	536
Reference Value:	139.600	502.800
Relative Error % :	5.515	1.441
Relative Deviation % :	15.159	6.041
Number Reporting:	57	55
Average % Recovery:	105.515	101.441
Your % Recovery:	113.897	106.603
Deviation from Mean - z Score:	0.553	0.855

Comment:

Parameter: Oil & Grease

	mg/L Level 1	Level 2
Your Result:	7.9	28.2
Reference Value:	8.990	34.970
Mean of Reporting Laboratories:	8.046	31.783
Actual Standard Deviation:	2.903	4.647
Number Reporting:	60	59
Average % Recovery:	89.497	90.888
Your % Recovery:	87.875	80.641
Deviation from Mean - z Score:	0.050	0.771

Comment:

Parameter: Alkalinity as CaCO3

	mg/L Level 1	Level 2
Your Result:	48	29
Reference Value:	47.620	29.980
Mean of Reporting Laboratories:	47.052	30.284
Actual Standard Deviation:	3.113	2.397
Number Reporting:	54	50
Average % Recovery:	98.807	101.014
Your % Recovery:	100.798	96.731
Deviation from Mean - z Score:	0.305	0.536

Comment:

Customer Code: 8254

Parameter: Calcium

	mg/L Level 1	Level 2
Your Result:	40.3	23.8
Reference Value:	38.080	21.100
Mean of Reporting Laboratories:	38.416	21.372
Actual Standard Deviation:	2.410	1.836
Number Reporting:	39	42
Average % Recovery:	100.883	101.290
Your % Recovery:	105.830	112.796
Deviation from Mean - z Score:	0.782	1.322

Comment:

Parameter: Chloride

	mg/L Level 1	Level 2
Your Result:	116	86
Reference Value:	117.970	87.160
Mean of Reporting Laboratories:	117.332	86.705
Actual Standard Deviation:	6.916	3.719
Number Reporting:	53	53
Average % Recovery:	99.459	99.477
Your % Recovery:	98.330	98.669
Deviation from Mean - z Score:	0.193	0.189

Comment:

Parameter: Conductivity umho/cm

	umhos/cm Level 1	Level 2
Your Result:	568	466
Reference Value:	569.700	471.300
Mean of Reporting Laboratories:	554.600	452.860
Actual Standard Deviation:	26.850	24.813
Number Reporting:	60	57
Average % Recovery:	97.349	96.088
Your % Recovery:	99.702	98.875
Deviation from Mean - z Score:	0.499	0.530

Comment:

Customer Code: 8254

Parameter: Magnesium

	mg/L Level 1	Level 2
Your Result:	11.3	3.93
Reference Value:	10.860	3.640
Mean of Reporting Laboratories:	10.681	3.539
Actual Standard Deviation:	0.461	0.228
Number Reporting:	36	36
Average % Recovery:	98.348	97.215
Your % Recovery:	104.052	107.967
Deviation from Mean - z Score:	1.343	1.714

Comment:

Parameter: Potassium

	mg/L Level 1	Level 2
Your Result:	21.2	46.7
Reference Value:	19.840	42.470
Mean of Reporting Laboratories:	19.617	42.088
Actual Standard Deviation:	1.106	2.874
Number Reporting:	38	38
Average % Recovery:	98.874	99.100
Your % Recovery:	106.855	109.960
Deviation from Mean - z Score:	1.431	1.605

Comment:

Parameter: Sodium

	mg/L Level 1	Level 2
Your Result:	41.2	36.7
Reference Value:	37.830	32.620
Mean of Reporting Laboratories:	37.837	32.677
Actual Standard Deviation:	1.354	1.896
Number Reporting:	40	39
Average % Recovery:	100.018	100.174
Your % Recovery:	108.908	112.508
Deviation from Mean - z Score:	2.484	2.122
Comment:	Warning	Warning

Customer Code: 8254

Parameter: Sulfate

	mg/L Level 1	Level 2
Your Result:	32	39
Reference Value:	33.280	39.130
Mean of Reporting Laboratories:	33.031	39.554
Actual Standard Deviation:	2.299	3.717
Number Reporting:	52	53
Average % Recovery:	99.252	101.083
Your % Recovery:	96.154	99.668
Deviation from Mean - z Score:	0.448	0.149

Comment:

Parameter: Total Hardness as CaCO3

	mg/L Level 1	Level 2
Your Result:	129	61
Reference Value:	139.790	67.670
Mean of Reporting Laboratories:	138.565	67.072
Actual Standard Deviation:	5.037	2.313
Number Reporting:	49	46
Average % Recovery:	99.124	99.116
Your % Recovery:	92.281	90.143
Deviation from Mean - z Score:	1.899	2.625

Comment: Unacceptable

Parameter: pH

	Units Level 1	Level 2
Your Result:	3.8	9.7
Reference Value:	3.840	9.640
Mean of Reporting Laboratories:	3.793	9.460
Actual Standard Deviation:	0.135	0.233
Number Reporting:	125	131
Average % Recovery:	98.781	98.128
Your % Recovery:	98.958	100.622
Deviation from Mean - z Score:	0.051	1.032

Comment:

Customer Code: 8254

Parameter: Aluminum

	ug/L Level 1	Level 2
Your Result:	53.1	551
Reference Value:	40.930	511.700
Mean of Reporting Laboratories:	43.369	505.218
Actual Standard Deviation:	11.123	40.260
Number Reporting:	49	51
Average % Recovery:	105.960	98.733
Your % Recovery:	129.734	107.680
Deviation from Mean - z Score:	0.875	1.137

Comment:

Parameter: Antimony

	ug/L Level 1	Level 2
Your Result:	484	760
Reference Value:	440.700	661.100
Mean of Reporting Laboratories:	453.345	697.340
Actual Standard Deviation:	49.007	66.237
Number Reporting:	42	41
Average % Recovery:	102.869	105.482
Your % Recovery:	109.825	114.960
Deviation from Mean - z Score:	0.626	0.946

Comment:

Parameter: Arsenic

	ug/L Level 1	Level 2
Your Result:	18.5	370
Reference Value:	18.980	379.700
Mean of Reporting Laboratories:	18.669	376.295
Actual Standard Deviation:	1.987	38.923
Number Reporting:	48	50
Average % Recovery:	98.360	99.103
Your % Recovery:	97.471	97.445
Deviation from Mean - z Score:	0.085	0.162

Comment:

Customer Code: 8254

Parameter: Barium

	ug/L Level 1	Level 2
Your Result:	811	1220
Reference Value:	796.200	1194.400
Mean of Reporting Laboratories:	782.980	1176.084
Actual Standard Deviation:	35.997	54.342
Number Reporting:	48	50
Average % Recovery:	98.340	98.467
Your % Recovery:	101.859	102.143
Deviation from Mean - z Score:	0.778	0.808

Comment:

Parameter: Beryllium

	ug/L Level 1	Level 2
Your Result:	23.7	180
Reference Value:	25.120	188.400
Mean of Reporting Laboratories:	24.611	186.284
Actual Standard Deviation:	1.545	8.500
Number Reporting:	43	47
Average % Recovery:	97.975	98.877
Your % Recovery:	94.347	95.541
Deviation from Mean - z Score:	0.590	0.739

Comment:

Parameter: Boron

	ug/L Level 1	Level 2
Your Result:	164	292
Reference Value:	157.900	296.000
Mean of Reporting Laboratories:	153.250	291.317
Actual Standard Deviation:	20.227	23.176
Number Reporting:	22	23
Average % Recovery:	97.055	98.418
Your % Recovery:	103.863	98.649
Deviation from Mean - z Score:	0.531	0.029

Comment:

Customer Code: 8254

Parameter: Cadmium

	ug/L Level 1	Level 2
Your Result:	62.0	154
Reference Value:	58.910	147.300
Mean of Reporting Laboratories:	58.389	146.496
Actual Standard Deviation:	3.448	8.394
Number Reporting:	60	64
Average % Recovery:	99.115	99.454
Your % Recovery:	105.245	104.549
Deviation from Mean - z Score:	1.047	0.894

Comment:

Parameter: Chromium

	ug/L Level 1	Level 2
Your Result:	23.5	301
Reference Value:	22.310	278.900
Mean of Reporting Laboratories:	22.803	276.578
Actual Standard Deviation:	3.338	18.462
Number Reporting:	65	70
Average % Recovery:	102.208	99.167
Your % Recovery:	105.334	107.924
Deviation from Mean - z Score:	0.209	1.323

Comment:

Parameter: Cobalt

	ug/L Level 1	Level 2
Your Result:	49.6	214
Reference Value:	46.960	208.700
Mean of Reporting Laboratories:	45.668	207.374
Actual Standard Deviation:	3.035	13.600
Number Reporting:	34	39
Average % Recovery:	97.249	99.365
Your % Recovery:	105.622	102.540
Deviation from Mean - z Score:	1.295	0.487

Comment:

Customer Code: 8254

Parameter: Copper

	ug/L Level 1	Level 2
Your Result:	79.5	162
Reference Value:	75.790	151.600
Mean of Reporting Laboratories:	76.013	151.251
Actual Standard Deviation:	5.922	10.792
Number Reporting:	67	75
Average % Recovery:	100.294	99.770
Your % Recovery:	104.895	106.860
Deviation from Mean - z Score:	0.589	0.996

Comment:

Parameter: Iron

	ug/L Level 1	Level 2
Your Result:	62.1	674
Reference Value:	58.880	630.800
Mean of Reporting Laboratories:	57.990	631.653
Actual Standard Deviation:	7.825	29.121
Number Reporting:	62	65
Average % Recovery:	98.489	100.135
Your % Recovery:	105.469	106.848
Deviation from Mean - z Score:	0.525	1.454

Comment:

Parameter: Lead

	ug/L Level 1	Level 2
Your Result:	33.8	268
Reference Value:	33.450	278.700
Mean of Reporting Laboratories:	32.897	275.158
Actual Standard Deviation:	3.187	23.652
Number Reporting:	52	63
Average % Recovery:	98.346	98.729
Your % Recovery:	101.046	96.161
Deviation from Mean - z Score:	0.283	0.303

Comment:

Customer Code: 8254

Parameter: Manganese

	ug/L Level 1	Level 2
Your Result:	29.9	121
Reference Value:	28.010	112.000
Mean of Reporting Laboratories:	28.408	113.513
Actual Standard Deviation:	1.926	6.270
Number Reporting:	52	56
Average % Recovery:	101.423	101.351
Your % Recovery:	106.748	108.036
Deviation from Mean - z Score:	0.775	1.194

Comment:

Parameter: Mercury

	ug/L Level 1	Level 2
Your Result:	1.63	3.54
Reference Value:	1.670	3.580
Mean of Reporting Laboratories:	1.691	3.703
Actual Standard Deviation:	0.254	0.484
Number Reporting:	46	47
Average % Recovery:	101.255	103.439
Your % Recovery:	97.605	98.883
Deviation from Mean - z Score:	0.240	0.337

Comment:

Parameter: Molybdenum

	ug/L Level 1	Level 2
Your Result:	174	308
Reference Value:	180.900	301.500
Mean of Reporting Laboratories:	175.558	296.018
Actual Standard Deviation:	17.559	35.609
Number Reporting:	33	34
Average % Recovery:	97.047	98.182
Your % Recovery:	96.186	102.156
Deviation from Mean - z Score:	0.089	0.336

Comment:

Customer Code: 8254

Parameter: Nickel

	ug/L Level 1	Level 2
Your Result:	35.8	173
Reference Value:	30.470	152.400
Mean of Reporting Laboratories:	30.892	152.935
Actual Standard Deviation:	4.024	12.650
Number Reporting:	60	68
Average % Recovery:	101.384	100.351
Your % Recovery:	117.493	113.517
Deviation from Mean - z Score:	1.220	1.586

Comment:

Parameter: Selenium

	ug/L Level 1	Level 2
Your Result:	26.3	129
Reference Value:	26.230	131.100
Mean of Reporting Laboratories:	25.335	128.590
Actual Standard Deviation:	3.491	9.427
Number Reporting:	46	43
Average % Recovery:	96.589	98.086
Your % Recovery:	100.267	98.398
Deviation from Mean - z Score:	0.276	0.043

Comment:

Parameter: Silver

	ug/L Level 1	Level 2
Your Result:	39.2	267
Reference Value:	35.940	385.000
Mean of Reporting Laboratories:	36.740	385.132
Actual Standard Deviation:	3.744	20.912
Number Reporting:	51	49
Average % Recovery:	102.225	100.034
Your % Recovery:	109.071	69.351
Deviation from Mean - z Score:	0.657	5.649

Comment: Unacceptable

Customer Code: 8254

Parameter: Thallium

	ug/L Level 1	Level 2
Your Result:	130	659
Reference Value:	136.420	682.100
Mean of Reporting Laboratories:	132.716	658.055
Actual Standard Deviation:	11.714	63.728
Number Reporting:	37	40
Average % Recovery:	97.285	96.475
Your % Recovery:	95.294	96.613
Deviation from Mean - z Score:	0.232	0.015

Comment:

Parameter: Vanadium

	ug/L Level 1	Level 2
Your Result:	96.1	1170
Reference Value:	95.050	1140.700
Mean of Reporting Laboratories:	95.359	1127.629
Actual Standard Deviation:	5.807	79.560
Number Reporting:	37	42
Average % Recovery:	100.326	98.854
Your % Recovery:	101.105	102.569
Deviation from Mean - z Score:	0.128	0.533

Comment:

Parameter: Zinc

	ug/L Level 1	Level 2
Your Result:	28.6	205
Reference Value:	29.860	199.000
Mean of Reporting Laboratories:	29.848	199.878
Actual Standard Deviation:	4.822	14.640
Number Reporting:	63	68
Average % Recovery:	99.959	100.441
Your % Recovery:	95.780	103.015
Deviation from Mean - z Score:	0.259	0.350

Comment:

Customer Code: 8254

Parameter: Phenol

	mg/L Level 1	Level 2
Your Result:	0.322	3.318
Reference Value:	0.320	3.320
Mean of Reporting Laboratories:	0.298	3.164
Actual Standard Deviation:	0.060	0.422
Number Reporting:	31	30
Average % Recovery:	92.995	95.314
Your % Recovery:	100.625	99.940
Deviation from Mean - z Score:	0.405	0.364

Comment:

Parameter: Cyanide

	mg/L Level 1	Level 2
Your Result:	0.444	2.639
Reference Value:	0.432	2.561
Mean of Reporting Laboratories:	0.434	2.551
Actual Standard Deviation:	0.051	0.464
Number Reporting:	35	34
Average % Recovery:	100.417	99.605
Your % Recovery:	102.778	103.046
Deviation from Mean - z Score:	0.201	0.190

Comment:

Parameter: Residual Chlorine

	mg/L Level 1	Level 2
Your Result:	0.55	1.66
Reference Value:	0.506	1.681
Mean of Reporting Laboratories:	0.482	1.635
Actual Standard Deviation:	0.051	0.189
Number Reporting:	67	64
Average % Recovery:	95.311	97.275
Your % Recovery:	108.696	98.751
Deviation from Mean - z Score:	1.333	0.131

Comment:

Customer Code: 8254

Parameter: Fluoride

	mg/L Level 1	Level 2
Your Result:	0.449	7.4
Reference Value:	0.450	7.440
Mean of Reporting Laboratories:	0.446	7.340
Actual Standard Deviation:	0.043	0.410
Number Reporting:	31	32
Average % Recovery:	99.061	98.658
Your % Recovery:	99.778	99.462
Deviation from Mean - z Score:	0.076	0.146
Comment:		

Parameter: Hexavalent Chromium

	mg/L Level 1	Level 2
Your Result:	NA	NA
Reference Value:	0.084	0.363
Mean of Reporting Laboratories:	0.081	0.367
Actual Standard Deviation:	0.007	0.026
Number Reporting:	16	16
Average % Recovery:	96.175	101.016
Your % Recovery:		
Deviation from Mean - z Score:	0.000	0.000
Comment:	Unreported	Unreported

Parameter: Uranium

	ug/L Level 1	Level 2
Your Result:	99.3	994
Reference Value:	100.100	900.900
Mean of Reporting Laboratories:	98.533	877.667
Actual Standard Deviation:	2.638	28.891
Number Reporting:	6	6
Average % Recovery:	98.435	97.421
Your % Recovery:	99.201	110.334
Deviation from Mean - z Score:	0.291	4.027
Comment:		Unacceptable

Data Return Instructions

Data Reporting:

The P.E.T. Program has been designed to allow you to compare your results with those of other participating laboratories. In order to insure comparability of results, please check the units for each parameter with the data reporting form. Your results should be returned on the enclosed reporting form.

All data is handled as proprietary information and will not be exchanged with other laboratories. Therefore, feel free to add additional information for your own internal use. Reports will include a transcription of your original data for verification.

Each data form should be signed by the laboratory supervisor before submittal. In order to be included in the statistical analysis your data **must** be received by the submittal date shown on the front of this form. If you choose to submit your data by FAX, you must also return the original of this form by mail. Please note that the FAX results **must** have the customer code on every page.

Should you have any questions regarding the P.E.T. Program Contact:

Analytical Products Group, Inc.
2730 Washington Blvd.
Belpre, OH 45714

614-423-4200 800-272-4442

FAX 614-423-5588

DATA MUST BE RETURNED BY:

JUN 03 1993

8254

D C Canada

LAB SUPERVISOR:

		Level 1	Level 2	Test Method
Demand				
Biochemical Oxygen Demand	mg/L	229.1	6.23	EPA-405.1
Chemical Oxygen Demand	mg/L	360	7	EPA-410.4
Total Organic Carbon	mg/L	146	3.9	EPA-415.1
Nutrients				
Ammonia Nitrogen as N	mg/L	0.174	2.77	EPA-350.3
Nitrate Nitrogen as N	mg/L	0.80	8.24	EPA-300.0
Orthophosphate as P	mg/L	0.46	8.22	SM-424
Total Kjeldahl Nitrogen	mg/L	Not	Analyzed	
Total Phosphorus as P	mg/L	0.44	4.04	SM-422
Solids				
Total Suspended Solids	mg/L	58	311	EPA-160.2
Total Dissolved Solids	mg/L	159	536	EPA-160.1
Oil & Grease				
Oil & Grease	mg/L	7.9	28.2	EPA-413.1
Minerals				
Alkalinity as CaC03	mg/L	48	29	EPA-310.1
Calcium	mg/L	40.3	23.8	EPA-200.7
Chloride	mg/L	116	86	EPA-325.3
Conductivity	umho/cm	568	466	EPA-120.1
Magnesium	mg/L	11.3	3.93	EPA-200.7
Potassium	mg/L	21.2	46.7	EPA-200.7
Sodium	mg/L	41.2	36.7	EPA-200.7
Sulfate	mg/L	32	39	EPA-300
Total Hardness as CaC02	mg/L	129	61	SM-314
pH				
pH	units	3.8	9.7	EPA-150.1

Report ALL results as mg/L except as indicated

MAY 1993 8254

Trace

		Level 1	Level 2	Test Method
Aluminum	ug/L	53.1	551	EPA-200.7
Antimony	ug/L	484	760	EPA-200.7
Arsenic	ug/L	18.5	370	EPA-206.2
Barium	ug/L	811	1220	EPA-200.7
Beryllium	ug/L	23.7	180	EPA-200.7
Boron	ug/L	164	292	EPA-200.7
Cadmium	ug/L	62.0	154	EPA-200.7
Chromium	ug/L	23.5	301	EPA-200.7
Cobalt	ug/L	49.6	214	EPA-200.7
Copper	ug/L	79.5	162	EPA-200.7
Iron	ug/L	62.1	674	EPA-200.7
Lead	ug/L	33.8	268	EPA-239.2
Manganese	ug/L	29.9	121	EPA-200.7
Mercury	ug/L	1.63	3.54	EPA-245.1
Molybdenum	ug/L	174	308	EPA-200.7
Nickel	ug/L	35.8	173	EPA-200.7
Selenium	ug/L	26.3	129	EPA-270.2
Silver	ug/L	39.2	267	EPA-200.7
Thallium	ug/L	130	659	EPA-279.2
Vanadium	ug/L	96.1	1170	EPA-200.7
Zinc	ug/L	28.6	205	EPA-200.7

Phenol	mg/L	0.322	3.318	EPA-420.1
Cyanide	mg/L	0.444	2.639	EPA-335.2
Residual Chlorine	mg/L	0.55	1.66	SM-408C
Aluminum High Level	mg/L	Not	Analyzed	
Fluoride	mg/L	0.449	7.4	EPA-340.2
Total Organic Halides (TOX)	ug/L	Not	Analyzed	
Hexavalent Chromium	mg/L			
Uranium	ug/L	99.3	994	EC-1910

8254

VR

Volatiles

		Level 1	Level 2	Method
Benzene	ug/L			
Chlorobenzene	ug/L			
1,2-Dichlorobenzene	ug/L			
1,3-Dichlorobenzene	ug/L			
1,4-Dichlorobenzene	ug/L			
Ethylbenzene	ug/L			
Toluene	ug/L			
Bromodichloromethane	ug/L			
Bromoform	ug/L			
Bromomethane	ug/L			
Carbon tetrachloride	ug/L			
Chloroethane	ug/L			
2-Chloroethyl vinyl ether	ug/L			
Chloroform	ug/L			
Chloromethane	ug/L			
Dibromochloromethane	ug/L			
Dichlorodifluoromethane	ug/L			
1,1-Dichlorethane	ug/L			
1,2-Dichloroethane	ug/L			
1,1-Dichloroethane	ug/L			
trans-1,2-Dichloroethene	ug/L			
1,2-Dichloropropane	ug/L			
cis-1,3-Dichloropropene	ug/L			
trans-1,3-Dichloropropene	ug/L			
Methylene chloride	ug/L			

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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 - FTS 545-2100)

JAN 11 1993

Mr. D. C. Canada
Oak Ridge Gaseous Diffusion Plant
Martin Marietta Energy Systems, Inc.
Hwy. 58, Drop Point A-20, Box 2003
Oak Ridge, TN 37831-7440

Dear Mr. Canada:

A report of your participation in the water pollution sample study, WP029, is enclosed. True values and acceptance limits for analytes in the multi-laboratory study are also furnished.

There is no requirement at this time for DOE laboratories to report corrective actions regarding problems with analysis of these samples. You may use the results for WP029 for support or diagnostics of current work as well as yielding a continuity in the record for performance of water pollution sample analysis. We would be glad to provide any further assistance you may require regarding the WP029 study.

Sincerely,

Harold A Vincent

Harold A Vincent
Chemist
Quality Assurance Research Branch, QAD

Enclosure

PERFORMANCE EVALUATION REPORT

DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: TN043

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
ALUMINUM	1	69.3	65.9	40.1- 100	47.7- 92.6	ACCEPTABLE
	2	564	548	435- 645	462- 619	ACCEPTABLE
ARSENIC	1	133	140	113- 168	120- 161	ACCEPTABLE
	2	14.7	15.0	11.1- 19.4	12.2- 18.4	ACCEPTABLE
BERYLLIUM	1	16.0	16.8	12.4- 21.4	13.5- 20.2	ACCEPTABLE
	2	600	609	497- 714	525- 686	ACCEPTABLE
CADMIUM	1	17.3	16.8	12.2- 21.5	13.4- 20.4	ACCEPTABLE
	2	392	380	319- 440	334- 425	ACCEPTABLE
COBALT	1	659	651	566- 724	586- 703	ACCEPTABLE
	2	16.8	13.3	9.54- 17.0	10.5- 16.0	CHECK FOR ERROR
CHROMIUM	1	645	620	516- 717	541- 691	ACCEPTABLE
	2	9.01	8.11	3.37- 12.3	4.49- 11.2	ACCEPTABLE
COPPER	1	6.34	6.33	3.68- 8.58	4.30- 7.97	ACCEPTABLE
	2	253	241	213- 267	219- 260	ACCEPTABLE
IRON	1	740	711	625- 800	647- 778	ACCEPTABLE
	2	86.2	83.0	68.2- 97.7	71.9- 94.0	ACCEPTABLE
MERCURY	1	10	8.12	6.26- 10.3	6.77- 9.81	CHECK FOR ERROR
	2	16	13.0	9.49- 16.9	10.4- 15.9	CHECK FOR ERROR
MANGANESE	1	354	340	303- 373	312- 364	ACCEPTABLE
	2	32.3	30.6	25.7- 35.6	26.9- 34.3	ACCEPTABLE
NICKEL	1	34.5	31.7	25.5- 37.4	27.0- 35.9	ACCEPTABLE
	2	599	569	498- 632	515- 616	ACCEPTABLE
LEAD	1	969	959	831- 1080	862- 1050	ACCEPTABLE
	2	1560	1500	1300- 1680	1350- 1630	ACCEPTABLE

* - BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT

DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: TN043

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	5.39	6.01	3.28- 8.06	3.88- 7.46	ACCEPTABLE
	2	154	170	116- 203	127- 192	ACCEPTABLE
VANADIUM	1	497	490	431- 541	445- 527	ACCEPTABLE
	2	38.9	38.2	30.6- 46.8	32.7- 44.7	ACCEPTABLE
ZINC	1	18.3	17.0	11.3- 22.9	12.8- 21.4	ACCEPTABLE
	2	620	612	536- 689	555- 670	ACCEPTABLE
ANTIMONY	3	19.2	22.0	12.4- 29.9	14.6- 27.6	ACCEPTABLE
	4	139	146	96.6- 192	107- 171	ACCEPTABLE
SILVER	3	5.84	5.59	4.20- 7.01	4.56- 6.66	ACCEPTABLE
	4	14.9	14.0	11.1- 16.8	11.8- 16.1	ACCEPTABLE
THALLIUM	3	4.60	5.30	3.45- 7.01	3.92- 6.54	ACCEPTABLE
	4	75.5	76.2	58.3- 94.0	63.0- 89.4	ACCEPTABLE
MOLYBDENUM	3	52.9	49.0	38.0- 61.2	41.0- 58.2	ACCEPTABLE
	4	13.9	7.96	4.27- 12.2	5.31- 11.2	NOT ACCEPTABLE
STRONTIUM	3	12.4	12.9	10.1- 15.4	10.8- 14.7	ACCEPTABLE
	4	59.5	61.9	50.3- 71.9	53.2- 69.1	ACCEPTABLE
TITANIUM	3	212	214	185- 237	192- 230	ACCEPTABLE
	4	77.3	78.0	65.4- 88.2	68.5- 85.2	ACCEPTABLE
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH-UNITS	3	4.37	4.40	4.28- 4.48	4.31- 4.45	ACCEPTABLE
	4	7.88	8.00	7.76- 8.21	7.81- 8.16	ACCEPTABLE
SPEC. COND. (UMHOS/CM AT 25 C)	1	181	162	162- 199	167- 194	ACCEPTABLE
	2	828	812	752- 882	769- 865	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT

DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: TN043

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
TDS AT 180 C	1	114	99.7	64.0- 144	73.9- 134	ACCEPTABLE
	2	459	459	342- 572	370- 543	ACCEPTABLE
TOTAL HARDNESS (AS CACO3)	1	37	46.5	39.6- 51.0	41.0- 49.6	NOT ACCEPTABLE
	2	209	221	203- 237	207- 233	ACCEPTABLE
CALCIUM	1	15.5	15.0	12.8- 15.9	13.2- 15.5	ACCEPTABLE
	2	54.5	49.0	44.7- 54.1	45.9- 53.0	NOT ACCEPTABLE
MAGNESIUM	1	2.54	2.48	2.07- 2.90	2.17- 2.79	ACCEPTABLE
	2	24.6	24.0	21.0- 26.9	21.8- 26.2	ACCEPTABLE
SODIUM	1	9.92	9.68	8.19- 11.3	8.59- 10.9	ACCEPTABLE
	2	50.7	48.4	42.4- 55.2	44.0- 53.6	ACCEPTABLE
POTASSIUM	1	6.41	6.30	5.16- 7.32	5.44- 7.05	ACCEPTABLE
	2	35.8	34.0	29.1- 38.9	30.3- 37.6	ACCEPTABLE
TOTAL ALKALINITY (AS CACO3)	1	12	9.70	6.65- 14.1	7.58- 13.2	ACCEPTABLE
	2	57	54.0	47.2- 62.0	49.0- 60.1	ACCEPTABLE
CHLORIDE	1	31.6	33.3	28.8- 36.0	29.7- 35.1	ACCEPTABLE
	2	152.6	159	143- 171	146- 167	ACCEPTABLE
FLUORIDE	1	0.42	0.460	0.378-0.544	0.399-0.523	ACCEPTABLE
	2	1.78	1.80	1.55- 2.02	1.61- 1.96	ACCEPTABLE
SULFATE	1	15	17.0	13.2- 20.2	14.1- 19.4	ACCEPTABLE
	2	76.9	84.0	70.1- 93.9	73.1- 90.9	ACCEPTABLE
NUTRIENTS IN MILLIGRAMS PER LITER:						
AMMONIA-NITROGEN	1	9.44	0.960	0.658- 1.25	0.729- 1.18	NOT ACCEPTABLE
	2	3.25	0.350	0.185-0.535	0.227-0.493	NOT ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT

DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: TN043

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
NUTRIENTS IN MILLIGRAMS PER LITER:						
NITRATE-NITROGEN	1	0.154	0.170	.0849-0.256	0.105-0.235	ACCEPTABLE
	2	1.22	1.30	1.00- 1.59	1.07- 1.52	ACCEPTABLE
ORTHOPHOSPHATE	1	0.04	0.030	.0116-.0498	.0162-.0452	ACCEPTABLE
	2	0.66	0.670	0.555-0.779	0.582-0.752	ACCEPTABLE
TOTAL PHOSPHORUS	3	5.76	7.02	5.20- 7.72	5.50- 7.42	ACCEPTABLE
	4	0.72	0.713	0.512-0.802	0.546-0.767	ACCEPTABLE
DEMANDS IN MILLIGRAMS PER LITER:						
COD	1	305	304	240- 341	253- 328	ACCEPTABLE
	2	148	157	122- 179	129- 172	ACCEPTABLE
TOC	1	118	120	100- 142	105- 136	ACCEPTABLE
	2	62	62.0	51.8- 73.6	54.6- 70.8	ACCEPTABLE
5-DAY BOD	1	212.4	193	120- 266	138- 248	ACCEPTABLE
	2	94.3	99.6	61.1- 138	70.7- 128	ACCEPTABLE
MISCELLANEOUS PARAMETERS:						
TOTAL CYANIDE (IN MG/L)	1	0.036	0.040	.0108-.0592	.0169-.0531	ACCEPTABLE
	2	0.295	0.350	0.206-0.461	0.239-0.429	ACCEPTABLE
NON-FILTERABLE RESIDUE (IN MG/L)	1	14	18.0	9.17- 19.8	10.5- 18.4	ACCEPTABLE
	2	76	93.0	71.8- 98.0	75.1- 94.8	ACCEPTABLE
OIL AND GREASE (IN MG/L)	1	59.2	72.0	43.7- 84.3	48.8- 79.2	ACCEPTABLE
	2	24.1	30.0	17.1- 36.7	19.6- 34.2	ACCEPTABLE
TOTAL PHENOLICS (IN MG/L)	1	1.12	1.06	0.572- 1.55	0.697- 1.42	ACCEPTABLE
	2	0.517	0.484	0.258-0.709	0.316-0.651	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT

DATE: 12/21/92

WATER POLLUTION STUDY NUMBER WP029

LABORATORY: TN043

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MISCELLANEOUS PARAMETERS:						
TOTAL RESIDUAL CHLORINE (IN MG/L)	1	4.56	4.80	3.44- 5.46	3.71- 5.20	ACCEPTABLE
	2	1.72	1.80	1.23- 2.12	1.35- 2.00	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

REGION 4
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QE 1 FY 93

LABORATORY: Martin Marietta ORDP (TN)
PERFORMANCE: ACCEPTABLE - Response Explaining Deficiency(ies) Required
RANK: Above = 10 Same = 1 Below = 3

% SCORE: 79.9
REPORT DATE: 12/24/9
MATRIX: WATER

COMPOUND	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY DATA CONC	Q	GLASS HIS-ONT	PROGRAM DATA GLASS NOT-ID	GLASS ID-CPD	TOTAL GLASS
TCL VOLATILE										
CHLOROMETHANE	35	71	29	91	82	S	2	1	58	59
1,1-DICHLOROETHANE	NU	NU	NU	NU	9		0	0	59	59
CHLOROFORM	61	75	39	83	61		1	0	59	59
2-BUTANONE	71	110	46	110	62	X	15	2	57	59
CIS-1,3-DICHLOROPROPENE	46	87	43	98	67		3	1	58	59
BROMOFORM	57	74	34	77	57		8	0	59	59
2-HEXANONE	110	250	92	270	180		3	0	59	59
1,1,2,2-TETRACHLOROETHANE	120	160	110	160	130		5	0	59	59
CHLOROBENZENE	34	41	34	44	35		3	0	59	59
STYRENE	160	200	150	210	190		3	0	59	59
XYLENES (TOTAL)	75	92	70	100	80		2	3	56	59
TCL SEMIVOLATILE										
PHENOL	17	28	16	29	18		4	1	58	59
BIS(2-CHLOROETHYL)ETHER	32	44	30	34	33	S	3	0	59	59
4-METHYLPHENOL	25	34	21	40	29		6	0	59	59
HEXACHLOROETHANE	33	60	28	76	49		0	0	59	59
2,4-DIMETHYLPHENOL	17	30	15	38	42	X	6	2	57	59
BIS(2-CHLOROETHOXY)METHANE	28	25	19	28	25		11	0	59	59
1,2,4-TRICHLOROBENZENE	28	43	26	51	41		2	0	59	59
HEXACHLOROCYCLOPENTADIENE	NU	NU	NU	NU	14		0	31	28	59
2,4,6-TRICHLOROPHENOL	21	31	20	32	32	S	7	0	59	59
4-NITROPHENOL	41	64	38	67	58	U A	11	1	58	59
4-BROMOPHENYL PHENYL ETHER	13	22	12	34	28		0	0	59	59
HEXACHLOROBENZENE	34	44	32	49	44		5	0	59	59
ANTHRACENE	NU	NU	NU	NU	10		0	0	59	59
PYRENE	74	140	65	180	130	S	3	0	59	59
BUTYL BENZYL PHTHALATE	38	63	35	67	18	X	9	0	59	59
BENZO(A)PYRENE	25	43	22	52	44	S	5	0	59	59
TCL PESTICIDES										
ALPHA-BHC	0.16	0.22	0.16	0.23	0.16		10	1	58	59
BETA-BHC	0.16	0.24	0.14	0.26	0.19		4	4	55	59
GAMMA-BHC (LINDANE)	0.15	0.22	0.14	0.23	0.16		6	0	59	59
HEPTACHLOR	0.29	0.43	0.27	0.45	0.32		8	1	58	59
ALDRIN	0.12	0.2	0.11	0.21	0.17		5	0	59	59
HEPTACHLOR EPOXIDE	0.31	0.43	0.29	0.44	0.4		7	1	58	59
ENDOSULFAN I	0.21	0.38	0.19	0.48	0.24		4	1	58	59
ENDOSULFAN II	0.43	0.7	0.39	0.84	0.46		2	1	58	59
ENDOSULFAN SULFATE	0.92	1.3	0.74	1.4	1.1		4	1	58	59
4,4'-DDT	0.95	1.5	0.87	1.8	0.91	S	6	0	59	59
ENDRIN KETONE	0.68	1.1	0.62	1.1	0.79		6	1	58	59
NON-TCL VOLATILE										
EPICHLORONYDRIN					0	NR		59	0	59

REGION 4
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QS 1 FY 93

LABORATORY: Martin Marietta ORNDP (TN)
PERFORMANCE: ACCEPTABLE - Response Explaining Deficiency(ies) Required
RANK: Above = 10 Same = 1 Below = 5

% SCORE: 79.9
REPORT DATE: 12/24/9
MATRIX: WATER

COMPOUND	TOLERANCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY DATA CONC	Q	FLAGS MIS-RNT	PROGRAM DATA FLAGS NOT-ID	FLAGS ID-CPD	TOTAL FLAGS
PROPANE,1,2-DIBROMO-3-CHLORO-					37			23	36	59
TOLUENE,2-CHLORO-					310			7	52	59
NON-TCL SEMIVOLATILE										
4,4'-DDT					0	A		15	44	59
TCL VOLATILE (Contaminants)										
METHYLENE CHLORIDE					2			38	21	59
TRICHLOROETHENE					3			28	31	59
TCL SEMIVOLATILE (Contaminants)										
BENZYL ALCOHOL					8			57	2	59
NON-TCL VOLATILE (Contaminants)										
2-PROPANOL					160			23	36	59
NON-TCL SEMIVOLATILE (Contaminants)										
P,P'-DDD					39			57	2	59

OF TCL COMPOUNDS NOT-IDENTIFIED: 1
OF TCL COMPOUNDS MIS-QUANTIFIED: 3
OF TCL CONTAMINANTS: 0

OF NON-TCL COMPOUNDS NOT-IDENTIFIED: 1
OF NON-TCL CONTAMINANTS: 0

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: Weston Lionville

PE Sample	Number Acceptable	Number Analyzed	% Acceptable
WP-030			
Metal	45	48	93.8
Inorganic	39	42	92.8
Organic	53	54	98.1
WS-032			
Metal	20	21	95.2
Inorganic	41	42	97.6
Organic	54	54	100.0

WESTON
MANAGERS DESIGNERS/CONSULTANTS
208 WELSH POOL ROAD
PICKERING CREEK INDUSTRIAL PARK
LIONVILLE, PA 19341-1313
PHONE: (215) 524-7360
TELEX: 83-5348

12 August 1993

Subject: WP030 Water Pollution PE Study

Enclosed are the results for WESTON'S participation in the above referenced PE Study and our responses (in the form of in-house memos) to any outliers.

Should you have any questions regarding this information, please do not hesitate to contact me.

Very truly yours,

ROY F. WESTON, INC.

Mary A. Jefferson, for

Keith Ryan
QA Section Manager

/maj
Enclosures

Inter-Office Memorandum

WESTON MANAGERS DESIGNERS/CONSULTANTS

TO: Kirk Cromer, Ray Siery, Nicki Perrone, Dina Osei-Mensah, Gail Lage, Sue Yates, Mary Reichner, Denise Skryzat, Corey Schnell, Amy Swisher

cc: Ray Frederici, Peter Hershey, Keith Ryan, Dianne Therry

FROM: Mary Jefferson

DATE: 19 July 1993

PROJECT:

W.O. NO.: WQAC-0WP-003-9300

SUBJECT: Performance Evaluation Results for WP030
RFW # 9303L842 (Inorg) & 9303L841 (Org)

ACTION: Congratulations to the **GC VOA & PEST** groups for perfect scores for the above referenced proficiency study. Overall score for all service groups was 137/144 = 95% of reported results acceptable. In summary:

Metals:	45/48 = 94% Hg (Level 1 & 2) Be (Level 1)
Inorganics:	39/42 = 93% Orthophosphate (Level 2) Total Phosphorus (Level 2) Non-Filterable Residue (Level 2)
PCB:	3/4 = 75%
PESTS:	16/16 = 100%
GC VOA:	34/34 = 100%

Please submit a corrective action response which should address the following criteria to Mary Jefferson, with a copy to Keith Ryan by 6 August 1993:

- investigation of the root cause analysis of the problem, including a summary of resultant symptoms for each root cause,
- corrective action implementation and/or plan to correct the problem, and
- performance testing planned or completed to verify effectiveness of actions.
- If applicable, assess the impact that these deficiencies have on the validity and defensibility of data collected concurrent to the duration of the unresolved deficiency.

PERFORMANCE EVALUATION REPORT DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

ROY F. WESTON, INC.
2155247360 / LIONVILLE, PA / JDB

LABORATORY: PA023

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
ALUMINUM	1	1168	1100	898- 1300	949- 1250	ACCEPTABLE
	2	4208	4000	3370- 4570	3520- 4410	ACCEPTABLE
ARSENIC	1	259	280	225- 334	238- 320	ACCEPTABLE
BERYLLIUM	1	91.5	63.0	51.1- 74.5	54.1- 71.5	NOT ACCEPTABLE
CADMIUM	1	9.35	8.12	6.30- 10.3	6.80- 9.79	ACCEPTABLE
	2	103	93.9	78.3- 110	82.2- 106	ACCEPTABLE
COBALT	1	507	480	416- 536	431- 521	ACCEPTABLE
	2	254	240	206- 275	214- 266	ACCEPTABLE
CHROMIUM	1	68.5	62.0	49.2- 73.7	52.3- 70.6	ACCEPTABLE
	2	485	460	378- 533	397- 514	ACCEPTABLE
COPPER	1	64.6	62.0	53.5- 69.8	55.6- 67.8	ACCEPTABLE
	2	429	410	365- 462	377- 450	ACCEPTABLE
IRON	1	3974	3800	3350- 4230	3460- 4120	ACCEPTABLE
	2	910	860	755- 963	781- 937	ACCEPTABLE
MERCURY	1	1.70	0.983	0.620- 1.42	0.719- 1.32	NOT ACCEPTABLE
	2	3.00	2.10	1.57- 2.75	1.72- 2.61	NOT ACCEPTABLE
MANGANESE	1	2294	2200	1950- 2450	2010- 2380	ACCEPTABLE
	2	231	221	196- 244	202- 238	ACCEPTABLE
NICKEL	1	142	130	111- 150	116- 145	ACCEPTABLE
	2	1390	1300	1160- 1450	1200- 1420	ACCEPTABLE
LEAD	1	79.2	79.2	62.7- 97.1	67.0- 92.8	ACCEPTABLE
	2	422	450	393- 513	408- 498	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: PA023

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	15.0	23.0	14.3- 29.1	16.1- 27.3	CHECK FOR ERROR
	2	53.5	78.1	52.8- 94.6	58.1- 89.3	CHECK FOR ERROR
VANADIUM	1	8468	8000	7110- 8830	7330- 8610	ACCEPTABLE
	2	16045	15000	12700-17400	13300-16800	ACCEPTABLE
ZINC	1	1179	1100	961- 1220	993- 1190	ACCEPTABLE
	2	263	240	209- 271	216- 263	ACCEPTABLE
ANTIMONY	3	107	116	79.4- 140	87.2- 133	ACCEPTABLE
	4	16.6	14.0	7.01- 20.4	8.73- 18.7	ACCEPTABLE
SILVER	3	2.90	2.39	1.80- 2.96	1.95- 2.82	CHECK FOR ERROR
	4	10.5	9.75	7.80- 11.5	8.25- 11.0	ACCEPTABLE
THALLIUM	3	81.6	90.2	70.7- 108	75.5- 103	ACCEPTABLE
	4	8.2	9.00	6.71- 11.3	7.29- 10.7	ACCEPTABLE
MOLYBDENUM	3	6.19	6.48	3.34- 8.82	4.04- 8.12	ACCEPTABLE
	4	42.5	39.0	30.3- 47.9	32.6- 45.6	ACCEPTABLE
STRONTIUM	3	3.91	4.01	3.01- 4.99	3.26- 4.73	ACCEPTABLE
	4	53.2	51.0	41.4- 60.1	43.8- 57.7	ACCEPTABLE
TITANIUM	3	65.8	66.0	51.5- 76.5	54.7- 73.3	ACCEPTABLE
	4	183	182	149- 205	156- 198	ACCEPTABLE
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH-UNITS	3	8.64	8.70	8.31- 9.05	8.40- 8.96	ACCEPTABLE
	4	6.17	6.10	5.96- 6.22	5.99- 6.19	ACCEPTABLE
SPEC. COND.	1	263	253	226- 274	232- 268	ACCEPTABLE
(UMHOS/CM AT 25 C)	2	889	868	819- 916	831- 904	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: PA023

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
TDS AT 180 C	1	131	116	76.2- 166	87.5- 155	ACCEPTABLE
	2	514	480	385- 617	414- 588	ACCEPTABLE
TOTAL HARDNESS (AS CACO3)	1	73.5	75.6	66.7- 84.1	68.8- 82.0	ACCEPTABLE
	2	224	225	209- 242	213- 238	ACCEPTABLE
CALCIUM	1	4.09	3.69	3.00- 4.47	3.18- 4.29	ACCEPTABLE
	2	87.6	80.9	73.4- 90.2	75.5- 88.1	ACCEPTABLE
MAGNESIUM	1	17.4	16.1	14.0- 18.1	14.5- 17.6	ACCEPTABLE
	2	6.00	5.64	4.84- 6.32	5.03- 6.13	ACCEPTABLE
SODIUM	1	17.1	15.9	14.0- 17.9	14.5- 17.4	ACCEPTABLE
	2	70.1	65.6	59.6- 72.0	61.2- 70.4	ACCEPTABLE
POTASSIUM	1	2.71	2.60	2.05- 3.22	2.19- 3.08	ACCEPTABLE
	2	19.9	19.0	16.2- 21.9	16.9- 21.1	ACCEPTABLE
TOTAL ALKALINITY (AS CACO3)	1	24.0	21.1	17.2- 26.1	18.3- 25.0	ACCEPTABLE
	2	96.0	97.0	85.0- 109	88.0- 106	ACCEPTABLE
CHLORIDE	1	52.4	54.3	48.2- 59.1	49.6- 57.8	ACCEPTABLE
	2	169	178	166- 191	170- 188	CHECK FOR ERROR
FLUORIDE	1	2.38	2.40	2.09- 2.65	2.16- 2.58	ACCEPTABLE
	2	0.224	0.230	0.175-0.286	0.189-0.272	ACCEPTABLE
SULFATE	1	9.52	9.10	6.48- 11.4	7.10- 10.8	ACCEPTABLE
	2	44.2	42.0	35.2- 48.1	36.8- 46.5	ACCEPTABLE
NUTRIENTS IN MILLIGRAMS PER LITER:						
AMMONIA-NITROGEN	1	5.55	5.50	4.35- 6.65	4.62- 6.37	ACCEPTABLE
	2	9.83	9.80	7.80- 11.6	8.25- 11.2	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: PA023

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
NUTRIENTS IN MILLIGRAMS PER LITER:						
NITRATE-NITROGEN	1	35.3	34.0	27.5- 40.2	29.0- 38.7	ACCEPTABLE
	2	7.61	7.10	5.70- 8.43	6.03- 8.10	ACCEPTABLE
ORTHOPHOSPHATE	1	0.941	0.830	0.692-0.961	0.724-0.929	CHECK FOR ERROR
	2	0.125	0.090	.0617-0.122	.0689-0.115	NOT ACCEPTABLE
KJELDAHL-NITROGEN	3	9.71	9.30	6.67- 11.5	7.26- 10.9	ACCEPTABLE
	4	19.2	19.0	13.9- 23.1	15.0- 22.0	ACCEPTABLE
TOTAL PHOSPHORUS	3	3.55	3.20	2.35- 3.57	2.49- 3.42	CHECK FOR ERROR
	4	2.01	1.60	1.25- 1.94	1.33- 1.86	NOT ACCEPTABLE
DEMANDS IN MILLIGRAMS PER LITER:						
COD	1	21.5	21.8	12.6- 30.5	14.9- 28.2	ACCEPTABLE
	2	34.0	35.4	23.6- 43.0	26.0- 40.5	ACCEPTABLE
TOC	1	8.16	8.61	7.22- 10.2	7.61- 9.80	ACCEPTABLE
	2	13.5	14.0	11.9- 16.3	12.5- 15.7	ACCEPTABLE
5-DAY BOD	1	11.0	14.0	7.36- 20.7	9.03- 19.0	ACCEPTABLE
	2	18.0	21.8	11.8- 31.9	14.3- 29.4	ACCEPTABLE
PCB'S IN MICROGRAMS PER LITER:						
PCB-AROCLOR 1016/1242	1	0.64		D.L.- D.L.	D.L.- D.L.	NOT ACCEPTABLE
	2	3.11	4.29	1.86- 5.71	2.35- 5.22	ACCEPTABLE
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
PCB IN OIL- 1016/1242	1	16.0	21.5	5.04- 27.6	7.92- 24.7	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
D.L. STANDS FOR DETECTION LIMIT

PERFORMANCE EVALUATION REPORT DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: PA023

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
PCB IN OIL- 1260	2	31.4	36.6	7.82- 57.8	14.2- 51.4	ACCEPTABLE
PESTICIDES IN MICROGRAMS PER LITER:						
CHLORDANE	3	0.88	0.964	0.469- 1.32	0.575- 1.21	ACCEPTABLE
	4	8.44	9.48	5.38- 12.4	6.26- 11.5	ACCEPTABLE
ALDRIN	1	0.14	0.159	.0344-0.214	.0572-0.191	ACCEPTABLE
	2	0.38	0.444	.0957-0.577	0.156-0.517	ACCEPTABLE
DIELDRIN	1	0.12	0.121	.0572-0.163	.0704-0.150	ACCEPTABLE
	2	0.48	0.553	0.270-0.750	0.330-0.690	ACCEPTABLE
DDD	1	0.22	0.216	.0863-0.317	0.115-0.288	ACCEPTABLE
	2	0.55	0.626	0.334-0.865	0.400-0.799	ACCEPTABLE
DDE	1	0.15	0.131	.0562-0.171	.0706-0.157	ACCEPTABLE
	2	0.45	0.495	0.228-0.699	0.288-0.639	ACCEPTABLE
DDT	1	0.18	0.186	.0628-0.284	.0905-0.257	ACCEPTABLE
	2	0.57	0.576	0.252-0.844	0.326-0.770	ACCEPTABLE
HEPTACHLOR	1	0.15	0.157	.0488-0.221	.0706-0.199	ACCEPTABLE
	2	0.48	0.514	0.180-0.715	0.247-0.648	ACCEPTABLE
HEPTACHLOR EPOXIDE	1	0.09	0.087	.0427-0.120	.0526-0.110	ACCEPTABLE
	2	0.33	0.375	0.189-0.513	0.229-0.473	ACCEPTABLE
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
1,2 DICHLOROETHANE	1	52.3	48.6	34.5- 62.8	38.0- 59.2	ACCEPTABLE
	2	9.87	10.2	7.28- 13.8	8.11- 12.9	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: PA023

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
CHLOROFORM	1	46.6	45.7	31.6- 59.5	35.1- 56.0	ACCEPTABLE
	2	11.6	13.8	9.42- 18.0	10.5- 16.9	ACCEPTABLE
1,1,1 TRICHLOROETHANE	1	53.2	52.0	32.3- 67.9	36.8- 63.4	ACCEPTABLE
	2	7.12	9.34	5.56- 12.6	6.46- 11.7	ACCEPTABLE
TRICHLOROETHENE	1	35.2	38.8	26.8- 49.1	29.6- 46.2	ACCEPTABLE
	2	8.53	9.91	6.52- 13.0	7.34- 12.2	ACCEPTABLE
CARBONTETRACHLORIDE	1	53.8	46.3	29.8- 63.7	34.1- 59.4	ACCEPTABLE
	2	13.6	13.5	8.93- 18.2	10.1- 17.0	ACCEPTABLE
TETRACHLOROETHENE	1	53.5	57.2	39.7- 71.9	43.8- 67.8	ACCEPTABLE
	2	14.2	16.2	10.9- 21.1	12.2- 19.8	ACCEPTABLE
BROMODICHLOROMETHANE	1	51.0	49.5	34.2- 64.3	38.0- 60.5	ACCEPTABLE
	2	7.08	7.75	4.88- 10.6	5.59- 9.86	ACCEPTABLE
DIBROMOCHLOROMETHANE	1	38.2	42.2	30.0- 54.4	33.1- 51.3	ACCEPTABLE
	2	14.3	16.4	10.9- 21.5	12.2- 20.2	ACCEPTABLE
BROMOFORM	1	53.6	53.7	33.5- 73.7	38.6- 68.6	ACCEPTABLE
	2	10.0	11.9	6.48- 17.1	7.83- 15.7	ACCEPTABLE
METHYLENE CHLORIDE	1	41.9	37.3	24.1- 53.2	27.7- 49.6	ACCEPTABLE
	2	8.50	8.77	4.21- 13.5	5.39- 12.3	ACCEPTABLE
CHLOROBENZENE	1	40.5	43.2	30.8- 55.0	33.9- 51.9	ACCEPTABLE
	2	11.7	12.9	8.99- 16.7	9.97- 15.7	ACCEPTABLE
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
BENZENE	1	9.45	10.3	7.34- 13.4	8.11- 12.6	ACCEPTABLE
	2	46.6	54.1	37.7- 70.8	41.9- 66.6	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

ROY F. WESTON, INC.
2155247360 / LIONVILLE, PA / JDB

LABORATORY: PA023

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
ETHYLBENZENE	1	11.2	11.3	7.71- 14.7	8.60- 13.8	ACCEPTABLE
	2	49.9	52.4	36.2- 68.5	40.3- 64.4	ACCEPTABLE
TOLUENE	1	12.3	13.9	9.86- 17.7	10.9- 16.7	ACCEPTABLE
	2	30.5	33.9	24.0- 43.1	26.4- 40.7	ACCEPTABLE
1,2-DICHLOROBENZENE	1	10.2	12.1	8.47- 15.4	9.37- 14.5	ACCEPTABLE
	2	45.2	52.0	36.1- 66.4	40.0- 62.5	ACCEPTABLE
1,3-DICHLOROBENZENE	1	8.39	9.43	6.17- 12.1	6.92- 11.4	ACCEPTABLE
	2	43.5	47.8	33.6- 61.2	37.2- 57.6	ACCEPTABLE
1,4-DICHLOROBENZENE	1	10.4	11.7	7.95- 15.2	8.86- 14.2	ACCEPTABLE
	2	53.2	58.1	39.1- 76.5	43.9- 71.7	ACCEPTABLE
MISCELLANEOUS PARAMETERS:						
TOTAL CYANIDE	1	0.249	0.250	0.138-0.341	0.164-0.316	ACCEPTABLE
(IN MG/L)	2	0.123	0.130	.0821-0.169	.0932-0.158	ACCEPTABLE
NON-FILTERABLE RESIDUE	1	44.3	43.2	34.7- 45.2	36.0- 43.9	CHECK FOR ERROR
(IN MG/L)	2	35.3	33.0	24.0- 34.6	25.3- 33.2	NOT ACCEPTABLE
OIL AND GREASE	1	16.0	15.0	8.13- 19.4	9.56- 18.0	ACCEPTABLE
(IN MG/L)	2	23.1	23.0	14.1- 28.1	15.9- 26.3	ACCEPTABLE
TOTAL PHENOLICS	1	0.031	.0271	.0093-.0449	.0139-.0403	ACCEPTABLE
(IN MG/L)	2	0.364	0.291	0.125-0.457	0.167-0.414	ACCEPTABLE
TOTAL RESIDUAL CHLORINE	1	0.675	0.729	0.469-0.912	0.528-0.853	ACCEPTABLE
(IN MG/L)	2	0.175	0.240	.0866-0.280	0.112-0.254	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

Inter-Office Memorandum

WESTON
MANAGERS DESIGNERS/CONSULTANTS

TO: Mary Jefferson

cc: Peter Hershey
Keith Ryan
Denise Skrzat

FROM: Kirk Cromer KC 8/12/93

DATE: 12 August 1993

PROJECT:

W.O. NO.:

SUBJECT: WP030 Results Response

ACTION:

On review of our results for PCB in water vial 1 sample, it became apparent that the analyst misidentified the Aroclor present in this sample. It was initially identified and reported as Aroclor 1242 (1016/1242), but my investigation into the reason we missed this result showed that it should have been identified as Aroclor 1232. When quantitated against the Aroclor 1232 standard which was analyzed as part of the same analytical sequence as the sample, the value as Aroclor 1232 is 1.44 ug/L.

The only distinguishing characteristic between Aroclor 1232 and 1242 is the relative concentrations of the first few peaks that elute in these two Aroclor patterns. The analyst and reviewer both missed this distinction in this sample, primarily because it was at a relatively low concentration. Our corrective action for this problem is continuation of our training of all analysts in Aroclor pattern recognition and to strengthen our procedure of reviewing each sample containing an Aroclor against the suspected Aroclor and all similar Aroclors on a direct one-to-one basis.

Given the nearly identical nature of Aroclor 1232 and 1242, a misidentification such as this would have little or no impact on any results we may have reported to our clients.

Inter-Office Memorandum

WESTON
MANAGERS DESIGNERS/CONSULTANTS

TO: Mary Jefferson
cc: Dianne Therry
Mary Reichner
Nicki Perrone
Peter Hershey

FROM: Ray Siery

DATE: August 11, 1993

PROJECT: WP030

W.O. NO.: WQAC-OWP-003-9300

SUBJECT: Inorganics Corrective Action Responses for RFW# 9303L842

ACTION:

Mercury (Level 1 & 2)

Assessment: Level 1 & 2 mercurys were reported at concentrations above the upper acceptance limit.

Root Cause: Based on review of the mercury data, Level 1 mercury sample was quantified following 3 laboratory control standards (LCS) at a concentration of 5 ug/L and it is suspected that auto-sampler carry-over contaminated this analysis. Level 2 was a transcription error. The value that should have been reported is 2.12 which is within acceptance limits.

Corrective Action: For Level 1, the analyst will be trained in setting adequate rinse times on the mercury analyzer for high samples before sample analysis is conducted and running blanks after LCS. For Level 2, additional review by the unit leader will be performed to ensure transcription errors are eliminated by checking electronic file to raw data.

Responsible Person(s): Mary Reichner/Jeff Welsh

Beryllium (Level 1)

Assessment: Beryllium in Level 1 was reported at a concentration above the upper acceptance limits.

Responsible Person(s): Nicki Perrone/Mike LeClerc

Total Phosphorus (Level 4)

Assessment: Total phosphorus in Level 4 was reported at a concentration above the upper acceptance limit.

Root Cause: It was determined in the review of phosphorus data that the likely source of the high value is contamination. All QC measures were within guidance limits. No other problem could be derived from the analysis log.

Corrective Action: The wet chemistry analyst was retrained on glassware segregation and cleaning procedures for phosphate analysis. A QA method audit will be conducted on analyst technique to ensure compliance with the standard operation procedure. Also, a blind QC sample will be submitted as a check on control attainment.

Responsible Person(s): Nicki Perrone/Mike LeCLerc

Non-Filterable Residue (Level 2)

Assessment: Non-filterable residue in Level 2 was reported at a concentration above the upper acceptance limit.

Root Cause: Based on review of associated QC measures the lab suspects that residue weights are subject to high bias during the course of handling. Sample residue weights on replicates range from 3.4 to 3.7 mg using 100 mL aliquots. Based on the filter diameter the lab should collect at least 2.0 mg of residue, however, the weights obtained from the sample are very close to the minimum.

Corrective Action: The lab will use 200 mL aliquots to increase the residue weights and thereby reduce bias.

Responsible Person(s): Nicki Perrone/Judy Henderson

Assessment: Beryllium in Level 1 was reported at a concentration above the upper acceptance limits.

Root Cause: Although an interelement correction (IEC) factor was applied on Be for V, it is suspected that an incorrect IEC factor was utilized. An analysis iteration of the PE sample was performed without an IEC and the result was 102. Another iteration with the IEC was determined at the reported value of 91.5 ug/L. There is negligible difference between the two values indicating that interelement correction had not occurred Vanadium (V) was detected in the PE sample at 8643 ug/L. An IEC study in this laboratory shows that V at 100 ppm produces an apparent Be concentration of 0.5 ppm. The calculation for sample correction is as follows: 8643 ug V/L x 0.005 Be/V = 43.22 ug Be/L. Using the uncorrected Be value less the apparent concentration due to vanadium equals 58.8 ug Be/L. The corrected value is within acceptance limits.

Corrective Action: The metals lab will keep hard copy file of ICP analysis method programs to include IEC factors. This will allow a review of actual factors used in the program.

Responsible Person(s): Mary Reichner/ICP Operators

Ortho-Phosphate (Level 2)

Assessment: O-phosphate in Level 2 was reported at a concentration above the upper acceptance limit.

Root Cause: It was determined in the review of o-phosphate data that the likely source of the high value is contamination. All QC measures were within guidance limits. No other problem could be derived from the analysis log.

Corrective Action: The wet chemistry analyst was retrained on glassware segregation and cleaning procedures for phosphate analysis. A QA method audit was conducted on June 29, 1993 on analyst technique to ensure compliance with the standard operation procedure. Also, a blind QC sample will be submitted as a check on control attainment.

WESTON®
MANAGERS DESIGNERS/CONSULTANTS
208 WELSH POOL ROAD
PICKERING CREEK INDUSTRIAL PARK
LIONVILLE, PA 19341-1313
PHONE: (215) 524-7360
TELEX: 83-5348

30 September 1993

Subject: WS032 Water Supply PE Study

Dear Sir/Madame:

Enclosed are the results for WESTON'S participation in the above referenced PE Study and our responses (in the form of in-house memos) to any outliers.

Should you have any questions regarding this information, please do not hesitate to contact me.

Very truly yours,

ROY F. WESTON, INC.

Keith Ryan

Keith Ryan
QA Section Manager

/maj
Enclosures

Inter-Office Memorandum

WESTON MANAGERS DESIGNERS/CONSULTANTS

TO: Ray Siery, Kirk Cromer, Mary Reichner, Maureen Doughty, Amy Swisher, Nicki Perrone, Susan Yates, Denise Skrzat, Joe Loeper, Keith Ryan

cc: Peter Hershey, Lisa DeLong, Dianne Therry, Pat Feldman, Debbie Racioppi

FROM: Mary Jefferson

DATE: 7 September 1993

PROJECT: PES-WS032

W.O. NO.: WQAC-0WS-004-9300

SUBJECT: Water Supply PE Study
RFW # 9304L265 - Inorganics & 9304L266 - Organics

ACTION:

Attached are the results for the above referenced Water Supply PE Study. Congratulations to the Inorganics, PCB and Herb groups for perfect scores. Overall score for all service groups was 83/87 = 95% of reported results acceptable. In summary:

Metals:	20/21 = 95% Be (high)
GC VOA:	30/31 = 97% 1,1,1-Trichloroethane (low)
Inorganics:	11/11 = 100%
Pests:	14/16 = 88% Hexachlorobenzene (high) Trifluralin (high)
PCB:	1/1 = 100%
Herbs:	7/7 = 100%

Please submit a corrective action response which should address the following criteria to Mary Jefferson and Keith Ryan by **24 September 1993**.

- investigation of the root cause analysis of the problem, including a summary of resultant symptoms for each root cause,
- corrective action implementation and/or plan to correct the problem, and

- performance testing planned or completed to verify effectiveness of actions.
- If applicable, assess the impact that these deficiencies have on the validity and defensibility of data collected concurrent to the duration of the unresolved deficiency.

JT

PERFORMANCE EVALUATION REPORT DATE: 8/10/93

WATER SUPPLY STUDY NUMBER WS032

ROY F. WESTON, INC.
2155247360 / LIONVILLE, PA / JDB

LABORATORY PA023

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
ALUMINUM	1	328	309	274- 335	ACCEPTABLE
ANTIMONY	2	4.6	5.58	3.34- 7.41	ACCEPTABLE
ARSENIC	1	86.0	91.4	76.5- 103	ACCEPTABLE
BARIUM	2	515	511	434- 588	ACCEPTABLE
BERYLLIUM	1	1.89	0.933	0.699- 1.17	NOT ACCEPTABLE
BORON	2	874 **	864	810- 1010	ACCEPTABLE
CADMIUM	1	4.97	4.80	3.84- 5.76	ACCEPTABLE
CHROMIUM	1	67.6	68.1	57.9- 78.3	ACCEPTABLE
COPPER	1	835	820	738- 902	ACCEPTABLE
LEAD	1	5.50	5.16	3.61- 6.71	ACCEPTABLE
MANGANESE	1	231	221	203- 234	ACCEPTABLE
MERCURY	1	6.37	6.23	4.36- 8.10	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT BIAS IS ANTICIPATED FOR THIS RESULT.

PERFORMANCE EVALUATION REPORT DATE: 9/10/93

WATER SUPPLY STUDY NUMBER WS032

LABORATORY PA023

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
MOLYBDENUM	2	6.05	6.58	4.80- 8.58	ACCEPTABLE
NICKEL	1	98.1	95.2	80.9- 109	ACCEPTABLE
SELENIUM	1	64.5	65.9	52.7- 79.1	ACCEPTABLE
SILVER	2	27.4	25.1	21.2- 29.4	ACCEPTABLE
THALLIUM	2	02.0	2.56	1.79- 3.33	ACCEPTABLE
VANADIUM	1	163	160	143- 174	ACCEPTABLE
ZINC	1	86.8	83.8	73.7- 91.1	ACCEPTABLE
NITRATE/NITRITE/FLUORIDE IN MILLIGRAMS PER LITER:					
NITRATE AS N	1	3.38	3.60	3.24- 3.96	ACCEPTABLE
NITRITE AS N	1	2.15	2.30	1.95- 2.64	ACCEPTABLE
FLUORIDE	1	2.01	2.00	1.80- 2.20	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 3/10/93

WATER SUPPLY STUDY NUMBER WS032

LABORATORY PA023

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
INSECTICIDES IN MICROGRAMS PER LITER:					
ALACHLOR	5	2.460	2.33	1.28- 3.38	ACCEPTABLE
ATRAZINE	5	8.300	7.20	3.96- 10.4	ACCEPTABLE
BROMACIL	6	13.00	13.6	0.741- 23.0	ACCEPTABLE
CHLORDANE (TOTAL)	3	4.42	5.33	2.93- 7.73	ACCEPTABLE
HEPTACHLOR	4	0.39	0.443	0.244-0.642	ACCEPTABLE
HEPTACHLOR EPOXIDE	4	0.35	0.346	0.190-0.502	ACCEPTABLE
HEXACHLOROBENZENE	4	1.19	0.857	0.390- 1.17	NOT ACCEPTABLE
HEXACHLOROCYCLOPENTADIEN	4	0.84	** 0.823	.0847- 1.18	ACCEPTABLE
LINDANE	1	0.19	0.214	0.118-0.310	ACCEPTABLE
METHOXYCHLOR	1	16.5	17.4	9.57- 25.2	ACCEPTABLE
METOLACHLOR	6	11.70	11.8	5.83- 17.0	ACCEPTABLE
METRIBUZIN	6	5.320	4.73	0.938- 7.42	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT BIAS IS ANTICIPATED FOR THIS RESULT.

PERFORMANCE EVALUATION REPORT DATE: 8/10/93

WATER SUPPLY STUDY NUMBER WS032

LABORATORY PA023

ANALYTES	SAMPLE NUMBER	REPORTED VALUE		TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
INSECTICIDES IN MICROGRAMS PER LITER:						
PROMETON	6	9.480	**	8.53	1.30- 12.9	ACCEPTABLE
SIMAZINE	5	4.680		4.43	0.682- 8.54	ACCEPTABLE
TOXAPHENE	2	3.01		3.71	2.04- 5.38	ACCEPTABLE
TRIFLURALIN	4	1.08	**	0.771	0.300- 1.02	NOT ACCEPTABLE
HERBICIDES IN MICROGRAMS PER LITER:						
2,4-D	1	17.0		18.6	9.30- 27.9	ACCEPTABLE
2,4,5-TP (SILVEX)	1	7.85		8.31	4.16- 12.5	ACCEPTABLE
DALAPON	2	4.62	**	12.5	D.L.- 20.8	ACCEPTABLE
DICAMBA	2	4.53		4.73	2.28- 7.05	ACCEPTABLE
DINOSEB	2	5.38	**	6.52	D.L.- 9.19	ACCEPTABLE
PENTACHLOROPHENOL	1	6.92		10.7	5.35- 16.0	ACCEPTABLE
PICLORAM	2	10.6		10.6	D.L.- 20.0	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT BIAS IS ANTICIPATED FOR THIS RESULT.
D.L. STANDS FOR DETECTION LIMIT

PERFORMANCE EVALUATION REPORT DATE: 9/10/93

WATER SUPPLY STUDY NUMBER WS032

LABORATORY PA023

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
POLYCHLORINATED BIPHENYLS IN MICROGRAMS PER LITER:					
DECACHLOROBIPHENYL	1	0.888	0.959	D.L.- 1.92	ACCEPTABLE
TRIHALOMETHANES IN MICROGRAMS PER LITER:					
BROMODICHLOROMETHANE	1	22.9	22.4	17.9- 26.9	ACCEPTABLE
BROMOFORM	1	23.0	26.4	21.1- 31.7	ACCEPTABLE
CHLORODIBROMOMETHANE	1	15.4	17.9	14.3- 21.5	ACCEPTABLE
CHLOROFORM	1	17.2	17.1	13.7- 20.5	ACCEPTABLE
TOTAL TRIHALOMETHANE	1	78.50	83.8	67.0- 101	ACCEPTABLE
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:					
BENZENE	1	16.1	16.5	13.2- 19.8	ACCEPTABLE
CARBON TETRACHLORIDE	1	13.9	14.5	11.6- 17.4	ACCEPTABLE
CHLOROBENZENE	2	12.5	13.5	10.8- 16.2	ACCEPTABLE
1,2 DICHLOROBENZENE	2	12.5	13.5	10.8- 16.2	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
D.L. STANDS FOR DETECTION LIMIT

PERFORMANCE EVALUATION REPORT DATE: 8/10/93

WATER SUPPLY STUDY NUMBER WS032

LABORATORY PA023

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:					
1,4-DICHLOROBENZENE	1	12.4	13.6	10.9- 16.3	ACCEPTABLE
1,2-DICHLOROETHANE	1	12.1	13.3	10.6- 16.0	ACCEPTABLE
1,1-DICHLOROETHYLENE	1	8.74	9.13	5.48- 12.8	ACCEPTABLE
C 1,2 DICHLOROETHYLENE	2	12.8	12.3	9.84- 14.8	ACCEPTABLE
T 1,2 DICHLOROETHYLENE	2	16.0	16.9	13.5- 20.3	ACCEPTABLE
1,2 DICHLOROPROPANE	2	6.50	6.46	3.88- 9.04	ACCEPTABLE
ETHYLBENZENE	2	10.7	11.8	9.44- 14.2	ACCEPTABLE
STYRENE	2	7.98	8.66	5.20- 12.1	ACCEPTABLE
TETRACHLOROETHYLENE	2	6.32	7.43	4.46- 10.4	ACCEPTABLE
TOLUENE	2	6.21	6.54	3.92- 9.16	ACCEPTABLE
1,1,1-TRICHLOROETHANE	1	7.60	10.1	8.09- 12.1	NOT ACCEPTABLE
TRICHLOROETHYLENE	1	9.34	11.2	8.96- 13.4	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 8/10/93

WATER SUPPLY STUDY NUMBER WS032

LABORATORY PA023

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:					
VINYL CHLORIDE	1	2.45	2.57	1.54- 3.60	ACCEPTABLE
TOTAL XYLENES	2	8.14	7.54	4.52- 10.6	ACCEPTABLE
BROMOMETHANE	3	12.9	16.0	7.98- 22.3	ACCEPTABLE
1,2DIBROMO3CHLOROPROPANE	4	1.08	1.78	1.07- 2.49	ACCEPTABLE
DICHLOROMETHANE	3	6.94	7.77	5.45- 10.2	ACCEPTABLE
ETHYLENE DIBROMIDE (EDB)	4	2.03	2.29	1.37- 3.21	ACCEPTABLE
HEXACHLOROBUTADIENE	3	17.6	19.3	14.1- 23.9	ACCEPTABLE
1,2,4-TRICHLOROBENZENE	3	12.1	14.1	9.90- 17.1	ACCEPTABLE
1,1,2-TRICHLOROETHANE	3	11.5	13.2	9.58- 15.7	ACCEPTABLE
1,2,3-TRICHLOROPROPANE	3	7.45	9.85	5.96- 12.4	ACCEPTABLE
MISCELLANEOUS ANALYTES:					
RESIDUAL FREE CHLORINE (MILLIGRAMS PER LITER)	1	1.03 **	1.09	0.805- 1.21	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT BIAS IS ANTICIPATED FOR THIS RESULT.

PERFORMANCE EVALUATION REPORT DATE: 9/10/93

WATER SUPPLY STUDY NUMBER WS032

LABORATORY PA023

ANALYTES	SAMPLE NUMBER	REPORTED VALUE		TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
MISCELLANEOUS ANALYTES:						
TURBIDITY (NTU'S)	1	4.12	**	4.10	3.76- 4.93	ACCEPTABLE
TOTAL FILTERABLE RESIDUE (MILLIGRAMS PER LITER)	1	455	**	275	201- 463	ACCEPTABLE
CALCIUM (MG. CACO3/L)	1	157		160	149- 172	ACCEPTABLE
PH-UNITS	1	9.00		9.12	8.85- 9.34	ACCEPTABLE
ALKALINITY (MG. CACO3/L)	1	29.3	**	29.0	27.0- 33.6	ACCEPTABLE
CORROSIVITY (LANGELIER IND. AT 20C)	1	0.52		0.846	0.465- 1.13	ACCEPTABLE
SODIUM (MILLIGRAMS PER LITER)	1	14.0		13.3	11.9- 14.8	ACCEPTABLE
SULFATE (MILLIGRAMS PER LITER)	1	28.2		27.0	24.7- 29.4	ACCEPTABLE
TOTAL CYANIDE (MILLIGRAMS PER LITER)	1	0.434		0.400	0.300-0.500	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT BIAS IS ANTICIPATED FOR THIS RESULT.

Inter-Office Memorandum

WESTON
MANAGERS DESIGNERS/CONSULTANTS

TO: Keith Ryan
cc: Mary Jefferson
Mary Reichner

FROM: Ray Siery WMO for RAS

DATE: September 28, 1993

PROJECT: WS032 Water Supply PE Study
RFW # 9304L265

W.O. NO.: WQAC-0WS-004-9300

SUBJECT: Inorganic Corrective Action Responses

ACTION:

Beryllium

Assessment:

Beryllium was reported at a concentration of 1.89 ug/L which is above the true value of 0.933 ug/L and outside the upper acceptance limit of 1.17 ug/L. Beryllium was analyzed on the ICP which has an instrument detection limit (IDL) of 1 ug/L. The true value result and the acceptance range are below the ICP practical quantitation limit (PQL) of 3 ug/L and also below the IDL. A review of the ICP data quality control indicates all measures were within routine acceptance limits.

Root Cause:

The problem is attributed to the quantitation in a region of uncertainty and an omission in the review process.

Corrective Action:

Beryllium at levels below 3 ppb will be quantified on graphite furnace AA. Unit Leader and analysts will be trained to review data for this criterion.

Responsible Person(s):

Ray Siery/Mary Reichner/ICP Operators/GFAA Operators

Inter-Office Memorandum

WESTON
MANAGERS DESIGNERS/CONSULTANTS

TO: Mary Jefferson
Keith Ryan

cc: Peter Hershey

FROM: Kirk Cromer/Denise Skrzat BKC 9/30/93 DS 9-30-93 DATE: 29 September 1993

PROJECT: W.O. NO.:

SUBJECT: WS032 Response

ACTION:

Volatiles

Our reported result for 1,1,1-trichloroethane was slightly below the WS032 acceptance limits. Careful review of the raw data has not revealed any obvious cause for the low reported value. A known check sample run at the same time had acceptable results, although the calculated value was near the low end of the known check samples acceptable range. We are reviewing all procedures, instrumentation and standards (both primary and second source) to ensure there is no bias in any part of our analytical methodology.

Pesticides

Results reported for trifluralin and hexachlorobenzene were slightly higher than the WS032 acceptance limits. The raw data was carefully reviewed for correctness and no notable errors were identified.

Possible reasons for the high reported values may be attributed to the micro-extraction sequence we followed with these PE samples. The standards were prepared on one day, while the samples and associated QC were prepared on the following day. The Blank Spike prepared on the second day had recoveries of approximately 115%, thus there may have been a slight bias introduced due to differences in the extraction conditions between the two days. We will be doing additional method development studies and training on these procedures in the near future.

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: Teledyne

	EMSL-LV Acceptance Range (%)	% of EMSL-LV True Value	% of all Participating Laboratory's Grand Average
January 15, 1993			
Sr-89	66.7 to 133.3	71.1	87.2
Sr-90	50.0 to 150.0	86.7	86.2
January 22, 1993			
Pu-239	82.5 to 117.5	90.0	97.1
January 29, 1993			
Alpha	54.1 to 145.9	51.0 **(LOW)**	101.2
Beta	80.2 to 119.8	118.2	123.8
February 05, 1993			
I-131	90.0 to 110.0	106.7	105.2
February 12, 1993			
Uranium	32.0 to 168.0	98.7	96.8
March 05,1993			
Ra-226	73.5 to 126.5	78.3	78.2
Ra-228	56.8 to 144.9	104.5	108.5
April 20, 1993			
Alpha	56.2 to 143.8	93.3	
Ra-226	74.3 to 125.7	76.3	
Ra-228	74.7 to 125.3	96.5	
Uranium	82.0 to 118.0	109.6	
Beta	73.6 to 126.4	84.7	
Sr-89	78.8 to 122.2	86.2	
Sr-90	70.0 to 130.0	94.2	
Co-60	77.7 to 122.3	104.3	
Cs-134	67.8 to 132.2	87.8	
Cs-137	72.8 to 127.2	107.3	
June 4, 1993			
Tritium	90.0 to 110.0	95.2	

EPA INTERLABORATORY COMPARISON PROGRAM 1993

Collection Date	Media	Nuclide	EPA Result(a)		Teledyne Isotopes Result(b)		
01/15/93	Water	Sr-89	15.0 ±	5.0	12.67 ±	1.15	
		Sr-90	10.0 ±	5.0	8.33 ±	1.15	
01/22/93	Water	Pu-239	20.0 ±	2.0	18.00 ±	1.00	
01/29/93	Water	Gr-Alpha	34.0 ±	9.0	17.33 ±	1.15	(c)
		Gr-Beta	44.0 ±	5.0	52.00 ±	1.00	(d)
02/05/93	Water	I-131	100.0 ±	10.0	106.67 ±	5.77	
02/12/93	Water	U	7.6 ±	3.0	6.93 ±	0.15	
03/05/93	Water	Ra-226	9.8 ±	1.5	7.67 ±	0.12	(e)
		Ra-228	18.5 ±	4.6	19.33 ±	2.31	
04/20/93	Water	Gr-Alpha	95.0 ±	24.0	94.33 ±	1.15	
		Ra-226	24.9 ±	3.7	19.00 ±	1.00	(e)
		Ra-228	19.0 ±	4.8	18.33 ±	0.58	
		U	28.9 ±	3.0	31.67 ±	0.58	
		Gr-Beta	177.0 ±	27.0	150.0 ±	0.00	
		Sr-89	41.0 ±	5.0	35.33 ±	1.53	
		Sr-90	29.0 ±	5.0	27.33 ±	0.58	
		Co-60	39.0 ±	5.0	40.67 ±	3.51	
		Cs-134	27.0 ±	5.0	23.67 ±	1.53	
		Cs-137	32.0 ±	5.0	34.33 ±	2.08	
06/04/93	Water	H-3	9844.0 ±	984.0	9366.67 ±	152.75	

August 26, 1993

EPA INTERLABORATORY COMPARISON PROGRAM 1993

Collection Date	Media	Nuclide	EPA Result(a)	Teledyne Isotopes Result(b)

Footnotes:

(a) EPA Results-Expected laboratory precision (1 sigma). Units are pCi/liter for water and milk except K is in mg/liter. Units are total pCi for air particulate filters.

(b) Teledyne Results - Average ± one sigma. Units are pCi/liter for water and milk except K is in mg/liter. Units are total pCi for air particulate filters.

(c) The EPA switched from Am-241 to Th-230 alpha spike. We calibrated with Th-230, using sodium nitrate to generate a self-absorption curve. The EPA water, however has minerals which have greater self-absorption than the sodium nitrate matrix. The EPA has agreed to send us a gallon of their water which we can use to prepare a self-absorption curve with Th-230.

(d) By oversight, we did not use the special self-absorption curve which we had previously derived using EPA water and Cs-137 standard. We will use the EPA curve in the future. We may also re-derive this curve using a water sample which the EPA has agreed to send us.

(e) An investigation is being conducted; the results will be available shortly.