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

0039438 9405784

94-ASB-076

NOV 15 1994

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DEC 07 1994
CORRESPONDENCE CONTROL

Mr. Doug Sherwood
Hanford Project Manager
U. S. Environmental Protection Agency
712 Swift Boulevard, Suite 5
Richland, Washington 99352

Mr. Roger F. Stanley, Director
Tri-Party Agreement Implementation
State of Washington
Department of Ecology
P. O. Box 47600
Olympia, Washington 98504-7600

Dear Messrs. Sherwood and Stanley:

QUARTERLY PERFORMANCE EVALUATION (PE) RESULTS

Enclosed are the PE results and corrective actions received from the laboratories supporting Hanford. This submittal includes the results from the following laboratories:

- Battelle Pacific Northwest Laboratories, Richland, Washington
- Westinghouse Hanford Company, 222-S Laboratory, Richland, Washington
- Quanterra Environmental Services, St. Louis Laboratory, Earth City, Missouri
- Martin Marietta Energy System, Incorporated, K-25 Laboratory, Oak Ridge, Tennessee
- Thermal Analytical, Incorporated, Richmond, California
  - Eberline Laboratory, Albuquerque, New Mexico
  - Monrovia Laboratory, Monrovia California
  - Skinner and Sherman Laboratory, Waltham, Massachusetts
  - ERG Laboratory, Ann Arbor, Michigan
- Roy F. Weston, Incorporated, Lionville Laboratory, Lionville, Pennsylvania

The evaluation has identified a problem with Thermal Analytical, Inc/Monrovia Laboratory's mercury analyses. The laboratory has had high mercury results for the last three Water Pollution PE samples. The laboratory has taken corrective action and the results of a commericial PE sample were satisfactory. The only other problem was with WHC 222-S laboratory and their low score on their Contract Laboratory Program organic results and a low uranium result on the April 19, 1994, U. S. Environmental Protection Agency Environmental Monitoring System Laboratory sample. WHC 222-S is currently working on solutions to these problems.

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As new and updated results are received from the above laboratories and new laboratories, they will be forwarded to you on a quarterly basis.

If you have any questions, please feel free to contact Marcanne Burrell of my staff on (509) 373-7285.

Sincerely,

June M. Hennig, Director
Waste Programs Division

WPD:MLB

Enclosure

cc w/encl:
[redacted], WHC
B. Mauss, Ecology

cc w/o encl:
K. N. Pool, WHC

Larry D. Arnold

PNL

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: Battlle Pacific Northern Laboratory

PE sample	Number Acceptable	Number Analyzed	% Acceptable
DOE-EML QAP 40			103
EMSL-LV QB3 FY94			EPA/CLP Score
Organics			90.7

DOE EML

Battelle
Pacific Northwest Laboratories

Project Number QA/QC

Internal Distribution

Original - Project File-
T5/RAD/DOE-EML, #94-4693,
94-5176, 94-5438-5441
w/attach
EA Lepel
NL Wynhoff
EJ Wyse
QA/QC PE File
w/out attach
AG King
JM Latkovich
SA Schubert
KN Pool, WHC-AS
File/LB

Date July 26, 1994

To LR Greenwood

From KJ Kuhl-Klinger for KJK

Subject SUMMARY OF EML QAP40 RADIOCHEMISTRY RESULTS

The DOE Environmental Monitoring Laboratory (EML) summary report for the QAP40 sample set was issued on July 1, 1994. The performance of the Analytical Chemistry Laboratory (ACL) on these samples is summarized below. The ACL results were compared to the results reported by the DOE EML and the grand average of all laboratories reporting results. Results are summarized by matrix and analysis type. Attached is a tabular summary of these data showing the ACL result, EML result, grand average, ACL/EML recovery, and the ACL/grand average recovery.

Overall, the ACL performed excellently on the QAP40 samples. The average ACL/EML recovery for all analyses reported was 103%. The average ACL/grand average recovery was 99%.

It should be noted that the EML QAP intercomparison program results are not an evaluation of a laboratories performance against a set of known values. This intercomparison program is designed to allow one laboratory to compare their results, and thus their analytical techniques, against any other laboratory in the country. The EML values presented are the results obtained from analyses performed at the EML and may represent analytical techniques which are more or less rigorous than those used by the participating laboratories. Variances in results may represent a difference in analytical technique rather than a problem with a laboratory's operations. Comparison of results against the grand average of all reporting laboratories is an indication of how the ACL results compare to the radiochemistry testing industry overall.

Results from other laboratories; Battelle Memorial Institute (Lab BM), IT Analytical Services-Richland (Lab IT), and Westinghouse-Hanford (Lab RI), are attached for your information.

AUG 1994
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K. N. Pool

RESULTS SUMMARY

AIR FILTERS

The gamma in air filter analysis produced excellent agreement with EML values for CO-57 (104%), Co-60 (108%) and Ce-144 (98%). The ACL/EML recoveries for Mn-54 (120%), Sb-125 (131%) and Cs-137 (123%) are high. On the last set of QAP samples, all gamma results were low. The shift from low results to high results should be investigated.

SOIL

The ACL showed good agreement with the EML value (106%) and the grand average (104%) for the Sr-90 in soil analysis. The K-40 and Cs-137 results were high when compared to the EML values (116% & 120%) but agreed with the grand averages of all labs (106% & 108%).

The uranium by ICP/MS analysis had a high recovery for this sample (124%). This is opposite of the previous QAP set which had a low recovery (52%). The recovery against the grand average was also high (123%). A review of other laboratories that perform uranium analysis by ICP/MS showed an average recovery of 113%. The QAP soil samples do not appear to be consistently prepared and are producing erratic results. The data should be reviewed for other potential causes of the high result.

WATER

All ACL results for the QAP water sample showed excellent agreement with the EML values (102% average) and the grand averages (98% average).

VEGETATION

The vegetation sample gamma results show acceptable agreement with the EML reported values (87% average).

Even though our performance is excellent overall, the responsible analysts must respond concerning results which need investigation and review. This response must be received by the QA/QC office on or before August 5, 1994. Please remember to also clearly state corrective actions that will be taken.

Attachments

EPA/CLP 3/94 ORGANIC

Battelle
Pacific Northwest Laboratories

Project Number 21372

Internal Distribution

AG King
JM Latkovich
SA Schubert
Project File T5\ORG CLP
(94-06476-06479)
KL Silver
SG McKinley
KN Pool, WHC OOQA
File/LB

Date July 27, 1994

To Eric Hoppe

From Kristine Kuhl-Klinger

Subject USEPA-CLP QB3, FY94 Organic PE Results

Enclosed, please find a copy of your laboratory's results on the USEPA-CLP PE study QB3, FY94. Congratulations your laboratory achieved a score of 90.7% which is considered acceptable.

Review of the attached report indicates all SVOA results were acceptable; however, benzo(G,H,I)perylene was outside the warning limits. Unlike the previous study where 50% of the VOA results were unacceptable, only trichloroethene failed while all other VOA results were acceptable. Five of the seven VOA results recovered below the recorded average. For Pest/PCBs, heptachlor failed and endosulfan II was outside the warning limits while all other Pest/PCBs results were acceptable. Eleven of the thirteen Pest/PCBs recovered higher than the recorded average.

Recall that we obtained a score of 77.7% on the last PE study.

The QB3FY94 results show an improvement over our QB2FY94 PE. Recall in that PE three out of six VOA results were unacceptable and two of the seven Pest/PCBs failed while all SVOA results were acceptable.

Based upon your score you are not required to submit a corrective action report for this PE. In addition upon resumption of work, the organic lab can resume Pest/PCB project work.

If you require additional information, please contact me or Ofelia Bredt at your earliest convenience.

JUL 1994
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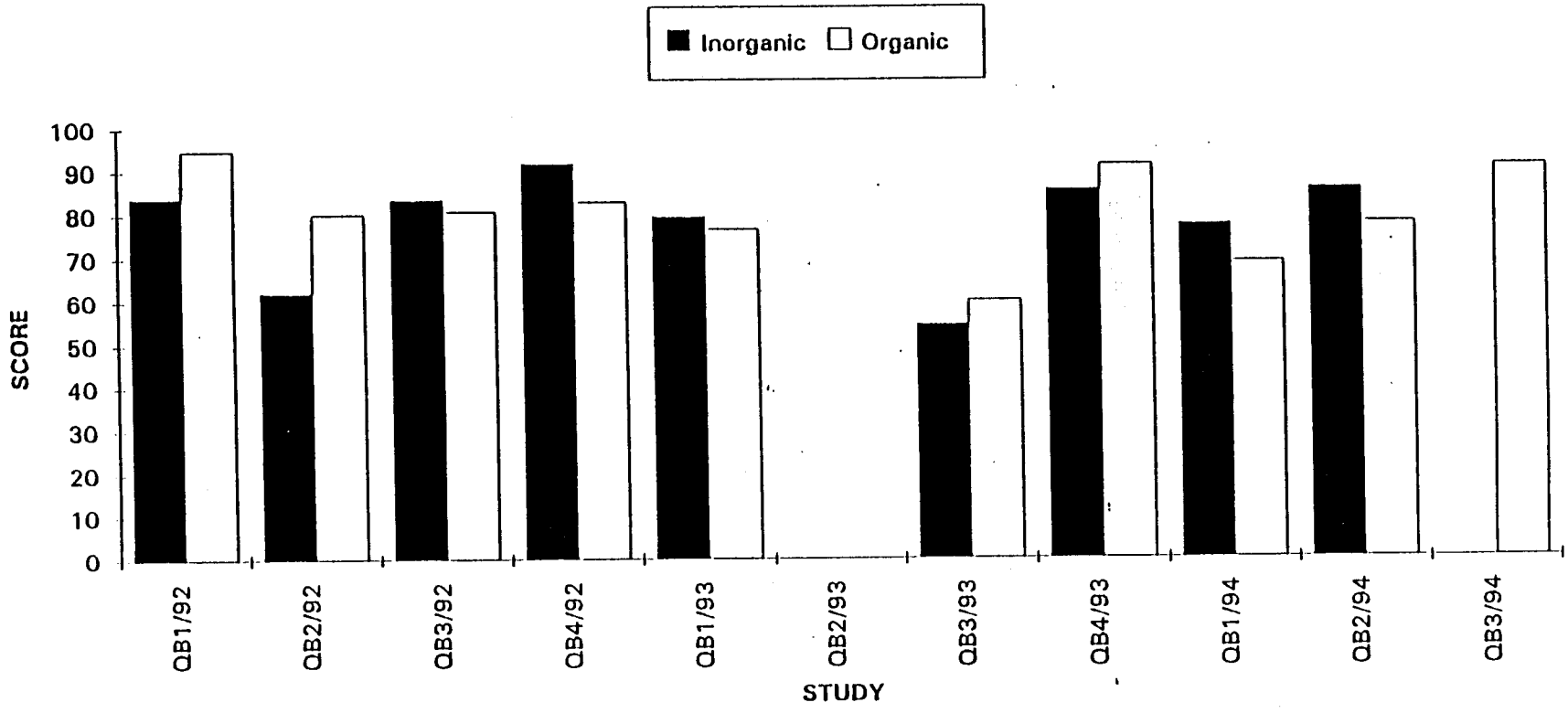
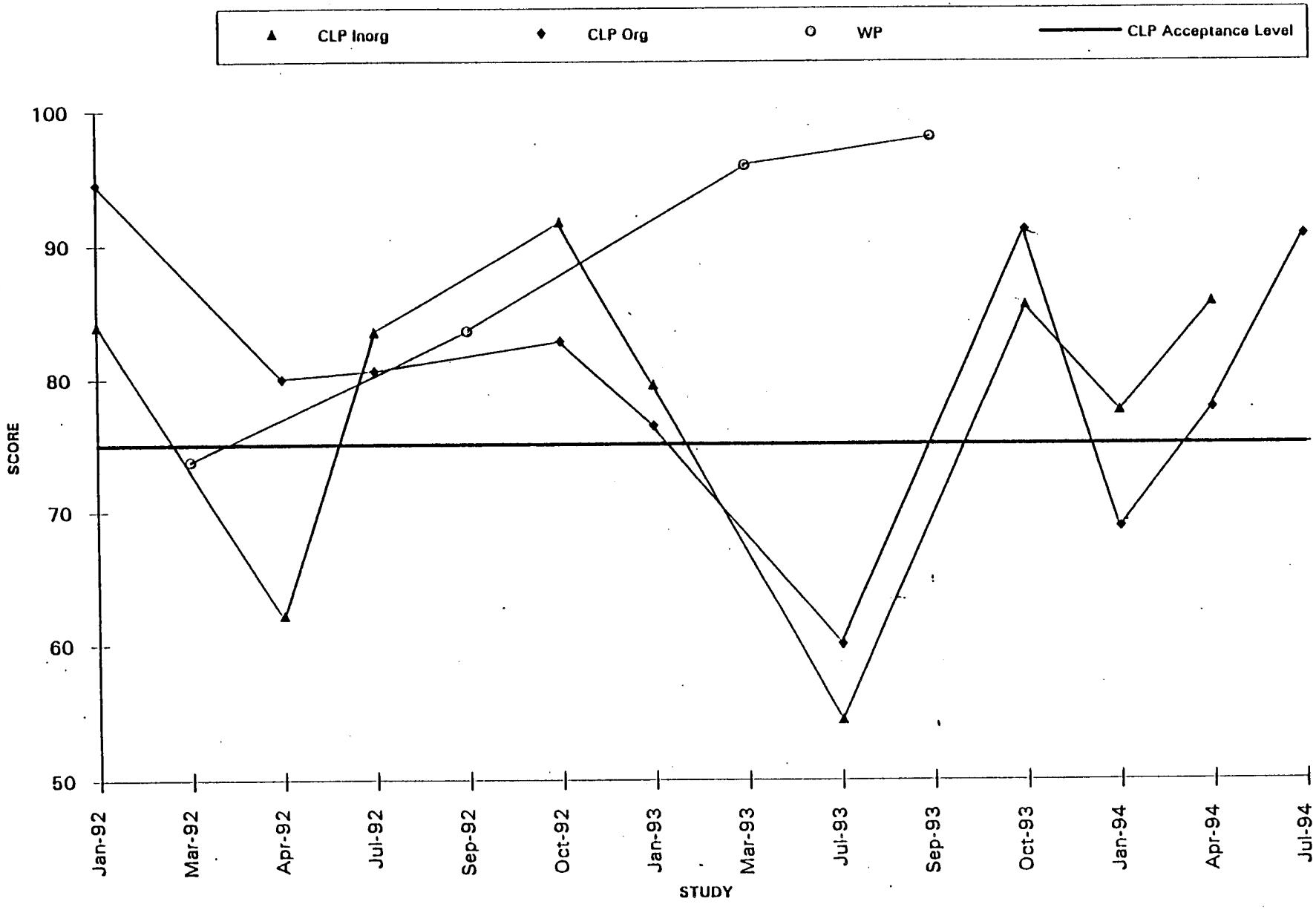
K. N. Pool

USEPA CLP PE RESULTS



Contract Laboratory Program / Water Pollution



REGION 10
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 94

LABORATORY: Battelle Pacific NW (WA)
PERFORMANCE: ACCEPTABLE - No Response Required
RANK: Above = 0 Same = 0 Below = 7

SCORE: 90.7
REPORT DATE: 06/24/9
MATRIX: WATER

COMPOUND	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY DATA CONC	Q	#LABS MIS-GNT	PROGRAM DATA #LABS NOT-ID	#LABS ID-CPD	TOTAL #LABS
TCL VOLATILE										
BROMOMETHANE	NU	NU	NU	NU	8		0	0	26	26
BROMODICHLOROMETHANE	100	140	98	140	100		0	0	26	26
TRICHLOROETHENE	33	40	32	40	31	X	4	0	26	26
2-PENTANONE,4-METHYL-	140	200	130	210	170		3	0	26	26
TETRACHLOROETHENE	53	73	50	76	61		1	0	26	26
1,1,2,2-TETRACHLOROETHANE	40	59	37	62	45		2	0	26	26
ETHYL BENZENE	14	18	14	19	16		2	0	26	26
STYRENE	120	160	110	160	140		2	0	26	26
TCL SEMIVOLATILE										
4-METHYLPHENOL	33	44	31	51	40		4	0	26	26
ISOPHORONE	16	22	15	23	18		3	0	26	26
1,2,4-TRICHLOROBENZENE	28	42	26	51	38		2	0	26	26
2-METHYLNAPHTHALENE	14	19	14	21	16		1	0	26	26
2,4-DINITROTOLUENE	65	92	61	110	77		2	0	26	26
PYRENE	15	24	13	26	20		1	0	26	26
BENZO(G,H,I)PERYLENE	25	40	23	43	24	S	6	0	26	26
TCL PESTICIDES										
ALPHA-BHC	0.076	0.16	0.064	0.17	0.124		0	0	26	26
BETA-BHC	0.061	0.12	0.051	0.13	0.103		0	0	26	26
DELTA-BHC	0.056	0.11	0.05	0.12	0.107		0	0	26	26
HEPTACHLOR	0.17	0.26	0.16	0.27	0.304	X	4	0	26	26
ALDRIN	0.19	0.41	0.16	0.45	0.318		2	0	26	26
HEPTACHLOR EPOXIDE	0.25	0.44	0.22	0.46	0.357		0	0	26	26
ENDOSULFAN I	0.35	0.55	0.32	0.66	0.446		6	0	26	26
DIELDRIN	0.27	0.43	0.24	0.45	0.356		2	0	26	26
ENDRIN	0.64	1.1	0.56	1.2	1.06		1	0	26	26
ENDOSULFAN II	NU	NU	NU	NU	0.1	U	0	2	24	26
4,4'-DDT	0.26	0.36	0.25	0.38	0.378	S	3	0	26	26
ENDRIN KETONE	0.24	0.37	0.22	0.39	0.284		2	0	26	26
ENDRIN ALDEHYDE	0.12	0.24	0.1	0.26	0.214		4	1	25	26
AROCLOR-1254	1	1.4	1	1.5	1.29		4	0	26	26
NON-TCL VOLATILE										
2-PROPENENITRILE					70			0	26	26
NON-TCL SEMIVOLATILE										
BETA-BHC					40			0	26	26
PHENOL,4-CHLORO-					56			4	22	26
TCL VOLATILE (Contaminants)										
ACETONE					15			15	11	26

REGION 10
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR 08 3 FY 94

LABORATORY: Battelle Pacific NW (WA)
PERFORMANCE: ACCEPTABLE - No Response Required
RANK: Above = 0 Same = 0 Below = 7

% SCORE: 90.7
REPORT DATE: 06/24/94
MATRIX: WATER

COMPOUND	PREDICTION 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
2-BUTANONE					9			13	13	26
NON-TCL VOLATILE (Contaminants)										-
2-PROPANOL					14			12	14	26

OF TCL COMPOUNDS NOT-IDENTIFIED: 0
OF TCL COMPOUNDS MIS-QUANTIFIED: 2
OF TCL CONTAMINANTS: 0

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

NON-CLP
ORGANIC PERFORMANCE EVALUATION SAMPLE
PROGRAM SUMMARY REPORT
FOR QB 3 FY 94

MATRIX: WATER

REPORT DATE: 06/24/94

COMPOUND	SPIKE CONC	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	AVG REC	STD DEV	#LABS MIS-CNT	PROGRAM #LABS NOT-ID	DATA #LABS ID-CPD	TOTAL #LABS
TCL VOLATILE											
BROMOMETHANE	20	NU	NU	NU	NU	NU	NU	0	0	8	8
BROMODICHLOROMETHANE	120	100	140	98	140	120	12.4	0	0	8	8
TRICHLOROETHENE	36	33	40	32	40	36.5	2.2	2	0	8	8
2-PENTANONE,4-METHYL-	160	140	200	130	210	167	22.2	2	0	8	8
TETRACHLOROETHENE	64	53	73	50	76	63	7.01	0	0	8	8
1,1,2,2-TETRACHLOROETHANE	50	40	59	37	62	49.2	6.81	0	0	8	8
ETHYL BENZENE	15	14	18	14	19	16.3	1.42	1	0	8	8
STYRENE	150	120	160	110	160	136	15.5	0	0	8	8
TCL SEMIVOLATILE											
4-METHYLPHENOL	50	33	44	31	51	38.4	3.93	3	0	8	8
ISOPHORONE	20	16	22	15	23	19.2	2.22	2	0	8	8
1,2,4-TRICHLOROBENZENE	50	28	42	26	51	35	5.15	2	0	8	8
2-METHYLNAPHTHALENE	20	14	19	14	21	16.6	1.53	1	0	8	8
2,4-DINITROTOLUENE	100	65	92	61	110	78.5	9.66	2	0	8	8
PYRENE	25	15	24	13	26	19.7	3.47	1	0	8	8
BENZO(G,H,I)PERYLENE	30	25	40	23	43	33	5.44	4	0	8	8
TCL PESTICIDES											
ALPHA-BHC	0.15	0.076	0.16	0.064	0.17	0.118	0.0302	0	0	8	8
BETA-BHC	0.1	0.061	0.12	0.051	0.13	0.0917	0.0223	0	0	8	8
DELTA-BHC	0.1	0.056	0.11	0.05	0.12	0.0817	0.0186	0	0	8	8
HEPTACHLOR	0.25	0.17	0.26	0.16	0.27	0.212	0.031	2	0	8	8
ALDRIN	0.4	0.19	0.41	0.16	0.45	0.302	0.0799	1	0	8	8
HEPTACHLOR EPOXIDE	0.3	0.25	0.44	0.22	0.46	0.343	0.0676	0	0	8	8
ENDOSULFAN I	2	0.35	0.55	0.32	0.66	0.448	0.0695	3	0	8	8
DIELDRIN	0.4	0.27	0.43	0.24	0.45	0.348	0.0578	2	0	8	8
ENDRIN	1	0.64	1.1	0.56	1.2	0.896	0.184	1	0	8	8
ENDOSULFAN II	0.2	NU	NU	NU	NU	NU	NU	0	1	7	8
4,4'-DDT	0.35	0.26	0.36	0.25	0.38	0.315	0.0367	2	0	8	8
ENDRIN KETONE	0.3	0.24	0.37	0.22	0.39	0.302	0.0472	1	0	8	8
ENDRIN ALDEHYDE	0.2	0.12	0.24	0.1	0.26	0.18	0.0453	2	0	8	8
AROCLOR-1254	1.4	1	1.4	1	1.5	1.23	0.16	3	0	8	8
NON-TCL VOLATILE											
2-PROPENENITRILE									0	8	8
NON-TCL SEMIVOLATILE											
BETA-BHC									0	8	8
PHENOL,4-CHLORO-									1	7	8
TCL VOLATILE (Contaminants)											
METHYLENE CHLORIDE									7	1	8
ACETONE									4	4	8
1,2-DICHLOROETHANE									8	0	8
2-BUTANONE									2	6	8
DIBROMOCHLOROMETHANE									7	1	8
XYLENES (TOTAL)									8	0	8
CHLOROFORM									7	1	8
TCL SEMIVOLATILE (Contaminants)											
NAPHTHALENE									7	1	8
BIS(2-ETHYLHEXYL)PHTHALATE									2	6	8

NON-CLP
ORGANIC PERFORMANCE EVALUATION SAMPLE
PROGRAM SUMMARY REPORT
FOR QB 3 FY 94

REPORT DATE: 06/24/94

MATRIX: WATER

COMPOUND	SPIKE CONC	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	AVG REC	STD DEV	#LABS MIS-QNT	PROGRAM DATA #LABS NOT-ID	#LABS ID-CPD	TOTAL #LABS
									7	1	8
DI-N-BUTYLPHTHALATE											
TCL PESTICIDES (Contaminants)											
									8	0	-8
4,4'-DDE									8	0	8
ALPHA-CHLORDANE											
NON-TCL VOLATILE (Contaminants)											
									6	2	8
UNKNOWN									8	0	8
UNKNOWN (BP M/E 45)									2	6	8
2-PROPANOL									8	0	8
2-PROPANOL (ACN)									6	2	8
ISOPROPYL ALCOHOL									8	0	8
PROPANE,2,2'-OXYBIS-									8	0	8
CARBON DIOXIDE									8	0	8
2-PROPANOL,1-CHLORO-									8	0	8
4-PENTEN-2-OL									8	0	8
ETHER,1-BUTYL-VINYL-METHYL-									7	1	8
ETHANE,1,1,2-TRICHLORO-TRIFLUORO-									7	1	8
HEXANE									8	0	8
PROPANE,2-CHLORO-1-METHOXY-									8	0	8
C5 H6 CL6 ISOMER									8	0	8
CYCLOHEXENOL ISOMER									8	0	8
CYCLOHEXENOL ISOMER									8	0	8
CYCLOHEXANE,DICHLORO- ISOMER									6	2	8
UNKNOWN									8	0	8
UNKNOWN									8	0	8
UNKNOWN									8	0	8
UNKNOWN									8	0	8
UNKNOWN (BP M/E 40)									8	0	8
UNKNOWN (BP M/E 40)									8	0	8
UNKNOWN SATURATED HYDROCARBO									8	0	8
UNKNOWN SATURATED HYDROCARBO									7	1	8
1,4-DIOXANE									8	0	8
PHOSPHINE OXIDE,TRIPHENYL-									8	0	8
2-CYCLOHEXEN-1-ONE									8	0	8
1,2-CYCLOHEXANEDIOL									8	0	8
HEXANEDIOIC ACID,MONO(2-ETH									8	0	8
PHENOL,3-CHLORO-									8	0	8
LINDANE									8	0	8
UNKNOWN									7	1	8
UNKNOWN									7	1	8
METHYLENE CHLORIDE									7	1	8
BENZENE,1,2-DIMETHYL-									7	1	8
HEPTANE,7-OXABICYCLO[4.1.0]									7	1	8
2-CYCLOHEXENE-1-OL									7	1	8
DECANE,2,9-DIMETHYL-									7	1	8
1,3,6-TRIOXOCANE									7	1	8
SULFUR,MOL. (S8)									7	1	8
2-BUTANAMINE, (.+/-.)- OR FORMAMID									8	0	8
CARINOL									7	1	8
PROPANOIC ACID,2-METHYL-,2,2-DIMET									7	1	8
PROPANOIC ACID,2-METHYL-3-HYDROXY-									8	0	8
UNKNOWN									8	0	8
UNKNOWN									8	0	8
UNKNOWN									7	1	8
1-OCTANOL,2-BUTYL-									7	1	8
UNKNOWN									7	1	8
HEXADECANOIC ACID									7	1	8
4-CHLORO-4-METHYLCYCLOHEXA-2											

NON-CLP
ORGANIC PERFORMANCE EVALUATION SAMPLE
PROGRAM SUMMARY REPORT
FOR QE 3 FY 94

MATRIX: WATER

REPORT DATE: 06/24/94

COMPOUND	SPIKE CONC	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	AVG REC	STD DEV	#LABS MIS-QNT	PROGRAM #LABS NOT-ID	DATA #LABS ID-CPD	TOTAL #LABS
UNKNOWN HYDROCARBON									7	1	8
UNKNOWN HYDROCARBON									7	1	8

OF LABS WITH ACCEPTABLE PERFORMANCE - NO RESPONSE REQUIRED: 1
OF LABS WITH ACCEPTABLE PERFORMANCE - RESPONSE EXPLAINING DEFICIENCY(IES) REQUIRED: 4
OF LABS WITH UNACCEPTABLE PERFORMANCE - RESPONSE EXPLAINING DEFICIENCY(IES) REQUIRED: 3

TMA/EBERLINE

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: TMA/Eberline

PE Sample	EMSL-LV Acceptance Range (%)	% of EMSL-LV True Value	% of all Participating Laboratory's Grand Average
January 14, 1994			
Sr-89	74.4 to 125.6	82.0	
Sr-90	42.0 to 158.0	89.2	107.4
January 28, 1994			
Alpha	42.0 to 158.0	144.5	157.6
Beta	72.1 to 127.9	82.3	90.8
February 11, 1994			
Uranium	48.5 to 151.5	88.8	93.0
Ra-226	73.9 to 126.1	88.4	92.3
Ra-228	56.5 to 143.5	78.9	82.3
March 11, 1994			
Pu-239		96.4	

TMA
Thermo Analytical Inc.

USDOE/EML-TMA/EBERLINE QUALITY ASSESSMENT PROGRAM (3/94)

Sample Type	Analysis	TMA/E	EML	Units	Ratio	+/-
Air Filter	Mn-54	25.3	33.5	Bq/filter	0.76	0.04
Air Filter	Co-57	8.41	12.5	Bq/filter	0.67	0.05
Air Filter	Co-60	53.0	70.2	Bq/filter	0.75	0.03
Air Filter	Sr-90	0.773	0.716	Bq/filter	1.08	0.16
Air Filter	Sb-125	17.4	23.3	Bq/filter	0.75	0.05
Air Filter	Cs-137	28.8	40.0	Bq/filter	0.72	0.04
Air Filter	Ce-144	86.3	128	Bq/filter	0.67	0.05
Air Filter	Pu-238	0.349	0.334	Bq/filter	1.04	0.05
Air Filter	Pu-239	0.340	0.310	Bq/filter	1.10	0.05
Air Filter	Am-241	0.349	0.391	Bq/filter	0.89	0.06
Air Filter	U-234	0.200	0.197	Bq/filter	1.02	0.06
Air Filter	U-238	0.211	0.203	Bq/filter	1.04	0.06
Air Filter	U	13.7	15.8	ug/filter	0.87	0.09
Soil	K-40	323	337	Bq/kg	0.96	0.08
Soil	Sr-90	7.31	8.79	Bq/kg	0.83	0.15
Soil	Cs-137	164	141	Bq/kg	1.16	0.23
Soil	Pu-238	10.8	11.2	Bq/kg	0.96	0.08
Soil	Pu-239	5.70	3.56	Bq/kg	1.60	0.16
Soil	Am-241	1.79	2.03	Bq/kg	0.88	0.21
Soil	U-234	22.7	27.1	Bq/kg	0.84	0.12
Soil	U-238	20.7	27.1	Bq/kg	0.76	0.11
Soil	U	1.91	2.13	ug/g	0.90	0.15
Vegetation	K-40	834	923	Bq/kg	0.90	0.04
Vegetation	Co-60	36.2	34.0	Bq/kg	1.06	0.09
Vegetation	Sr-90	519	575	Bq/kg	0.90	0.13
Vegetation	Cs-137	521	461	Bq/kg	1.13	0.05
Vegetation	Pu-239	3.85	3.90	Bq/kg	0.99	0.13
Vegetation	Am-241	1.68	2.57	Bq/kg	0.65	0.11
Water	H-3	130	187	Bq/l	0.70	0.05
Water	Mn-54	99.6	98.2	Bq/l	1.01	0.02
Water	Fe-55	930	933	Bq/l	1.00	0.02
Water	Co-60	106	101	Bq/l	1.05	0.02
Water	Sr-90	33.9	28.6	Bq/l	1.19	0.16
Water	Cs-134	167	154	Bq/l	1.08	0.01
Water	Cs-137	108	93.7	Bq/l	1.15	0.02
Water	Pu-238	1.19	0.941	Bq/l	1.26	0.10
Water	Pu-239	1.02	0.956	Bq/l	1.07	0.08
Water	Am-241	0.566	0.545	Bq/l	1.04	0.19
Water	U-234	0.535	0.520	Bq/l	1.03	0.13
Water	U-238	0.575	0.528	Bq/l	1.09	0.14
Water	U	0.0364	0.0413	ug/ml	0.88	0.09

Prepared by: Kathy Burnham
Kathy Burnham, QA Manager

Date: 7-12-94

USEPA-TMA/EBERLINE CROSSCHECK PROGRAM

Sample Type	Study Analysis	Date	EPA pCi/l	TMA/E pCi/l	Deviation (known)
Water	Alpha	01/28/94	15.0 ± 5.0	21.67 ± 1.53	+2.31
Water	Beta	01/28/94	62.0 ± 10.0	51.00 ± 1.00	-1.91
Water	I-131	02/04/94	119.0 ± 12.0	133.3 ± 6.43	+2.65
Water	Sr-89	01/14/94	25.0 ± 5.0	22.3 ± 0.6	-0.92
Water	Sr-90	01/14/94	15.0 ± 5.0	12.3 ± 0.6	-0.92
Water	Uranium	02/11/94	10.1 ± 3.0	8.97 ± 0.81	-0.65
Water	Ra-226	02/11/94	19.9 ± 3.0	17.6 ± 0.1	-1.31
Water	Ra-228	02/11/94	14.7 ± 3.7	11.6 ± 0.4	-1.45
Water	Pu-239	03/11/94	27.6 ± 2.8	26.6 ± 0.3	-0.62

TMA/MONROVIA
(ARLI)

PERVORMANCE EVALUATION SAMPLE SUMMARY SHEET

Laboratory: TMA/Monrovia(ARLI)

PE Sample	Number Acceptable	Number Analyzed	% Acceptable
WP-030			
Metals	30	40	75.0
Inorganic/Minerals	39	46	84.8
Organic	54	54	100.0
WP-031			
Metals	39	42	92.9
Inorganics/Minerals	43	46	93.5
Organic	50	54	92.6
WS-033			
Metals	15	18	100.0
Inorganics/Minerals	11	12	91.7
APG Organic	39	39	100.0
TMA Double Blind Organic	11	11	100.0

WP-030

PERFORMANCE EVALUATION REPORT DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: CA208

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
ALUMINUM	1	1023	1100	898- 1300	949- 1250	ACCEPTABLE
	2	3535	4000	3370- 4570	3520- 4410	ACCEPTABLE
ARSENIC	1	235	280	225- 334	238- 320	CHECK FOR ERROR
BERYLLIUM	1	85.5	63.0	51.1- 74.5	54.1- 71.5	NOT ACCEPTABLE
CADMIUM	1	8.3	8.12	6.30- 10.3	6.80- 9.79	ACCEPTABLE
	2	95.5	93.9	78.3- 110	82.2- 106	ACCEPTABLE
COBALT	1	525.6	480	416- 536	431- 521	CHECK FOR ERROR
	2	256.3	240	206- 275	214- 266	CHECK FOR ERROR
CHROMIUM	1	60.5	62.0	49.2- 73.7	52.3- 70.6	ACCEPTABLE
	2	455	460	378- 533	397- 514	ACCEPTABLE
COPPER	1	61.1	62.0	53.5- 69.8	55.6- 67.8	ACCEPTABLE
	2	419	410	365- 462	377- 450	ACCEPTABLE
IRON	1	4097	3800	3350- 4230	3460- 4120	ACCEPTABLE
	2	957	850	755- 963	781- 937	NOT ACCEPTABLE
MERCURY	1	1.85	0.983	0.620- 1.42	0.719- 1.32	NOT ACCEPTABLE
	2	3.95	2.10	1.57- 2.75	1.72- 2.61	NOT ACCEPTABLE
MANGANESE	1	2.278	2200	1950- 2450	2010- 2390	NOT ACCEPTABLE
	2	240.2	221	196- 244	202- 239	CHECK FOR ERROR
NICKEL	1	110.3	130	111- 150	116- 145	NOT ACCEPTABLE
	2	1231	1300	1160- 1450	1200- 1420	ACCEPTABLE
LEAD	1	75	79.2	62.7- 97.1	67.0- 92.8	ACCEPTABLE
	2	448	450	393- 513	408- 498	ACCEPTABLE

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

LAB ACCREDITATION PROGRAM

JUL 9 1993

CAL DEPT HEALTH SERVICES

PERFORMANCE EVALUATION REPORT DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: CA208

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	19	23.0	14.3- 29.1	16.1- 27.3	ACCEPTABLE
	2	65.7	73.1	52.8- 94.6	58.1- 89.3	ACCEPTABLE
VANADIUM	1	8863	8000	7110- 8830	7330- 8610	NOT ACCEPTABLE
	2	17450	15000	12700-17400	13300-16800	NOT ACCEPTABLE
ZINC	1	1200	1100	961- 1220	993- 1190	CHECK FOR ERROR
	2	270.7	240	209- 271	215- 253	CHECK FOR ERROR
ANTIMONY	3	111	116	79.4- 140	87.2- 133	ACCEPTABLE
	4	13	14.0	7.01- 20.4	8.73- 18.7	ACCEPTABLE
SILVER	3	3.2	2.39	1.80- 2.96	1.95- 2.82	NOT ACCEPTABLE
	4	9.0	9.75	7.80- 11.5	8.25- 11.0	ACCEPTABLE
THALLIUM	3	80.6	90.2	70.7- 108	75.5- 103	ACCEPTABLE
	4	9.3	9.00	5.71- 11.3	7.29- 10.7	ACCEPTABLE
MOLYBDENUM	3	6.7	6.48	3.34- 8.92	4.04- 8.12	ACCEPTABLE
	4	45.3	39.0	30.3- 47.9	32.6- 45.6	ACCEPTABLE
STRONTIUM	3	5.0	4.01	3.01- 4.99	3.26- 4.73	NOT ACCEPTABLE
	4	52	51.0	41.4- 60.1	43.9- 57.7	ACCEPTABLE
TITANIUM	3	68.7	66.0	51.5- 76.5	54.7- 73.3	ACCEPTABLE
	4	201.2	192	149- 205	156- 198	CHECK FOR ERROR
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH-UNITS	3	8.79	8.70	8.31- 9.05	8.40- 8.96	ACCEPTABLE
	4	6.09	6.10	5.95- 6.22	5.99- 6.19	ACCEPTABLE
SPEC. COND. (UMHOS/CM AT 25 C)	1	238	253	226- 278	232- 268	ACCEPTABLE
	2	882	868	819- 916	831- 904	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT

DATE: 5/22/93

WATER POLLUTION STUDY NUMBER WP030

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	100	116	76.2- 166	87.5- 155	ACCEPTABLE
	2	518	480	385- 617	414- 588	ACCEPTABLE
TOTAL HARDNESS (AS CACO3)	1	82.3	75.6	66.7- 84.1	68.8- 82.0	CHECK FOR ERROR
	2	229.3	225	209- 242	213- 238	ACCEPTABLE
CALCIUM	1	5.366	3.69	3.00- 4.47	3.18- 4.29	NOT ACCEPTABLE
	2	99.99	80.9	73.4- 90.2	75.5- 88.1	NOT ACCEPTABLE
MAGNESIUM	1	20.15	16.1	14.0- 18.1	14.5- 17.6	NOT ACCEPTABLE
	2	6.045	5.64	4.84- 6.32	5.03- 6.13	ACCEPTABLE
SODIUM	1	18.57	15.9	14.0- 17.9	14.5- 17.4	NOT ACCEPTABLE
	2	67.02	65.6	59.6- 72.0	61.2- 70.4	ACCEPTABLE
POTASSIUM	1	2.476	2.60	2.05- 3.22	2.19- 3.08	ACCEPTABLE
	2	18.40	19.0	16.2- 21.9	16.9- 21.1	ACCEPTABLE
TOTAL ALKALINITY (AS CACO3)	1	22.8	21.1	17.2- 26.1	18.3- 25.0	ACCEPTABLE
	2	96.9	97.0	85.0- 109	88.0- 106	ACCEPTABLE
CHLORIDE	1	59.1	54.3	48.2- 59.1	49.6- 57.8	CHECK FOR ERROR
	2	175.8	178	166- 191	170- 188	ACCEPTABLE
FLUORIDE	1	2.32	2.40	2.09- 2.65	2.16- 2.58	ACCEPTABLE
	2	0.76	0.230	0.175-0.286	0.189-0.272	NOT ACCEPTABLE
SULFATE	1	8.91	9.10	6.48- 11.4	7.10- 10.8	ACCEPTABLE
	2	41.5	42.0	35.2- 48.1	36.8- 46.5	ACCEPTABLE
NUTRIENTS IN MILLIGRAMS PER LITER:						
AMMONIA-NITROGEN	1	4.83	5.50	4.35- 6.65	4.62- 6.37	ACCEPTABLE
	2	9.02	9.80	7.30- 11.6	8.25- 11.2	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 5/22/83

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: CA204

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
NUTRIENTS IN MILLIGRAMS PER LITER:						
NITRATE-NITROGEN	1	33.9	34.0	27.5- 40.2	29.0- 38.7	ACCEPTABLE
	2	7.51	7.10	5.70- 8.43	6.03- 8.10	ACCEPTABLE
ORTHOPHOSPHATE	1	0.96	0.830	0.692-0.961	0.724-0.929	CHECK FOR ERROR
	2	0.151	0.090	.0617-0.122	.0689-0.115	NOT ACCEPTABLE
KJELDAHL-NITROGEN	3	9.54	9.30	6.67- 11.5	7.26- 10.9	ACCEPTABLE
	4	19.6	19.0	13.9- 23.1	15.0- 22.0	ACCEPTABLE
TOTAL PHOSPHORUS	3	3.12	3.20	2.35- 3.57	2.49- 3.42	ACCEPTABLE
	4	1.72	1.60	1.25- 1.94	1.33- 1.86	ACCEPTABLE
DEMANDS IN MILLIGRAMS PER LITER:						
COD	1	19.9	21.8	12.6- 30.5	14.9- 28.2	ACCEPTABLE
	2	32.4	35.4	23.6- 43.0	26.0- 40.5	ACCEPTABLE
PCB'S IN MICROGRAMS PER LITER:						
PCB-AROCLOR 1016/1242	2	4.228	4.29	1.86- 5.71	2.35- 5.22	ACCEPTABLE
PCB-AROCLOR 1232	1	1.292	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	14.04	21.5	5.04- 27.6	7.92- 24.7	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 5/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: CA200

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	32.95	36.6	7.82- 57.8	14.2- 51.4	ACCEPTABLE
PESTICIDES IN MICROGRAMS PER LITER:						
CHLORDANE	3	0.919	0.964	0.469- 1.32	0.575- 1.21	ACCEPTABLE
	4	8.923	9.48	5.38- 12.8	6.26- 11.5	ACCEPTABLE
ALDRIN	1	0.124	0.159	.0344-0.218	.0572-0.191	ACCEPTABLE
	2	0.329	0.444	.0957-0.577	0.156-0.517	ACCEPTABLE
DIELDRIN	1	0.106	0.121	.0572-0.163	.0704-0.150	ACCEPTABLE
	2	0.474	0.553	0.270-0.750	0.330-0.690	ACCEPTABLE
DDD	1	0.188	0.216	.0863-0.317	0.115-0.288	ACCEPTABLE
	2	0.552	0.626	0.334-0.865	0.400-0.799	ACCEPTABLE
DDE	1	0.107	0.131	.0562-0.171	.0706-0.157	ACCEPTABLE
	2	0.390	0.495	0.229-0.599	0.299-0.639	ACCEPTABLE
DDT	1	0.170	0.186	.0628-0.284	.0905-0.257	ACCEPTABLE
	2	0.474	0.576	0.252-0.844	0.326-0.770	ACCEPTABLE
HEPTACHLOR	1	0.139	0.157	.0438-0.221	.0706-0.199	ACCEPTABLE
	2	0.407	0.514	0.130-0.715	0.247-0.649	ACCEPTABLE
HEPTACHLOR EPOXIDE	1	0.076	0.087	.0427-0.120	.0526-0.110	ACCEPTABLE
	2	0.302	0.375	0.189-0.513	0.229-0.473	ACCEPTABLE
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
1,2 DICHLOROETHANE	1	47.39	48.6	34.5- 62.8	38.0- 59.2	ACCEPTABLE
	2	10.88	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: 5/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: CA204

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
CHLOROFORM	1	44.64	45.7	31.6- 59.5	35.1- 56.0	ACCEPTABLE
	2	13.36	13.8	9.42- 18.0	10.5- 16.9	ACCEPTABLE
1,1,1 TRICHLOROETHANE	1	47.74	52.0	32.3- 67.9	36.8- 63.4	ACCEPTABLE
	2	9.009	9.34	5.56- 12.6	6.46- 11.7	ACCEPTABLE
TRICHLOROETHENE	1	31.40	38.8	26.8- 49.1	29.6- 46.2	ACCEPTABLE
	2	8.512	9.31	6.52- 13.0	7.34- 12.2	ACCEPTABLE
CARBONTETRACHLORIDE	1	43.46	46.3	29.8- 63.7	34.1- 59.4	ACCEPTABLE
	2	12.81	13.5	8.93- 18.2	10.1- 17.0	ACCEPTABLE
TETRACHLOROETHENE	1	46.69	57.2	39.7- 71.9	43.8- 67.8	ACCEPTABLE
	2	18.33	16.2	10.9- 21.1	12.2- 19.8	ACCEPTABLE
BROMODICHLOROMETHANE	1	51.52	49.5	34.2- 64.3	38.0- 60.5	ACCEPTABLE
	2	8.350	7.75	4.88- 10.5	5.59- 9.86	ACCEPTABLE
DIBROMOCHLOROMETHANE	1	49.53	42.2	30.0- 54.4	33.1- 51.3	ACCEPTABLE
	2	14.67	16.4	10.9- 21.5	12.2- 20.2	ACCEPTABLE
BROMOFORM	1	66.44	53.7	33.5- 73.7	38.6- 68.6	ACCEPTABLE
	2	13.54	11.9	6.49- 17.1	7.83- 15.7	ACCEPTABLE
METHYLENE CHLORIDE	1	39.42	37.3	24.1- 53.2	27.7- 49.6	ACCEPTABLE
	2	10.16	8.77	4.21- 13.5	5.39- 12.3	ACCEPTABLE
CHLOROBENZENE	1	40.51	43.2	30.8- 55.0	33.9- 51.9	ACCEPTABLE
	2	12.78	12.9	8.99- 16.7	9.97- 15.7	ACCEPTABLE
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
BENZENE	1	9.962	10.3	7.34- 13.4	8.11- 12.6	ACCEPTABLE
	2	49.35	54.1	37.7- 70.8	41.9- 65.6	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 5/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: CA204

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
ETHYLBENZENE	1	10.71	11.3	7.71- 14.7	8.60- 13.8	ACCEPTABLE
	2	44.51	52.4	36.2- 68.5	40.3- 64.4	ACCEPTABLE
TOLUENE	1	12.40	13.9	9.86- 17.7	10.9- 16.7	ACCEPTABLE
	2	27.30	33.9	24.0- 43.1	26.4- 40.7	ACCEPTABLE
1,2-DICHLOROBENZENE	1	11.45	12.1	8.47- 15.8	9.37- 14.5	ACCEPTABLE
	2	47.38	52.0	36.1- 55.4	40.0- 52.5	ACCEPTABLE
1,3-DICHLOROBENZENE	1	8.722	9.43	6.17- 12.1	6.92- 11.4	ACCEPTABLE
	2	42.70	47.8	33.6- 51.2	37.2- 57.6	ACCEPTABLE
1,4-DICHLOROBENZENE	1	11.16	11.7	7.95- 15.2	8.86- 14.2	ACCEPTABLE
	2	52.34	58.1	39.1- 76.5	43.9- 71.7	ACCEPTABLE
MISCELLANEOUS PARAMETERS:						
TOTAL CYANIDE (IN MG/L)	1	0.21	0.250	0.138-0.341	0.164-0.316	ACCEPTABLE
	2	0.12	0.130	.0921-0.169	.0932-0.158	ACCEPTABLE
NON-FILTERABLE RESIDUE (IN MG/L)	1	41.4	43.2	34.7- 45.2	36.0- 43.9	ACCEPTABLE
	2	30.6	33.0	24.0- 34.6	25.3- 33.2	ACCEPTABLE
OIL AND GREASE (IN MG/L)	1	14.6	15.0	8.13- 19.4	9.56- 18.0	ACCEPTABLE
	2	21.7	23.0	14.1- 29.1	15.9- 26.3	ACCEPTABLE
TOTAL PHENOLICS (IN MG/L)	1	0.04	.0271	.0093-.0449	.0139-.0403	ACCEPTABLE
	2	0.304	0.291	0.125-0.457	0.167-0.414	ACCEPTABLE
TOTAL RESIDUAL CHLORINE (IN MG/L)	1	0.65	0.729	0.469-0.912	0.528-0.853	ACCEPTABLE
	2	0.30	0.240	.0866-0.280	0.112-0.258	NOT ACCEPTABLE

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

TMA/ARLI
THERMO ANALYTICAL

WATER POLLUTION STUDY
WP-031

'quality environmental services'

WATER POLLUTION STUDY NUMBER WP031

BORATORY: CA204

TES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
UMINUM	1	720	681	550- 784	579- 755	ACCEPTABLE
	2	138	140	107- 182	117- 173	ACCEPTABLE
SENIC	1	508	492	408- 587	430- 565	ACCEPTABLE
	2	79	74.3	56.7- 92.9	61.2- 88.4	ACCEPTABLE
RYLLIUM	1	448	461	382- 533	401- 514	ACCEPTABLE
	2	232	240	198- 278	208- 268	ACCEPTABLE
DMIUM	1	169.7	165	138- 194	145- 187	ACCEPTABLE
	2	63.5	61.0	50.8- 72.0	53.5- 69.4	ACCEPTABLE
BALT	1	951.4	880	775- 980	801- 954	ACCEPTABLE
	2	57.2	53.8	45.4- 61.9	47.5- 59.8	ACCEPTABLE
IROMIUM	1	786.9	730	604- 843	634- 813	ACCEPTABLE
	2	24.6	23.4	17.4- 29.0	18.9- 27.6	ACCEPTABLE
PPER	1	585.2	601	524- 657	541- 640	ACCEPTABLE
	2	16.9	18.7	13.6- 24.1	14.9- 22.8	ACCEPTABLE
K	1	57.86	58.0	43.5- 72.5	47.2- 68.8	ACCEPTABLE
	2	1204	1100	950- 1270	991- 1230	ACCEPTABLE
ERCURY	1	13.86	9.38	7.31- 11.9	7.89- 11.3	NOT ACCEPTABLE
	2	9.58	6.67	5.00- 8.48	5.44- 8.04	NOT ACCEPTABLE
ANGANESE	1	647	600	536- 660	551- 644	CHECK FOR ERROR
	2	79.2	73.5	64.0- 82.7	66.4- 80.4	ACCEPTABLE
ICKEL	1	945.4	860	766- 952	789- 928	CHECK FOR ERROR
	2	374.8	340	296- 383	307- 372	CHECK FOR ERROR
EAD	1	1112	1200	1060- 1350	1100- 1310	ACCEPTABLE
	2	686	738	636- 833	661- 809	ACCEPTABLE

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

LAB ACCREDITATION PROGRAM

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CAL DEPT HEALTH SERVICES

WATER POLLUTION STUDY NUMBER WP031

LABORATORY: CA204

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	240	228	156- 277	171- 262	ACCEPTABLE
	2	390	387	268- 486	296- 459	ACCEPTABLE
VANADIUM	1	997	940	832- 1040	860- 1020	ACCEPTABLE
	2	178.9	170	146- 188	151- 183	ACCEPTABLE
ZINC	1	862.7	842	737- 947	763- 921	ACCEPTABLE
	2	45.9	46.3	37.5- 56.1	39.8- 53.7	ACCEPTABLE
ANTIMONY	3	100.9	94.5	56.4- 119	64.3- 111	ACCEPTABLE
	4	194.3	189	108- 244	125- 227	ACCEPTABLE
SILVER	3	85.3	73.9	60.6- 86.8	63.9- 83.5	CHECK FOR ERROR
	4	25.5	25.8	21.1- 30.4	22.2- 29.2	ACCEPTABLE
THALLIUM	3	60.8	62.8	47.0- 77.3	50.8- 73.4	ACCEPTABLE
	4	503	539	421- 643	450- 615	ACCEPTABLE
MOLYBDENUM	3	25.0	24.5	18.6- 30.6	20.2- 29.0	ACCEPTABLE
	4	83.4	81.6	64.4- 95.0	68.3- 91.1	ACCEPTABLE
STRONTIUM	3	30	19.1	14.4- 23.3	15.5- 22.1	NOT ACCEPTABLE
	4	82	73.4	62.0- 84.5	64.9- 81.5	CHECK FOR ERROR
TITANIUM	3	130	130	109- 151	114- 145	ACCEPTABLE
	4	43.2	43.0	34.0- 53.4	36.5- 50.9	ACCEPTABLE
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH-UNITS	3	9.52	9.50	9.19- 9.75	9.26- 9.68	ACCEPTABLE
	4	4.69	4.70	4.62- 4.77	4.64- 4.75	ACCEPTABLE
SPEC. COND. (UMHOS/CM AT 25 C)	1	904	899	840- 980	857- 963	ACCEPTABLE
	2	388	398	368- 435	377- 427	ACCEPTABLE

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

WATER POLLUTION STUDY NUMBER WP031

BORATORY: CA204

TES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
S AT 180 C	1	508	577	396- 759	441- 713	ACCEPTABLE
	2	208	223	168- 284	183- 269	ACCEPTABLE
TAL HARDNESS S CACO3)	1	269.5	279	236- 307	245- 298	ACCEPTABLE
	2	56.9	57.4	51.2- 63.8	52.8- 62.2	ACCEPTABLE
LCIUM	1	121	110	87.4- 126	92.2- 121	ACCEPTABLE
	2	7.92	7.00	5.95- 8.19	6.23- 7.91	CHECK FOR ERROR
GNESIUM	1	1.01	0.960	0.771- 1.18	0.822- 1.13	ACCEPTABLE
	2	10.31	9.70	8.38- 11.0	8.71- 10.6	ACCEPTABLE
DIUM	1	63.20	61.7	56.2- 67.8	57.6- 66.3	ACCEPTABLE
	2	28.2	26.3	23.6- 29.2	24.3- 28.5	ACCEPTABLE
TASSIUM	1	7.25	7.50	6.39- 8.81	6.70- 8.50	ACCEPTABLE
	2	44.8	40.0	34.5- 45.6	35.9- 44.2	CHECK FOR ERROR
TAL ALKALINITY AS CACO3)	1	119	120	106- 133	109- 130	ACCEPTABLE
	2	11.4	11.0	7.85- 15.3	8.77- 14.3	ACCEPTABLE
IDE	1	237	199	183- 213	187- 210	NOT ACCEPTABLE
	2	41.9	41.2	36.5- 45.4	37.6- 44.3	ACCEPTABLE
LUORIDE	1	3.34	3.30	2.83- 3.77	2.95- 3.65	ACCEPTABLE
	2	0.45	0.380	0.319-0.457	0.336-0.439	CHECK FOR ERROR
ULFATE	1	13.54	14.0	10.8- 16.8	11.5- 16.0	ACCEPTABLE
	2	90.9	92.0	78.1- 105	81.5- 102	ACCEPTABLE
NUTRIENTS IN MILLIGRAMS PER LITER:						
MMONIA-NITROGEN	1	7.15	7.70	6.10- 9.16	6.47- 8.79	ACCEPTABLE
	2	0.66	0.730	0.491-0.982	0.550-0.923	ACCEPTABLE

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

WATER POLLUTION STUDY NUMBER WP031

ABORATORY: CA204

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
NUTRIENTS IN MILLIGRAMS PER LITER:						
ITRATE-NITROGEN	1	0.52	0.520	0.378-0.658	0.412-0.625	ACCEPTABLE
	2	10.59	11.0	8.84- 13.0	9.34- 12.5	ACCEPTABLE
RTHOPHOSPHATE	1	0.14	0.150	0.114-0.187	0.122-0.178	ACCEPTABLE
	2	3.82	4.10	3.48- 4.68	3.62- 4.54	ACCEPTABLE
JELDAHL-NITROGEN	3	4.20	14.0	10.3- 17.1	11.1- 16.3	NOT ACCEPTABLE
	4	0.81	0.710	0.226- 1.32	0.357- 1.19	ACCEPTABLE
TOTAL PHOSPHORUS	3	6.8	7.40	5.57- 8.05	5.86- 7.75	ACCEPTABLE
	4	0.46	0.490	0.341-0.569	0.369-0.542	ACCEPTABLE
DEMANDS IN MILLIGRAMS PER LITER:						
COD	1	67.3	70.8	52.4- 84.6	56.5- 80.5	ACCEPTABLE
	2	201	207	163- 230	172- 221	ACCEPTABLE
PCB'S IN MICROGRAMS PER LITER:						
PCB-AROCLOR 1254	1	1.74	1.87	0.988- 2.71	1.21- 2.49	ACCEPTABLE
PCB-AROCLOR 1260	2	4.55	4.63	2.79- 5.96	3.19- 5.56	ACCEPTABLE
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
PCB IN OIL- 1016/1242	2	30.43	35.3	8.02- 46.6	13.0- 41.6	ACCEPTABLE

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

WATER POLLUTION STUDY NUMBER WP031

LABORATORY: CA204

TESTS	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	39.27	43.9	13.5- 61.8	19.8- 55.5	ACCEPTABLE
PESTICIDES IN MICROGRAMS PER LITER:						
CHLORDANE	3	7.92	8.21	4.91- 9.72	5.52- 9.11	ACCEPTABLE
	4	2.23	2.21	1.07- 2.77	1.29- 2.56	ACCEPTABLE
ALDRIN	1	0.48	0.539	0.122-0.754	0.202-0.674	ACCEPTABLE
	2	0.07	0.086	.0171-0.121	.0303-0.108	ACCEPTABLE
DIELDRIN	1	0.53	0.475	0.203-0.710	0.267-0.645	ACCEPTABLE
	2	0.18	0.173	.0861-0.239	0.106-0.219	ACCEPTABLE
DDD	1	0.86	0.866	0.433- 1.15	0.524- 1.06	ACCEPTABLE
	2	0.17	0.202	.0956-0.268	0.117-0.246	ACCEPTABLE
DDE	1	0.45	0.539	0.235-0.756	0.301-0.690	ACCEPTABLE
	2	0.14	0.173	.0788-0.236	.0989-0.216	ACCEPTABLE
DDT	1	0.79	0.796	0.362- 1.06	0.450-0.972	ACCEPTABLE
	2	0.13	0.142	.0570-0.216	.0772-0.196	ACCEPTABLE
HEPTACHLOR	1	0.61	0.669	0.187-0.918	0.279-0.825	ACCEPTABLE
	2	0.20	0.216	.0756-0.269	0.100-0.245	ACCEPTABLE
HEPTACHLOR EPOXIDE	1	0.43	0.478	0.260-0.640	0.308-0.592	ACCEPTABLE
	2	0.16	0.174	.0858-0.235	0.105-0.216	ACCEPTABLE
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
1,2 DICHLOROETHANE	1	11.82	15.1	10.2- 20.4	11.5- 19.1	ACCEPTABLE
	2	44.45	55.8	36.2- 73.4	40.9- 68.7	ACCEPTABLE

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

WATER POLLUTION STUDY NUMBER WP031

LABORATORY: CA204

TES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
HLOROFORM	1	9.89	11.8	7.85- 15.9	8.86- 14.8	ACCEPTABLE
	2	49.80	64.4	38.3- 86.7	44.4- 80.6	ACCEPTABLE
,1,1 TRICHLOROETHANE	1	9.87	13.4	8.68- 18.2	9.89- 17.0	CHECK FOR ERROR
	2	24.68	37.8	22.7- 50.0	26.2- 46.6	CHECK FOR ERROR
RICHLOROETHENE	1	4.87	7.57	5.10- 10.3	5.75- 9.62	NOT ACCEPTABLE
	2	42.64	62.7	38.6- 80.5	43.9- 75.2	CHECK FOR ERROR
ARBONTETRACHLORIDE	1	10.22	16.4	10.9- 22.2	12.3- 20.8	NOT ACCEPTABLE
	2	22.67	37.1	23.0- 50.1	26.4- 46.6	NOT ACCEPTABLE
ETRACHLOROETHENE	1	5.96	9.24	6.08- 12.5	6.89- 11.7	NOT ACCEPTABLE
	2	34.64	51.3	31.2- 66.7	35.7- 62.2	CHECK FOR ERROR
ROMODICHLOROMETHANE	1	8.88	10.8	7.33- 14.2	8.21- 13.3	ACCEPTABLE
	2	31.83	38.1	24.9- 53.6	28.5- 50.0	ACCEPTABLE
IBROMOCHLOROMETHANE	1	9.21	13.1	8.48- 17.0	9.55- 15.9	CHECK FOR ERROR
	2	46.18	58.1	34.1- 80.2	39.9- 74.4	ACCEPTABLE
ROMOFORM	1	10.10	14.5	7.45- 20.0	9.04- 18.4	ACCEPTABLE
	2	33.82	42.3	25.5- 59.9	29.9- 55.6	ACCEPTABLE
ETHYLENE CHLORIDE	1	8.35	10.6	6.59- 16.1	7.79- 14.9	ACCEPTABLE
	2	41.07	54.1	30.7- 76.5	36.5- 70.7	ACCEPTABLE
HLOROBENZENE	1	12.15	16.0	11.4- 20.1	12.5- 19.0	CHECK FOR ERROR
	2	48.33	63.7	41.3- 79.8	46.2- 74.9	ACCEPTABLE
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
ENZENE	1	29.90	40.1	25.7- 56.0	29.5- 52.2	ACCEPTABLE
	2	5.89	8.25	5.24- 11.6	6.04- 10.8	CHECK FOR ERROR

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

WATER POLLUTION STUDY NUMBER WP031

LABORATORY: CA204

NOTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
ETHYLBENZENE	1	52.64	66.9	36.0- 94.3	43.4- 86.9	ACCEPTABLE
	2	9.70	14.0	9.26- 19.0	10.5- 17.8	CHECK FOR ERROR
TOLUENE	1	38.26	49.2	30.2- 65.2	34.6- 60.8	ACCEPTABLE
	2	6.75	9.51	6.09- 12.8	6.93- 11.9	CHECK FOR ERROR
1,2-DICHLOROBENZENE	1	58.2	65.5	32.7- 93.9	40.5- 86.2	ACCEPTABLE
	2	7.96	8.88	5.85- 11.7	6.59- 11.0	ACCEPTABLE
1,3-DICHLOROBENZENE	1	42.3	47.9	29.4- 61.7	33.5- 57.6	ACCEPTABLE
	2	14.15	16.6	11.6- 21.1	12.9- 19.9	ACCEPTABLE
1,4-DICHLOROBENZENE	1	55.2	62.5	34.4- 85.8	41.0- 79.3	ACCEPTABLE
	2	10.52	12.4	7.49- 17.8	8.79- 16.5	ACCEPTABLE
MISCELLANEOUS PARAMETERS:						
TOTAL CYANIDE (IN MG/L)	1	0.86	0.860	0.598- 1.15	0.668- 1.08	ACCEPTABLE
	2	0.16	0.160	0.102-0.208	0.116-0.194	ACCEPTABLE
NON FILTERABLE RESIDUE (IN MG/L)	1	56.8	61.0	47.7- 64.6	49.8- 62.5	ACCEPTABLE
	2	80.1	83.0	62.8- 91.3	66.4- 87.8	ACCEPTABLE
OIL AND GREASE (IN MG/L)	1	13.3	8.30	3.07- 12.2	4.22- 11.0	NOT ACCEPTABLE
	2	52.9	48.4	33.7- 56.0	36.5- 53.2	ACCEPTABLE
TOTAL PHENOLICS (IN MG/L)	1	0.6	0.595	0.312-0.878	0.384-0.805	ACCEPTABLE
	2	3.16	3.13	1.66- 4.60	2.04- 4.23	ACCEPTABLE
TOTAL RESIDUAL CHLORINE (IN MG/L)	1	3.72	3.70	3.06- 4.52	3.25- 4.32	ACCEPTABLE
	2	1.33	1.50	1.09- 1.77	1.18- 1.68	ACCEPTABLE

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

TMA

CALIFORNIA CORRECTIVE ACTION REPORT

CAR No. CARA-94-02 Issue Date 2/7/94 Page ___ of ___

1. To: BARBRA Sobbiner Department: METALS DEPARTMENT

2. Corrective action is required for (description of problem/item): Unacceptable results were obtained on for WP-031 for the following parameters: Strontium by Flame AA, Vanadium by Flame AA and Calcium by Flame AA; also silver by GFAA was unacceptable (Low level analysis of copper, manganese, zinc by flame were also unacceptable)

3. Reference QAM Section 17.2.2

4. Requestor Robert Mazurek Title QC Coordinator

5. Completion of items 6 through 10 are due by _____

6. 10 CFR Part 21 Applies: YES ____ NO X

7. Root cause of problem Sensitivity of instrument is not sufficient to accurately determine concentration levels within WP acceptance criteria (Cu, Sr, Mn, Zn). Current method/equipment is not sufficient for WP reporting (V, Ca)

8. Proposed corrective action Metals with low sensitivity will not be reported on WP below 20X MDL. Vanadium and Calcium are no longer reported for WP. Silver is on ongoing investigation and purity of reagent assessed.

9. Proposed action completion date 5-20-94

10. Department Representative Cristeta Rocamora Date 5-20-94

11. Corrective action proposed acceptable: YES X NO ____

12. Signature Robert Mazurek Date 8/20/94

13. Completion of items 14 through 17 due by: 5/20/94

14. Actual corrective action taken WP results submitted with estimated detection limits to assess suitability of submission. Vanadium and Calcium were not analyzed. For Silver, Reagents were checked for purity; Type II water cartridges were changed.

15. Action taken to assess impact on program or technical data GFAA/ICP results were used for sensitive elements. Calcium and Vanadium are not reported by Flame AA. Silver analysis by GFAA are assessed with LCSS and spikes to assess accuracy, therefore no adverse effect on program

16. Action taken to prevent recurrence Actions in #14 are designed to prevent recurrence.

17. Signature Cristeta V. Rocamora Date 5-20-94

18. Implementation verified by: R Mazurek Date 7/19/94

19. Manager review _____ Date _____

20. Q.A. final review (CAR closed) R Mazurek Date 8/8/94 SEE APG result

Form QAP-08.2, 09-10-93

"quality environmental services"

TMA/CALIFORNIA CORRECTIVE ACTION REQUEST

TMA

CAR No. CABA-94-03 Issue Date 2/7/94 Page ___ of ___

1. To: TONY LIM Department: WET CHEMISTRY

2. Corrective action is required for (description of problem/item): UNACCEPTABLE results WERE obtained on WP-031 for the following PARAMETERS: TKN, Oil and Grease, and Chloride (300.0)

3. Reference TMA/ABU QAM SECTION 17.2.2

4. Requestor ROBERT MAZUREK Title QC COORDINATOR

5. Completion of items 6 through 10 are due by 2/21/94

6. 10 CFR Part 21 Applies: YES ___ NO X

7. Root cause of problem See attached sheet item 7

8. Proposed corrective action See item 8

9. Proposed action completion date

10. Department Representative Rastoni Lim (wet chemistry) Date 7/1/94.

11. Corrective action proposed acceptable: YES X NO ___

12. Signature R. Mazurek Date 7/1/94

13. Completion of items 14 through 17 due by: 7/1/94

14. Actual corrective action taken See the attached sheet.

15. Action taken to assess impact on program or technical data See attached sheet item 15.

16. Action taken to prevent recurrence See item 14.

17. Signature Rastoni Lim Date 7/1/94

18. Implementation verified by: R. Mazurek Date 8/8/94 TRAINING FILE D Reyes

19. Manager review Date

20. Q.A. final review (CAR closed) Date

Form QAP-08.2, 09-10-93

quality environmental services

TMA/California CORRECTIVE ACTION REQUEST
Additional Responses

CAR No. CARA-94-03 Issue Date: February 7, 1994

Item 7: Root Cause of Problem:

TKN the old distillation apparatus produced results that were inconsistent. The same PE sample (Tai Kai) was run but with this apparatus and acceptable result were obtained.

Dilution of this sample for chloride was not accurately performed. The undiluted sample run and chloride was found at 200 ppm which is within acceptance limits. the rerun of the sample, which was diluted prior to analysis, fell outside of acceptance limits.

Oil and Grease: contamination is suspected from the water used to prepare the sample, or from the reagents or the glassware.

Item 8: Proposed corrective action:

The following corrective actions are proposed:

For TKN:

1) Use the new distillation apparatus.

For chloride:

1) Retrain analyst in proper dilution techniques and purchase a micropipettor to assure dilution are always consistent.

Oil and Grease:

1) Analyze freon 113 and DI system water for contamination.

2) Install a carbon polishing unit in the WC water system.

Item 14 Actual corrective action taken

The following corrective actions have been completed:

TKN

1) The TKN distillation apparatus is now used to distill all TKN samples.

Chloride

2) Automated pipettor has been ordered.

   The analyst has been instructed regarding dilution techniques.

Oil and Grease

3) Freon lot BF066 and the new DI water system were analyzed and found to contribute no contaminations to the O/G analysis. The LCS shows no negative bias.

Item 15 Affect on technical data

1) Based on the evaluation of the PE results, reported TKN results performed using the old distillation apparatus may have produced result with a negative bias. This bias would varied from sample to sample.

2) Based on the evaluation of the PE results, reported chloride results in the concentration range of the PE sample may be up to 20% higher than the true concentration in the sample.

3) Oil and grease samples run prior to the installation of the DI system could show positive bias of around 5 mg/L.

TMA

TMA/CALIFORNIA CORRECTIVE ACTION REQUEST

CAR No. CARA-94-04 Issue Date 2-7-94 Page ___ of ___

1. To: WIDA ANG Department: ORGANICS

2. Corrective action is required for (description of problem/item): The following parameters Analyzed by GCMS method 2840 had unacceptable results: Trichloroethene, Carbon tetrachloride, tetrachloroethene (See WP-[illegible]

3. Reference QAM Section 17.2.2

4. Requestor Robert MAZUREK Title QC COORDINATOR

5. Completion of items 6 through 10 are due by 2/21/94

6. 10 CFR Part 21 Applies: YES ___ NO X

7. Root cause of problem Problem was with the actual STD New vials were opened for this sample set and new calibration were analyzed. All were acceptable. The actual stock solution was too contentrated.

8. Proposed corrective action all new standards will be QC'd against an existing standard with all resulting conc. within given guidelines before it can be used for actual sample runs.

9. Proposed action completion date Implemented 01/02/94

10. Department Representative SAM YOKOYAMA Date 02/07/94

11. Corrective action proposed acceptable: YES X Mea 2/7/94 NO ___

12. Signature John Yokoyama Robert MAZUREK Date 02/07/94 2/7/94

13. Completion of items 14 through 17 due by: ___

14. Actual corrective action taken standards Samples have been checked against a second source before being implemented. All compounds must be within given guidelines before use.

15. Action taken to assess impact on program or technical data Majority of cases analyzed with the STD and since the PE was run has been CLP 90 which utilized a different working solns. The 8240 cases analyzed were run on relatively clean samples with TCL hits being mostly common lab contaminants such as $MeCl_2$ + acetone. Little impact on data.

16. Action taken to prevent recurrence as stated, standards will be checked against a different lot or supplier to ensure accuracy of contentration before being used in actual sample runs.

17. Signature John Yokoyama Date 02/07/94

18. Implementation verified by: R Mazurek Date 4/19/94 See Attached Cross Check

19. Manager review Wida Ang Date 4/13/94

20. Q.A. final review (CAR closed) R Mazurek Date 4/19/94

Form QAP-08.2, 09-10-93

"quality environmental services"

TMA

TMA/ .IFORNIA CORRECTIVE ACTION REQU

CAR No. CARA-94-05 Issue Date 2/7/94 Page ___ of ___

1. To: _____ Department: METALS DEPARTMENT

2. Corrective action is required for (description of problem/item): Unacceptable mercury results for WP-031 were obtained for mercury.

3. Reference TMA/ABL QAM 17.2.2

4. Requestor ROBERT MAZUREK Title QC COORDINATOR

5. Completion of items 6 through 10 are due by 2/21/94

6. 10 CFR Part 21 Applies: YES ___ NO X

7. Root cause of problem Sample preparation techniques; errors in calculations of results biasing the results high

8. Proposed corrective action Retrained cold vapor Mercury operator; Trained extraction personnel in sample prep to eliminate source of preparation errors

9. Proposed action completion date 5-20-94

10. Department Representative Cristeta Pacamora Date 5-20-94

11. Corrective action proposed acceptable: YES X NO ___

12. Signature Robert Mazurek Date 5/20/94

13. Completion of items 14 through 17 due by: 5/20/94

14. Actual corrective action taken Retrained AA analyst and trained extraction analyst

15. Action taken to assess impact on program or technical data Mercury results were based high by 20% but no more than 50%

16. Action taken to prevent recurrence Corrective actions in section 14 are designed to prevent recurrence and supervisor awareness of situation will allow ongoing monitoring

17. Signature Cristeta Pacamora Date 5-20-94

18. Implementation verified by: R Mazurek Date 7/29/94 VERIFICATION BASED ON Acceptable WP OR BLIND PE result.

19. Manager review _____ Date _____

20. Q.A. final review (CAR closed) R Mazurek Date 8/8/94

Form QAP-08.2, 09-10-93

"quality environmental services"

ADDENDUM CARA-94-05 METALS 8-15-94 BJS

#7 ROOT CAUSE OF PROBLEM:
SAMPLES WERE DIGESTED USING 50 ML OF SAMPLE INSTEAD OF 100 ML FOR LIQUID SAMPLES. THE SAMPLES WERE THEN ANALYZED BY THE AA OPERATOR AND CALCULATED AS IF THEY HAD BEEN TAKEN TO 100 ML FINAL VOLUME. THE STANDARDS USE FOR THE CALIBRATION CURVE WERE NOT DIGESTED BUT WERE PREPARED AT THE BENCH BEFORE ANALYSIS. THE EXTRACTION ANALYST DID NOT COMPLETE THE SAMPLES FOR THE INSTRUMENTATION ANALYSIS AND THE AA OPERATOR DID NOT TAKE INTO ACCOUNT THAT THE VOLUMES WERE INCORRECT.

#8 PROPOSED CORRECTIVE ACTION:
NEW SOP'S HAVE BEEN WRITTEN AND ARE BEING PUT INTO PLACE IN THE ARLI SYSTEM. A NEW EXTRACTION ANALYST IS BEING TRAINED ACCORDING TO THE NEW SOP. THE SAMPLES AND STANDARDS ARE BEING DIGESTED WITH 100ML (FOR LIQUID SAMPLES) INITIAL VOLUME AND ARE BEING TAKEN TO THE POINT OF THE INSTRUMENTATION ANALYSIS BY THE EXTRACTION PERSONNEL. THE EXTRACTION DEPT. WILL BE DOING THE COMPLETE ANALYSIS RATHER THAN ONLY THE DIGESTIONS AS THE TRAINING PROCEEDS. THE AA OPERATOR HAS BEEN REPRIMANDED FOR NOT FOLLOWING THROUGH AND CALCULATING THE SAMPLES INCORRECTLY.

#15 MERCURY RESULTS HAVE BEEN AFFECTED BY 25-35% ERROR ON THE HIGH SIDE.

MANAGER REVIEW Barbara Scribner DATE 8/15/94

TMA/ARLI
Thermo Analytical Inc.

CORRECTIVE ACTION REQUEST FORM

1. Department: Metals — Report No.: CARA-93-11
2. Attention: Robert Ferguson — Reply By: 7/20/93
3. Auditor: Robert Mazurek — Date: 7/6/93

4. Observation:
Within the last two years Performance Evaluation samples for mercury have had continual unacceptable results for mercury. These PE rounds are listed below:

1) WS-028 (High result)
2) WS-030 (Acceptable)
3) WS-030 (High result)
4) WS-031 (High result)
5) WP-026 (High result)
6) WP-027 (High result)
7) WP-028 (High result)
8) WP-029 (High result)

5. Recommendation:

1) Determine why past corrective actions have failed to identify and correct the root cause of the unacceptable PE result.

2) Review mercury procedure step by step identify and record steps where mercury contamination or loss can occur. Determine if contamination is being introduced at this step and make appropriate corrective actions.

3) Successful corrective actions shall result in method and reagent blanks that are free of contamination and blank spike samples (spiking level at 10 times the IDL) recoveries within 80 to 120 percent.

4) Verify the corrective action by analyzing blind performance evaluation samples and obtaining acceptable results.

6. Corrective Action Reply:
See attached for reply.

7. Date Action Will Be Completed: September 10, 1993.

8. Signature of Department Representative: [signature] Date: 8/13/93

9. Evaluation of Corrective Action Response:

CAR Continued on CARA-94-05

Acceptable _____ Not Acceptable _____ Other X

10. Quality Assurance Auditor: Robert Mazurek Date: 3/13/94

11. Corrective Action Complete: See CARA-94-05 for Continued Corrective Action

Verified By: Robert Mazurek Date: 3/13/94

cc: Dave Kohlenberger

Form-164-1, Rev: 02, 02/27/93

Corrective Action Reply CARA-93-11

1 & 2) A complete review of Mercury analyses has been performed. The following items appear to be the root cause of the consistently high results.

a. The cleaning of glassware was not performed by SW-846 protocol. In particular, the HCl rinse was not performed.

b. The heating schedule and temperature in sample preparation has not been strictly adhered to.

c. The hot plate temperature was not verified to be 95°C.

d. A preliminary run method reagent was not performed to confirm the absence of organics that could absorb at the Hg wavelength.

3) To correct these difficulties, the following steps are being taken:

a. The correct cleaning procedure is now being performed routinely.

b. The hot plate was not able to reach 95°C, and therefore was repaired. Calibration was performed after the repair using a NIST thermometer in an equal volume of silicone oil.

c. A Hg-4 Mercury analyzer is currently being set up to measure Mercury. It is expected to be in operation by August 27, 1993 at which time the blank check and blank spike samples will be run. These actions should be completed by September 10, 1993.

TMA CALIFORNIA CORRECTIVE ACTION REQUEST

CAR No. CARA-94-06 Issue Date 2/28/94 Page 1 of 1

1. To: Rastowi Lim Department: WET CHEMISTRY

2. Corrective action is required for (description of problem/item): Results for WP-031, submitted for a commercial client on W.O A3-09-079 were unacceptable for the following compounds: ammonia-nitrogen, nitrate-nitrogen orthophosphate and total phosphorous.

3. Reference TMA/ARLI QAM SECTION

4. Requestor ROBERT MAZUREK Title QC COORDINATOR

5. Completion of items 6 through 10 are due by 2/28/94

6. 10 CFR Part 21 Applies: YES _____ NO X

7. Root cause of problem All unacceptable results on W.O A3-09-079 were acceptable for WP-031. These results were submitted to California DOHS (See Enclosure). The vial recieved by the lab on W.O A3-09-079 for nutrient #2, was cracked, but was still analyzed. Total phosphorous unacceptable result were due to calculation errors caused by the incorrect recording of the volume of sample used.

8. Proposed corrective action ① Whenever a crack or damaged PE sample vial is recieved, the analysis will not be performed until a new vial is recieved. ② Lab technicians will be asked to record the sample amount used, immediately after the sample is aliquot is delivered.

9. Proposed action completion date 2/28/94

10. Department Representative Rastowi Lim Date 2/28/94

11. Corrective action proposed acceptable: YES X NO _____

12. Signature Robert Mazurek Date 2/28/94

13. Completion of items 14 through 17 due by: _____

14. Actual corrective action taken A memo was sent to all area supervisors and Project Managers that informs them about the processing of damaged PE vials (see enclosure). The wet chemistry supervisor has reminded all wet chem technicians that all sample aliquot volume used shall be recorded in lab notebook immediately after the sample aliquot is taken

15. Action taken to assess impact on program or technical data Sealed PE vials are unique to PE Program therefore they do not affect other technical programs.

16. Action taken to prevent recurrence The actions taken in Section 14 are design to prevent recurrence.

17. Signature Rastowi Lim Date 2/28/94

18. Implementation verified by: Robert Mazurek Date 2/28/94

19. Manager review Bill Fallenberger Date 2/28/94

20. Q.A. final review (CAR closed) Robert Mazurek Date 4/29/94

TMA

TMA/CALIFORNIA CORRECTIVE ACTION REQUEST

CAR No. CARA 9407 Issue Date 4/26/94 Page ___ of ___

1. To: Tony Lim Department: Wet Chemistry

2. Corrective action is required for (description of problem/item): Turbidity on WS-033 was unacceptable

3. Reference QAM Section - 17.2

4. Requestor R Maebek Title QC Coordinator

5. Completion of items 6 through 10 are due by ___

6. 10 CFR Part 21 Applies: YES ___ NO X

7. Root cause of problem Transcription error by QA Dept.

8. Proposed corrective action WC Supervisor will review submitted result for accuracy prior to submittal to USEPA

9. Proposed action completion date 6/29/94

10. Department Representative Rastoni Lim Date 7/1/94

11. Corrective action proposed acceptable: YES X NO ___

12. Signature R Maebek Date 7/1/94

13. Completion of items 14 through 17 due by: 7/1/94

14. Actual corrective action taken No further action required until PE results are recieved. 7/1/94

15. Action taken to assess impact on program or technical data NONE

16. Action taken to prevent recurrence The actions in Section 14 are designed to prevent recurrence

17. Signature Rastoni Lim Date 7/1/94

18. Implementation verified by: R Maebek Date 7/1/94

19. Manager review [illegible] Date 7/5/94

20. Q.A. final review (CAR closed) [illegible] Date 7/5/94

Form QAP-08.2, 09-10-93

"quality environmental services"

WS-33

TMA/ARLI
THERMO ANALYTICAL

WATER SUPPLY STUDY
WS-033

'quality environmental services'

PERFORMANCE EVALUATION REPORT

DATE: 2/10/94

WATER SUPPLY STUDY NUMBER WS033

LABORATORY CA204

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
ALUMINUM	1	1448	1400	1260- 1510	ACCEPTABLE
ANTIMONY	2	56.0	48.9	34.2- 63.6	ACCEPTABLE
ARSENIC	1	43.4	39.5	33.1- 45.1	ACCEPTABLE
BARIUM	2	1779	1800	1530- 2070	ACCEPTABLE
BERYLLIUM	1	9.9	9.07	7.71- 10.4	ACCEPTABLE
IRON	2	1635	1700	1500- 1990	ACCEPTABLE
CADMIUM	1	48.6	49.0	39.2- 58.9	ACCEPTABLE
CHROMIUM	1	169.1	159	135- 183	ACCEPTABLE
COPPER	1	1867	1900	1710- 2090	ACCEPTABLE
LEAD	1	80.4	78.7	55.1- 102	ACCEPTABLE
MANGANESE	1	69.5	61.3	56.7- 67.7	NOT ACCEPTABLE
MERCURY	1	2.87	1.77	1.24- 2.30	NOT ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT

DATE: 2/10/94

WATER SUPPLY STUDY NUMBER WS033

LABORATORY CA204

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
MOLYBDENUM	2	137.3	130	89.2- 166	ACCEPTABLE
NICKEL	1	513.9	490	417- 563	ACCEPTABLE
SELENIUM	1	106.5	93.3	73.6- 113	ACCEPTABLE
SILVER	2	65.7	66.9	57.1- 75.6	ACCEPTABLE
THALLIUM	2	8.0	9.56	6.69- 12.4	ACCEPTABLE
ZINC	1	2246	2090	1920- 2240	NOT ACCEPTABLE
NITRATE/NITRITE/FLUORIDE IN MILLIGRAMS PER LITER:					
NITRATE AS N	1	9.88	9.80	8.52- 10.8	ACCEPTABLE
NITRITE AS N	1	1.32	1.40	1.19- 1.61	ACCEPTABLE
FLUORIDE	1	6.81	6.60	5.94- 7.26	ACCEPTABLE
MISCELLANEOUS ANALYTES:					
RESIDUAL FREE CHLORINE (MILLIGRAMS PER LITER)	1	3.90 **	4.20	3.32- 4.71	ACCEPTABLE

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

LAB ACCREDITATION PROGRAM
MAR 07 1994
DEPT OF HEALTH

PERFORMANCE EVALUATION REPORT

DATE: 2/10/93

WATER SUPPLY STUDY NUMBER WS033

LABORATORY CA204

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
MISCELLANEOUS ANALYTES:					
TURBIDITY (NTU'S)	1	35	** 1.10	0.836- 1.54	NOT ACCEPTABLE
TOTAL FILTERABLE RESIDUE (MILLIGRAMS PER LITER)	1	350	384	255- 567	ACCEPTABLE
CALCIUM (MG. CACO3/L)	1	204	200	147- 212	ACCEPTABLE
PH-UNITS	1	9.18	9.10	8.36- 9.31	ACCEPTABLE
ALKALINITY (MG. CACO3/L)	1	43.2	41.0	37.3- 46.4	ACCEPTABLE
SODIUM (MILLIGRAMS PER LITER)	1	20.4	18.8	17.1- 20.5	ACCEPTABLE
SULFATE (MILLIGRAMS PER LITER)	1	170	170	152- 185	ACCEPTABLE
TOTAL CYANIDE (MILLIGRAMS PER LITER)	1	0.30	0.340	0.255-0.425	ACCEPTABLE

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

LAB ACCREDITATION PROGRAM
MAR 07 1994
HEALTH SERVICES

TMA/ARLI
THERMO ANALYTICAL

APG ROUND ROBIN STUDY
JANUARY 1994

'quality environmental services'

Parameter	Level	Reported	Ref Value	Mean	Std Dev	Acceptance Range	Comment
Mercury	1		0.710	0.770	0.203	0.246 - 1.294	Unreported
Mercury	2		3.810	3.897	0.551	2.476 - 5.318	Unreported
Molybdenum	1		153.550	145.706	11.342	116.444 - 174.967	Unreported
Molybdenum	2		294.300	282.706	15.845	241.826 - 323.586	Unreported
Nickel	1		74.820	75.043	6.043	59.451 - 90.634	Unreported
Nickel	2		281.310	281.565	12.182	250.136 - 312.995	Unreported
Selenium	1		39.080	37.978	4.244	27.028 - 48.928	Unreported
Selenium	2		61.410	61.117	6.189	45.151 - 77.084	Unreported
Silver	1		30.800	30.491	2.992	22.773 - 38.210	Unreported
Silver	2		352.060	348.900	24.298	286.210 - 411.590	Unreported
Thallium	1		152.980	148.118	11.689	117.961 - 178.276	Unreported
Thallium	2		250.330	249.400	19.130	200.044 - 298.756	Unreported
Vanadium	1		175.720	174.325	7.622	154.660 - 193.990	Unreported
Vanadium	2		1490.820	1486.539	61.526	1327.803 - 1645.275	Unreported
Zinc	1		69.660	70.287	4.078	59.766 - 80.807	Unreported
Zinc	2		144.300	145.858	8.148	124.836 - 166.881	Unreported

Standard: Acids ug/L

2-Chlorophenol	1	16.7	23.180	18.720	4.472	7.182 - 30.258	
2-Chlorophenol	2	135.1	179.780	136.771	33.748	49.700 - 223.842	
2,4-Dichlorophenol	1	21.2	32.160	24.456	4.876	11.876 - 37.037	
2,4-Dichlorophenol	2	43.0	58.960	46.532	9.324	22.476 - 70.589	
2,4-Dimethylphenol	1	12.6	17.660	12.552	3.358	3.889 - 21.216	
2,4-Dimethylphenol	2	75.5	97.560	75.953	15.547	35.841 - 116.065	
2,4-Dinitrophenol	1	25.4	67.160	44.877	15.407	5.127 - 84.627	
2,4-Dinitrophenol	2	132.5	186.260	156.523	44.115	42.706 - 270.340	
2-Methyl-4,6-Dinitrophenol	1	31.3	57.300	47.333	9.313	23.306 - 71.359	
2-Methyl-4,6-Dinitrophenol	2	101.8	131.860	113.087	30.228	35.099 - 191.076	
2-Nitrophenol	1	20.5	33.440	25.542	5.743	10.724 - 40.360	

APG The Measure of Quality
2730 Washington Blvd., Belpre, OH 45714 800-272-4442 614-423-4200

Customer Code: 3486

January, 1994

Parameter	Level	Reported	Ref Value	Mean	Std Dev	Acceptance Range	Comment
2-Nitrophenol	2	57.8	80.680	63.738	12.314	31.967 - 95.509	
4-Nitrophenol	1	34.1	58.080	39.853	19.189	0.000 - 89.360	
4-Nitrophenol	2	99.9	130.960	89.313	35.766	0.000 - 181.589	
Pentachlorophenol	1	44.5	68.720	59.527	13.317	25.169 - 93.885	
Pentachlorophenol	2	102.7	151.840	136.382	32.426	52.723 - 220.041	

Standard: Base/Neutrals ug/L

Di-n-butylphthalate	1	15.9	38.820	29.371	11.007	0.973 - 57.770	
Di-n-butylphthalate	2	125.7	192.340	119.915	46.452	0.068 - 239.763	
Dimethylphthalate	1		58.900	32.148	21.910	0.000 - 88.676	Unreported
Dimethylphthalate	2	30.4	118.820	56.101	40.356	0.000 - 160.218	
Aldrin	1		9.180	8.404	3.319	0.000 - 16.967	Unreported
Aldrin	2		61.860	56.200	14.179	19.618 - 92.782	Unreported
Gamma-BHC	1		5.780	4.182	2.248	0.000 - 9.981	Unreported
Gamma-BHC	2		201.320	127.125	60.931	0.000 - 284.326	Unreported
4,4'-DDT	1		20.720	13.021	7.591	0.000 - 32.606	Unreported
4,4'-DDT	2		108.720	62.100	29.736	0.000 - 138.818	Unreported
Isophorone	1	34.7	35.320	29.210	5.341	15.430 - 42.990	
Isophorone	2	45.5	57.440	45.936	8.443	24.152 - 67.720	
Anthracene	1	19.2	23.660	21.724	3.452	12.819 - 30.629	
Anthracene	2	53.9	67.980	57.854	9.102	34.372 - 81.337	
Benzo (a) Anthracene	1	21.6	24.860	21.827	3.398	13.061 - 30.593	
Benzo (a) Anthracene	2	60.6	74.280	62.349	8.393	40.694 - 84.003	
Benzo (a) Pyrene	1	30.4	34.640	29.037	6.677	11.810 - 46.263	
Benzo (a) Pyrene	2	52.7	62.520	48.628	9.895	23.099 - 74.157	
Fluorene	1	37.2	40.160	37.323	4.819	24.889 - 49.757	
Fluorene	2	118.9	134.760	112.359	20.746	58.835 - 165.883	
Naphthalene	1	25.3	26.580	22.791	3.367	14.104 - 31.478	
Naphthalene	2	78.4	96.860	74.514	14.099	38.139 - 110.889	

APG The Measure of Quality
Analytical Products Group, Inc.
2730 Washington Blvd., Belpre, OH 45714 800-272-4442 614-423-4200

Customer Code: 3486 January, 1994 Page: 4

Parameter	Level	Reported	Ref Value	Mean	Std Dev	Acceptance Range	Comment
Pyrene	1	23.6	26.700	24.051	3.742	14.397 - 33.705	
Pyrene	2	44.1	54.120	46.655	7.129	28.262 - 65.049	
Bis (2-Chloroethyl) Ether	1	76.6	83.920	69.508	13.739	34.061 - 104.955	
Bis (2-Chloroethyl) Ether	2	195.7	271.600	194.814	43.730	81.989 - 307.638	
Hexachlorobutadiene	1	34.2	41.900	29.648	6.548	12.754 - 46.542	
Hexachlorobutadiene	2	36.2	51.400	35.070	7.583	15.507 - 54.634	
1,2,4-Trichlorobenzene	1	25.6	28.760	22.324	4.617	10.410 - 34.237	
1,2,4-Trichlorobenzene	2	115.4	144.480	111.032	29.236	35.604 - 186.459	

APG The Measure of Quality
2730 Washington Blvd., Belpre, OH 45714 800-272-4442 614-423-4200

ENVIRONMENTAL EVALUATION

TMA/ARLI
THERMO ANALYTICAL

TMA
DOUBLE BLIND

'quality environmental services'

A3-09-030

The Environmental Performance Audit

EPA0893

August 1993

TMA - ARLI

Laboratory # 000104

asi Analytical Standards, Incorporated

Organic Summary Report

Compound	Reported Values	Mean Recovery	# of Labs	Acceptance Limits	Warning Limits	Performance Evaluation
Base/Neutrals & Acids				Units reported in micrograms per liter		
Fluoranthene	19.000	18.720	53	7.729 - 29.711	10.370 - 27.070	Acceptable
Hexachlorobutadiene	43.000	38.993	53	15.554 - 62.432	21.186 - 56.800	Acceptable
2-Nitrophenol	70.000	52.017	53	16.274 - 87.760	24.863 - 79.171	Acceptable

A3-09-030

The Environmental Performance Audit

EPA0893

August 1993

TMA - ARLI

Laboratory # 000104

Analytical Standards, Incorporated

Organic Summary Report

Compound	Reported Values	Mean Recovery	# of Labs	Acceptance Limits	Warning Limits	Performance Evaluation
Organochlorine Pesticides				Units reported in micrograms per liter		
4,4'-DDD	*********	13.551	53	2.088 - 25.014	4.843 - 22.259	Not Reporting
4,4'-DDE	*********	5.895	53	0.567 - 11.223	1.848 - 9.942	Not Reporting
4,4'-DDT	*********	12.199	53	1.497 - 22.901	4.069 - 20.329	Not Reporting
Heptachlor	*********	5.468	53	2.184 - 8.752	2.973 - 7.963	Not Reporting
PCB'S				Units reported in micrograms per liter		
PCB-1260	8.200	9.389	53	1.308 - 17.470	3.250 - 15.528	Acceptable
Volatiles				Units reported in micrograms per liter		
Benzene	42.000	49.972	56	32.366 - 67.578	36.597 - 63.347	Acceptable
Carbon tetrachloride	19.000	23.440	56	11.115 - 35.765	14.077 - 32.803	Acceptable
Chlorobenzene	29.000	35.171	56	24.074 - 46.268	26.741 - 43.601	Acceptable
Chloroform	93.000	103.151	56	69.936 - 136.366	77.918 - 128.384	Acceptable
Toluene (Methylbenzene)	64.000	72.924	56	52.070 - 93.778	57.081 - 88.767	Acceptable
Base/Neutrals & Acids				Units reported in micrograms per liter		
Butyl benzyl phthalate	77.000	59.897	53	1.504 - 118.290	15.536 - 104.258	Acceptable
2-Chlorophenol	48.000	36.300	53	15.067 - 57.533	20.169 - 52.431	Acceptable

TMA/ERG

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: TMA/ERG Laboratory

PE Sample	Number Acceptable	Number Analyzed	% Acceptable
WS-033			
Metal	18	18	100.0
Inorganic/Mineral	9	13	69.2
Organic	21	30	70.0

Corrective actions for WP-031. WP-031 was submitted June 1994.

WP-031

PERFORMANCE EVALUATION REPORT

DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

RECEIVED

LABORATORY: MI007

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
ALUMINUM	1	700	681	550- 784	579- 755	ACCEPTABLE
	2	141	140	107- 182	117- 173	ACCEPTABLE
ARSENIC	1	490	492	408- 587	430- 565	ACCEPTABLE
	2	111	74.3	56.7- 92.9	61.2- 86.4	NOT ACCEPTABLE
BERYLLIUM	1	439	461	382- 533	401- 514	ACCEPTABLE
	2	226	240	198- 278	208- 268	ACCEPTABLE
CADMIUM	1	172	165	138- 194	145- 187	ACCEPTABLE
	2	62.4	61.0	50.8- 72.0	53.5- 69.4	ACCEPTABLE
COBALT	1	893	880	775- 980	801- 954	ACCEPTABLE
	2	50.8	53.8	45.4- 61.9	47.5- 59.8	ACCEPTABLE
CHROMIUM	1	699	730	604- 843	634- 813	ACCEPTABLE
	2	15.0	23.4	17.4- 29.0	18.9- 27.6	NOT ACCEPTABLE
COPPER	1	628	601	524- 657	541- 640	ACCEPTABLE
	2	19.5	18.7	13.6- 24.1	14.9- 22.8	ACCEPTABLE
IRON	1	61.9	58.0	43.5- 72.5	47.2- 68.8	ACCEPTABLE
	2	1100	1100	950- 1270	991- 1230	ACCEPTABLE
MERCURY	1	9.12	9.38	7.31- 11.9	7.89- 11.3	ACCEPTABLE
	2	6.30	6.67	5.00- 8.48	5.44- 8.04	ACCEPTABLE
MANGANESE	1	623	600	536- 660	551- 644	ACCEPTABLE
	2	75.1	73.5	64.0- 82.7	66.4- 80.4	ACCEPTABLE
NICKEL	1	899	860	766- 952	789- 928	ACCEPTABLE
	2	350	340	296- 383	307- 372	ACCEPTABLE
LEAD	1	1260	1200	1060- 1350	1100- 1310	ACCEPTABLE
	2	761	738	636- 833	661- 809	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT

DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

RECEIVED JA

LABORATORY: MI007

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	230	228	156- 277	171- 262	ACCEPTABLE
	2	390	387	268- 486	296- 459	ACCEPTABLE
VANADIUM	1	971	940	832- 1040	860- 1020	ACCEPTABLE
	2	171	170	146- 188	151- 183	ACCEPTABLE
ZINC	1	849	842	737- 947	763- 921	ACCEPTABLE
	2	18.2	46.3	37.5- 56.1	39.8- 53.7	NOT ACCEPTABLE
ANTIMONY	3	94.0	94.5	56.4- 119	64.3- 111	ACCEPTABLE
	4	195	189	108- 244	125- 227	ACCEPTABLE
SILVER	3	75.1	73.9	60.6- 86.8	63.9- 83.5	ACCEPTABLE
	4	26.4	25.8	21.1- 30.4	22.2- 29.2	ACCEPTABLE
THALLIUM	3	136	62.8	47.0- 77.3	50.8- 73.4	NOT ACCEPTABLE
	4	566	539	421- 643	450- 615	ACCEPTABLE
MOLYSDENUM	3	25.2	24.5	18.6- 30.6	20.2- 29.0	ACCEPTABLE
	4	82.4	81.6	64.4- 95.0	68.3- 91.1	ACCEPTABLE
STRONTIUM	3	18.6	19.1	14.4- 23.3	15.5- 22.1	ACCEPTABLE
	4	72.0	73.4	62.0- 84.5	64.9- 81.5	ACCEPTABLE
TITANIUM	3	134	130	109- 151	114- 145	ACCEPTABLE
	4	45.6	43.0	34.0- 53.4	36.5- 50.9	ACCEPTABLE
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH-UNITS	3	9.38	9.50	9.19- 9.75	9.26- 9.68	ACCEPTABLE
	4	4.64	4.70	4.62- 4.77	4.64- 4.75	ACCEPTABLE
SPEC. COND. (UMHOS/CM AT 25 C)	1	945	899	840- 980	857- 963	ACCEPTABLE
	2	421	398	366- 435	377- 427	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT

WATER POLLUTION STUDY NUMBER WP031

DATE: 12/27/93

RECEIVED JAN 1

LABORATORY: MI007

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	500	577	396- 759	441- 713	ACCEPTABLE
	2	636	223	168- 284	183- 269	NOT ACCEPTABLE
TOTAL HARDNESS (AS CACO3)	1	299	279	236- 307	245- 298	CHECK FOR ERROR
	2	61.4	57.4	51.2- 63.8	52.8- 62.2	ACCEPTABLE
CALCIUM	1	118	110	87.4- 126	92.2- 121	ACCEPTABLE
	2	7.56	7.00	5.95- 8.19	6.23- 7.91	ACCEPTABLE
MAGNESIUM	1	1.03	0.960	0.771- 1.18	0.822- 1.13	ACCEPTABLE
	2	10.3	9.70	8.38- 11.0	8.71- 10.6	ACCEPTABLE
SODIUM	1	62.8	61.7	56.2- 67.8	57.6- 66.3	ACCEPTABLE
	2	26.8	26.3	23.6- 29.2	24.3- 28.5	ACCEPTABLE
POTASSIUM	1	7.49	7.50	6.39- 8.81	6.70- 8.50	ACCEPTABLE
	2	40.2	40.0	34.5- 45.6	35.9- 44.2	ACCEPTABLE
TOTAL ALKALINITY (AS CACO3)	1	118	120	106- 133	109- 130	ACCEPTABLE
	2	12.5	11.0	7.85- 15.3	8.77- 14.3	ACCEPTABLE
CHLORIDE	1	172	199	183- 213	187- 210	NOT ACCEPTABLE
	2	44.8	41.2	36.5- 45.4	37.6- 44.3	CHECK FOR ERROR
FLUORIDE	1	2.88	3.30	2.83- 3.77	2.95- 3.65	CHECK FOR ERROR
	2	0.257	0.380	0.319-0.457	0.336-0.439	NOT ACCEPTABLE
SULFATE	1	12.95	14.0	10.8- 16.8	11.5- 16.0	ACCEPTABLE
	2	89.0	92.0	78.1- 105	81.5- 102	ACCEPTABLE
NUTRIENTS IN MILLIGRAMS PER LITER:						
AMMONIA-NITROGEN	1	5.40	7.70	6.10- 9.16	6.47- 8.79	NOT ACCEPTABLE
	2	0.493	0.730	0.491-0.982	0.550-0.923	CHECK FOR ERROR

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

PERFORMANCE EVALUATION REPORT

DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

RECEIVED JAN

LABORATORY: MI007

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
NUTRIENTS IN MILLIGRAMS PER LITER:						
NITRATE-NITROGEN	1	0.490	0.520	0.378-0.658	0.412-0.625	ACCEPTABLE
	2	10.4	11.0	8.84- 13.0	9.34- 12.5	ACCEPTABLE
ORTHOPHOSPHATE	1	0.131	0.150	0.114-0.187	0.122-0.178	ACCEPTABLE
	2	4.17	4.10	3.48- 4.68	3.62- 4.54	ACCEPTABLE
KJELDAHL-NITROGEN	3	13.5	14.0	10.3- 17.1	11.1- 16.3	ACCEPTABLE
	4	1.31	0.710	0.226- 1.32	0.357- 1.19	CHECK FOR ERRO
TOTAL PHOSPHORUS	3	5.54	7.40	5.57- 8.05	5.86- 7.75	NOT ACCEPTABLE
	4	0.424	0.490	0.341-0.569	0.369-0.542	ACCEPTABLE
DEMANDS IN MILLIGRAMS PER LITER:						
COD	1	62.0	70.8	52.4- 84.6	56.5- 80.5	ACCEPTABLE
	2	195	207	163- 230	172- 221	ACCEPTABLE
TOC	1	25.6	28.0	23.9- 32.8	25.0- 31.6	ACCEPTABLE
	2	75.5	82.0	69.5- 95.3	72.8- 91.9	ACCEPTABLE
5-DAY BOD	1	47.3	44.9	26.1- 60.1	30.3- 55.8	ACCEPTABLE
	2	143	131	75.4- 180	88.5- 167	ACCEPTABLE
PCB'S IN MICROGRAMS PER LITER:						
PCB-AROCLOR 1254	1	2.69	1.87	0.938- 2.71	1.21- 2.49	CHECK FOR ERRO
PCB-AROCLOR 1260	2	5.20	4.63	2.79- 5.96	3.19- 5.56	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT

DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

RECEIVED JAN 19

LABORATORY: MI007

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
PCB IN OIL- 1016/1242	2	39.8	35.3	8.02- 46.6	13.0- 41.6	ACCEPTABLE
PCB IN OIL- 1254	1	51.5	43.9	13.5- 61.8	19.8- 55.5	ACCEPTABLE
PESTICIDES IN MICROGRAMS PER LITER:						
CHLORDANE	3	5.82	8.21	4.91- 9.72	5.52- 9.11	ACCEPTABLE
	4	0.887	2.21	1.07- 2.77	1.29- 2.56	NOT ACCEPTABLE
ALDRIN	1	0.455	0.539	0.122-0.754	0.202-0.674	ACCEPTABLE
	2	0.081	0.086	.0171-0.121	.0303-0.108	ACCEPTABLE
DIELDRIN	1	0.965	0.475	0.203-0.710	0.267-0.645	NOT ACCEPTABLE
	2	0.367	0.173	.0861-0.239	0.106-0.219	NOT ACCEPTABLE
DDD	1	0.828	0.866	0.433- 1.15	0.524- 1.06	ACCEPTABLE
	2	0.211	0.202	.0956-0.268	0.117-0.246	ACCEPTABLE
DDE	1	<0.075	0.539	0.235-0.756	0.301-0.690	NOT ACCEPTABLE
	2	<0.075	0.173	.0788-0.236	.0989-0.216	NOT ACCEPTABLE
DDT	1	0.780	0.796	0.362- 1.06	0.450-0.972	ACCEPTABLE
	2	0.172	0.142	.0570-0.216	.0772-0.196	ACCEPTABLE
HEPTACHLOR	1	0.622	0.669	0.187-0.918	0.279-0.825	ACCEPTABLE
	2	0.221	0.216	.0756-0.269	0.100-0.245	ACCEPTABLE
HEPTACHLOR EPOXIDE	1	0.430	0.478	0.260-0.640	0.308-0.592	ACCEPTABLE
	2	0.171	0.174	.0858-0.235	0.105-0.216	ACCEPTABLE

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

DATE: 12/27/93

PERFORMANCE EVALUATION REPORT

WATER POLLUTION STUDY NUMBER WP031

RECEIVED JAN

BORATORY: MI007

ALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
,2 DICHLOROETHANE	1	12.7	15.1	10.2- 20.4	11.5- 19.1	ACCEPTABLE
	2	47.5	55.8	36.2- 73.4	40.9- 68.7	ACCEPTABLE
CHLOROFORM	1	9.02	11.8	7.85- 15.9	8.86- 14.8	ACCEPTABLE
	2	44.8	64.4	38.3- 86.7	44.4- 80.6	ACCEPTABLE
1,1,1 TRICHLOROETHANE	1	9.04	13.4	8.68- 18.2	9.89- 17.0	CHECK FOR ERROR
	2	20.6	37.8	22.7- 50.0	26.2- 46.6	NOT ACCEPTABLE
TRICHLOROETHENE	1	4.55	7.57	5.10- 10.3	5.75- 9.62	NOT ACCEPTABLE
	2	35.9	62.7	38.6- 80.5	43.9- 75.2	NOT ACCEPTABLE
CARBONTETRACHLORIDE	1	12.7	16.4	10.9- 22.2	12.3- 20.8	ACCEPTABLE
	2	26.4	37.1	23.0- 50.1	26.4- 46.6	ACCEPTABLE
TRACHLOROETHENE	1	9.41	9.24	6.08- 12.5	6.89- 11.7	ACCEPTABLE
	2	48.2	51.3	31.2- 66.7	35.7- 62.2	ACCEPTABLE
BROMODICHLOROMETHANE	1	9.98	10.8	7.33- 14.2	8.21- 13.3	ACCEPTABLE
	2	36.0	38.1	24.9- 53.6	28.5- 50.0	ACCEPTABLE
DIBROMOCHLOROMETHANE	1	1.86	13.1	8.48- 17.0	9.55- 15.9	NOT ACCEPTABLE
	2	11.0	58.1	34.1- 80.2	39.9- 74.4	NOT ACCEPTABLE
BROMOFORM	1	26.5	14.5	7.45- 20.0	9.04- 18.4	NOT ACCEPTABLE
	2	52.0	42.3	25.5- 59.9	29.9- 55.6	ACCEPTABLE
METHYLENE CHLORIDE	1	10.2	10.6	6.59- 16.1	7.79- 14.9	ACCEPTABLE
	2	46.3	54.1	30.7- 76.5	36.5- 70.7	ACCEPTABLE
CHLOROBENZENE	1	14.5	16.0	11.4- 20.1	12.5- 19.0	ACCEPTABLE
	2	53.8	63.7	41.3- 79.8	46.2- 74.9	ACCEPTABLE
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
BENZENE	1	61.7	40.1	25.7- 56.0	29.5- 52.2	NOT ACCEPTABL
	2	16.3	8.25	5.24- 11.6	6.04- 10.8	NOT ACCEPTABL

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

PERFORMANCE EVALUATION REPORT

DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

RECEIVED JAN 19 199

LABORATORY: MI007

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
ETHYLBENZENE	1	62.2	66.9	36.0- 94.3	43.4- 86.9	ACCEPTABLE
	2	16.3	14.0	9.26- 19.0	10.5- 17.8	ACCEPTABLE
TOLUENE	1	46.6	49.2	30.2- 65.2	34.6- 60.8	ACCEPTABLE
	2	17.4	9.51	6.09- 12.8	6.93- 11.9	NOT ACCEPTABLE
1,2-DICHLOROBENZENE	1	35.8	65.5	32.7- 93.9	40.5- 86.2	CHECK FOR ERRO
	2	4.48	8.88	5.85- 11.7	6.59- 11.0	NOT ACCEPTABLE
1,3-DICHLOROBENZENE	1	24.7	47.9	29.4- 61.7	33.5- 57.6	NOT ACCEPTABLE
	2	8.65	16.6	11.6- 21.1	12.9- 19.9	NOT ACCEPTABLE
1,4-DICHLOROBENZENE	1	36.5	62.5	34.4- 85.8	41.0- 79.3	CHECK FOR ERRO
	2	7.58	12.4	7.49- 17.8	8.79- 16.5	CHECK FOR ERRO
MISCELLANEOUS PARAMETERS:						
TOTAL CYANIDE (IN MG/L)	1	1.12	0.860	0.598- 1.15	0.668- 1.08	CHECK FOR ERRO
	2	0.192	0.160	0.102-0.208	0.116-0.194	ACCEPTABLE
NON-FILTERABLE RESIDUE (IN MG/L)	1	57.3	61.0	47.7- 64.6	49.8- 62.5	ACCEPTABLE
	2	76.0	83.0	62.8- 91.3	66.4- 87.8	ACCEPTABLE
OIL AND GREASE (IN MG/L)	1	5.7	8.30	3.07- 12.2	4.22- 11.0	ACCEPTABLE
	2	36	48.4	33.7- 56.0	36.5- 53.2	CHECK FOR ERRO
TOTAL PHENOLICS (IN MG/L)	1	0.488	0.595	0.312-0.878	0.384-0.805	ACCEPTABLE
	2	2.518	3.13	1.66- 4.60	2.04- 4.23	ACCEPTABLE
TOTAL RESIDUAL CHLORINE (IN MG/L)	1	3.90	3.70	3.06- 4.52	3.25- 4.32	ACCEPTABLE
	2	1.77	1.50	1.09- 1.77	1.18- 1.68	CHECK FOR ERRO

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

TMA
Thermo Analytical Inc.

TMA/ERG
525 Avis Drive, Suite 7
Ann Arbor, MI 48108

(313) 662-3104
(313) 662-3344 (Fax)

CORRECTIVE ACTION REQUEST FORM

1. Department: METALS Report No.: 3
2. Attention: Barbara Scribner Reply By: 01/30/94
3. Auditor: Mark Ruwe Date: 01/20/94

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4. Observation: Results from USEPA Water Pollution Study WP031 indicate unsatisfactory results for Arsenic(conc.2), Chromium(conc.2), Zinc(conc.2) and Thallium(conc.1).

5. Recommendation: Evaluate data for sources of error.

6. Corrective Action Reply: Results for Chromium and Zinc were blank subtracted due to contamination in theCCCB, resulting in lower recoveries. All CCV recoveries acceptable. except for Thallium which was slightly below acceptance limits. For Arsenic, no apparent cause is evident.
Blind check samples were run concurrently with these analyses and were acceptable for chromium and zinc. No other corrective actions will be necessary.

7. Date Action Will be Completed: 01/30/94
8. Signature of Department Representative: [signature] Date: 01/30/94

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9. Evaluation of Corrective Action Response:

Acceptable ✓ Not Acceptable____ Other____

10. Quality Assurance Auditor: Mark Ruwe Date: 5/16/94

Corrective Action Complete:

Verified By: Mark Ruwe Date: 5/16/94

TMA
Thermo Analytical Inc.

CORRECTIVE ACTION REQUEST FORM

0:2

1. Department: ORGANICS Report No.: _____
2. Attention: MIKE DEW Reply By: 01/30/94
3. Auditor: MARK RUWE Date: 01/20/94

4. Observation: Results from Water Pollution Control Study WP031 indicates unsatisfactory performance for chlordane, dieldrin and DDE.

5. Recommendation: Perform florisil column cleanup on future samples.

6. Corrective Action: Compounds in question co-eluted because the sample was not put through a florisil cleanup procedure. All pesticide check samples will be in the future.

7. Date Corrective Action Completed 01/30/94
8. Signature of Department Representative: [signature] Date: 1/30/94

9. Evaluation of Corrective Action: Acceptable ✓
Not Acceptable _____
Other _____

10. Quality Assurance Auditor: Mark Ruwe Date: 2/6/94

11. Corrective Action Complete:
Verified By: Mark Ruwe Date: 5/17/94

WS-033

PERFORMANCE EVALUATION REPORT

DATE: 2/10/94

WATER SUPPLY STUDY NUMBER WS033

LABORATORY MI007

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
ALUMINUM	1	1450	1400	1260- 1510	ACCEPTABLE
ANTIMONY	2	52.1	48.9	34.2- 63.6	ACCEPTABLE
ARSENIC	1	36.9	39.5	33.1- 45.1	ACCEPTABLE
BARIUM	2	1780	1800	1530- 2070	ACCEPTABLE
BERYLLIUM	1	9.34	9.07	7.71- 10.4	ACCEPTABLE
BORON	2	1650	1700	1500- 1990	ACCEPTABLE
CADMIUM	1	50.1	49.0	39.2- 58.8	ACCEPTABLE
CHROMIUM	1	168	159	135- 183	ACCEPTABLE
COPPER	1	2030	1900	1710- 2090	ACCEPTABLE
LEAD	1	87.1	78.7	55.1- 102	ACCEPTABLE
MANGANESE	1	65.4	63.3	56.7- 67.7	ACCEPTABLE
MERCURY	1	1.30	1.77	1.24- 2.30	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT

DATE: 2/10/94

WATER SUPPLY STUDY NUMBER WS033

LABORATORY MI007

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
MOLYBDENUM	2	134	130	89.2- 166	ACCEPTABLE
NICKEL	1	512	490	417- 563	ACCEPTABLE
SELENIUM	1	89.3	98.3	78.6- 118	ACCEPTABLE
SILVER	2	67.6	66.9	57.1- 75.6	ACCEPTABLE
THALLIUM	2	10.4	9.56	6.69- 12.4	ACCEPTABLE
ZINC	1	2210	2090	1920- 2240	ACCEPTABLE
NITRATE/NITRITE/FLUORIDE IN MILLIGRAMS PER LITER:					
NITRATE AS N	1	4.74	9.80	8.82- 10.8	NOT ACCEPTABLE
NITRITE AS N	1	1.35	1.40	1.19- 1.61	ACCEPTABLE
FLUORIDE	1	6.30	6.60	5.94- 7.26	ACCEPTABLE
INSECTICIDES IN MICROGRAMS PER LITER:					
CHLORDANE (TOTAL)	3	2.12	2.76	1.52- 4.00	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT

DATE: 2/10/94

WATER SUPPLY STUDY NUMBER WS033

LABORATORY MI007

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
INSECTICIDES IN MICROGRAMS PER LITER:					
ENDRIN	1	2.65	2.63	1.84- 3.42	ACCEPTABLE
LINDANE	1	0.145	0.136	.0748-0.197	ACCEPTABLE
METHOXYCHLOR	1	19.6	42.3	23.3- 61.3	NOT ACCEPTABLE
TOXAPHENE	2	8.58	9.23	5.08- 13.4	ACCEPTABLE
HERBICIDES IN MICROGRAMS PER LITER:					
2,4-D	1	5.52	7.57	3.78- 11.4	ACCEPTABLE
2,4,5-TP (SILVEX)	1	7.11	5.60	2.80- 8.40	ACCEPTABLE
TRIHALOMETHANES IN MICROGRAMS PER LITER:					
BROMODICHLOROMETHANE	1	12.5	15.8	12.6- 19.0	NOT ACCEPTABLE
BROMOFORM	1	28.6	34.4	27.5- 41.3	ACCEPTABLE
CHLORODIBROMOMETHANE	1	18.8	28.7	23.0- 34.4	NOT ACCEPTABLE
CHLOROFORM	1	32.2	36.7	29.4- 44.0	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT

DATE: 2/10/94

WATER SUPPLY STUDY NUMBER WS033

LABORATORY MI007

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRIHALOMETHANES IN MICROGRAMS PER LITER:					
TOTAL TRIHALOMETHANE	1	92.10	115.6	92.5- 139	NOT ACCEPTABLE
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:					
BENZENE	1	12.5	12.0	9.60- 14.4	ACCEPTABLE
CARBON TETRACHLORIDE	1	12.2	13.4	10.7- 16.1	ACCEPTABLE
CHLOROBENZENE	2	15.8	18.4	14.7- 22.1	ACCEPTABLE
1,2 DICHLOROBENZENE	2	13.3	15.5	12.4- 18.6	ACCEPTABLE
1,4-DICHLOROBENZENE	1	11.8	15.1	12.1- 18.1	NOT ACCEPTABLE
1,2-DICHLOROETHANE	1	13.8	16.9	13.5- 20.3	ACCEPTABLE
1,1-DICHLOROETHYLENE	1	15.5	12.9	10.3- 15.5	ACCEPTABLE
C 1,2 DICHLOROETHYLENE	2	12.7	16.5	13.2- 19.8	NOT ACCEPTABLE
T 1,2 DICHLOROETHYLENE	2	12.7	13.9	11.1- 16.7	ACCEPTABLE
1,2 DICHLOROPROPANE	2	13.5	14.3	11.4- 17.2	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 2/10/94

WATER SUPPLY STUDY NUMBER WS033

LABORATORY MI007

ANALYTES	SAMPLE NUMBER	REPORTED VALUE		TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:						
ETHYLBENZENE	2	15.3		17.0	13.6- 20.4	ACCEPTABLE
STYRENE	2	6.22		13.0	10.4- 15.6	NOT ACCEPTABLE
TETRACHLOROETHYLENE	2	11.5		12.9	10.3- 15.5	ACCEPTABLE
TOLUENE	2	13.3		12.3	9.84- 14.8	ACCEPTABLE
1,1,1-TRICHLOROETHANE	1	11.1		14.6	11.7- 17.5	NOT ACCEPTABLE
RICHLOROETHYLENE	1	12.5		14.9	11.9- 17.9	ACCEPTABLE
VINYL CHLORIDE	1	8.48		7.35	4.41- 10.3	ACCEPTABLE
TOTAL XYLENES	2	4.95		11.6	9.28- 13.9	NOT ACCEPTABLE
MISCELLANEOUS ANALYTES:						
RESIDUAL FREE CHLORINE (MILLIGRAMS PER LITER)	1	4.17	**	4.20	3.32- 4.71	ACCEPTABLE
TURBIDITY (NTU'S)	1	1.16	**	1.10	0.836- 1.54	ACCEPTABLE
TOTAL FILTERABLE RESIDUE (MILLIGRAMS PER LITER)	1	232		384	255- 567	NOT ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT

DATE: 2/10/94

WATER SUPPLY STUDY NUMBER WS033

LABORATORY MI007

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
MISCELLANEOUS ANALYTES:					
CALCIUM (MG. CACO3/L)	1	222.7	200	187- 212	NOT ACCEPTABLE
PH-UNITS	1	8.97	9.10	8.86- 9.31	ACCEPTABLE
ALKALINITY (MG. CACO3/L)	1	43.0	41.0	37.3- 46.4	ACCEPTABLE
CORROSIVITY (LANGELIER IND. AT 20C)	1	11.6	1.057	0.679- 1.39	NOT ACCEPTABLE
SODIUM (MILLIGRAMS PER LITER)	1	20.0	18.8	17.1- 20.5	ACCEPTABLE
ULFATE (MILLIGRAMS PER LITER)	1	165	170	152- 185	ACCEPTABLE
TOTAL CYANIDE (MILLIGRAMS PER LITER)	1	0.404	0.340	0.255-0.425	ACCEPTABLE

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

1,00T1M

TMA
Thermo Analytical Inc.

CORRECTIVE ACTION REQUEST FORM

1. Department: WET CHEMISTRY Report No.: 04
2. Attention: BARBARA SCRIBNER Reply By: 03/15/94
3. Auditor: Mark Ruwe Date: 02/28/94

4. Observation: Results from USEPA Water Supply Study WS033 indicates unsatisfactory results for Nitrate, TDS, Calcium and Corrosivity.

5. Recommendation: Review data for possible sources of error.

6. Corrective Action: The TDS result was reported incorrectly. The correct result is 500 mg/L. The corrosivity was calculated incorrectly. All reported data and calculations will be checked by the supervisor prior to data entry. No apparent errors for calcium and nitrate. All QC with the run is acceptable.

7. Date Corrective Action Completed 3-13-94

8. Signature of Department Representative: [illegible] Date: 3-15-94

9. Evaluation of Corrective Action: Acceptable ✓

Not Acceptable

Other

10. Quality Assurance Auditor: Mark Ruwe Date: 3/15/94

11. Corrective Action Complete:

Verified By: Mark Ruwe Date: 3/31/94

TMA/SKINNER & SHERMAN

PERFORMANCE EVALUATION SAMPLE SUMMARY SHEET

Laboratory: TMA/Skinner and Sherman

PE Sample	Number Acceptable	Number Analyzed	% Acceptable
WP-031			
Metals	41	42	97.6
Inorganic/Mineral	44	48	91.7
Organics	39	54	72.2
WS-033			
Metals	18	18	100.0
Inorganic/Mineral	11	12	91.7
Organic	27	30	90.0

	EMSL-LV % Score
QB2-FY94	
Inorganics(metals)	94.5
QB3-FY94	
Inorganics(metals)	96.5

WP-031

M-MA024 Mr. David Peterson
TMA/Skinner & Sherman Laboratories, Inc.
300 Second Ave.
Waltham, MA 02254

ION REPORT

UMBER WP031

DATE: 12/27/93

ABORATORY: MA024

ALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
LUMINUM	1	688	681	550- 784	579- 755	ACCEPTABLE
	2	148	140	107- 182	117- 173	ACCEPTABLE
RSENIC	1	492	492	408- 587	430- 565	ACCEPTABLE
	2	74.0	74.3	56.7- 92.9	61.2- 88.4	ACCEPTABLE
ERYLLIUM	1	422	461	382- 533	401- 514	ACCEPTABLE
	2	219	240	198- 278	208- 268	ACCEPTABLE
ADMIUM	1	162	165	138- 194	145- 187	ACCEPTABLE
	2	59.4	61.0	50.8- 72.0	53.5- 69.4	ACCEPTABLE
OBALT	1	854	880	775- 980	801- 954	ACCEPTABLE
	2	52.8	53.8	45.4- 61.9	47.5- 59.8	ACCEPTABLE
HROMIUM	1	709	730	604- 843	634- 813	ACCEPTABLE
	2	24.7	23.4	17.4- 29.0	18.9- 27.6	ACCEPTABLE
OPPER	1	854	601	524- 657	541- 640	NOT ACCEPTABLE
	2	21.8	18.7	13.6- 24.1	14.9- 22.8	ACCEPTABLE
RON	1	52.6	58.0	43.5- 72.5	47.2- 68.8	ACCEPTABLE
	2	1030	1100	950- 1270	991- 1230	ACCEPTABLE
ERCURY	1	11.0	9.38	7.31- 11.9	7.89- 11.3	ACCEPTABLE
	2	7.99	6.67	5.00- 8.48	5.44- 8.04	ACCEPTABLE
ANGANESE	1	583	600	536- 660	551- 644	ACCEPTABLE
	2	70.9	73.5	64.0- 82.7	66.4- 80.4	ACCEPTABLE
ICKEL	1	876	860	766- 952	789- 928	ACCEPTABLE
	2	336	340	296- 383	307- 372	ACCEPTABLE
EAD	1	1170	1200	1060- 1350	1100- 1310	ACCEPTABLE
	2	720	738	636- 833	661- 809	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

ABORATORY: MA024

NALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
ELENIUM	1	229	228	156- 277	171- 262	ACCEPTABLE
	2	387	387	268- 486	296- 459	ACCEPTABLE
ANADIUM	1	935	940	832- 1040	860- 1020	ACCEPTABLE
	2	167	170	146- 188	151- 183	ACCEPTABLE
INC	1	834	842	737- 947	763- 921	ACCEPTABLE
	2	46.8	46.3	37.5- 56.1	39.8- 53.7	ACCEPTABLE
NTIMONY	3	90.6	94.5	56.4- 119	64.3- 111	ACCEPTABLE
	4	188	189	108- 244	125- 227	ACCEPTABLE
ILVER	3	74.4	73.9	60.6- 86.8	63.9- 83.5	ACCEPTABLE
	4	26.0	25.8	21.1- 30.4	22.2- 29.2	ACCEPTABLE
HALLIUM	3	62.7	62.8	47.0- 77.3	50.8- 73.4	ACCEPTABLE
	4	525	539	421- 643	450- 615	ACCEPTABLE
OLYBDENUM	3	25.8	24.5	18.6- 30.6	20.2- 29.0	ACCEPTABLE
	4	78.8	81.6	64.4- 95.0	68.3- 91.1	ACCEPTABLE
TRONTIUM	3	18.6	19.1	14.4- 23.3	15.5- 22.1	ACCEPTABLE
	4	69.8	73.4	62.0- 84.5	64.9- 81.5	ACCEPTABLE
ITANIUM	3	128	130	109- 151	114- 145	ACCEPTABLE
	4	41.8	43.0	34.0- 53.4	36.5- 50.9	ACCEPTABLE
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
H-UNITS	3	9.44	9.50	9.19- 9.75	9.26- 9.68	ACCEPTABLE
	4	4.69	4.70	4.62- 4.77	4.64- 4.75	ACCEPTABLE
PEC. COND.	1	901	899	840- 980	857- 963	ACCEPTABLE
UMHOS/CM AT 25 C)	2	411	398	368- 435	377- 407	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

BORATORY: MA024

ALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
S AT 180 C	1	568	577	396- 759	441- 713	ACCEPTABLE
	2	231	223	168- 284	183- 269	ACCEPTABLE
TAL HARDNESS S CACO3)	1	276	279	236- 307	245- 298	ACCEPTABLE
	2	61.6	57.4	51.2- 63.8	52.8- 62.2	ACCEPTABLE
LCIUM	1	109	110	87.4- 126	92.2- 121	ACCEPTABLE
	2	7.55	7.00	5.95- 8.19	6.23- 7.91	ACCEPTABLE
GNESIUM	1	1.02	0.960	0.771- 1.18	0.822- 1.13	ACCEPTABLE
	2	10.4	9.70	8.38- 11.0	8.71- 10.6	ACCEPTABLE
DIUM	1	64.8	61.7	56.2- 67.8	57.6- 66.3	ACCEPTABLE
	2	27.1	26.3	23.6- 29.2	24.3- 28.5	ACCEPTABLE
TASSIUM	1	7.59	7.50	6.39- 8.81	6.70- 8.50	ACCEPTABLE
	2	40.4	40.0	34.5- 45.6	35.9- 44.2	ACCEPTABLE
TAL ALKALINITY S CACO3)	1	122	120	106- 133	109- 130	ACCEPTABLE
	2	12.8	11.0	7.85- 15.3	8.77- 14.3	ACCEPTABLE
LORIDE	1	201	199	183- 213	187- 210	ACCEPTABLE
	2	40.6	41.2	36.5- 45.4	37.6- 44.3	ACCEPTABLE
UORIDE	1	3.21	3.30	2.83- 3.77	2.95- 3.65	ACCEPTABLE
	2	0.45	0.380	0.319-0.457	0.336-0.439	CHECK FOR ERROR
LFATE	1	12.8	14.0	10.8- 16.8	11.5- 16.0	ACCEPTABLE
	2	81.8	92.0	78.1- 105	81.5- 102	ACCEPTABLE
NUTRIENTS IN MILLIGRAMS PER LITER:						
MONIA-NITROGEN	1	6.90	7.70	6.10- 9.16	6.47- 8.79	ACCEPTABLE
	2	0.60	0.730	0.491-0.982	0.550-0.923	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

BORATORY: MA024

ALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
NUTRIENTS IN MILLIGRAMS PER LITER:						
TRATE-NITROGEN	1	0.49	0.520	0.378-0.658	0.412-0.625	ACCEPTABLE
	2	10.6	11.0	8.84- 13.0	9.34- 12.5	ACCEPTABLE
THOPHOSPHATE	1	0.54	0.150	0.114-0.187	0.122-0.178	NOT ACCEPTABLE
	2	1.87	4.10	3.48- 4.68	3.62- 4.54	NOT ACCEPTABLE
ELDAHL-NITROGEN	3	18.3	14.0	10.3- 17.1	11.1- 16.3	NOT ACCEPTABLE
	4	1.04	0.710	0.226- 1.32	0.357- 1.19	ACCEPTABLE
TAL PHOSPHORUS	3	7.20	7.40	5.57- 8.05	5.86- 7.75	ACCEPTABLE
	4	0.42	0.490	0.341-0.569	0.369-0.542	ACCEPTABLE
DEMANDS IN MILLIGRAMS PER LITER:						
D	1	67.5	70.8	52.4- 84.6	56.5- 80.5	ACCEPTABLE
	2	199	207	163- 230	172- 221	ACCEPTABLE
	1	28.1	28.0	23.9- 32.8	25.0- 31.6	ACCEPTABLE
	2	85.0	82.0	69.5- 95.3	72.8- 91.9	ACCEPTABLE
DAY BOD	1	36.0	44.9	26.1- 60.1	30.3- 55.8	ACCEPTABLE
	2	95.0	131	75.4- 180	88.5- 167	ACCEPTABLE
PCB'S IN MICROGRAMS PER LITER:						
B-AROCLOR 1254	1	1.82	1.87	0.988- 2.71	1.21- 2.49	ACCEPTABLE
B-AROCLOR 1260	2	4.13	4.63	2.79- 5.86	3.19- 5.56	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

ABORATORY: MA024

ALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
CB IN OIL- 1016/1242	2	15.1	35.3	8.02- 46.6	13.0- 41.6	ACCEPTABLE
CB IN OIL- 1254	1	29.6	43.9	13.5- 61.8	19.8- 55.5	ACCEPTABLE
PESTICIDES IN MICROGRAMS PER LITER:						
HLORDANE	3	8.18	8.21	4.91- 9.72	5.52- 9.11.	ACCEPTABLE
	4	2.40	2.21	1.07- 2.77	1.29- 2.56	ACCEPTABLE
LDRIN	1	4.73	0.539	0.122-0.754	0.202-0.674	NOT ACCEPTABLE
	2	1.05	0.086	.0171-0.121	.0303-0.108	NOT ACCEPTABLE
ELDRIN	1	4.65	0.475	0.203-0.710	0.267-0.645	NOT ACCEPTABLE
	2	1.56	0.173	.0861-0.239	0.106-0.219	NOT ACCEPTABLE
D	1	8.27	0.866	0.433- 1.15	0.524- 1.06	NOT ACCEPTABLE
	2	1.68	0.202	.0956-0.268	0.117-0.246	NOT ACCEPTABLE
DE	1	4.82	0.539	0.235-0.756	0.301-0.690	NOT ACCEPTABLE
	2	1.31	0.173	.0788-0.236	.0989-0.216	NOT ACCEPTABLE
DT	1	6.36	0.796	0.362- 1.06	0.450-0.972	NOT ACCEPTABLE
	2	0.98	0.142	.0570-0.216	.0772-0.196	NOT ACCEPTABLE
PTACHLOR	1	5.36	0.669	0.187-0.918	0.279-0.825	NOT ACCEPTABLE
	2	1.79	0.216	.0756-0.269	0.100-0.245	NOT ACCEPTABLE
PTACHLOR EPOXIDE	1	4.49	0.478	0.260-0.640	0.308-0.592	NOT ACCEPTABLE
	2	1.59	0.174	.0858-0.235	0.105-0.216	NOT ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT

DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

ABORATORY: MA024

NALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
,2 DICHLOROETHANE	1	14.9	15.1	10.2- 20.4	11.5- 19.1	ACCEPTABLE
	2	55.1	55.8	36.2- 73.4	40.9- 68.7	ACCEPTABLE
HLOROFORM	1	11.7	11.8	7.85- 15.9	8.86- 14.8	ACCEPTABLE
	2	63.9	64.4	38.3- 86.7	44.4- 80.6	ACCEPTABLE
,1,1 TRICHLOROETHANE	1	12.8	13.4	8.68- 18.2	9.89- 17.0	ACCEPTABLE
	2	37.3	37.8	22.7- 50.0	26.2- 46.6	ACCEPTABLE
RICHLOROETHENE	1	7.61	7.57	5.10- 10.3	5.75- 9.62	ACCEPTABLE
	2	60.0	62.7	38.6- 80.5	43.9- 75.2	ACCEPTABLE
ARBONTETRACHLORIDE	1	15.9	16.4	10.9- 22.2	12.3- 20.8	ACCEPTABLE
	2	37.3	37.1	23.0- 50.1	26.4- 46.6	ACCEPTABLE
ETRACHLOROETHENE	1	9.37	9.24	6.08- 12.5	6.89- 11.7	ACCEPTABLE
	2	49.6	51.3	31.2- 66.7	35.7- 62.2	ACCEPTABLE
ROMODICHLOROMETHANE	1	10.0	10.8	7.33- 14.2	8.21- 13.3	ACCEPTABLE
	2	36.7	38.1	24.9- 53.6	28.5- 50.0	ACCEPTABLE
IBROMOCHLOROMETHANE	1	11.0	13.1	8.48- 17.0	9.55- 15.9	ACCEPTABLE
	2	50.3	58.1	34.1- 80.2	39.9- 74.4	ACCEPTABLE
ROMOFORM	1	12.4	14.5	7.45- 20.0	9.04- 18.4	ACCEPTABLE
	2	38.0	42.3	25.5- 59.9	29.9- 55.6	ACCEPTABLE
THYLENE CHLORIDE	1	19.5	10.6	5.59- 16.1	7.79- 14.9	NOT ACCEPTABLE
	2	58.2	54.1	30.7- 76.5	36.5- 70.7	ACCEPTABLE
LOROBENZENE	1	15.3	16.0	11.4- 20.1	12.5- 19.0	ACCEPTABLE
	2	58.7	63.7	41.3- 79.8	46.2- 74.9	ACCEPTABLE
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
NZENE	1	39.6	40.1	25.7- 56.0	29.5- 52.2	ACCEPTABLE
	2	8.30	8.25	5.24- 11.6	6.04- 10.8	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT

DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

ATORY: MA024

ALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
HYLBENZENE	1	59.6	66.9	36.0- 94.3	43.4- 86.9	ACCEPTABLE
	2	13.3	14.0	9.26- 19.0	10.5- 17.8	ACCEPTABLE
LUENE	1	45.5	49.2	30.2- 65.2	34.6- 60.8	ACCEPTABLE
	2	9.36	9.51	6.09- 12.8	6.93- 11.9	ACCEPTABLE
2-DICHLOROBENZENE	1	56.0	65.5	32.7- 93.9	40.5- 86.2	ACCEPTABLE
	2	8.06	8.88	5.85- 11.7	6.59- 11.0	ACCEPTABLE
3-DICHLOROBENZENE	1	42.2	47.9	29.4- 61.7	33.5- 57.6	ACCEPTABLE
	2	15.1	16.5	11.6- 21.1	12.9- 19.9	ACCEPTABLE
4-DICHLOROBENZENE	1	54.3	62.5	34.4- 85.8	41.0- 79.3	ACCEPTABLE
	2	11.6	12.4	7.49- 17.8	8.79- 16.5	ACCEPTABLE
MISCELLANEOUS PARAMETERS:						
TAL CYANIDE /L)	1	0.77	0.860	0.598- 1.15	0.668- 1.08	ACCEPTABLE
	2	0.13	0.160	0.102-0.208	0.116-0.194	ACCEPTABLE
-FILTERABLE RESIDUE MG/L)	1	61.5	61.0	47.7- 64.6	49.8- 62.5	ACCEPTABLE
	2	85.5	83.0	62.8- 91.3	66.4- 87.8	ACCEPTABLE
AND GREASE MG/L)	1	2.10	8.30	3.07- 12.2	4.22- 11.0	NOT ACCEPTABLE
	2	46.0	48.4	33.7- 56.0	36.5- 53.2	ACCEPTABLE
AL PHENOLICS MG/L)	1	0.49	0.595	0.312-0.879	0.384-0.805	ACCEPTABLE
	2	2.78	3.13	1.66- 4.60	2.04- 4.23	ACCEPTABLE

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

WS032 Inorganics:

Beryllium: This element was reported incorrectly. It should have been reported as 0.99. There was no apparent problem with the turbidity analysis.

Nitrate: The nitrate was not corrected for a nitrite conversion factor. This correction will be made for future performance evaluation samples.

WP031 Organics:

Pesticides: The pesticide results were inadvertently increased by a factor of 10. This is due to an error in the conversion from on-column levels to sample levels. If the correct conversion factor was applied, all pesticide results would have been within acceptance limits. Analysts and data review personnel have been made aware of this occurrence to avoid future errors.

Methylene Chloride: This compound is a common laboratory contaminant and interference may have caused the high result.

WP031 Inorganics:

The copper value was reported incorrectly, it should have been reported as 590 ppb which would have passed. The orthophosphate was reported incorrectly not taking into account dilution and concentration factors. It should have been reported as 0.14 and 3.74 which would have been within acceptance limits. The TKN may be due to an improperly made dilution. The analyst was made aware of the problem. The low oil and grease result may have been due to a high blank being subcontracted from the result. Stricter monitoring of blanks is being conducted in this area.

Sincerely,

Lisa Snow

Lisa A. Snow
Quality Assurance Officer

Encl:2

TMA
Thermo Analytical Inc.

Skinner & Sherman Laboratories Inc.
300 Second Avenue
Post Office Box 521
Waltham, MA 02254-0521

(617) 890-7200

Comments WP031 Results

After further review by the laboratory, it appears that the pesticide results were incorrectly reported for EPA Study WP031. The reported results were inadvertently increased by a factor of 10. This is due to an error in the conversion from on-column levels to sample levels. If the correct conversion factor was applied, all pesticide results would have been within acceptance limits.

Analysts and data review personnel have been made aware of this occurrence to avoid future errors.

WS-033

M-MA024 Mr. David Peterson
TMA/Skinner & Sherman Laboratories, Inc.
300 Second Ave.
Waltham, MA 02254

TION REPORT

NUMBER WS033

DATE: 2/10/94

.BORATORY MA024

IALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
LUMINUM JST	1	1420	1400	1260- 1510	ACCEPTABLE
ITIMONY	2	44.9	48.9	34.2- 63.6	ACCEPTABLE
RSENIC J. Shu	1	40.7	39.5	33.1- 45.1	ACCEPTABLE
ARIUM JST	2	1820	1800	1530- 2070	ACCEPTABLE
ERYLLIUM	1	9.01	9.07	7.71- 10.4	ACCEPTABLE
[illegible]	2	1730	1700	1500- 1990	ACCEPTABLE
ADMIUM	1	49.2	49.0	39.2- 58.8	ACCEPTABLE
HROMIUM	1	160	159	135- 183	ACCEPTABLE
OPPER	1	1950	1900	1710- 2090	ACCEPTABLE
EAD S. Shu	1	82.3	78.7	55.1- 102	ACCEPTABLE
ANGANESE JST	1	66.0	63.3	56.7- 67.7	ACCEPTABLE
ERCURY J Shuartz	1	1.82	1.77	1.24- 2.30	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 2/10/94

WATER SUPPLY STUDY NUMBER WS033

BORATORY MA024

ALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
OLYBDENUM SST	2	131	130	89.2- 166	ACCEPTABLE
ICKEL ↓	1	504	490	417- 563	ACCEPTABLE
ELENIUM S Shw	1	106	98.3	78.6- 118	ACCEPTABLE
ILVER SST	2	66.4	66.9	57.1- 75.6	ACCEPTABLE
HALLIUM S Shw	2	9.00	9.56	6.69- 12.4	ACCEPTABLE
I SST	1	2080	2090	1920- 2240	ACCEPTABLE
NITRATE/NITRITE/FLUORIDE IN MILLIGRAMS PER LITER:					
ITRATE AS N S.D.	1	10.5	9.80	8.82- 10.8	ACCEPTABLE
↓ ITRITE AS N	1	1.40	1.40	1.19- 1.61	ACCEPTABLE
LUORIDE ~~AEF~~ YCK	1	6.55	6.60	5.94- 7.26	ACCEPTABLE
TRIHALOMETHANES IN MICROGRAMS PER LITER:					
ROMODICHLOROMETHANE	1	15.1	15.8	12.6- 19.0	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 2/10/94

WATER SUPPLY STUDY NUMBER WS033

ABORATORY MA024

NALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRIHALOMETHANES IN MICROGRAMS PER LITER:					
ROMOFORM	1	31.6	34.4	27.5- 41.3	ACCEPTABLE
HLORODIBROMOMETHANE	1	26.6	28.7	23.0- 34.4	ACCEPTABLE
HLOROFORM	1	31.1	36.7	29.4- 44.0	ACCEPTABLE
OTAL TRIHALOMETHANE	1	104.4	115.6	92.5- 139	ACCEPTABLE
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:					
ENZENE	1	11.6	12.0	9.60- 14.4	ACCEPTABLE
ARBON TETRACHLORIDE	1	13.7	13.4	10.7- 16.1	ACCEPTABLE
HLOROBENZENE	2	18.1	18.4	14.7- 22.1	ACCEPTABLE
,2 DICHLOROBENZENE	2	15.7	15.5	12.4- 18.6	ACCEPTABLE
,4-DICHLOROBENZENE	1	13.7	15.1	12.1- 18.1	ACCEPTABLE
,2-DICHLOROETHANE	1	16.1	16.9	13.5- 20.3	ACCEPTABLE
,1-DICHLOROETHYLENE	1	13.7	12.9	10.3- 15.5	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 2/10/94

WATER SUPPLY STUDY NUMBER WS033

\BORATORY MA024

\ALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:					
1,2 DICHLOROETHYLENE	2	16.9	16.5	13.2- 19.8	ACCEPTABLE
1,2 DICHLOROETHYLENE	2	14.7	13.9	11.1- 16.7	ACCEPTABLE
,2 DICHLOROPROPANE	2	14.1	14.3	11.4- 17.2	ACCEPTABLE
THYLBENZENE	2	16.9	17.0	13.6- 20.4	ACCEPTABLE
TYRENE	2	12.9	13.0	10.4- 15.6	ACCEPTABLE
E 'CHLOROETHYLENE	2	14.5	12.9	10.3- 15.5	ACCEPTABLE
OLUENE	2	12.1	12.3	9.84- 14.8	ACCEPTABLE
,1,1-TRICHLOROETHANE	1	14.2	14.6	11.7- 17.5	ACCEPTABLE
RICHLOROETHYLENE	1	14.3	14.9	11.9- 17.9	ACCEPTABLE
INYL CHLORIDE	1	13.3	7.35	4.41- 10.3	NOT ACCEPTABLE
OTAL XYLENES	2	11.6	11.6	9.28- 13.9	ACCEPTABLE
HLOROETHANE	3	25.7	16.8	10.3- 24.6	NOT ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 2/10/94

WATER SUPPLY STUDY NUMBER WS033

ABORATORY MA024

NALYTES	SAMPLE NUMBER	REPORTED VALUE		TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:						
,2DIBROMO3CHLOROPROPANE	4	0.280		0.233	0.140-0.326	ACCEPTABLE
LBROMOMETHANE	3	13.7		15.2	10.5- 18.7	ACCEPTABLE
ICHLOROMETHANE	3	7.99		12.8	9.25- 16.3	NOT ACCEPTABLE
,1,1,2TETRACHLOROETHANE	3	9.54	**	8.63	6.37- 9.98	ACCEPTABLE
,2,4-TRICHLOROBENZENE	3	17.1		16.8	12.0- 20.1	ACCEPTABLE
, 2-TRICHLOROETHANE	3	16.0		15.7	9.66- 19.7	ACCEPTABLE
MISCELLANEOUS ANALYTES:						
URBIDITY NTU'S) JD	1	1.59	**	1.10	0.836- 1.54	NOT ACCEPTABLE
OTAL FILTERABLE RESIDUE MILLIGRAMS PER LITER) RB	1	342		384	255- 567	ACCEPTABLE
ALCIUM MG. CACO3/L) JST	1	212		200	187- 212	ACCEPTABLE
H-UNITS RB	1	8.95		9.10	8.86- 9.31	ACCEPTABLE
LKALINITY MG. CACO3/L) YLK	1	42.7		41.0	37.3- 46.4	ACCEPTABLE

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

* SIGNIFICANT BIAS IS ANTICIPATED FOR THIS RESULT.

PERFORMANCE EVALUATION REPORT DATE: 2/10/94

WATER SUPPLY STUDY NUMBER WS033

LABORATORY MA024

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
MISCELLANEOUS ANALYTES:					
CORROSIVITY (LANGELIER IND. AT 20C) RB	1	1.05	1.057	0.679- 1.39	ACCEPTABLE
SODIUM (MILLIGRAMS PER LITER) 55	1	20.2	18.8	17.1- 20.5	ACCEPTABLE
SULFATE (MILLIGRAMS PER LITER) RB	1	166	170	152- 185	ACCEPTABLE
TOTAL CYANIDE (MILLIGRAMS PER LITER) RB	1	0.329	0.340	0.255-0.425	ACCEPTABLE

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

Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Protection
Lawrence Experiment Station

William F. Weld
Governor
Daniel S. Greenbaum
Commissioner

March 25, 1994 Cert. Mail # P 354 484 426

M-MA024
Mr. David Peterson
TMA/Skinner & Sherman Laboratories, Inc.
300 Second Avenue
Waltham, Massachusetts 02254

Dear Mr. Peterson:

Your laboratory's results from the EPA's Performance Evaluation Water Supply Study (WS033) have been reviewed. Pursuant to 310 CMR 42.12, your laboratory's certification has been downgraded to NOT CERTIFIED status in the following categories:

Potable Water
Turbidity

This status is effective immediately. After review of the next Performance Evaluation Study results another evaluation will be made concerning the certification status of your laboratory. Meanwhile, no analytical measurements in the "not certified" categories may be submitted to the Massachusetts Department of Environmental Protection where the Department requires analyses to be conducted by a certified laboratory.

Sincerely,

Ann Marie Allen

Ann Marie Allen
Director, Laboratory Certification Office

37 Shattuck Street • Lawrence, Massachusetts 01843 • FAX (508) 688-0352 • Telephone (508) 682-5237

TMA
Thermo Analytical Inc.

Skinner & Sherman Laboratories Inc.
300 Second Avenue
Post Office Box 521
Waltham, MA 02254-0521
(617) 890-7200

May 26,1994

Mr. Charles Dyer
Department of Environmental Services
Office of the Commissioner
6 Hazen Dr
PO Box 95
Concord NH 03302-0095

Dear Mr. Dyer:

The following corrective actions have been taken concerning the unacceptable results for VOC's and Turbidity in the WS033 Performance Evaluation Study:

Organics

The vinyl chloride and the chloroethane results are high due to the response of these compounds in the standards. These compounds are very volatile, therefore minimum response requirements have been established in the lab so the analyst can be aware of the quality of the standards that are being used. The gas standard will be replaced more often. The low response of the dichloromethane could be due to the fact that it is a common lab contaminant and this may artificially elevate the response in the calibration standards, thus giving a lower actual result in samples.

Inorganics

The instrument was not being calibrated correctly with the new standards. The correct calibration procedure has been implemented.

Sincerely,

Lisa A. Snow
Quality Assurance Officer

TMA/Skinner & Sherman Laboratories, Inc.
Quality Assurance Program

Corrective Action Request Form

1. Department: Organics Report No.: 94-09

Agenda / Checklist Item WS033 PE Results

2. Attention: Rachel Howell Reply By: 5/11/94

3. Auditor: EPA/L. Snow Date: 5/6/94

4. Observation:

Observed the following outliers:
vinyl chloride (high), chloroethane (high)
dichloromethane (low).

5. Recommendation:

Determine root cause and corrective action.
List performing analysts for training records

6. Corrective Action Reply:

The vinyl chloride and the chloroethane results are high due to the response of these compounds in the standards. These compounds are very volatile, therefore minimum response requirements have been established in the lab so the analyst can be aware of the quality of the standards that are being used. The gas standard needs to be replaced more often. The low response of the dichloromethane could be due to the fact that it is a common lab contaminant and this may artificially elevate the response in the calibration standards, thus giving a lower actual result in samples.

7. Date Action Will Be Completed: 5/6/94

8. Signature of Department Representative: Rachel O. Howell Date: 5/6/94

9. Evaluation of Corrective Action Response:

Acceptable ✓ Not Acceptable _____ Other _____

10. Quality Assurance Auditor: L. Snow Date: 05/26/94

11. Corrective Action Complete:

Verified By: L. Snow Date: 5/26/94

TMA/Skinner & Sherman Laboratories, Inc.
Quality Assurance Program

Corrective Action Request Form

1. Department: INORGANICS Report No.: 94-08

Agenda / Checklist Item WS033 PE Results

2. Attention: Dave Petersen Reply By: 5/11/94

3. Auditor: EPA / L. Snow Date: 5/6/94

4. Observation:

Observed the following outliers:
Turbidity slightly outside of acceptance limits.
Certification dropped to NOT CERTIFIED

5. Recommendation:

Determine root cause and corrective action.
List performing analysts for training records

6. Corrective Action Reply:

The instrument was not being calibrated correctly with the new standards. The correct calibration procedure has been implemented

7. Date Action Will Be Completed: 5/25/94

8. Signature of Department Representative: [signature] Date: 5/25/94

9. Evaluation of Corrective Action Response:

Acceptable ✓ Not Acceptable _____ Other _____

10. Quality Assurance Auditor: L. Snow Date: 05/26/94

11. Corrective Action Complete:

Verified By: L. Snow Date: 05/26/94

EPA/CLP 2/94

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

APR 14 1994

Mr. Jeff Depaolo
Skinner & Sherman
300 Second Avenue
Waltham, MA 02254

Dear Mr. Depaolo:

The Individual Laboratory Summary Report (ILSR) summarizing your laboratory's results for the most recent Quarterly Blind (QB) Performance Evaluation (PE) Sample (QB2, FY94) 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 for CLP laboratories:

- Acceptable, No Response Required (Score greater than or equal to 90 percent):

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

- Acceptable, Response Explaining Deficiency(ies) Required (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)

- Unacceptable, Response Explaining Deficiency(ies) Required (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, a data package audit, a 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

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 2 FY 94

LABORATORY NAME: TMA/Skinner & Sherman (MA) [01] (SKINER)
PERFORMANCE LEVEL: ACCEPTABLE
LABORATORY RANK: Above = 7 Same = 0 Below = 8

% Score: 94.5
REPORT DATE: 3/22/1994
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	627	2670	406	2890	1240		0	0	0	0	3	16
ANTIMONY	c	c	c	c	15.2	#	0	0	6	9	0	16
ARSENIC	321	475	305	491	399		0	2	0	0	0	16
BARIUM	689	1330	619	1400	884		0	1	0	8	1	16
BERYLLIUM	d	d	d	d	0.47	B	0	0	0	0	0	16
CADMIUM	126	176	120	182	143		0	0	0	0	0	16
CALCIUM	25900	31700	25900	31700	29000		0	1	0	0	0	16
[illegible]IUM	2.0	35.3	2.0	39.8	10.4		0	1	0	1	0	16
[illegible]LT	d	d	d	d	2.3	B	0	0	0	0	0	16
COPPER	208	254	204	258	228		0	1	0	0	0	16
IRON	82401	113001	79100	116000	86300		0	0	0	0	0	16
LEAD	12000	15900	11600	16300	13000		0	0	0	0	0	16
MAGNESIUM	14500	17700	14200	18000	16300		0	1	0	0	0	16
MANGANESE	108000	154001	103001	158000	124000		0	1	0	0	0	16
MERCURY	0.16	0.54	0.12	0.58	0.45		0	0	0	0	0	16
NICKEL	8.0	17.8	8.0	19.8	7.5	B	0	1	0	0	1	16
POTASSIUM	1000.0	1580	1000.0	1660	1060		0	0	0	0	0	16
SELENIUM	1.0	5.2	1.0	5.8	3.5	S	0	1	0	9	0	16
SILVER	4.8	43.6	2.0	47.8	36		0	0	0	0	0	16
SODIUM	d	d	d	d	379	B	0	0	1	0	0	16
THALLIUM	2.0	5.7	2.0	6.1	4.3	S	0	0	0	7	0	16
VANADIUM	10.0	20.0	10.0	22.4	6.3	B	0	1	0	0	0	16
ZINC	21000	28900	20100	29700	22600		0	1	0	0	0	16

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

OF MATRIX SPIKES OUT: 2
SOIL : Sb, Ba

OF DUPLICATES OUT: 1
SOIL : Al

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 2 FY 94

LABORATORY NAME: TMA/Skinner & Sherman (MA) [01] (SKINER)
PERFORMANCE LEVEL: ACCEPTABLE
LABORATORY RANK: Above = 7 Same = 0 Below = 8

% Score: 94.5
REPORT DATE: 3/22/1994
MATRIX: WATER 1

ELEMENT	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY REPORTED VALUE	Q	#LABS NOT-ID	#LABS MIS-QUANT	PROGRAM DATA #LABS FALSE POS	#LABS MSPK OUT	#LABS DUP OUT	TOTAL #LABS
ALUMINUM	810	990	806	995	896		0	1	0	0	0	16
ANTIMONY	314	384	309	389	328		0	0	0	0	0	16
ARSENIC	35.6	46.3	34.4	47.5	42.9		0	3	0	1	1	16
BARIUM	789	964	789	964	886		0	0	0	0	0	16
BERYLLIUM	23.3	28.5	23.3	28.5	26.3		0	1	0	0	0	16
CADMIUM	35.2	46.9	34.0	48.2	41.8		0	0	0	0	0	16
CALCIUM	11400	14000	11400	14000	13000		0	0	0	0	0	16
CHROMIUM	45.8	58.0	44.5	59.3	55.8		0	1	0	0	0	16
C T	183	224	183	224	209		0	0	0	0	0	16
C R	128	157	128	157	142		0	0	0	0	0	16
IRON	516	631	516	632	552		0	0	0	0	0	16
LEAD	25.2	36.3	24.0	37.5	34.1		0	0	0	0	1	16
MAGNESIUM	13500	16500	13500	16500	15500		0	0	0	0	0	16
MANGANESE	78.1	95.4	78.1	95.4	88		0	0	0	0	0	16
MERCURY	0.75	1.2	0.71	1.2	1.3	X	0	1	0	0	0	16
NICKEL	87.3	113	84.6	115	101		0	0	0	0	0	16
POTASSIUM	17200	21100	17200	21100	19700		0	0	0	0	0	16
SELENIUM	24.7	34.0	23.7	35.0	31.3		0	0	0	1	0	16
SILVER	55.3	74.6	53.2	76.7	68.8		0	1	0	0	0	16
SODIUM	20600	25200	20600	25200	23100		0	0	0	0	0	16
THALLIUM	36.2	46.8	35.0	48.0	44.8		0	0	0	1	0	16
VANADIUM	197	241	197	241	226		0	0	0	0	0	16
ZINC	83.1	109	80.3	112	92.4		0	0	0	0	0	16

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 1
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 2 FY 94

LABORATORY NAME: TMA/Skinner & Sherman (MA) [01] (SKINER)
PERFORMANCE LEVEL: ACCEPTABLE
LABORATORY RANK: Above = 7 Same = 0 Below = 8

% Score: 94.5
REPORT DATE: 3/22/1994
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	537	740	515	762	641		0	1	0	0	0	16
ANTIMONY	288	352	288	352	313		0	0	0	0	0	16
ARSENIC	185	231	180	236	215		0	2	0	1	1	16
BARIUM	661	808	661	808	742		0	0	0	0	0	16
BERYLLIUM	46.5	56.8	46.5	56.8	50.4		0	1	0	0	0	16
CADMIUM	41.7	54.4	40.4	55.8	49.4		0	0	0	0	0	16
CALCIUM	12600	15400	12500	15500	14300		0	0	0	0	0	16
CHROMIUM	51.0	64.9	49.5	66.4	62.4		0	2	0	0	0	16
\LT	136	166	133	170	157		0	0	0	0	0	16
ER	198	242	198	242	218		0	0	0	0	0	16
IRON	440	538	440	538	469		0	1	0	0	0	16
LEAD	23.8	31.5	23.0	32.4	30.5		0	1	0	0	1	16
MAGNESIUM	9990	12200	9990	12200	11400		0	0	0	0	0	16
MANGANESE	39.8	48.6	39.3	49.2	43.9		0	0	0	0	0	16
MERCURY	4.5	7.6	4.2	8.0	5.7		0	1	0	0	0	16
NICKEL	176	215	172	219	208		0	1	0	0	0	16
POTASSIUM	d	d	d	d	2880	B	0	0	0	0	0	16
SELENIUM	33.8	52.3	31.8	54.3	48.5		0	0	0	1	0	16
SILVER	10.0	15.4	10.0	16.8	4.1	U	0	0	0	0	0	16
SODIUM	d	d	d	d	2330	B	0	0	0	0	0	16
THALLIUM	45.0	59.7	43.4	61.3	57.5		0	0	0	1	0	16
VANADIUM	118	144	118	144	132		0	0	0	0	0	16
ZINC	177	226	172	232	202		0	0	0	0	0	16

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

OF MATRIX SPIKES OUT: 0
WATER :

OF DUPLICATES OUT: 0
WATER :

TMA/Skinner & Sherman Laboratories, Inc.
Quality Assurance Program

5401130

Corrective Action Request Form

1. Department: Inorganics Report No.: 94-07

Agenda / Checklist Item QB2 (EPA) FY94 PE SCORES

2. Attention: Dave Peterson Reply By:

3. Auditor: EPA Date: 4/19/94

4. Observation:

Soil: Antimony was reported as a false positive. Antimony & Barium matrix spikes were out. Aluminum duplicate was out.

Water 1: Mercury was mis-quantified (high)

5. Recommendation:

Determine reason for outliers. Mercury has been problematic and needs further investigation....

QB1 - misquantified (low), QB4, FY93 OUTSIDE WARNING LIMITS (HIGH), QB3 - False Positive (soil)

!!!!! INDICATE PERFORMING PREP & ANALYSIS

6. Corrective Action Reply:

Soil: I investigated the Sb false positive and can find no explanation. The Sb matrix spike was out, the Post Spike was o.k. This is a method problem historically. I investigated the Ba As and Al drop percent and can find no explanation.

Water: the mercury sample read 1.3 the dup read 1.3, the CCV read 100% recovery. There appear to be no explanation why this is out.

7. Date Action Will Be Completed: 6/27/94

8. Signature of Department Representative: Date: 6/27/94

9. Evaluation of Corrective Action Response:

Acceptable ✓ Not Acceptable Other

10. Quality Assurance Auditor: Susan Woodyatt Date: 6/28/94

11. Corrective Action Complete:

Verified By: Susan Woodyatt Date: 6/28/94

EPA/CLP 3/94

PE file

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
ENVIRONMENTAL SERVICES DIVISION
60 WESTVIEW STREET, LEXINGTON, MASSACHUSETTS 02173-3185

COPY

JW JUL 29 1994

June 29, 1994

David Peterson
Skinner and Sherman Laboratory
300 Second Avenue
Waltham, MA 02254

S404147

Re: Quarterly Blind Performance Evaluation Sample Results
Data Audit Results for Case #21747

Dear Mr. Peterson,

Enclosed are the results for the Inorganic Quarterly Blind Performance Evaluation Sample Results for QB3-FY94.

- Your score was 96.5% .
- A score greater than or equal to 90 percent is classified as Acceptable, No Response Required.
- No corrective action is required, however, it is strongly recommended that all errors be evaluated and necessary corrective action be implemented as part of your laboratory Quality Assurance Program.

Sincerely,

Moira Lataille
Deborah Szaro
Region I CLP/TPOs

cc: Larry Butler, EPA
Quality Assurance Research Branch
P.O Box 93478
Las Vegas, NV 89193-3478

Michael Hurd, APO, EPA
401 M Street S.W. (OS-230) Rm M-2624
Washington, DC 20460

/af
qb>90

PRINTED ON RECYCLED PAPER

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 94

% Score: 96.5

LABORATORY NAME: TMA/Skinner & Sherman (MA) [X2] (SKINER)
PERFORMANCE LEVEL: ACCEPTABLE
LABORATORY RANK: Above = 6 Same = 0 Below = 7

REPORT DATE: 6/8/1994
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	2820	12600	1740	13700	6850		0	0	0	0	1	14
ANTIMONY	12.0	13.2	12.0	14.3	4.4	BN	0	2	0	10	0	14
ARSENIC	32.4	51.8	30.3	53.9	45.8		0	0	0	0	0	14
BARIUM	4030	10200	3360	10900	5930		0	0	0	0	0	14
BERYLLIUM	1.0	1.1	1.0	1.2	0.48	B	0	0	0	0	0	14
CADMIUM	1.0	3.4	1.0	3.7	1.8		0	0	0	0	0	14
CIUM	20900	25500	20600	25800	23800		0	1	0	0	0	14
OMIUM	592	723	589	726	662		0	0	0	0	0	14
COBALT	d	d	d	d	6.8	B	0	0	0	0	0	14
COPPER	102	132	98.7	136	114		0	0	0	1	0	14
IRON	10000	20600	8880	21800	13700		0	0	0	0	0	14
LEAD	903	1260	864	1290	1120		0	0	0	0	0	14
MAGNESIUM	2640	3670	2520	3780	3090		0	0	0	0	0	14
MANGANESE	1010	1230	1000	1240	1090		0	1	0	0	0	14
MERCURY	0.61	1.5	0.51	1.6	0.99	*	0	0	0	2	7	14
NICKEL	18.5	29.6	17.3	30.8	21.9	*	0	1	0	0	1	14
POTASSIUM	1000.0	2080	1000.0	2210	1300		0	0	0	0	0	14
SELENIUM	1.0	2.5	1.0	2.7	1.6		0	1	0	5	0	14
SILVER	4.0	6.8	3.7	7.1	6.5	N	0	0	0	1	0	14
SODIUM	d	d	d	d	364	B	0	0	1	0	0	14
THALLIUM	c	c	c	c	0.43	U	0	0	1	2	0	14
VANADIUM	79.7	118	75.5	123	104		0	0	0	1	0	14
ZINC	200	287	191	297	251	N	0	0	0	2	0	14

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

OF MATRIX SPIKES OUT: 3
SOIL : Sb, Ag, Zn

OF DUPLICATES OUT: 2
SOIL : Hg, Ni

INORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 94

LABORATORY NAME: TMA/Skinner & Sherman (MA) [X2] (SKINER)
PERFORMANCE LEVEL: ACCEPTABLE
LABORATORY RANK: Above = 6 Same = 0 Below = 7

% Score: 96.5
REPORT DATE: 6/8/1994
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	1330	1630	1330	1630	1570		0	0	0	0	0	14
ANTIMONY	274	368	264	378	312		0	1	0	0	0	14
ARSENIC	118	158	113	162	145		0	1	0	2	0	14
BARIUM	706	863	706	863	814		0	0	0	0	0	14
BERYLLIUM	39.8	49.5	38.7	50.6	46.2		0	0	0	0	0	14
CADMIUM	42.6	55.8	41.2	57.2	51.2		0	0	0	1	0	14
CALCIUM	11000	13400	10900	13600	13000		0	0	0	0	0	14
CHROMIUM	44.5	55.8	43.3	57.0	48.1		0	1	0	0	0	14
COBALT	154	190	150	194	180		0	0	0	0	0	14
COPPER	100	123	100	123	112		0	1	0	0	0	14
IRON	593	786	572	806	740		0	1	0	1	1	14
LEAD	33.2	45.4	31.9	46.7	40.8		0	1	0	1	2	14
MAGNESIUM	6540	8150	6360	8330	7900		0	0	0	0	0	14
MANGANESE	102	124	101	125	118		0	1	0	0	0	14
MERCURY	4.6	6.1	4.5	6.2	5.4		0	2	0	0	0	14
NICKEL	72.4	112	68.1	117	98.6		0	0	0	0	0	14
POTASSIUM	5260	6730	5100	6890	6660		0	1	0	0	0	14
SELENIUM	31.1	46.2	29.4	47.8	40.2		0	0	0	1	0	14
SILVER	c	c	c	c	3.6	B	0	0	2	0	0	14
SODIUM	10300	12600	10300	12600	12400		0	0	0	0	0	14
THALLIUM	35.4	48.4	34.0	49.8	43		0	0	0	4	0	14
VANADIUM	259	317	259	317	295		0	1	0	0	0	14
ZINC	520	636	514	642	609	E	0	0	0	0	0	14

OF ELEMENTS NOT-IDENTIFIED: 0
OF ELEMENTS MIS-QUANTIFIED: 0
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 3 FY 94

LABORATORY NAME: TMA/Skinner & Sherman (MA) [X2] (SKINER)
PERFORMANCE LEVEL: ACCEPTABLE
LABORATORY RANK: Above = 6 Same = 0 Below = 7

% Score: 96.5
REPORT DATE: 6/8/1994
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	767	937	767	937	913		0	1	0	0	0	14
ANTIMONY	280	426	264	442	342		0	0	0	0	0	14
ARSENIC	91.0	120	87.9	123	109		0	1	0	2	0	14
BARIUM	388	474	388	474	450		0	0	0	0	0	14
BERYLLIUM	35.7	43.6	35.7	43.6	41.2		0	1	0	0	0	14
CADMIUM	22.8	32.9	21.6	34.0	28.2		0	0	0	1	0	14
CALCIUM	10900	13300	10900	13300	12900		0	1	0	0	0	14
CHROMIUM	61.2	74.8	61.2	74.8	63.4		0	1	0	0	0	14
T	233	285	231	287	267		0	0	0	0	0	14
C..ER	90.0	110	90.0	110	99.5		0	0	0	0	0	14
IRON	517	653	502	668	653		0	2	0	1	1	14
LEAD	32.8	41.4	31.8	42.4	37.4		0	0	0	1	2	14
MAGNESIUM	7420	9060	7370	9110	8880		0	0	0	0	0	14
MANGANESE	48.6	60.0	47.4	61.2	56.8		0	1	0	0	0	14
MERCURY	3.0	4.6	2.8	4.8	3.8		0	0	0	0	0	14
NICKEL	85.4	116	82.1	119	105		0	0	0	0	0	14
POTASSIUM	12000	14600	11800	14800	14500		0	0	0	0	0	14
SELENIUM	31.8	46.6	30.2	48.2	42.4		0	0	0	1	0	14
SILVER	10.0	33.0	10.0	36.6	8.2	B	0	0	0	0	0	14
SODIUM	16200	19900	16200	19900	19400		0	0	0	0	0	14
THALLIUM	40.9	63.0	38.4	65.5	56.9		0	0	0	4	0	14
VANADIUM	115	141	115	141	132		0	1	0	0	0	14
ZINC	99.2	132	95.5	136	133	E S	0	1	0	0	0	14

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

OF MATRIX SPIKES OUT: 0
WATER :

DUPLICATES OUT: 0
WATER :

CORRECTIVE ACTION REPORT Report #: 94-16

TMA/Skinner and Sherman Laboratories

DEPARTMENT: Inorganics
AGENDA/ITEM: Quarterly Blind PE
ATTENTION: Dave Peterson

DATE: 08/04/94
SAM #: S404147
REPLY BY: 08/18/94

Identify the CONDITIONS that adversely affected the quality of the sample.

Dups were out for Hg and Ni

Matrix Spikes were out for Ag and Zn

What was the CAUSE of these conditions? The silver and zinc ~~of the~~ outliers appear to be due to matrix interferences.

~~A can find no reason~~

There is no apparent reason for the nickel duplicates to exceed control limits.

The mercury duplicates outlier appears to be a caused by a matrix problem (note one-half of the labs had the same problem).

Describe ACTION that will be taken to preclude recurrence of the condition(s).

The outliers are due to sample matrix or method problems and cannot be corrected.

[signature]
Signature of technician, dept. head, or supervisor

8/17/94
Date

The above Corrective Action is (circle one) Acceptable Not Acceptable (reason)

Corrective Action Completion:
The Corrective Action(s) were implemented on (date) 08/22/94

Susan E. Woodyatt
QA Officer

08/22/94
Date

WHC 222-S

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: WHC 222S Laboratory

Laboratoy Code: FJ

April 19, 1994

	EMSL-LV Acceptance Range (%)	% of EMSL-LV True Value	% of all Participating Laboratory's Grand Average
Alpha	77.8 to 122.2	79.8	81.4
Beta	73.3 to 126.7	121.3	132.9
Co-60	56.5 to 143.5	110.0	109.3
Cs-134	74.4 to 125.6	95.1	97.3
Cs-137	70.0 to 130.0	110.3	102.7
Uranium	79.2 to 120.8	39.2(**Low**)	40.2

PE Sample	EPA/CLP Score
EMSL-LV QB3 FY94	
Organic	67.6(**Fail**)

PE Sample	No. Analyzed	No. Acceptable	% Acceptable
WP-32			
Metals	42	42	100.0
Inorganic/Minerals	22	26	84.6
Organic	54	54	100.0

EPA/EMSL-LV APRIL 19, 1994

United States
Environmental Protection
Agency

Office of Research and
Development
Washington, DC 20460

EPA/600/R-94/121A
July 1994

5515

EPA

Blind-A Performance Evaluation Study

A Statistical Evaluation of the April 19, 1994 Data

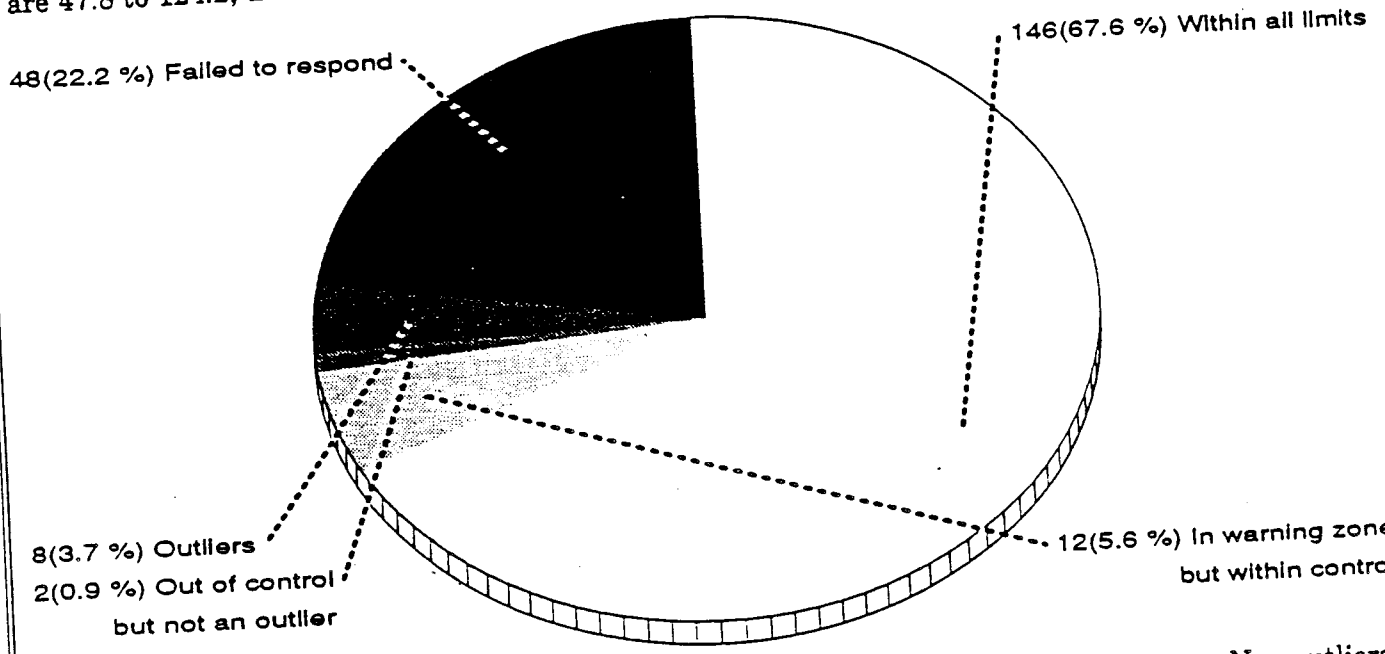
AUG 1994
RECEIVED
D.A. SEBELIEN

0014rsd94.121a

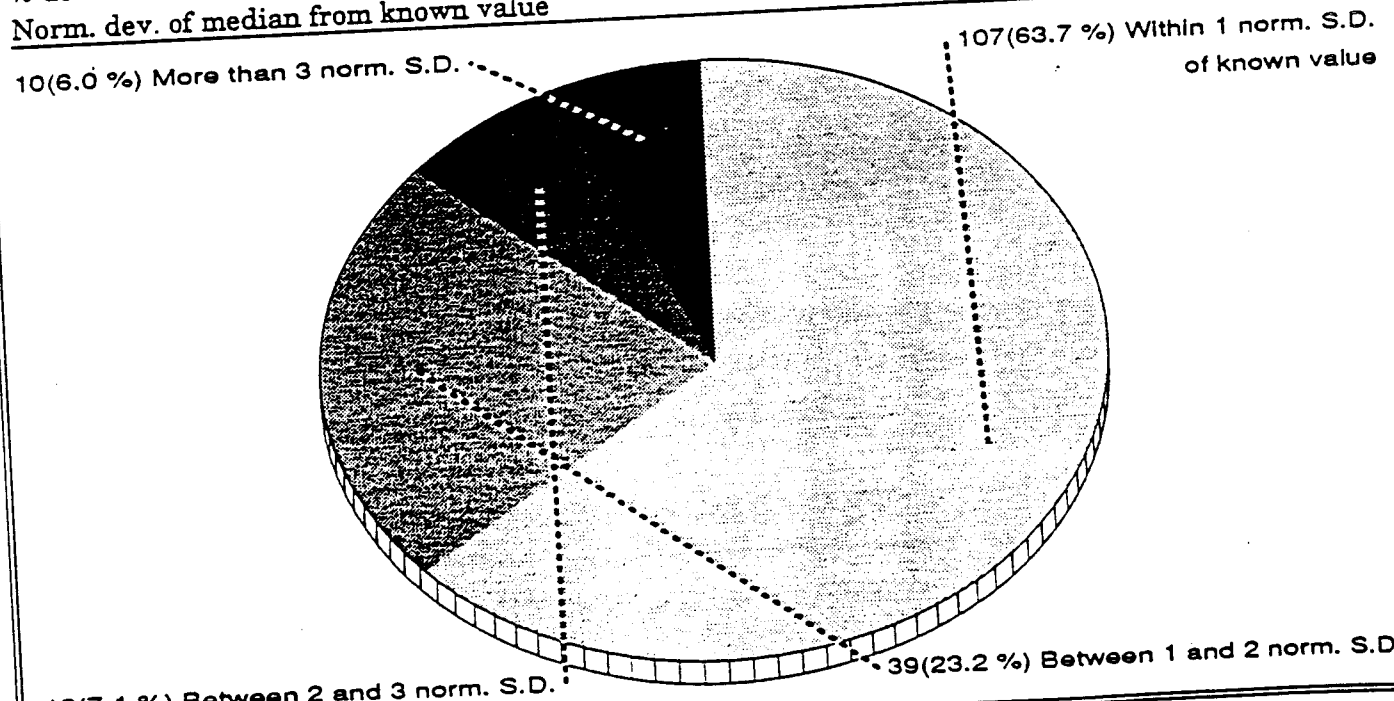
Statistical Summary 216 Participants

Gross Alpha

The known value of this nuclide is **86.0 pCi/l** with an expected precision of **22.0**; the control limits are 47.8 to 124.2; the warning regions are 47.8 to 60.5 and 111.5 to 124.2



Statistic	Respondents	Non-outliers
Mean	88.55	Grand Avg 84.40
Std. Dev.	24.95	14.63
Variance	622.58	214.02
% Coef. of Var.	28.18	17.33
% deviation of mean from known value	2.96	-1.87
Norm. dev. of mean from known value	0.10	-0.11
Median	84.00	83.67
% deviation of median from known value	-2.33	-2.71
Norm. dev. of median from known value	-0.08	-0.16



Gross Alpha

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DO									•
DS	81.0	88.0	88.0	4.04	0.188	85.67	0.10	-0.03	
DT	88.0	71.0	83.0	8.74	0.456	80.67	-0.29	-0.42	
DZ	86.0	82.0	83.0	2.08	0.107	83.67	-0.06	-0.18	
E	86.0	80.0	83.0	3.00	0.161	83.00	-0.11	-0.24	
EB	95.0	99.0	98.0	2.08	0.107	97.33	1.02	0.89	
EH	51.0	52.0	50.0	1.00	0.054	51.00	-2.63	-2.76	
EL									•
EO	90.0	90.0	87.0	1.73	0.081	89.00	0.36	0.24	
ER	83.0	84.0	84.0	0.58	0.027	83.67	-0.06	-0.18	
EV	75.0	77.0	77.0	1.15	0.054	76.33	-0.63	-0.76	
EX									•
FE	128.0	149.0	163.0	17.62	0.940	146.67	4.90	4.78	×
FF	94.0	93.0	89.0	2.65	0.134	92.00	0.60	0.47	
FJ	68.0	69.0	69.0	0.58	0.027	68.67	-1.24	-1.36	
FL	56.0	54.0	56.0	1.15	0.054	55.33	-2.29	-2.41	
FN	130.0	118.0	122.0	6.11	0.322	123.33	3.07	2.94	
FU	86.0	81.0	82.0	2.65	0.134	83.00	-0.11	-0.24	
FZ	78.0	66.0	80.0	7.57	0.376	74.67	-0.77	-0.89	
GE									•
GI									•
GQ	69.0	72.0	76.0	3.51	0.188	72.33	-0.95	-1.08	
GT	77.0	82.0	83.0	3.21	0.161	80.67	-0.29	-0.42	
GZ	70.0	73.0	68.0	2.52	0.134	70.33	-1.11	-1.23	
HH									•
HI	75.0	80.0	78.0	2.52	0.134	77.67	-0.53	-0.66	
HK	94.0	95.0	100.0	3.21	0.161	96.33	0.94	0.81	
HL	104.0	104.0	104.0	0.00	0.000	104.00	1.54	1.42	
HP	67.0	62.0	62.0	2.89	0.134	63.67	-1.63	-1.76	
HU	157.0	158.0	153.0	2.65	0.134	156.00	5.64	5.51	×
HX									•
I	60.0	64.0	59.0	2.65	0.134	61.00	-1.84	-1.97	
IA									•
IC	88.0	84.0	80.0	4.00	0.215	84.00	-0.03	-0.16	
ID	106.0	106.0	107.0	0.58	0.027	106.33	1.73	1.60	
IE	96.0	100.0	89.0	5.57	0.295	95.00	0.83	0.71	
IU									•
J	87.0	92.0	90.0	2.52	0.134	89.67	0.41	0.29	
JE	78.0	83.0	93.0	7.64	0.403	84.67	0.02	-0.10	
JG	102.0	105.0	112.0	5.13	0.268	106.33	1.73	1.60	
JH									•
JN	78.0	66.0	71.0	6.03	0.322	71.67	-1.00	-1.13	
JQ	77.0	89.0	86.0	6.24	0.322	84.00	-0.03	-0.16	
JS	61.0	71.0	75.0	7.21	0.376	69.00	-1.21	-1.34	
JY	83.0	81.0	80.0	1.53	0.081	81.33	-0.24	-0.37	

TAG SYMBOLS

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

EMSL-LV Performance Evaluation: Blind-A, 19-Apr-1994

Gross Alpha

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
K	91.0	98.0	93.0	3.61	0.188	94.00	0.76	0.63	
KE	82.0	83.0	75.0	4.36	0.215	80.00	-0.35	-0.47	
KM									•
KT	100.0	110.0	118.0	9.02	0.483	109.33	1.96	1.84	
KX	77.0	81.0	82.0	2.65	0.134	80.00	-0.35	-0.47	
L	83.0	84.0	84.0	0.58	0.027	83.67	-0.06	-0.18	
LF	74.0	81.0	80.0	3.79	0.188	78.33	-0.48	-0.60	
LG	101.0	97.0	91.0	5.03	0.268	96.33	0.94	0.81	
LL	81.0	80.0	86.0	3.21	0.161	82.33	-0.16	-0.29	
LM									•
LR	100.0	70.0	67.0	18.25	0.886	79.00	-0.42	-0.55	
LT	79.0	82.0	78.0	2.08	0.107	79.67	-0.37	-0.50	
M	75.0	80.0	78.0	2.52	0.134	77.67	-0.53	-0.66	
MA									•
MN									•
MO									•
MP									•
MQ	94.0	92.0	94.0	1.15	0.054	93.33	0.70	0.58	
MS									•
MV	78.0	74.0	75.0	2.08	0.107	75.67	-0.69	-0.81	
MY									•
N	97.0	93.0	99.0	3.06	0.161	96.33	0.94	0.81	
NA	143.0	140.0	145.0	2.52	0.134	142.67	4.59	4.46	×
NG									•
NH	140.0	141.0	139.0	1.00	0.054	140.00	4.38	4.25	×
NI									•
NJ	82.0	80.0	86.0	3.06	0.161	82.67	-0.14	-0.26	
NK	63.0	65.0	57.0	4.16	0.215	61.67	-1.79	-1.92	
NO	65.0	68.0	71.0	3.00	0.161	68.00	-1.29	-1.42	
NT	84.0	88.0	86.0	2.00	0.107	86.00	0.13	0.00	
O	91.0	91.0	89.0	1.15	0.054	90.33	0.47	0.34	
OF	227.0	243.0	256.0	14.53	0.779	242.00	12.41	12.28	×
OS	74.0	75.0	74.0	0.58	0.027	74.33	-0.79	-0.92	
OX	76.0	82.0	72.0	5.03	0.268	76.67	-0.61	-0.73	
OY	94.0	97.0	104.0	5.13	0.268	98.33	1.10	0.97	
P	78.0	78.0	75.0	1.73	0.081	77.00	-0.58	-0.71	
PA	62.0	70.0	66.0	4.00	0.215	66.00	-1.45	-1.57	
PB	85.0	81.0	79.0	3.06	0.161	81.67	-0.21	-0.34	
PC	140.0	143.0	152.0	6.24	0.322	145.00	4.77	4.65	×
PG	100.0	92.0	97.0	4.04	0.215	96.33	0.94	0.81	
PI									•
PM	100.0	104.0	114.0	7.21	0.376	106.00	1.70	1.57	
PP									•
PQ	72.0	73.0	70.0	1.53	0.081	71.67	-1.00	-1.13	
[illegible]	74.0	74.0	76.0	1.15	0.054	74.67	-0.77	-0.89	

• ≡ No data submitted

∅ ≡ Insufficient data

TAG SYMBOLS

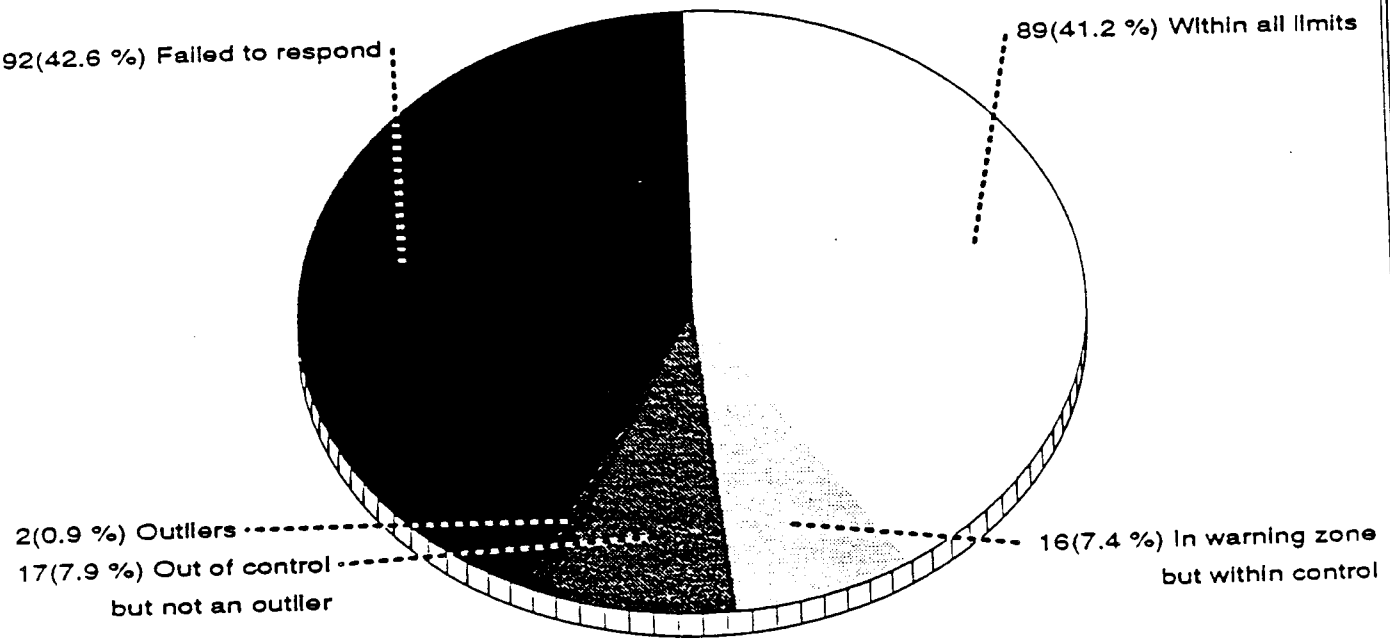
× ≡ Determined to be an outlier

⇑ ≡ Above control limit

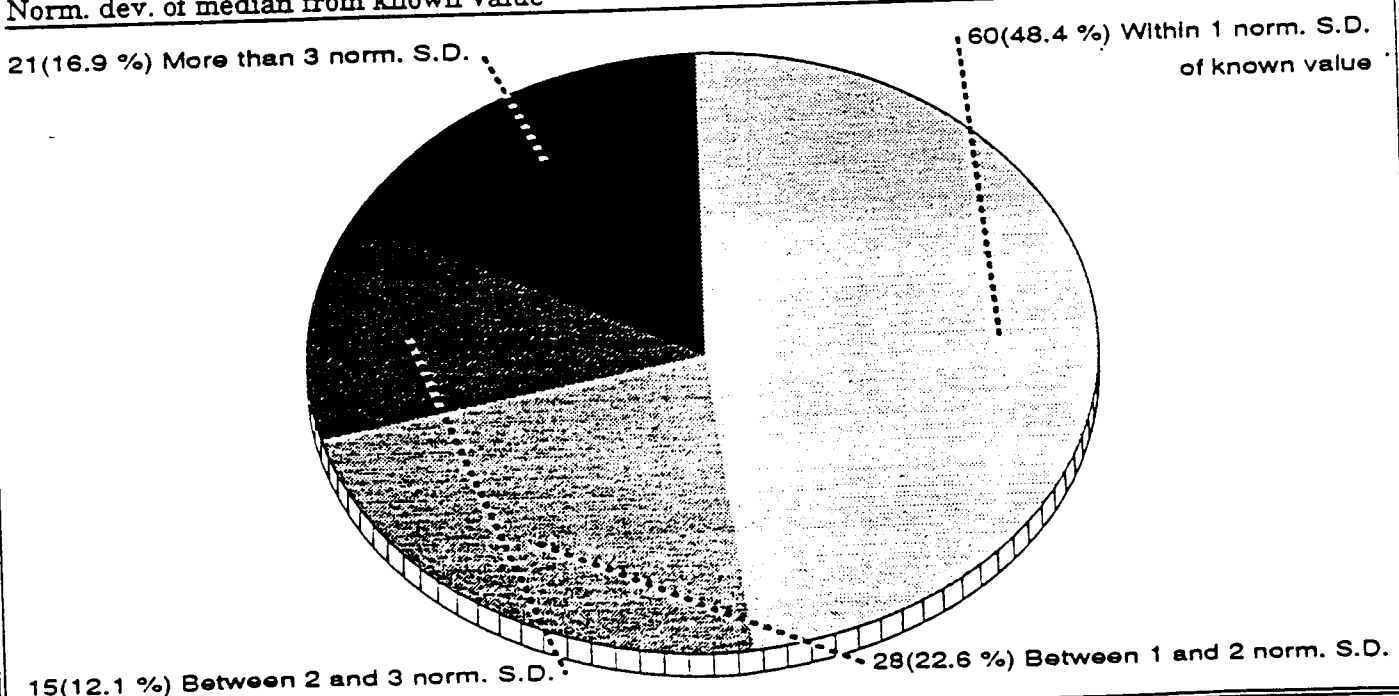
⇓ ≡ Below control limit

Uranium (Natural) Statistical Summary 216 Participants

The known value of this nuclide is **25.0 pCi/l** with an expected precision of **3.0**; the control limits are 19.8 to 30.2; the warning regions are 19.8 to 21.5 and 28.5 to 30.2



Statistic	Respondents	Non-outliers
Mean	24.16	**Grand Avg 24.39**
Std. Dev.	3.94	3.53
Variance	15.51	12.48
% Coef. of Var.	16.30	14.48
% deviation of mean from known value	-3.36	-2.44
Norm. dev. of mean from known value	-0.21	-0.17
Median	24.27	24.30
% deviation of median from known value	-2.93	-2.80
Norm. dev. of median from known value	-0.19	-0.20



Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DO	26.2	22.8	23.2	1.86	0.669	24.07	-0.19	-0.54	
DS									•
DT	26.5	22.8	25.2	1.88	0.728	24.83	0.26	-0.10	
DZ	30.6	31.9	32.3	0.89	0.335	31.60	4.16	3.81	⇑
E	22.1	22.9	22.8	0.44	0.158	22.60	-1.03	-1.39	
EB	24.1	25.1	25.3	0.64	0.236	24.83	0.26	-0.10	
EH									•
EL	23.5	22.7	25.2	1.28	0.492	23.80	-0.34	-0.69	
EO									•
ER	20.1	21.6	22.1	1.04	0.394	21.27	-1.80	-2.16	
EV									•
EX									•
FE	24.3	23.9	23.9	0.23	0.079	24.03	-0.21	-0.56	
FF									•
FJ	9.7	9.8	9.9	0.10	0.039	9.80	-8.42	-8.78	×
FL									•
FN	19.5	20.0	19.1	0.45	0.177	19.53	-2.80	-3.16	⇓
FU									•
FZ	26.9	25.6	28.5	1.45	0.571	27.00	1.51	1.15	
GE									•
GI									•
GQ	27.4	29.3	28.3	0.95	0.374	28.33	2.28	1.92	
GT									•
GZ									•
HH									•
HI									•
HK	23.1	24.4	22.0	1.20	0.473	23.17	-0.71	-1.06	
HL	30.4	27.4	32.8	2.71	1.120	30.20	3.35	3.00	
HP	25.6	26.1	25.1	0.50	0.197	25.60	0.70	0.35	
HU	13.2	13.2	13.6	0.23	0.079	13.33	-6.38	-6.74	⇓
HX									•
I	31.4	32.4	28.2	2.19	0.827	30.67	3.62	3.27	⇑
IA									•
IC									•
ID	30.9	31.1	32.3	0.76	0.276	31.43	4.07	3.71	⇑
IE	21.6	20.1	20.2	0.84	0.295	20.63	-2.17	-2.52	
IU									•
J	23.8	25.4	25.2	0.87	0.315	24.80	0.24	-0.12	
JE	23.1	26.0	25.0	1.47	0.571	24.70	0.18	-0.17	
JG									•
JH									•
JN									•
JQ									•
JS	18.9	18.9	19.1	0.12	0.039	18.97	-3.13	-3.48	⇓
JY	24.7	22.8	23.6	0.95	0.374	23.70	-0.40	-0.75	

TAG SYMBOLS

• ≡ No data submitted

∅ ≡ Insufficient data

× ≡ Determined to be an outlier

⇑ ≡ Above control limit

⇓ ≡ Below control limit

Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
K	27.5	27.3	23.5	2.25	0.788	26.10	0.99	0.64	
KE									•
KM									•
KT	18.0	19.0	21.0	1.53	0.591	19.33	-2.92	-3.27	⇓
KX									•
L	28.2	24.0	25.9	2.10	0.827	26.03	0.95	0.60	
LF									•
LG									•
LL									•
LM									•
LR									•
LT	29.8	27.6	26.8	1.55	0.591	28.07	2.12	1.77	
M									•
MA									•
MN									•
MO									•
MP									•
MQ									•
MS									•
MV									•
MY									•
N	32.5	29.0	30.4	1.76	0.689	30.63	3.60	3.25	⇑
NA	28.0	28.0	30.0	1.15	0.394	28.67	2.47	2.12	
NG									•
NH	24.0	24.2	23.3	0.47	0.177	23.83	-0.32	-0.67	
NI									•
NJ	22.0	23.0	24.0	1.00	0.394	23.00	-0.80	-1.15	
NK	23.0	25.1	24.6	1.10	0.413	24.23	-0.09	-0.44	
NO	23.2	23.8	25.1	0.97	0.374	24.03	-0.21	-0.56	
NT	21.3	22.9	24.5	1.60	0.630	22.90	-0.86	-1.21	
O									•
OF	21.0	23.0	27.0	3.06	1.345	23.67	-0.42	-0.77	
OS	18.5	18.1	18.5	0.23	0.079	18.37	-3.48	-3.83	⇓
OX									•
OY	20.7	20.4	21.3	0.46	0.177	20.80	-2.07	-2.42	
P	22.4	21.6	21.6	0.46	0.158	21.87	-1.46	-1.81	
PA									•
PB	25.5	24.7	25.0	0.40	0.158	25.07	0.39	0.04	
PC	23.2	24.4	25.3	1.05	0.413	24.30	-0.05	-0.40	
PG									•
PI									•
PM	21.0	22.0	22.0	0.58	0.197	21.67	-1.57	-1.92	
PP	23.1	23.1	23.0	0.06	0.020	23.07	-0.76	-1.12	
PQ	24.3	24.6	24.1	0.25	0.098	24.33	-0.03	-0.38	
PR									•

• ≡ No data submitted
∅ ≡ Insufficient data

TAG SYMBOLS
× ≡ Determined to be an outlier

⇑ ≡ Above control limit
⇓ ≡ Below control limit

United States
Environmental Protection
Agency

Office of Research and
Development
Washington, DC 20460

EPA/600/R-94/121B
July 1994

5516

EPA

Blind-B Performance Evaluation Study

A Statistical Evaluation of the April 19, 1994 Data

AUG 1994
RECEIVED
D.A. SEBELIEN

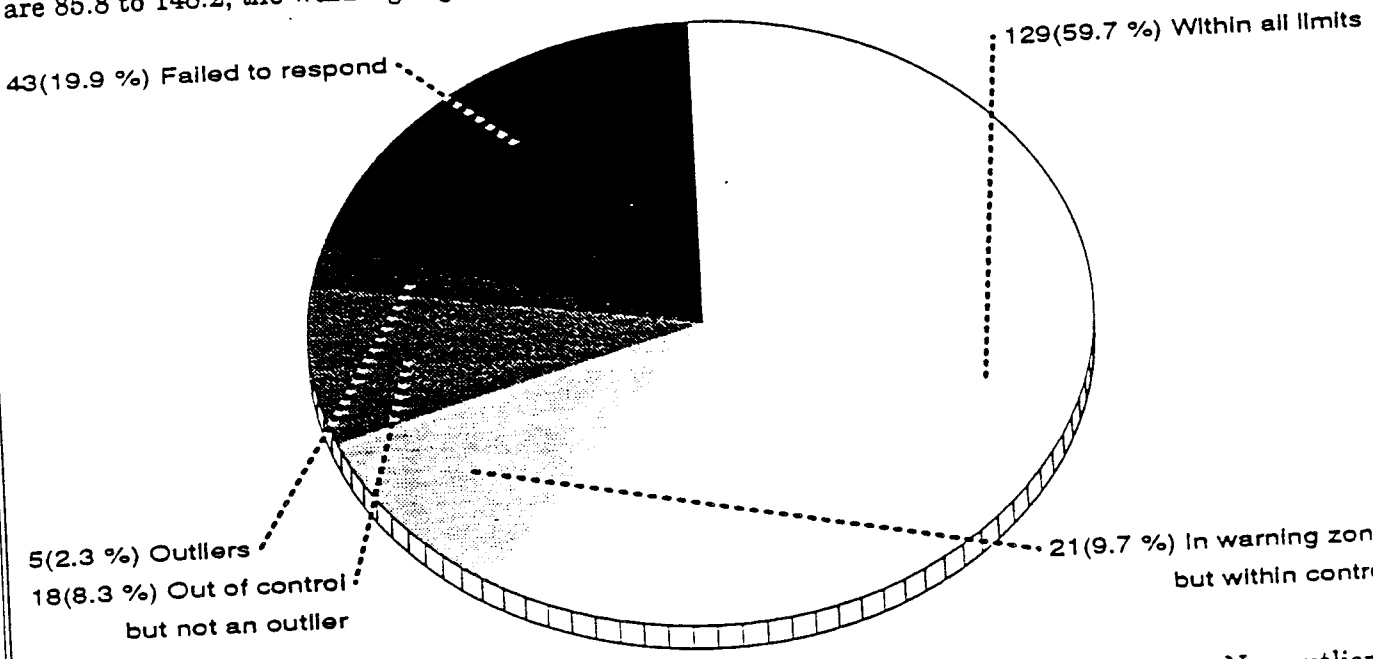
0014rsd94.121b

216 Participants

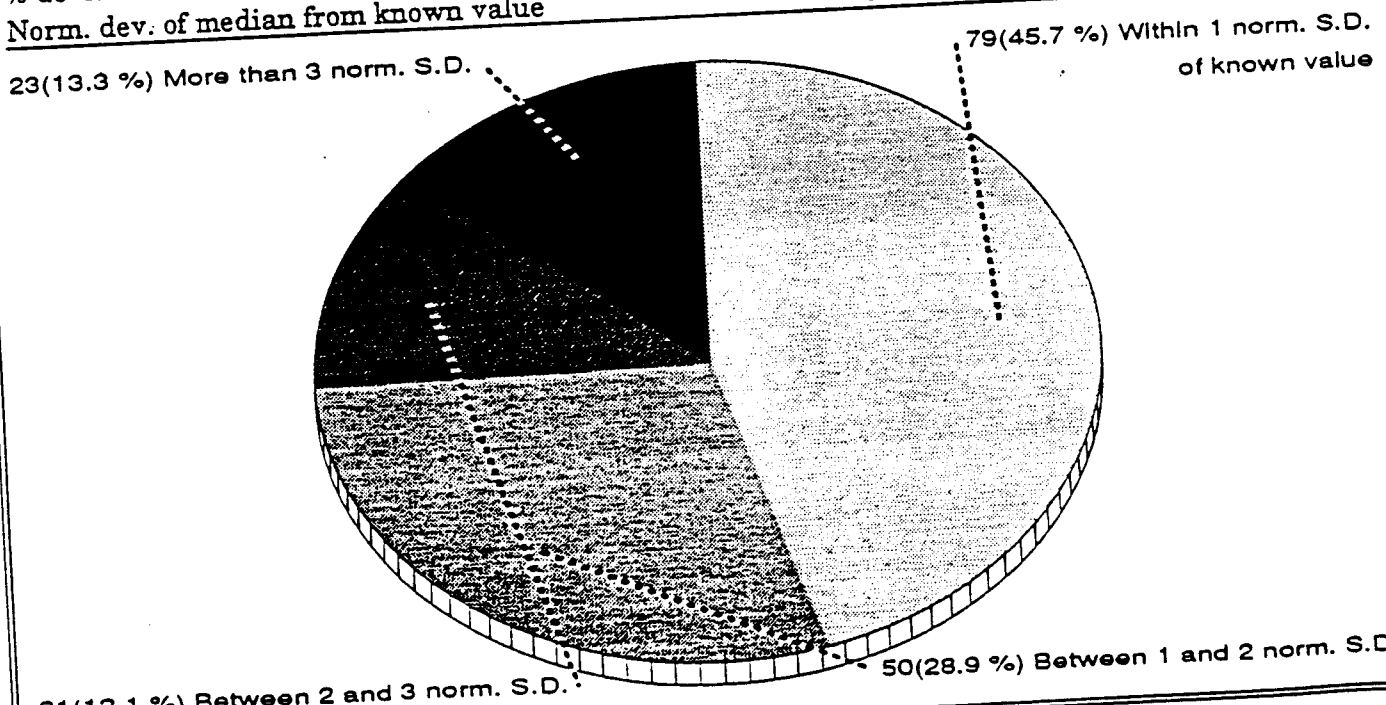
Statistical Summary

Gross Beta

The known value of this nuclide is **117.0 pCi/l** with an expected precision of **18.0**; the control limits are 85.8 to 148.2; the warning regions are 85.8 to 96.2 and 137.8 to 148.2



Statistic	Respondents		Non-outliers
Mean	441.79	**Grand Avg**	**106.86**
Std. Dev.	4387.42		15.47
Variance	19249479.28		239.40
% Coef. of Var.	993.11		14.48
% deviation of mean from known value	277.60		-8.67
Norm. dev. of mean from known value	0.07		-0.66
Median	108.33		108.00
% deviation of median from known value	-7.41		-7.69
Norm. dev. of median from known value	0.00		-0.58



Gross Beta

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DO									•
DS	105.0	104.0	106.0	1.00	0.066	105.00	-0.18	-1.15	
DT	113.0	112.0	109.0	2.08	0.131	111.33	0.43	-0.55	
DZ	102.0	110.0	111.0	4.93	0.295	107.67	0.08	-0.90	
E	108.0	113.0	111.0	2.52	0.164	110.67	0.37	-0.61	
EB	105.0	112.0	114.0	4.73	0.295	110.33	0.33	-0.64	
EH	102.0	103.0	105.0	1.53	0.098	103.33	-0.34	-1.32	
EL									•
EO	115.0	116.0	117.0	1.00	0.066	116.00	0.88	-0.10	
ER									•
EV	104.0	103.0	105.0	1.00	0.066	104.00	-0.27	-1.25	
EX									•
FE	114.0	113.0	115.0	1.00	0.066	114.00	0.69	-0.29	
FF	197.0	197.0	184.0	7.51	0.427	192.67	8.26	7.28	×
FJ	139.0	137.0	150.0	7.00	0.427	142.00	3.38	2.41	
FL	93.0	98.0	98.0	2.89	0.164	96.33	-1.01	-1.99	
FN	103.0	104.0	98.0	3.21	0.197	101.67	-0.50	-1.48	
FU	87.0	92.0	91.0	2.65	0.164	90.00	-1.62	-2.60	
FZ	75.0	75.0	93.0	10.39	0.591	81.00	-2.49	-3.46	⇓
GE	109.0	109.0	109.0	0.00	0.000	109.00	0.21	-0.77	
GI									•
GQ	117.0	124.0	131.0	7.00	0.459	124.00	1.65	0.67	
GT	97.0	102.0	104.0	3.61	0.230	101.00	-0.56	-1.54	
GZ	138.0	137.0	135.0	1.53	0.098	136.67	2.87	1.89	
HH									•
HI	110.0	110.0	110.0	0.00	0.000	110.00	0.30	-0.67	
HK	106.0	105.0	107.0	1.00	0.066	106.00	-0.08	-1.06	
HL	116.0	116.0	116.0	0.00	0.000	116.00	0.88	-0.10	
HP	89.0	94.0	97.0	4.04	0.263	93.33	-1.30	-2.28	
HU	146.0	136.0	140.0	5.03	0.328	140.67	3.25	2.28	
HX									•
I	103.0	105.0	103.0	1.15	0.066	103.67	-0.31	-1.28	
IA									•
IC	104.0	106.0	105.0	1.00	0.066	105.00	-0.18	-1.15	
ID									•
IE	104.0	102.0	106.0	2.00	0.131	104.00	-0.27	-1.25	
IU									•
J	119.0	119.0	120.0	0.58	0.033	119.33	1.20	0.22	
JE	131.0	133.0	134.0	1.53	0.098	132.67	2.48	1.51	
JG	117.0	131.0	133.0	8.72	0.525	127.00	1.94	0.96	
JH									•
JN	99.0	102.0	104.0	2.52	0.164	101.67	-0.50	-1.48	
JQ	154.0	140.0	152.0	7.57	0.459	148.67	4.02	3.05	⇑
JS	95.0	96.0	97.0	1.00	0.066	96.00	-1.04	-2.02	
JY	96.0	98.0	97.0	1.00	0.066	97.00	-0.95	-1.92	

TAG SYMBOLS

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

Gross Beta

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
K	79.0	82.0	81.0	1.53	0.098	80.67	-2.52	-3.50	⇓
KE	103.0	95.0	102.0	4.36	0.263	100.00	-0.66	-1.64	
KM									•
KT	20.0	24.0	29.0	4.51	0.295	24.33	-7.94	-8.92	×
KX	116.0	119.0	119.0	1.73	0.098	118.00	1.07	0.10	
L	116.0	115.0	113.0	1.53	0.098	114.67	0.75	-0.22	
LF	99.0	110.0	100.0	6.08	0.361	103.00	-0.37	-1.35	
LG	111.0	113.0	111.0	1.15	0.066	111.67	0.46	-0.51	
LL	81.0	89.0	84.0	4.04	0.263	84.67	-2.14	-3.11	⇓
LM									•
LR	113.0	102.0	114.0	6.66	0.394	109.67	0.27	-0.71	
LT	100.0	100.0	104.0	2.31	0.131	101.33	-0.53	-1.51	
M	144.0	140.0	140.0	2.31	0.131	141.33	3.32	2.34	
MA	121.0	116.0	124.0	4.04	0.263	120.33	1.30	0.32	
MN									•
MO									•
MP									•
MQ	116.0	112.0	107.0	4.51	0.295	111.67	0.46	-0.51	
MS									•
MV	117.0	117.0	109.0	4.62	0.263	114.33	0.72	-0.26	
MY									•
N	100.0	102.0	107.0	3.61	0.230	103.00	-0.37	-1.35	
NA	118.0	120.0	119.0	1.00	0.066	119.00	1.17	0.19	
NG									•
NH	122.0	124.0	114.0	5.29	0.328	120.00	1.26	0.29	
NI									•
NJ	116.0	133.0	125.0	8.50	0.558	124.67	1.71	0.74	
NK	97.0	102.0	105.0	4.04	0.263	101.33	-0.53	-1.51	
NO	75.0	77.0	79.0	2.00	0.131	77.00	-2.87	-3.85	⇓
NT	112.0	113.0	112.0	0.58	0.033	112.33	0.53	-0.45	
O	107.0	103.0	111.0	4.00	0.263	107.00	0.01	-0.96	
OF	116.0	119.0	120.0	2.08	0.131	118.33	1.10	0.13	
OS	133.0	129.0	129.0	2.31	0.131	130.33	2.26	1.28	
OX	104.0	111.0	114.0	5.13	0.328	109.67	0.27	-0.71	
OY	92.0	94.0	94.0	1.15	0.066	93.33	-1.30	-2.28	
P	123.0	108.0	119.0	7.77	0.492	116.67	0.94	-0.03	
PA	84.0	103.0	98.0	9.85	0.623	95.00	-1.14	-2.12	
PB	119.0	122.0	120.0	1.53	0.098	120.33	1.30	0.32	
PC	65.0	68.0	71.0	3.00	0.197	68.00	-3.74	-4.72	⇓
PG	81.0	86.0	80.0	3.21	0.197	82.33	-2.36	-3.34	⇓
PI									•
PM	118.0	114.0	112.0	3.06	0.197	114.67	0.75	-0.22	
PP									•
PQ	92.0	94.0	95.0	1.53	0.098	93.67	-1.27	-2.25	
PR	88.0	89.0	89.0	0.58	0.033	88.67	-1.75	-2.73	

• ≡ No data submitted
∅ ≡ Insufficient data

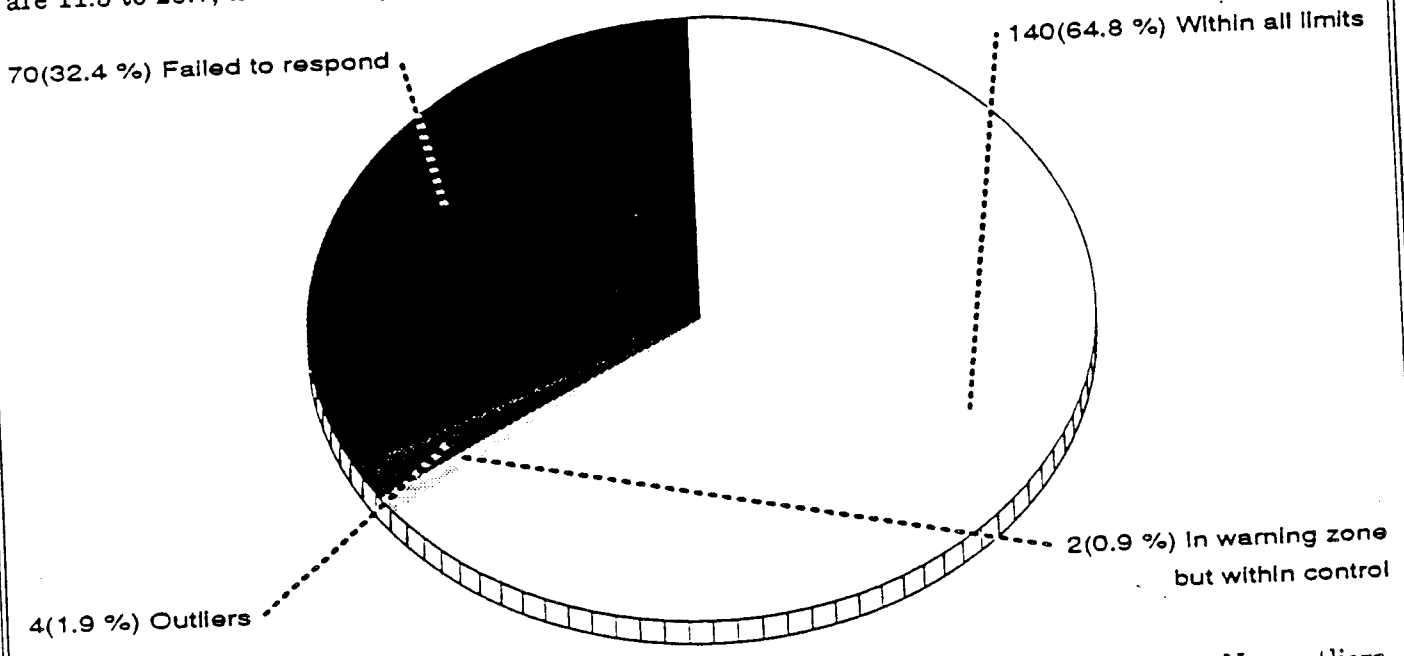
TAG SYMBOLS
× ≡ Determined to be an outlier

⇑ ≡ Above control limit
⇓ ≡ Below control limit

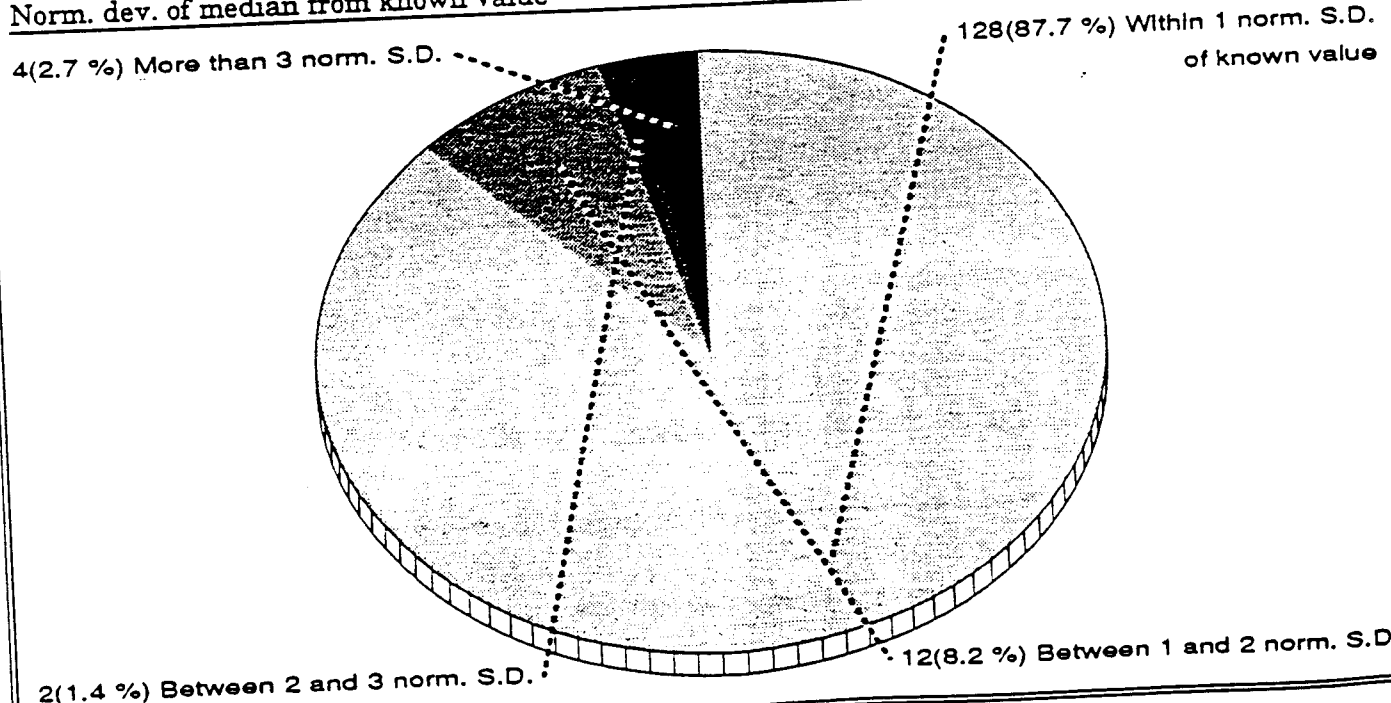
Statistical Summary 216 Participants

Cobalt-60

The known value of this nuclide is **20.0 pCi/l** with an expected precision of **5.0**; the control limits are 11.3 to 28.7; the warning regions are 11.3 to 14.2 and 25.8 to 28.7



Statistic	Respondents	Non-outliers
Mean	20.12	Grand Avg 20.12
Std. Dev.	2.60	1.83
Variance	6.75	3.35
% Coef. of Var.	12.92	9.10
% deviation of mean from known value	0.59	0.60
Norm. dev. of mean from known value	0.05	0.07
Median	20.00	20.00
% 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	20.0	23.0	19.0	2.08	0.473	20.67	0.19	0.23	
DS									•
DT	22.0	19.0	21.0	1.53	0.354	20.67	0.19	0.23	
DZ	18.0	17.0	18.0	0.58	0.118	17.67	-0.85	-0.81	
E	21.0	20.0	21.0	0.58	0.118	20.67	0.19	0.23	
EB	19.0	19.0	19.0	0.00	0.000	19.00	-0.39	-0.35	
EH	18.0	20.0	20.0	1.15	0.236	19.33	-0.27	-0.23	
EL	19.0	20.0	18.0	1.00	0.236	19.00	-0.39	-0.35	
EO									•
ER									•
EV									•
EX									•
FE	21.0	18.0	15.0	3.00	0.709	18.00	-0.73	-0.69	
FF									•
FJ	22.0	23.0	21.0	1.00	0.236	22.00	0.65	0.69	
FL	20.0	21.0	21.0	0.58	0.118	20.67	0.19	0.23	
FN									•
FU	21.0	21.0	18.0	1.73	0.354	20.00	-0.04	0.00	
FZ	24.0	23.0	24.0	0.58	0.118	23.67	1.23	1.27	
GE	20.0	20.0	20.0	0.00	0.000	20.00	-0.04	0.00	
GI	19.0	20.0	19.0	0.58	0.118	19.33	-0.27	-0.23	
GQ	20.0	20.0	20.0	0.00	0.000	20.00	-0.04	0.00	
GT									•
GZ									•
HH									•
HI	36.0	31.0	27.0	4.51	1.120	31.33	3.88	3.93	×
HK	20.0	20.0	20.0	0.00	0.000	20.00	-0.04	0.00	
HL	19.0	21.0	22.0	1.53	0.354	20.67	0.19	0.23	
HP	21.0	22.0	22.0	0.58	0.118	21.67	0.54	0.58	
HU	17.0	17.0	16.0	0.58	0.118	16.67	-1.20	-1.15	
HX									•
I	22.0	20.0	23.0	1.53	0.354	21.67	0.54	0.58	
IA	17.0	20.0	18.0	1.53	0.354	18.33	-0.62	-0.58	
IC	21.0	20.0	20.0	0.58	0.118	20.33	0.07	0.12	
ID									•
IE									•
IU									•
J	20.0	19.0	19.0	0.58	0.118	19.33	-0.27	-0.23	
JE	20.0	20.0	21.0	0.58	0.118	20.33	0.07	0.12	
JG	18.0	16.0	22.0	3.06	0.709	18.67	-0.50	-0.46	
JH									•
JN									•
JQ									•
JS	19.0	19.0	20.0	0.58	0.118	19.33	-0.27	-0.23	
JY	23.0	20.0	23.0	1.73	0.354	22.00	0.65	0.69	

TAG SYMBOLS

• ≡ No data submitted

∅ ≡ Insufficient data

× ≡ Determined to be an outlier

⇑ ≡ Above control limit

⇓ ≡ Below control limit

Cobalt-60

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
K	22.0	23.0	24.0	1.00	0.236	23.00	1.00	1.04	
KE									•
KM	19.0	22.0	19.0	1.73	0.354	20.00	-0.04	0.00	
KT									•
KX	21.0	20.0	23.0	1.53	0.354	21.33	0.42	0.46	
L	20.0	20.0	20.0	0.00	0.000	20.00	-0.04	0.00	
LF	21.0	22.0	18.0	2.08	0.473	20.33	0.07	0.12	
LG									•
LL									•
LM									•
LR	20.0	19.0	22.0	1.53	0.354	20.33	0.07	0.12	
LT	20.0	20.0	20.0	0.00	0.000	20.00	-0.04	0.00	
M	19.0	18.0	18.0	0.58	0.118	18.33	-0.62	-0.58	
MA	23.0	23.0	22.0	0.58	0.118	22.67	0.88	0.92	
MN									•
MO									•
MP	14.0	17.0	17.0	1.73	0.354	16.00	-1.43	-1.39	
MQ	22.0	25.0	21.0	2.08	0.473	22.67	0.88	0.92	
MS									•
MV	22.0	21.0	22.0	0.58	0.118	21.67	0.54	0.58	
MY									•
NA	22.0	20.0	22.0	1.15	0.236	21.33	0.42	0.46	
NG									•
NH	20.0	21.0	19.0	1.00	0.236	20.00	-0.04	0.00	
NI									•
NJ	19.0	19.0	19.0	0.00	0.000	19.00	-0.39	-0.35	
NK	19.0	18.0	20.0	1.00	0.236	19.00	-0.39	-0.35	
NO	15.0	15.0	15.0	0.00	0.000	15.00	-1.77	-1.73	
NT									•
O	21.0	21.0	21.0	0.00	0.000	21.00	0.30	0.35	
OF									•
OS									•
OX									•
OY									•
P	31.0	32.0	31.0	0.58	0.118	31.33	3.88	3.93	×
PA									•
PB	20.0	20.0	20.0	0.00	0.000	20.00	-0.04	0.00	
PC	22.0	23.0	24.0	1.00	0.236	23.00	1.00	1.04	
PG									•
PI	19.0	19.0	19.0	0.00	0.000	19.00	-0.39	-0.35	
PM	23.0	21.0	21.0	1.15	0.236	21.67	0.54	0.58	
PP	20.0	24.0	23.0	2.08	0.473	22.33	0.77	0.81	
[illegible]	20.0	19.0	20.0	0.58	0.118	19.67	-0.16	-0.12	
PR									•

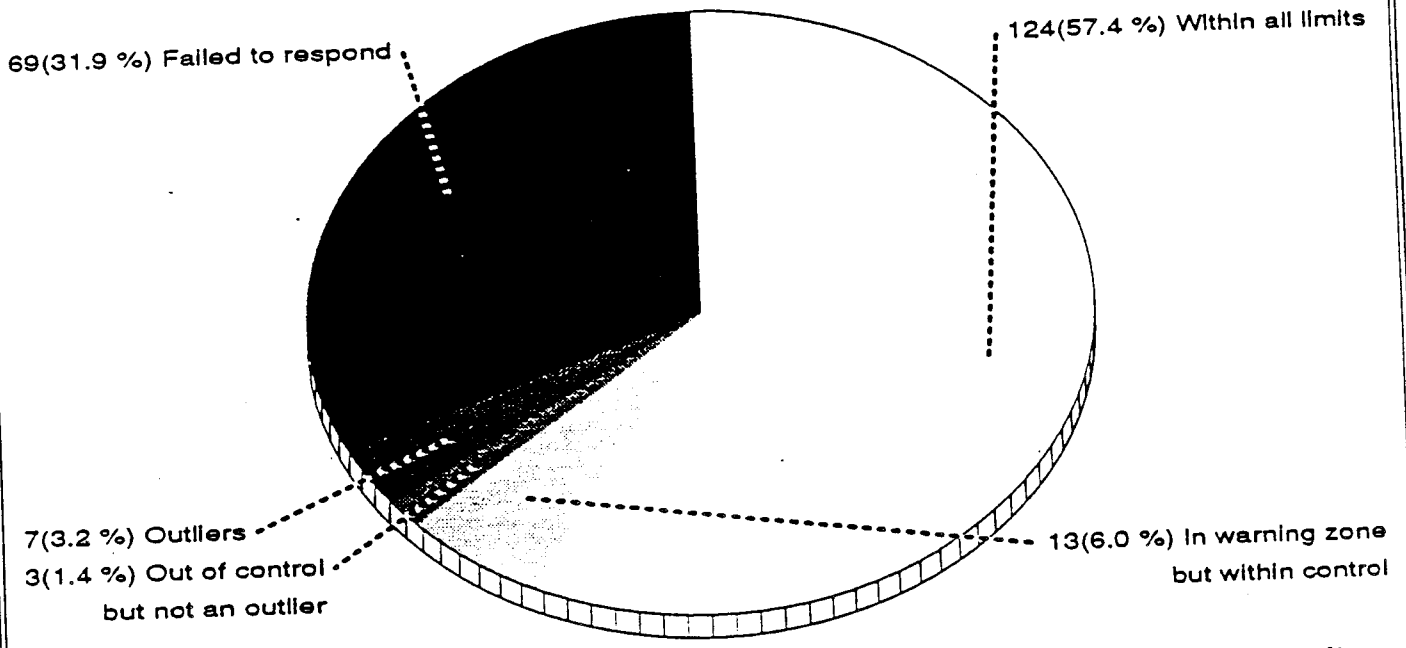
• ≡ No data submitted
∅ ≡ Insufficient data

TAG SYMBOLS
× ≡ Determined to be an outlier

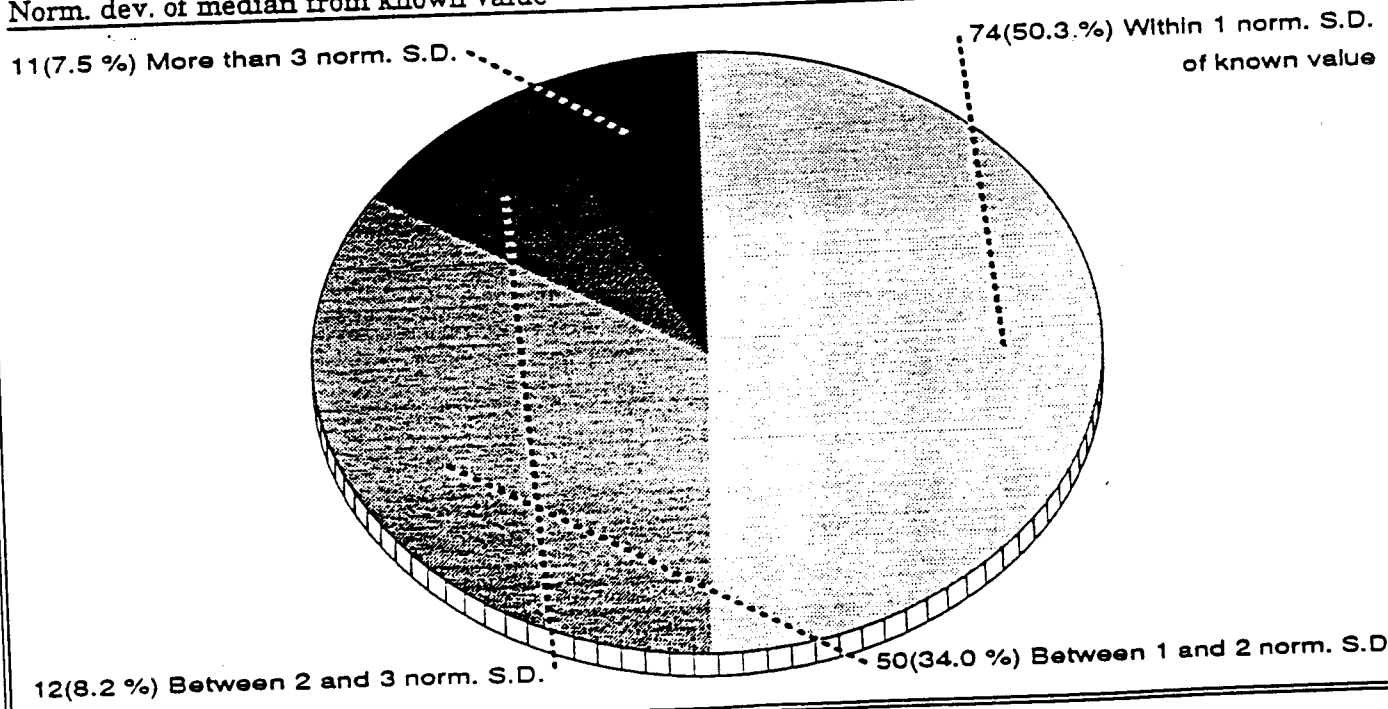
⇑ ≡ Above control limit
⇓ ≡ Below control limit

Cesium-134 Statistical Summary 216 Participants

The known value of this nuclide is **34.0 pCi/l** with an expected precision of **5.0**; the control limits are 25.3 to 42.7; the warning regions are 25.3 to 28.2 and 39.8 to 42.7



Statistic	Respondents	Non-outliers
Mean	31.36	**Grand Avg 31.45**
Std. Dev.	4.25	2.72
Variance	18.08	7.41
% Coef. of Var.	13.56	8.66
% deviation of mean from known value	-7.76	-7.51
Norm. dev. of mean from known value	-0.62	-0.94
Median	31.67	31.67
% deviation of median from known value	-6.86	-6.86
Norm. dev. of median from known value	-0.55	-0.86



EMSL-LV Performance Evaluation: Blind-B, 19-Apr-1994

Cesium-134

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DO	28.0	31.0	28.0	1.73	0.354	29.00	-0.85	-1.73	
DS									•
DT	29.0	30.0	34.0	2.65	0.591	31.00	-0.15	-1.04	
DZ	25.0	25.0	27.0	1.15	0.236	25.67	-2.00	-2.89	
E	32.0	32.0	31.0	0.58	0.118	31.67	0.08	-0.81	
EB	30.0	29.0	30.0	0.58	0.118	29.67	-0.62	-1.50	
EH	37.0	32.0	40.0	4.04	0.945	36.33	1.69	0.81	
EL	33.0	34.0	32.0	1.00	0.236	33.00	0.54	-0.35	
EO									•
ER									•
EV									•
EX									•
FE	31.0	30.0	30.0	0.58	0.118	30.33	-0.39	-1.27	
FF									•
FJ	33.0	30.0	34.0	2.08	0.473	32.33	0.31	-0.58	
FL	34.0	33.0	33.0	0.58	0.118	33.33	0.65	-0.23	
FN									•
FU	30.0	29.0	29.0	0.58	0.118	29.33	-0.73	-1.62	
FZ	32.0	32.0	32.0	0.00	0.000	32.00	0.19	-0.69	
GE	27.0	30.0	27.0	1.73	0.354	28.00	-1.19	-2.08	
GI	30.0	29.0	28.0	1.00	0.236	29.00	-0.85	-1.73	
GQ	33.0	33.0	33.0	0.00	0.000	33.00	0.54	-0.35	
GT									•
GZ									•
HH									•
HI	40.0	47.0	47.0	4.04	0.827	44.67	4.58	3.70	×
HK	33.0	31.0	31.0	1.15	0.236	31.67	0.08	-0.81	
HL	32.0	31.0	33.0	1.00	0.236	32.00	0.19	-0.69	
HP	36.0	38.0	37.0	1.00	0.236	37.00	1.92	1.04	
HU	26.0	26.0	26.0	0.00	0.000	26.00	-1.89	-2.77	
HX									•
I	32.0	31.0	34.0	1.53	0.354	32.33	0.31	-0.58	
IA	29.0	27.0	27.0	1.15	0.236	27.67	-1.31	-2.19	
IC	38.0	36.0	35.0	1.53	0.354	36.33	1.69	0.81	
ID									•
IE									•
IU									•
J	32.0	31.0	32.0	0.58	0.118	31.67	0.08	-0.81	
JE	30.0	31.0	31.0	0.58	0.118	30.67	-0.27	-1.15	
JG	30.0	30.0	23.0	4.04	0.827	27.67	-1.31	-2.19	
JH									•
JN									•
JQ									•
JS	32.0	32.0	33.0	0.58	0.118	32.33	0.31	-0.58	
JY	33.0	30.0	32.0	1.53	0.354	31.67	0.08	-0.81	

TAG SYMBOLS

• ≡ No data submitted

∅ ≡ Insufficient data

× ≡ Determined to be an outlier

⇑ ≡ Above control limit

⇓ ≡ Below control limit

Cesium-134

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
K	29.0	30.0	28.0	1.00	0.236	29.00	-0.85	-1.73	
KE									•
KM	31.0	30.0	30.0	0.58	0.118	30.33	-0.39	-1.27	
KT									•
KX	31.0	32.0	30.0	1.00	0.236	31.00	-0.15	-1.04	
L	35.0	34.0	34.0	0.58	0.118	34.33	1.00	0.12	
LF	31.0	31.0	34.0	1.73	0.354	32.00	0.19	-0.69	
LG									•
LL									•
LM									•
LR	46.0	48.0	42.0	3.06	0.709	45.33	4.81	3.93	×
LT	31.0	31.0	31.0	0.00	0.000	31.00	-0.15	-1.04	
M	29.0	28.0	29.0	0.58	0.118	28.67	-0.96	-1.85	
MA	35.0	35.0	35.0	0.00	0.000	35.00	1.23	0.35	
MN									•
MO									•
MP	32.0	34.0	34.0	1.15	0.236	33.33	0.65	-0.23	
MQ	28.0	30.0	27.0	1.53	0.354	28.33	-1.08	-1.96	
MS									•
MV	33.0	32.0	34.0	1.00	0.236	33.00	0.54	-0.35	
MY									•
N	32.0	31.0	31.0	0.58	0.118	31.33	-0.04	-0.92	
NA									•
NG									•
NI	31.0	30.0	31.0	0.58	0.118	30.67	-0.27	-1.15	
NJ									•
NK	29.0	29.0	29.0	0.00	0.000	29.00	-0.85	-1.73	
NO	35.0	32.0	36.0	2.08	0.473	34.33	1.00	0.12	
NT	22.0	24.0	26.0	2.00	0.473	24.00	-2.58	-3.46	⇓
O									•
OF	36.0	36.0	35.0	0.58	0.118	35.67	1.46	0.58	
OS									•
OX									•
OY									•
P									•
PA	37.0	36.0	36.0	0.58	0.118	36.33	1.69	0.81	
PB									•
PC	30.0	30.0	30.0	0.00	0.000	30.00	-0.50	-1.39	
PG	36.0	38.0	39.0	1.53	0.354	37.67	2.16	1.27	
PI									•
PM	30.0	29.0	30.0	0.58	0.118	29.67	-0.62	-1.50	
PP	27.0	26.0	27.0	0.58	0.118	26.67	-1.66	-2.54	
PQ	33.0	32.0	35.0	1.53	0.354	33.33	0.65	-0.23	
PR	30.0	31.0	31.0	0.58	0.118	30.67	-0.27	-1.15	

≡ No data submitted

sufficient data

TAG-SYMBOLS

× ≡ Determined to be an outlier

⇑ ≡ Above control limit

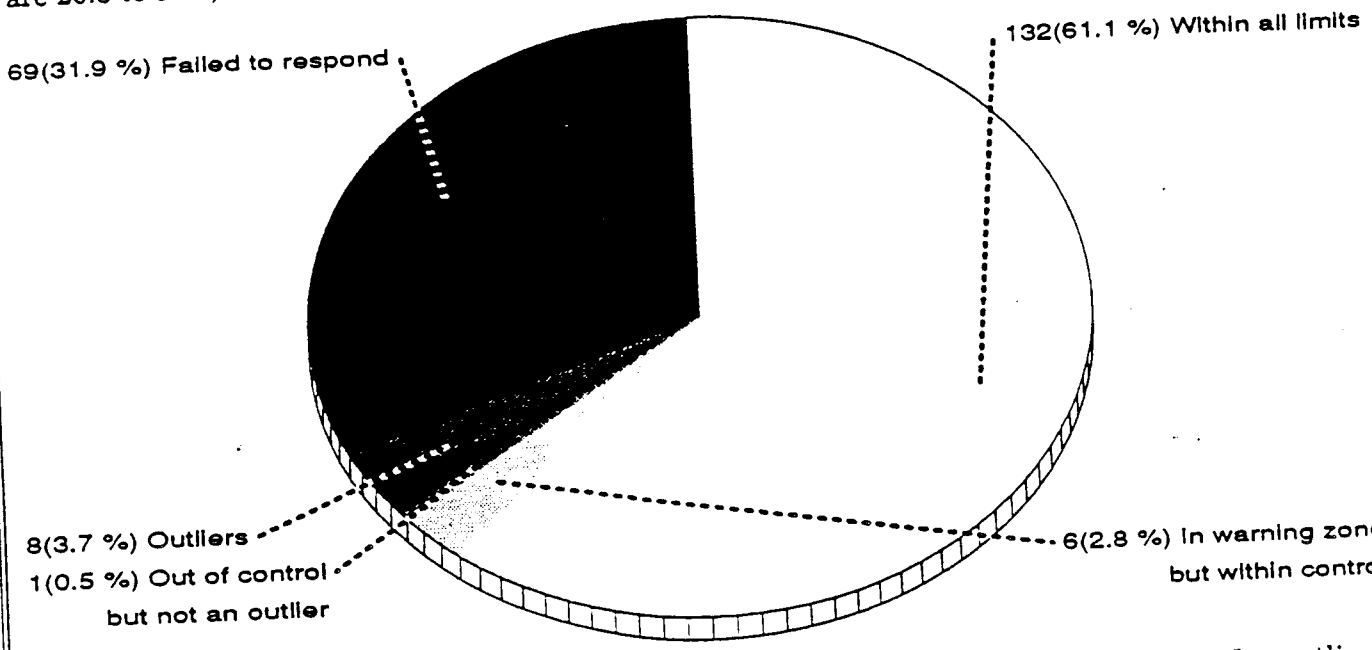
⇓ ≡ Below control limit

216 Participants

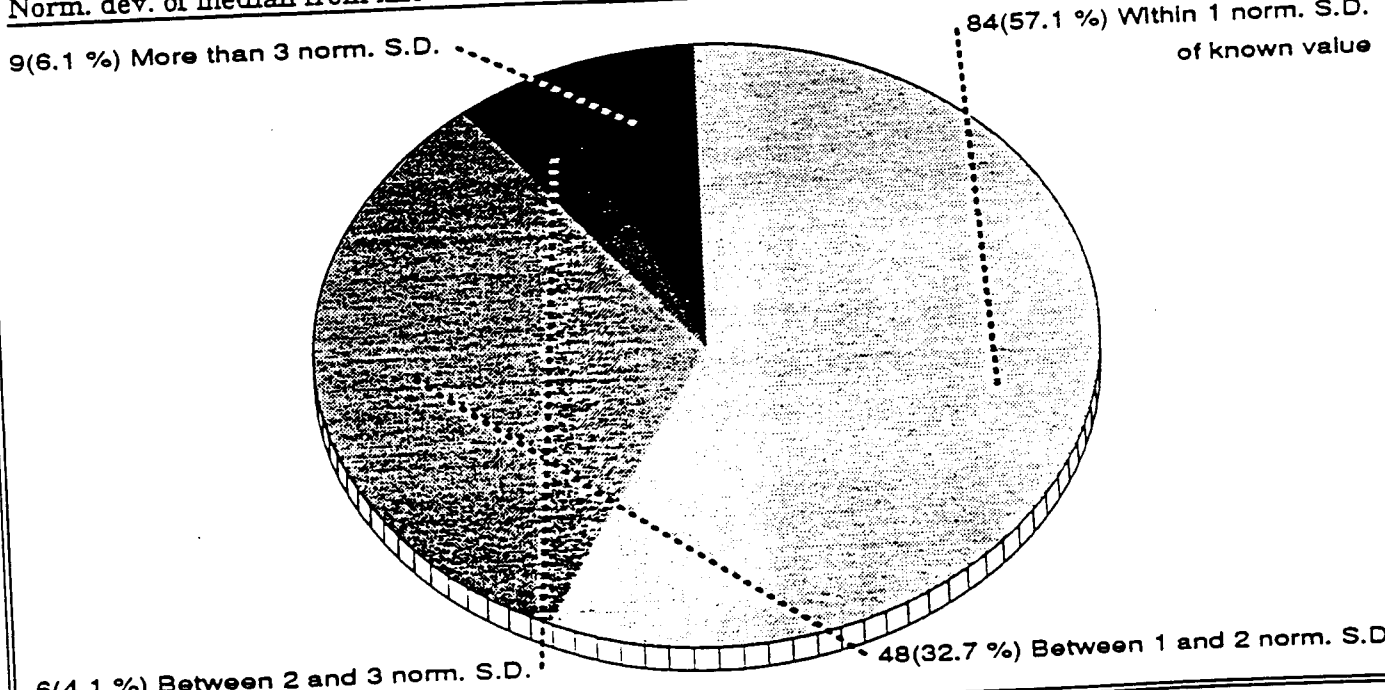
Statistical Summary

Cesium-137

The known value of this nuclide is **29.0 pCi/l** with an expected precision of **5.0**; the control limits are 20.3 to 37.7; the warning regions are 20.3 to 23.2 and 34.8 to 37.7



Statistic	Respondents	Non-outliers
Mean	30.98	Grand Avg 31.17
Std. Dev.	4.29	2.40
Variance	18.41	5.76
% Coef. of Var.	13.85	7.70
% deviation of mean from known value	6.82	7.48
Norm. dev. of mean from known value	0.46	0.90
Median	31.00	31.00
% deviation of median from known value	6.90	6.90
Norm. dev. of median from known value	0.47	0.83



Cesium-137

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
DO	34.0	27.0	28.0	3.79	0.827	29.67	-0.52	0.23	
DS									•
DT	37.0	33.0	30.0	3.51	0.827	33.33	0.75	1.50	
DZ	26.0	28.0	26.0	1.15	0.236	26.67	-1.56	-0.81	
E	32.0	32.0	30.0	1.15	0.236	31.33	0.06	0.81	
EB	31.0	31.0	31.0	0.00	0.000	31.00	-0.06	0.69	
EH	28.0	29.0	30.0	1.00	0.236	29.00	-0.75	0.00	
EL	30.0	29.0	28.0	1.00	0.236	29.00	-0.75	0.00	
EO									•
ER									•
EV									•
EX									•
FE	28.0	29.0	26.0	1.53	0.354	27.67	-1.21	-0.46	
FF									•
FJ	33.0	30.0	33.0	1.73	0.354	32.00	0.29	1.04	
FL	32.0	32.0	33.0	0.58	0.118	32.33	0.40	1.15	
FN									•
FU	30.0	30.0	29.0	0.58	0.118	29.67	-0.52	0.23	
FZ	33.0	32.0	33.0	0.58	0.118	32.67	0.52	1.27	
GE	28.0	33.0	29.0	2.65	0.591	30.00	-0.41	0.35	
GI	31.0	31.0	30.0	0.58	0.118	30.67	-0.17	0.58	
GQ	32.0	32.0	32.0	0.00	0.000	32.00	0.29	1.04	
GT									•
GZ									•
HH									•
HI	47.0	45.0	49.0	2.00	0.473	47.00	5.48	6.24	×
HK	32.0	33.0	32.0	0.58	0.118	32.33	0.40	1.15	
HL	32.0	32.0	33.0	0.58	0.118	32.33	0.40	1.15	
HP	35.0	39.0	37.0	2.00	0.473	37.00	2.02	2.77	
HU	24.0	24.0	24.0	0.00	0.000	24.00	-2.48	-1.73	
HX									•
I	32.0	29.0	32.0	1.73	0.354	31.00	-0.06	0.69	
IA	33.0	31.0	31.0	1.15	0.236	31.67	0.17	0.92	
IC	31.0	34.0	31.0	1.73	0.354	32.00	0.29	1.04	
ID									•
IE									•
IU									•
J	31.0	31.0	31.0	0.00	0.000	31.00	-0.06	0.69	
JE	31.0	30.0	31.0	0.58	0.118	30.67	-0.17	0.58	
JG	28.0	26.0	28.0	1.15	0.236	27.33	-1.33	-0.58	
JH									•
JN									•
JQ									•
JS	30.0	32.0	32.0	1.15	0.236	31.33	0.06	0.81	
JY	33.0	34.0	33.0	0.58	0.118	33.33	0.75	1.50	

TAG SYMBOLS

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

Cesium-137

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
K	35.0	38.0	37.0	1.53	0.354	36.67	1.90	2.66	
KE									•
KM	29.0	28.0	30.0	1.00	0.236	29.00	-0.75	0.00	
KT									•
KX	29.0	31.0	31.0	1.15	0.236	30.33	-0.29	0.46	
L	31.0	30.0	29.0	1.00	0.236	30.00	-0.41	0.35	
LF	31.0	30.0	29.0	1.00	0.236	30.00	-0.41	0.35	
LG									•
LL									•
LM									•
LR	28.0	32.0	30.0	2.00	0.473	30.00	-0.41	0.35	
LT	32.0	32.0	32.0	0.00	0.000	32.00	0.29	1.04	
M	29.0	30.0	30.0	0.58	0.118	29.67	-0.52	0.23	
MA	35.0	35.0	33.0	1.15	0.236	34.33	1.10	1.85	
MN									•
MO									•
MP	25.0	30.0	27.0	2.52	0.591	27.33	-1.33	-0.58	
MQ	29.0	32.0	30.0	1.53	0.354	30.33	-0.29	0.46	
MS									•
MV	32.0	32.0	33.0	0.58	0.118	32.33	0.40	1.15	
MY									•
N	31.0	31.0	32.0	0.58	0.118	31.33	0.06	0.81	
NA									•
NG									•
NH	33.0	33.0	33.0	0.00	0.000	33.00	0.63	1.39	
NI									•
NJ	49.0	51.0	51.0	1.15	0.236	50.33	6.64	7.39	×
NK	31.0	31.0	29.0	1.15	0.236	30.33	-0.29	0.46	
NO	15.0	14.0	15.0	0.58	0.118	14.67	-5.72	-4.97	×
NT									•
O	34.0	34.0	34.0	0.00	0.000	34.00	0.98	1.73	
OF									•
OS									•
OX									•
OY									•
P	41.0	43.0	44.0	1.53	0.354	42.67	3.98	4.73	×
PA									•
PB	31.0	32.0	29.0	1.53	0.354	30.67	-0.17	0.58	
PC	35.0	37.0	39.0	2.00	0.473	37.00	2.02	2.77	
PG									•
PI	31.0	29.0	30.0	1.00	0.236	30.00	-0.41	0.35	
PM	32.0	29.0	28.0	2.08	0.473	29.67	-0.52	0.23	
PP	28.0	31.0	30.0	1.53	0.354	29.67	-0.52	0.23	
PQ	32.0	32.0	34.0	1.15	0.236	32.67	0.52	1.27	
PR									•

• ≡ No data submitted
∅ ≡ Insufficient data

TAG SYMBOLS
× ≡ Determined to be an outlier

⇑ ≡ Above control limit
⇓ ≡ Below control limit

EPA/CLP 3/94 ORGANIC

Westinghouse Hanford Company | **Internal Memo**

From: 222-S Analytical Operations 8E400-94-062
Phone: 373-4131 T6-16
Date: July 25, 1994
Subject: CORRECTIVE ACTION REQUEST - EPA QUARTERLY BLIND (QB3FY94) ORGANIC PERFORMANCE EVALUATION PROGRAM

To: R. P. Marshall T6-14
K. D. Wehner T6-50

cc:

R. Akita	T6-20	C. T. Narquis	T6-50
M. L. Bell	T6-16	K. N. Pool	H4-23
T. F. Dale	T6-20	J. R. Prilucik	T6-24
D. A. Dodd	T6-50	C. Stacey	H4-23
D. G. Farwick	H4-16	M. C. Thompson	T6-14
E. J. Kosiancic	T6-16	W. I. Winters	T6-50
J. G. Kristofzski	T6-06		
LPM File/LB			

ACTION DUE DATE
AUGUST 8, 1994

The failure of the 222-S Laboratory to pass the Organic QB3FY94 Quarterly Blind (QB) Performance Evaluation standards (Score 67.6%) submitted on June 9, 1994, requires corrective action as per program protocol. A score of <75% requires corrective action. The deficiencies which have contributed to the 222-S Laboratory failure to pass the QB3FY94 Performance Evaluation standards, need to be identified and corrected.

The fourth quarter QB samples (QB4FY94) are due to arrive the week of August 1st. The deficiencies need to be corrected prior to preparation/extraction and analysis of these samples. The Pesticide compound (Heptachlor) merits special attention because of the mis-quantification of this compound in the last three QB's.

A written response is requested by **August 8, 1994**. Please include details in the response letter identifying the actions that have been taken.

L. P. Markel, Laboratory Quality Assurance Officer
222-S Analytical Operations

lpm

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

DATE: August 15, 1994

TO: Claude Stacey H4-23

FROM: L. P. Markel T6-16

Telephone: 373-4131

SUBJECT: WHC 222-S LABORATORY QUARTERLY BLIND PERFORMANCE EVALUATION PROGRAM

Attached you will find the faxed results of our Quarterly Blind Organic Performance Evaluation Program Report returned to the 222-S Laboratory from EPA Las Vegas. The results were from QB3FY94. Our score was 67.6%.

As per program protocol corrective action is required for unacceptable scores <75%. The corrective action was completed. Your copy was mailed to you last week.

If there are any questions please call.

C:\WPDATA\HASMNOT.QB

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
- LAS VEGAS
QUALITY ASSURANCE RESEARCH BRANCH
944 EAST HARMON
LAS VEGAS, NEVADA 89119
[fax (702) 798-2107]

EPA

JUL 1994 RECEIVED M.W. Barnes

fax

to:	LARRY MARKEL - WESTINGHOUSE HANFORD
tele:	fax #:(509) 373-4884 / phone #:(509) 373-4131
from:	HAROLD A VINCENT
date:	July 19, 1994
subject:	QB3FY94ORGANIC
pages:	6 Including this cover sheet.

NOTES: I just received copies of Individual Laboratory Summary Reports for QB3FY94ORGANIC for your lab. They are attached. Some program information for non-CLP labs doing this QB is included. Confirming copies will follow by regular mail.

The official hard copy - not received yet.

REGION 10
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 94

LABORATORY: Westinghouse Hanford (WA)
PERFORMANCE: UNACCEPTABLE - Response Explaining Deficiency(ies) Required
RANK: Above = 5 Same = 0 Below = 2

% SCORE: 67.6
REPORT DATE: 06/24/9
MATRIX: WATER

COMPOUND	PREDICTION INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY DATA CONC	Q	#LABS MIS-ONT	PROGRAM DATA #LABS NOT-ID	#LABS ID-CPD	TOTAL #LABS
TCL VOLATILE										
BROMOMETHANE	NU	NU	NU	NU	10		0	0	26	26
BROMODICHLOROMETHANE	100	140	95	140	130		0	0	26	26
TRICHLOROETHENE	33	40	32	40	41	X	4	0	26	26
2-PENTANONE,4-METHYL-	140	200	130	210	160		3	0	26	26
TETRACHLOROETHENE	53	73	50	76	62		1	0	26	26
1,1,2,2-TETRACHLOROETHANE	40	59	37	62	52		2	0	26	26
ETHYL BENZENE	14	18	14	19	16		2	0	26	26
STYRENE	120	160	110	160	150		2	0	26	26
TCL SEMIVOLATILE										
4-METHYLPHENOL	33	44	31	51	43		4	0	26	26
ISOPHORONE	16	22	15	23	22		3	0	26	26
1,2,4-TRICHLOROBENZENE	28	42	26	51	41		2	0	26	26
2-METHYLNAPHTHALENE	14	19	14	21	20	S	1	0	26	26
2,4-DINITROTOLUENE	65	92	61	110	97	S	2	0	26	26
PYRENE	15	24	13	26	24		1	0	26	26
BENZO(G,H,I)PERYLENE	25	40	23	43	31		6	0	26	26
TCL PESTICIDES										
ALPHA-BHC	0.076	0.16	0.064	0.17	0.14		0	0	26	26
BETA-BHC	0.061	0.12	0.051	0.13	0.11		0	0	26	26
DELTA-BHC	0.056	0.11	0.05	0.12	0.11		0	0	26	26
HEPTACHLOR	0.17	0.26	0.16	0.27	0.31	X	4	0	26	26
ALDRIN	0.19	0.41	0.16	0.45	0.47	X	2	0	26	26
HEPTACHLOR EPOXIDE	0.25	0.44	0.22	0.46	0.41		0	0	26	26
ENDOSULFAN I	0.35	0.55	0.32	0.66	0.7	X	6	0	26	26
DIELDRIN	0.27	0.43	0.24	0.45	0.44	S	2	0	26	26
ENDRIN	0.64	1.1	0.56	1.2	1.4	X	1	0	26	26
ENDOSULFAN II	NU	NU	NU	NU	0.12		0	2	24	26
4,4'-DDT	0.26	0.36	0.25	0.38	0.47	X	3	0	26	26
ENDRIN KETONE	0.24	0.37	0.22	0.39	0.44	X	2	0	26	26
ENDRIN ALDEHYDE	0.12	0.24	0.1	0.26	0.25	S	4	1	25	26
AROCLOR-1254	1	1.4	1	1.5	1.5	S	4	0	26	26
NON-TCL VOLATILE										
2-PROPENENITRILE					55			0	26	26
NON-TCL SEMIVOLATILE										
BETA-BHC					38			0	26	26
PHENOL,4-CHLORO-					33			4	22	26
TCL VOLATILE (Contaminants)										
ACETONE					5			15	11	26

REGION 10
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 3 FY 94

LABORATORY: Westinghouse Hanford (WA)
PERFORMANCE: UNACCEPTABLE - Response Explaining Deficiency(ies) Required
RANK: Above = 5 Same = 0 Below = 2

% SCORE: 67.6
REPORT DATE: 06/24/9
MATRIX: WATER

COMPOUND	PREDICTION 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
DIBROMOCHLOROMETHANE					0.5			24	2	26
CHLOROFORM					0.3			25	1	26
TCL SEMIVOLATILE (Contaminants)										
BIS(2-ETHYLHEXYL)PHTHALATE					2			14	12	26
NON-TCL VOLATILE (Contaminants)										
UNKNOWN					12			23	3	26
2-PROPANOL					31			12	14	26

OF TCL COMPOUNDS NOT-IDENTIFIED: 0
OF TCL COMPOUNDS MIS-QUANTIFIED: 7
OF TCL CONTAMINANTS: 0

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

Westinghouse Hanford Company | **Internal Memo**

From: 222-S Organic Chemistry 8E460-94-018
Phone: 373-2872 T6-50
Date: August 9, 1994
Subject: CORRECTIVE ACTION PLAN - EPA QUARTERLY BLIND (QB3FY94) ORGANIC PERFORMANCE EVALUATION PROGRAM

To: L. P. Markel T6-16

cc:	R. Akita	T6-20	R. B. Marshall	T6-14
	M. L. Bell	T6-16	C. T. Narquis	T6-50
	T. F. Dale	T6-20	K. N. Pool	H4-23
	D. A. Dodd	T6-50	J. R. Prilucik	T6-24
	D. G. Farwick	H4-16	C. Stacey	H4-23
	E. J. Kosiancic	T6-16	M. C. Thompson	T6-14
	J. G. Kristofzski	T6-06	W. I. Winters	T6-50
	KBW File/LB			

Per program protocol, the following corrective action is submitted.

No semi-volatile compounds on the last quarterly blind samples were missed. All were identified and quantitated correctly.

One volatile compound exceeded the upper action limit by 1 ppb. This compound has been recalibrated.

The low score we received on this performance evaluation sample was mainly due to misquantitation of six pesticides. The quantitation on the six pesticides missed exceeded the upper action level by an average of .07 ppb. The following actions were completed in an attempt to determine why our results were slightly higher than acceptable:

1. Comparison of standards used for this study to a set of new standards.
2. Reanalyzed quarterly blind extract using new standards.
3. Comparison of standards used in quarterly blinds to standards obtained from a different supplier.

No significant difference between the standards initially used and the new standards were noted. The results of reanalysis of the extract did not indicate an error in the quantitation of the pesticides. The average difference in concentration between the initial standard and the standard prepared from a different supplier was lower by 7.7% Therefore, it was concluded that this was not the reason for the elevated pesticide values.

We were unable to detect any significant problems with our procedures, but, we did not use the florisil clean-up option in our extraction procedure. Therefore, the corrective action we are planning for the upcoming quarterly blind samples will be the use of the florisil clean-up option.

Very few pesticide analysis have been performed in our laboratory. Of the few that have been performed, no pesticides were found. The results of the quarterly blind indicated we were capable of correctly finding and identifying the pesticides, but the quantitation of these pesticides was slightly high. It is hopeful the addition of the florisil clean-up in the extraction procedure will account for the quantitation differences.

K. B. Wehner, Manager
222-S Organic Chemistry

sz

WP-032

222-S Laboratory

Performance Evaluation Report
USEPA Water Pollution Study WP032

Date: 05AUG94

Participant ID: WA00156 Type: OTHER Requesting Office: R

SEP 1994
RECEIVED
L.P. MARKEL

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
TRACE METALS IN MICROGRAMS/LITER					
001-ALUMINUM					
01	1280	1301	1080- 1510	1130- 1450	Accept.
02	1840	1801	1500- 2080	1570- 2010	Accept.
002-ARSENIC					
01	223	210	168- 251	179- 241	Accept.
02	387	350	281- 418	299- 401	Accept.
003-BERYLLIUM					
01	28.0	28.0	22.2- 33.6	23.6- 32.1	Accept.
02	86.0	85.2	67.1- 98.2	71- 94.3	Accept.
004-CADMIUM					
01	79.2	78.0	65.8- 91	69- 87.9	Accept.
02	28.0	27.9	22.5- 34	24- 32.6	Accept.
005-COBALT					
01	171	170	149- 190	154- 185	Accept.
02	406	410	363- 456	375- 444	Accept.
006-CHROMIUM					
01	173	169	140- 196	147- 189	Accept.
02	958	955	795- 1100	834- 1060	Accept.
07-COPPER					
01	103	98.0	84.7- 111	88- 107	Accept.
02	314	320	280- 358	290- 348	Accept.
008-IRON					
01	316	310	273- 346	282- 337	Accept.
02	2570	2600	2310- 2890	2380- 2820	Accept.
009-MERCURY					
01	0.670	0.615	0.321-0.881	0.391-0.811	Accept.
02	4.14	3.89	2.87- 5.02	3.14- 4.75	Accept.
010-MANGANESE					
01	449	470	420- 518	433- 506	Accept.
02	897	950	851- 1060	877- 1030	Accept.
011-NICKEL					
01	680	660	587- 732	605- 714	Accept.
02	2820	2800	2500- 3100	2570- 3020	Accept.
012-LEAD					
01	116	110	92.9- 127	97.2- 123	Accept.
02	236	220	189- 247	196- 240	Accept.
013-SELENIUM					
01	108	100	67.2- 123	74.2- 116	Accept.
02	100	90.2	60.5- 111	66.9- 105	Accept.
014-VANADIUM					
01	1720	1705	1510- 1890	1560- 1840	Accept.
02	6920	7202	6290- 7870	6490- 7670	Accept.
015-ZINC					
01	173	171	150- 194	156- 188	Accept.
02	1690	1710	1500- 1920	1550- 1870	Accept.

* Based on theoretical calculations, or a reference value when necessary.

Participant ID: WA00156 Type: OTHER Requesting Office: R10

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
016-ANTIMONY					
03	232	320	187- 404	214- 377	Accept.
04	123	159	99.2- 199	112- 187	Accept.
017-SILVER					
03	46.0	47.8	39- 56.3	41.2- 54.1	Accept.
04	93.0	93.1	76.1- 109	80.3- 105	Accept.
018-THALLIUM					
03	250	260	199- 302	212- 289	Accept.
04	106	110	85.9- 132	91.8- 126	Accept.
074-MOLYBDENUM					
03	44.1	44.0	31.7- 52	34.2- 49.4	Accept.
04	134	130	101- 157	108- 150	Accept.
075-STRONTIUM					
03	26.0	26.0	21.2- 30.2	22.4- 29	Accept.
04	7.70	7.62	5.79- 9.75	6.3- 9.24	Accept.
076-TITANIUM					
03	94.6	97.0	80.3- 111	84.3- 107	Accept.
04	252	250	214- 283	223- 274	Accept.
MINERALS IN MG/LITER (EXCEPT AS NOTED)					
19-PH-UNITS					
03	6.16	6.20	6.05- 6.33	6.08- 6.3	Accept.
04	8.46	8.40	8.1- 8.71	8.18- 8.63	Accept.
020-SPEC. COND.(UMHOS/CM AT 25 C)					
01	447	475	424- 532	438- 518	Accept.
02	607	646	579- 724	597- 706	Accept.
022-TOTAL HARDNESS(AS CACO3)					
01	180	175	158- 192	162- 188	Accept.
02	160	149	135- 167	139- 163	Accept.
023-CALCIUM					
01	38.5	37.0	33- 42.8	34.2- 41.5	Accept.
02	61.4	57.0	51.6- 65	53.3- 63.3	Accept.
024-MAGNESIUM					
01	20.3	20.0	16.9- 23.3	17.7- 22.5	Accept.
02	1.60	1.60	1.31- 1.84	1.37- 1.77	Accept.
025-SODIUM					
01	10.6	9.98	8.64- 11.4	8.99- 11.1	Accept.
02	49.6	50.9	46.5- 56.2	47.7- 55	Accept.
026-POTASSIUM					
01	3.63	3.60	2.85- 4.36	3.04- 4.17	Accept.
02	26.8	27.0	23.4- 30	24.3- 29.2	Accept.
028-CHLORIDE					
01	118	124	114- 134	117- 132	Accept.
02	107	106	98.6- 116	101- 114	Accept.
029-FLUORIDE					
01	1.77	1.50	1.28- 1.7	1.33- 1.65	Not Accept.
02	1.17	0.980	0.826- 1.12	0.865- 1.05	Not Accept.

* Based on theoretical calculations, or a reference value when necessary.

Participant ID: WA00156 Type: OTHER Requesting Office: R10

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
030-SULFATE					
01	5.94	5.60	3.52- 7.88	4.07- 7.34	Accept.
02	110	75.0	62.7- 84.9	65.5- 82.1	Not Accept.
NUTRIENTS IN MILLIGRAMS/LITER					
032-NITRATE-NITROGEN					
01	37.5	39.2	31.7- 46.1	33.5- 44.3	Accept.
02	2.72	2.81	2.23- 3.34	2.37- 3.21	Accept.
033-ORTHOPHOSPHATE					
01	1.42	1.20	1.01- 1.38	1.05- 1.34	Not Accept.
035-TOTAL PHOSPHORUS					
03	1.20	1.30	0.915- 1.58	1.01- 1.49	Accept.
04	2.53	2.60	1.87- 3.14	2.04- 2.96	Accept.
DEMANDS IN MILLIGRAMS/LITER					
037-TOC					
01	44.0	44.0	37.6- 51.1	39.5- 49.4	Accept.
PCB'S IN MICROGRAMS/LITER					
040-PCB-AROCLOR 1016/1242					
01	10.7	12.7	4.33- 16.7	5.88- 15.1	Accept.
044-PCB-AROCLOR 1248					
02	4.91	5.39	2.71- 7.12	3.26- 6.56	Accept.
PCB'S IN OIL IN MILLIGRAMS/KILOGRAM					
100-PCB IN OIL- 1254					
01	20.6	18.5	1.31- 33.7	5.49- 29.5	Accept.
101-PCB IN OIL- 1260					
02	20.7	23.6	4.95- 34.4	8.7- 30.7	Accept.
PESTICIDES IN MICROGRAMS/LITER					
047-ALDRIN					
01	0.537	0.626	0.145-0.844	0.234-0.755	Accept.
02	0.097	0.129	0.0417-0.176	0.0585-0.159	Accept.
048-DIELDRIN					
01	0.558	0.582	0.305-0.801	0.368-0.738	Accept.
02	0.136	0.151	0.0942-0.212	0.109-0.197	Accept.
049-DDD					
01	0.691	0.752	0.416-0.998	0.489-0.924	Accept.
02	0.126	0.144	0.0617-0.213	0.0809-0.194	Accept.
050-DDE					
01	0.587	0.626	0.304-0.846	0.373-0.779	Accept.
02	0.195	0.216	0.094-0.299	0.12-0.274	Accept.
051-DDT					
01	1.05	1.14	0.518- 1.57	0.651- 1.44	Accept.
02	0.221	0.227	0.0945-0.333	0.125-0.303	Accept.
52-HEPTACHLOR					
01	0.656	0.733	0.266-0.966	0.355-0.879	Accept.
02	0.200	0.216	0.0742-0.294	0.102-0.267	Accept.

* Based on theoretical calculations, or a reference value when necessary.

Participant ID: WA00156 Type: OTHER Requesting Office: R10

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
053-CHLORDANE					
03	1.42	1.53	0.577- 2.33	0.798- 2.11	Accept.
04	4.91	5.35	2.28- 8.04	3- 7.31	Accept.
078-HEPTACHLOR EPOXIDE					
01	0.481	0.543	0.255-0.749	0.317-0.687	Accept.
02	0.174	0.195	0.085- 0.28	0.109-0.256	Accept.
VOLATILE HALOCARBONS IN MICROGRAMS/LITER					
054-1,2 DICHLOROETHANE					
01	59.7	60.9	41.2- 80.3	46.1- 75.4	Accept.
02	12.5	11.7	8.65- 15	9.45- 14.2	Accept.
055-CHLOROFORM					
01	51.7	55.9	36.3- 73.6	41- 68.9	Accept.
02	15.4	16.3	11.1- 21.1	12.4- 19.9	Accept.
056-1,1,1 TRICHLOROETHANE					
01	38.8	45.2	27.7- 60.1	31.8- 56	Accept.
02	8.80	11.5	7.48- 14.7	8.4- 13.8	Accept.
057-TRICHLOROETHENE					
01	39.9	43.0	29.5- 54.1	32.6- 51	Accept.
02	10.7	11.8	8.19- 15.2	9.07- 14.3	Accept.
058-CARBONTETRACHLORIDE					
01	39.5	43.9	28- 60.1	32- 56	Accept.
02	11.0	14.7	9.81- 19.8	11.1- 13.5	Ck. for Err.
059-TETRACHLOROETHENE					
01	39.9	44.2	29.9- 56.1	33.2- 52.6	Accept.
02	13.6	15.5	10.7- 19.8	11.9- 18.7	Accept.
060-BROMODICHLOROMETHANE					
01	51.6	53.6	37.3- 71.2	41.6- 66.9	Accept.
02	11.6	13.9	9.56- 18.4	10.7- 17.3	Accept.
061-DIBROMOCHLOROMETHANE					
01	45.7	48.5	33- 64.2	36.9- 60.3	Accept.
02	8.91	9.67	6.36- 12.3	7.1- 11.5	Ck. for Err.
062-BROMOFORM					
01	63.7	64.1	40.7- 89.3	46.8- 83.2	Accept.
02	9.55	12.8	7.2- 17.8	8.53- 16.4	Accept.
063-METHYLENE CHLORIDE					
01	41.4	43.8	25.6- 62.2	30.2- 57.6	Accept.
02	14.9	15.2	9.04- 21.9	10.7- 20.3	Accept.
064-CHLOROBENZENE					
01	49.0	51.9	37.4- 65	40.9- 61.5	Accept.
02	10.8	11.9	8.91- 14.9	9.66- 14.1	Accept.
VOLATILE AROMATICS IN MICROGRAMS/LITER					
065-BENZENE					
01	12.8	14.2	10- 18.7	11.1- 17.6	Accept.
02	55.9	62.7	43.6- 83	48.5- 78	Accept.
066-ETHYLBENZENE					
01	7.70	8.74	6.63- 10.8	7.16- 10.3	Accept.
02	51.3	54.8	36.5- 72.7	41.1- 68.1	Accept.

* Based on theoretical calculations, or a reference value when necessary.

Participant ID: WA00156 Type: OTHER Requesting Office: R10

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
067-TOLUENE					
01	10.7	12.1	8.54- 15.5	9.41- 14.6	Accept.
02	37.2	39.9	28.6- 50.4	31.3- 47.7	Accept.
094-1,2-DICHLOROBENZENE					
01	10.7	11.8	8.15- 15.2	9.04- 14.3	Accept.
02	44.0	46.0	30.7- 59.9	34.4- 56.2	Accept.
095-1,4-DICHLOROBENZENE					
01	7.41	8.30	5.64- 11.2	6.34- 10.5	Accept.
02	40.5	42.8	28.2- 56.4	31.8- 52.8	Accept.
096-1,3-DICHLOROBENZENE					
01	8.16	8.86	6.11- 11.3	6.76- 10.6	Accept.
02	46.6	48.6	33.4- 62.2	37- 58.6	Accept.
MISCELLANEOUS PARAMETERS					
071-TOTAL CYANIDE(IN MG/L)					
01	.0598	0.065	0.0362-0.089	0.0429-0.083	Accept.
02	0.289	0.310	0.203-0.402	0.228-0.377	Accept.

********** END OF DATA FOR WA00156 **********
NOTE: FOR LIMITS AND TRUE VALUES, ASSUME THREE SIGNIFICANT DIGITS.
********** END OF REPORT FOR WA00156 **********

* Based on theoretical calculations, or a reference value when necessary.

Westinghouse
Hanford Company

Internal
Memo

From: Inorganic Chemistry T6-30 8E450-94-014
Phone: 372-0894
Date: September 23, 1994
Subject: CORRECTIVE ACTIONS FOR WATER POLLUTION STUDY WP032

To: L. P. Markel T6-16

cc:	R. Akita	T6-20	W. D. Leggett	T6-07
	W. W. Baird	T6-51	R. P. Marshall	T6-14
	M. W. Barnes	T6-16	C. G. Mooers	H4-19
	M. L. Bell	T6-16	P. M. Morant	H4-19
	T. F. Dale	T6-20	C. T. Narquis	T6-50
	J. L. Deichman	H4-19	C. Stacey	H4-23
	D. A. Dodd	T6-50	C. R. Stroup	B2-23
	J. M. Frye	T6-30	L. H. Taylor	H4-23
	K. J. Greenhough	T6-20	M. C. Thompson	T6-14
	T. G. Ibsen	S3-30	S. J. Veitenheimer	T6-50
	E. J. Kosiancic	T6-16	K. B. Wehner	T6-50
	J. R. Kristofzski	T6-20	W. I. Winters	T6-50

THB File/LB

Sixty-six of seventy (94.3%) inorganic analytes were correctly identified in the most recent Water Pollution Performance Evaluation Study (WP032). Our results for the other four analytes (all from ion chromatography) were scored as unacceptable. Our results from the five other ion chromatography analytes were acceptable.

Corrective Actions

Our primary corrective action is to examine our calibration practices for ion chromatography. Changes to our practices may include:

- More closely assessing the quality of the calibration curves and restricting the acceptable dilution range as appropriate.
- Implementing a more appropriate calibration curve (e.g., a quadratic fit instead of a linear fit, or using a "weighted" fit to improve the relative error at the low end of the calibration) to better model the response of the instrumentation to analyte concentration.
- Increasing the frequency of instrument calibration.
- Continue our recently implemented practice of eluent-matching our direct analyses.
- For fluoride analysis in particular, we will be assessing the several alternatives described above on QA-submitted blind samples. If none is found satisfactory, we will proceed with implementing an alternative fluoride analysis method (e.g., by ion selective electrode).

The above corrective actions are a consequence of the following observations from our investigation into the source of the unacceptable results:

Fluoride in Mineral Sample 1 and 2

Both results were biased high (approximately 0.2 ug/ml; 118% and 119% of the EPA "true" value; 4.1% and 4.5% higher than the maximum acceptable result, respectively). Examination of the calibration, blank, duplicate, and LMCS recovery results suggested no explanation for this bias. However, two possible sources have been identified:

1) If the sample matrix does not match the eluent used during the analysis, a "water dip" is observed in the chromatograph which interferes with the fluoride peak. This interference can bias the fluoride peak area determination. This "dip" can be minimized by spiking the sample to match the eluent. This "eluent-matching" is normally performed on diluted samples (as specified in the procedure), but has not routinely been performed on direct samples. We have recently begun spiking the direct samples with a small volume of concentrated eluent to match the normal eluent concentration without significant dilution. We will rerun the WP032 samples to assess the effect of this practice.

2) Certain organic acids, if present in the sample, co-elute with fluoride causing a positive interference. However, if the ion chromatograph column and eluent are changed to those used for quantitation of organic acids, these components (including fluoride) will be separated and can be more accurately quantitated. This kind of analysis could be performed routinely for fluoride, but would require a separate analysis (from the other anions) and a corresponding increase in analysis time and cost.

Phosphate in Nutrient Sample 1

Our phosphate result was 118% of the EPA "true" value and 2.9% above the upper limit of the acceptable concentration range. The blank and duplicate were considered acceptable. The LMCS standard showed a recovery of 106%. While this is normally considered acceptable, this high bias was enough to move our result outside of the acceptable range. The LMCS standard and this sample had similar concentrations (5.12 ug/ml and 3.68 ug/ml, respectively).

Examination of phosphate calibrations between March 8, 1994 and September 19, 1994 show a tendency for a slightly non-linear response curve. Although a linear fit of this data produces a nominally acceptable correlation coefficient (>0.995), calculated results at the high and low end of the calibration tend to be biased high. Over the ten calibrations performed during this seven month period, the linear fit was consistently biased high (typically 6 to 12%) in the region of the calibration where the result for this sample was calculated.

Sulfate in Mineral Sample #2

Our sulfate result was 147% of the EPA "true" value and 29.6% above the upper limit of the acceptable concentration range. This is clearly an unacceptable result. The duplicate agreement was excellent and the sulfate result for Mineral Sample #1 was acceptable. The concentration for Sample #2 was too high for direct analysis (Sample #1 was analyzed direct). A dilution error can be ruled out because the duplicate agreement was good and the chloride result (reported from this same dilution) was acceptable. Close examination of the calibration curve shows significant deviations between the calibration best-fit line and the known concentration for the lowest two standards used to construct the calibration (a 35% deviation for the lowest standard). Even with this poor "fit" at the low end of the calibration, the correlation coefficient (which we normally use to assess "goodness-of-fit") was quite good (0.9994). The dilution used for Sample #2 (41x) reduced the sulfate concentration to this "poor" end of the calibration; near, but still above, the concentration of the lowest calibration standard. Using a calibration curve constructed from the lowest three points of the calibration produced results that were only 3.8% and 8.7% higher than the true value (sample and duplicate, respectively).

The acceptable sulfate result for Mineral Sample #1 (analyzed direct), was also near the lower end of the calibration, but above the second lowest standard where the "fit" was good.

The sulfate calibration data shows a slight curvature in the instrument response. For this behavior, a higher order fit (e.g., quadratic) is advisable. Alternatively, the linear fit could be "weighted" to minimize the relative deviations rather than the absolute deviations between the best-fit line and the calibration points.

T. H. Bushaw, Manager
Inorganic Chemistry
222-S Analytical Operations

QUANTERRA - ST. LOUIS

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: Quanterra - St. Loius Laboratory

PE Sample	Number Acceptable	Number Analyzed	% Acceptable
WP-032			
Metal	50	50	100.0
Inorganic/Mineral	40	44	90.9
Organic	54	55	98.2

WP-032

Performance Evaluation Report
USEPA Water Pollution Study WP032

Date: 05AUG94

Participant ID: M000054 Type: M000054 Requesting Office: R07

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
TRACE METALS IN MICROGRAMS/LITER					
001-ALUMINUM					
01	1270	1301	1080- 1510	1130- 1450	Accept.
02	1850	1801	1500- 2080	1570- 2010	Accept.
002-ARSENIC					
01	213	210	168- 251	179- 241	Accept.
02	350	350	281- 418	299- 401	Accept.
003-BERYLLIUM					
01	29.8	28.0	22.2- 33.6	23.6- 32.1	Accept.
02	94.3	85.2	67.1- 98.2	71- 94.3	Accept.
004-CADMIUM					
01	78.6	78.0	65.8- 91	69- 87.9	Accept.
02	26.6	27.9	22.5- 34	24- 32.6	Accept.
005-COBALT					
01	172	170	149- 190	154- 185	Accept.
02	408	410	363- 456	375- 444	Accept.
006-CHROMIUM					
01	178	169	140- 196	147- 189	Accept.
02	973	955	795- 1100	834- 1060	Accept.
007-COPPER					
01	109	98.0	84.7- 111	88- 107	Ck. for Err.
02	330	320	280- 358	290- 348	Accept.
008-IRON					
01	285	310	273- 346	282- 337	Accept.
02	2690	2600	2310- 2890	2380- 2820	Accept.
009-MERCURY					
01	0.487	0.615	0.321-0.881	0.391-0.811	Accept.
02	3.94	3.89	2.87- 5.02	3.14- 4.75	Accept.
010-MANGANESE					
01	476	470	420- 518	433- 506	Accept.
02	953	950	851- 1060	877- 1030	Accept.
011-NICKEL					
01	678	660	587- 732	605- 714	Accept.
02	2810	2800	2500- 3100	2570- 3020	Accept.
012-LEAD					
01	112	110	92.9- 127	97.2- 123	Accept.
02	216	220	189- 247	196- 240	Accept.
013-SELENIUM					
01	99.4	100	67.2- 123	74.2- 116	Accept.
02	89.0	90.2	60.5- 111	66.9- 105	Accept.
014-VANADIUM					
01	1770	1705	1510- 1890	1560- 1840	Accept.
02	7170	7202	6290- 7870	6490- 7670	Accept.
015-ZINC					
01	180	171	150- 194	156- 188	Accept.
02	1720	1710	1500- 1920	1550- 1870	Accept.

* Based on theoretical calculations, or a reference value when necessary.

Participant ID: M000054 Type: M000054 Requesting Office: R07

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
016-ANTIMONY					
03	303	320	187- 404	214- 377	Accept.
04	158	159	99.2- 199	112- 187	Accept.
017-SILVER					
03	47.0	47.8	39- 56.3	41.2- 54.1	Accept.
04	91.9	93.1	76.1- 109	80.3- 105	Accept.
018-THALLIUM					
03	251	260	199- 302	212- 289	Accept.
04	122	110	85.9- 132	91.8- 126	Accept.
074-MOLYBDENUM					
03	49.1	44.0	31.7- 52	34.2- 49.4	Accept.
04	131	130	101- 157	108- 150	Accept.
075-STRONTIUM					
03	26.4	26.0	21.2- 30.2	22.4- 29	Accept.
04	7.09	7.62	5.79- 9.75	6.3- 9.24	Accept.
076-TITANIUM					
03	98.3	97.0	80.3- 111	84.3- 107	Accept.
04	254	250	214- 283	223- 274	Accept.
MINERALS IN MG/LITER (EXCEPT AS NOTED)					
019-PH-UNITS					
03	6.24	6.20	6.05- 6.33	6.08- 6.3	Accept.
04	8.51	8.40	8.1- 8.71	8.18- 8.63	Accept.
020-SPEC. COND.(UMHOS/CM AT 25 C)					
01	472	475	424- 532	438- 518	Accept.
02	653	646	579- 724	597- 706	Accept.
021-TDS AT 180 C					
01	401	289	134- 442	173- 403	Accept.
02	382	376	265- 493	293- 464	Accept.
022-TOTAL HARDNESS(AS CACO3)					
01	176	175	158- 192	162- 188	Accept.
02	150	149	135- 167	139- 163	Accept.
023-CALCIUM					
01	37.8	37.0	33- 42.8	34.2- 41.5	Accept.
02	57.5	57.0	51.6- 65	53.3- 63.3	Accept.
024-MAGNESIUM					
01	19.9	20.0	16.9- 23.3	17.7- 22.5	Accept.
02	1.41	1.60	1.31- 1.84	1.37- 1.77	Accept.
025-SODIUM					
01	9.86	9.98	8.64- 11.4	8.99- 11.1	Accept.
02	50.7	50.9	46.5- 56.2	47.7- 55	Accept.
026-POTASSIUM					
01	3.47	3.60	2.85- 4.36	3.04- 4.17	Accept.
02	26.5	27.0	23.4- 30	24.3- 29.2	Accept.
027-TOTAL ALKALINITY(AS CACO3)					
01	15.6	16.1	12.6- 21.4	13.7- 20.3	Accept.
02	61.7	64.0	53.4- 74.7	56.1- 72	Accept.

* Based on theoretical calculations, or a reference value when necessary.

Participant ID: A000054 Type: N000054 Requesting Office: R07

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
028-CHLORIDE					
01	118	128	114- 134	117- 132	Accept.
02	102	106	98.6- 116	101- 114	Accept.
029-FLUORIDE					
01	1.53	1.50	1.28- 1.7	1.33- 1.65	Accept.
02	0.899	0.980	0.828- 1.12	0.865- 1.08	Accept.
030-SULFATE					
01	5.15	5.60	3.52- 7.88	4.07- 7.34	Accept.
02	71.8	75.0	62.7- 84.9	65.5- 82.1	Accept.
NUTRIENTS IN MILLIGRAMS/LITER					
031-AMMONIA-NITROGEN					
01	11.4	12.0	9.48- 14.3	10.1- 13.7	Accept.
02	2.27	2.30	1.74- 2.86	1.88- 2.73	Accept.
032-NITRATE-NITROGEN					
01	39.8	39.2	31.7- 46.1	33.5- 44.3	Accept.
02	1.37	2.81	2.23- 3.34	2.37- 3.21	Not Accept.
033-ORTHOPHOSPHATE					
01	1.19	1.20	1.01- 1.38	1.05- 1.34	Accept.
02	0.747	0.749	0.624-0.868	0.658-0.838	Accept.
034-KJELDAHL-NITROGEN					
03	21.1	29.1	21.9- 35	23.4- 33.4	Not Accept.
04	5.15	6.32	4.37- 8.16	4.82- 7.7	Accept.
035-TOTAL PHOSPHORUS					
03	1.21	1.30	0.915- 1.58	1.01- 1.49	Accept.
04	2.42	2.60	1.87- 3.14	2.04- 2.96	Accept.
DEMANDS IN MILLIGRAMS/LITER					
036-COD					
01	100	111	84.7- 128	90.2- 123	Accept.
02	20.0	24.3	12.6- 35.3	15.5- 32.4	Accept.
037-TOC					
01	42.5	44.0	37.8- 51.1	39.5- 49.4	Accept.
02	10.2	9.60	7.97- 11.5	8.43- 11	Accept.
038-5-DAY BOD					
01	47.5	70.9	37.2- 105	45.7- 96.2	Accept.
02	10.3	15.2	8.06- 22.3	9.84- 20.5	Accept.
102-CARBONACEOUS BOD					
01	51.3	64.7	32.9- 96.5	41.3- 88.2	Accept.
02	14.4	13.4	4.72- 22	7.07- 19.7	Accept.
PCB'S IN MICROGRAMS/LITER					
043-PCB-AROCLOR 1016/1242					
01	12.4	12.7	4.33- 16.7	5.88- 15.1	Accept.
044-PCB-AROCLOR 1248					
02	6.17	5.39	2.71- 7.12	3.26- 6.56	Accept.
045-PCB-AROCLOR 1254					
01	1.08		Not Present		Not Accept.

* Based on theoretical calculations, or a reference value when necessary.

Participant ID: M000054 Type: M000054 Requesting Office: 507

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
PCB'S IN OIL IN MILLIGRAMS/KILOGRAM					
100-PCB IN OIL- 1254					
01	16.4	18.5	1.31- 33.7	5.49- 29.5	Accept.
101-PCB IN OIL- 1260					
02	21.2	23.6	4.95- 34.4	8.7- 30.7	Accept.
PESTICIDES IN MICROGRAMS/LITER					
047-ALDRIN					
01	0.783	0.626	0.145-0.844	0.234-0.755	Ck. for Err.
02	0.169	0.129	0.0417-0.176	0.0585-0.159	Ck. for Err.
048-DIELDRIN					
01	0.706	0.582	0.305-0.801	0.368-0.738	Accept.
02	0.182	0.151	0.0942-0.212	0.109-0.197	Accept.
049-DDD					
01	0.849	0.752	0.416-0.998	0.489-0.924	Accept.
02	0.186	0.144	0.0617-0.213	0.0809-0.194	Accept.
050-DDE					
01	0.758	0.626	0.304-0.848	0.373-0.779	Accept.
02	0.250	0.216	0.094-0.299	0.12-0.274	Accept.
051-DDT					
01	1.40	1.14	0.518- 1.57	0.651- 1.44	Accept.
02	0.310	0.227	0.0945-0.333	0.125-0.303	Ck. for Err.
052-HEPTACHLOR					
01	0.922	0.733	0.266-0.968	0.355-0.879	Ck. for Err.
02	0.277	0.216	0.0742-0.294	0.102-0.267	Ck. for Err.
053-CHLORDANE					
03	1.96	1.53	0.577- 2.33	0.798- 2.11	Accept.
04	7.01	5.35	2.28- 8.04	3- 7.31	Accept.
078-HEPTACHLOR EPOXIDE					
01	0.673	0.543	0.255-0.749	0.317-0.687	Accept.
02	0.250	0.195	0.085- 0.28	0.109-0.256	Accept.
VOLATILE HALOCARBONS IN MICROGRAMS/LITER					
054-1,2 DICHLOROETHANE					
01	59.8	60.9	41.2- 80.3	46.1- 75.4	Accept.
02	12.0	11.7	8.65- 15	9.45- 14.2	Accept.
055-CHLOROFORM					
01	55.1	55.9	36.3- 73.6	41- 68.9	Accept.
02	16.5	16.3	11.1- 21.1	12.4- 19.9	Accept.
056-1,1,1 TRICHLOROETHANE					
01	35.2	45.2	27.7- 60.1	31.8- 56	Accept.
02	9.52	11.5	7.48- 14.7	8.4- 13.8	Accept.
057-TRICHLOROETHENE					
01	41.9	43.0	29.5- 54.1	32.6- 51	Accept.
02	11.4	11.8	8.19- 15.2	9.07- 14.3	Accept.
058-CARBONTETRACHLORIDE					
01	44.7	43.9	28- 60.1	32- 56	Accept.
02	13.2	14.7	9.81- 19.8	11.1- 18.5	Accept.

* Based on theoretical calculations, or a reference value when necessary.

Participant ID: MOOOOS4 Type: MOOWOS4 Requesting Office: R07

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
U59-TETRACHLOROETHENE					
01	40.5	44.2	29.9- 56.1	33.2- 52.8	Accept.
02	14.8	15.5	10.7- 19.8	11.9- 18.7	Accept.
U60-BROMODICHLOROMETHANE					
01	57.8	53.6	37.3- 71.2	41.6- 66.9	Accept.
02	14.0	13.9	9.56- 18.4	10.7- 17.3	Accept.
U61-DIBROMOCHLOROMETHANE					
01	50.0	48.5	33- 64.2	36.9- 60.3	Accept.
02	8.51	9.67	6.36- 12.3	7.1- 11.5	Accept.
U62-BROMOFORM					
01	69.1	64.1	40.7- 89.3	46.8- 83.2	Accept.
02	10.7	12.8	7.2- 17.8	8.53- 16.4	Accept.
U63-METHYLENE CHLORIDE					
01	45.6	43.8	25.6- 62.2	30.2- 57.6	Accept.
02	14.0	15.2	9.04- 21.9	10.7- 20.3	Accept.
U64-CHLOROBENZENE					
01	51.1	51.9	37.4- 65	40.9- 61.5	Accept.
02	12.1	11.9	8.91- 14.9	9.66- 14.1	Accept.
VOLATILE AROMATICS IN MICROGRAMS/LITER					
U65-BENZENE					
01	14.9	14.2	10- 18.7	11.1- 17.6	Accept.
02	68.4	62.7	43.6- 83	48.5- 78	Accept.
U66-ETHYLBENZENE					
01	8.80	8.74	6.63- 10.8	7.16- 10.3	Accept.
02	57.5	54.8	36.5- 72.7	41.1- 68.1	Accept.
U67-TOLUENE					
01	11.9	12.1	8.58- 15.5	9.41- 14.6	Accept.
02	41.6	39.9	28.6- 50.4	31.3- 47.7	Accept.
U94-1,2-DICHLOROBENZENE					
01	11.8	11.8	8.15- 15.2	9.08- 14.3	Accept.
02	47.9	46.0	30.7- 59.9	34.4- 56.2	Accept.
U95-1,4-DICHLOROBENZENE					
01	8.62	8.30	5.64- 11.2	6.38- 10.5	Accept.
02	48.5	42.8	28.2- 56.4	31.8- 52.8	Accept.
U96-1,3-DICHLOROBENZENE					
01	9.01	8.86	6.11- 11.3	6.76- 10.6	Accept.
02	49.7	48.6	33.4- 62.2	37- 58.6	Accept.
MISCELLANEOUS PARAMETERS					
U71-TOTAL CYANIDE(IN MG/L)					
01	0.061	0.065	0.0362-0.089	0.0429-0.083	Accept.
02	0.308	0.310	0.203-0.402	0.228-0.377	Accept.
U72-NON-FILTERABLE RESIDUE(IN MG/L)					
01	50.0	50.0	35.5- 53.9	37.8- 51.6	Accept.
02	26.0	26.0	20- 27.9	21- 26.9	Accept.
U73-OIL AND GREASE(IN MG/L)					
01	18.4	12.7	5.97- 17.3	7.4- 15.9	Not Accept.
02	26.5	18.2	11.6- 22.7	13- 21.3	Not Accept.

* Based on theoretical calculations, or a reference value when necessary.

Participant ID: W000054 Type: W000054 Requesting Office: R07

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
097-TOTAL PHENOLICS(IN MG/L)					
01	0.060	0.0862	0.0431-0.129	0.0541-0.118	Accept.
02	0.169	0.177	0.0944- 0.26	0.116-0.239	Accept.
098-TOTAL RESIDUAL CHLORINE(IN MG/L)					
01	0.370	0.320	0.15-0.453	0.19-0.413	Accept.
02	0.590	0.530	0.302-0.697	0.354-0.645	Accept.

********** END OF DATA FOR W000054 **********
NOTE: FOR LIMITS AND TRUE VALUES, ASSUME THREE SIGNIFICANT DIGITS.
********** END OF REPORT FOR W000054 **********

* Based on theoretical calculations, or a reference value when necessary.

Claudia
Rich
Jeff
Clay

Quanterra Incorporated
2800 George Washington Way
Richland, Washington 99352

509 375-3131 Telephone
509 375-5590 Fax

Quanterra
Environmental Services

WHC940063

SEP 1994
RECEIVED
J.H. KESSNER

September 16, 1994

Bechtel Hanford Inc.
P.O. Box 969
Richland, WA 99352

Attention: Ms Joan Kessner, Buyer's Technical Representative

Reference: Purchase Order MPV-SVV-23000

Dear Ms. Kessner:

In accordance with the referenced purchase order, Quanterra wishes to notify you that due to unacceptable performance on EPA sponsored Performance Evaluation Studies, Our Laboratory in St. Louis, MO lost it's Washington State Department of Ecology (WDOE) accreditation to perform Oil and Grease Analysis by Method 413.1. The St. Louis Laboratory has since successfully analyzed Oil and Grease Performance Evaluation Samples by 413.1 and regained WDOE Accreditation for Oil and Grease. The dates when St. Louis was un-accredited were August 23, 1994 to September 14, 1994.

St. Louis lost its certification when their Oil and Grease PE results were outside acceptance limits. (1.1 mg/L and 3.8 mg/L above acceptance limits).

All Oil and Grease Samples submitted under this contract are listed below:

Sample ID	SAF	SDG	Receipt Date	Analysis Date	Method
94288-01	94-228	W0122	7/8/94	7/18/94	413.1
657N-3	B94-020	W0171	8/10/94	8/12/94	413.1
B0CJ48	B94-006	W0177	8/17/94	8/25/94	9070
B0CJ34	B94-006	W0177	8/17/94	8/25/94	9070
B0CS66	B94-006	W0177	8/17/94	8/25/94	9070
B0CJ42	B94-006	W0177	8/17/94	8/25/94	9070
B0CJ52	B94-006	W0177	8/19/94	8/24/94	9070
B0CJ63	B94-006	W0177	9/19/94	8/24/94	9070
B0CJ62	B94-006	W0177	8/25/94	N/A	9070
B0CJD6	B94-006	W0177	8/25/94	N/A	9070
B0CJC8	B94-006	W0177	8/25/94	N/A	9070
B0CSJ0	B94-006	W0177	8/25/94	N/A	9070
B0CSQ6	B94-006	W0204	9/9/94	N/A	9070

Quanterra
Environmental Services

As the above table illustrates no samples were analyzed or accepted for analysis of Oil and Grease by 413.1 during the time St. Louis was un-accreditated.

Please accept our apology for the delay in bringing this to your attention. We feel confident that recent organizational changes implemented by Quanterra will better enable us to notify you in a timely manner of unexpected occurrences.

Should you require further information or have questions regarding this matter please do not hesitate to contact me at 375-3131.

Sincerely,

Douglas Swenson
QA Officer

File
R. Merrell, Quanterra
K. Pool, Westinghouse Hanford

WESTON

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: Weston Lionville Laboratory

PE Sample	Number Acceptable	Number Analyzed	% Acceptable
WP-031			
Metal	44	44	100.0
Inorganic/Mineral	45	48	93.8
Organic	53	53	100.0

WP-031

PERFORMANCE EVALUATION REPORT DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

77192

LABORATORY: PA023

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
ALUMINUM	1	709	681	550- 788	579- 755	ACCEPTABLE
	2	148	140	107- 182	117- 173	ACCEPTABLE
ARSENIC	1	490	492	408- 597	430- 565	ACCEPTABLE
	2	79.4	74.3	56.7- 92.9	61.2- 88.4	ACCEPTABLE
BERYLLIUM	1	413	461	382- 533	401- 514	ACCEPTABLE
	2	210	240	198- 279	208- 269	ACCEPTABLE
CADMIUM	1	177	165	138- 194	145- 187	ACCEPTABLE
	2	64.8	61.0	50.8- 72.0	53.5- 69.4	ACCEPTABLE
COBALT	1	870	880	775- 989	801- 954	ACCEPTABLE
	2	57.2	53.8	45.4- 61.9	47.5- 59.9	ACCEPTABLE
CHROMIUM	1	734	730	604- 843	634- 813	ACCEPTABLE
	2	27.6	23.4	17.4- 29.0	18.9- 27.6	ACCEPTABLE
COPPER	1	598	601	524- 657	541- 640	ACCEPTABLE
	2	20.5	18.7	13.6- 24.1	14.9- 22.8	ACCEPTABLE
IRON	1	58.4	59.0	43.5- 72.5	47.2- 69.8	ACCEPTABLE
	2	1114	1100	950- 1270	991- 1230	ACCEPTABLE
MERCURY	1	8.94	9.38	7.31- 11.1	7.89- 11.3	ACCEPTABLE
	2	6.13	6.67	5.00- 8.48	5.44- 8.04	ACCEPTABLE
MANGANESE	1	597	600	536- 660	551- 648	ACCEPTABLE
	2	73.1	73.5	64.0- 82.7	66.4- 80.4	ACCEPTABLE
NICKEL	1	876	860	766- 952	789- 928	ACCEPTABLE
	2	351	340	295- 384	307- 372	ACCEPTABLE
LEAD	1	1253	1200	1060- 1350	1102- 1313	ACCEPTABLE
	2	770	738	636- 833	661- 809	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

LABORATORY: PA023

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	210	229	156- 277	171- 262	ACCEPTABLE
	2	351	387	266- 406	296- 459	ACCEPTABLE
VANADIUM	1	949	940	832- 1040	860- 1020	ACCEPTABLE
	2	167	170	146- 199	152- 183	ACCEPTABLE
ZINC	1	901	882	737- 987	763- 931	ACCEPTABLE
	2	51.9	46.3	37.5- 56.1	39.8- 53.7	ACCEPTABLE
ANTIMONY	3	91.7	98.5	56.8- 119	68.3- 111	ACCEPTABLE
	4	187	189	158- 208	175- 227	ACCEPTABLE
SILVER	3	84.2	73.9	60.6- 86.9	63.9- 83.5	CHECK FOR ERROR
	4	29.0	25.8	21.1- 30.8	22.2- 29.7	ACCEPTABLE
THALLIUM	3	52.8	62.8	47.0- 77.3	50.8- 73.8	ACCEPTABLE
	4	513	539	421- 603	450- 615	ACCEPTABLE
MOLYBDENUM	3	19.8	24.5	18.6- 30.6	20.2- 29.0	CHECK FOR ERROR
	4	83.7	81.6	68.8- 95.0	68.3- 91.1	ACCEPTABLE
STRONTIUM	3	19.2	19.1	14.8- 23.3	15.5- 22.1	ACCEPTABLE
	4	74.3	73.4	62.0- 88.5	68.9- 91.5	ACCEPTABLE
TITANIUM	3	130	130	109- 151	114- 145	ACCEPTABLE
	4	39.8	43.9	34.0- 53.8	36.5- 50.9	ACCEPTABLE
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH-UNITS	3	9.60	9.50	9.19- 9.75	9.24- 9.68	ACCEPTABLE
	4	8.64	8.70	8.62- 8.77	8.68- 8.75	ACCEPTABLE
SPEC. COND.	1	976	899	840- 990	857- 963	CHECK FOR ERROR
(UMHOS/CM AT 25 C)	2	402	399	369- 435	377- 427	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP031

LABORATORY: PA021

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	696	577	396- 759	481- 713	ACCEPTABLE
	2	233	223	160- 288	193- 259	ACCEPTABLE
TOTAL HARDNESS (AS CACO3)	1	275	279	216- 307	245- 298	ACCEPTABLE
	2	59.5	57.8	51.2- 63.8	52.8- 62.2	ACCEPTABLE
CALCIUM	1	108	110	87.8- 126	92.2- 123	ACCEPTABLE
	2	7.50	7.08	5.95- 8.19	6.23- 7.91	ACCEPTABLE
MAGNESIUM	1	1.05	0.960	0.771- 1.18	0.822- 1.13	ACCEPTABLE
	2	10.5	9.70	8.38- 11.0	8.71- 10.6	ACCEPTABLE
SODIUM	1	68.0	61.7	56.2- 67.8	57.6- 66.3	NOT ACCEPTABLE
	2	29.0	26.3	23.6- 29.2	24.3- 28.5	CHECK FOR ERROR
POTASSIUM	1	8.13	7.50	6.39- 8.81	6.70- 8.50	ACCEPTABLE
	2	43.0	40.0	34.5- 45.5	35.9- 44.2	ACCEPTABLE
TOTAL ALKALINITY (AS CACO3)	1	117	120	106- 133	109- 130	ACCEPTABLE
	2	11.0	11.0	7.85- 15.3	8.77- 14.3	ACCEPTABLE
CHLORIDE	1	196	199	183- 213	187- 210	ACCEPTABLE
	2	39.3	41.2	36.5- 45.8	37.6- 44.3	ACCEPTABLE
FLUORIDE	1	3.36	3.30	2.83- 3.77	2.95- 3.65	ACCEPTABLE
	2	0.378	0.380	0.319-0.457	0.336-0.439	ACCEPTABLE
SULFATE	1	13.2	14.0	10.8- 16.8	11.5- 16.0	ACCEPTABLE
	2	94.6	92.0	79.1- 105	81.5- 102	ACCEPTABLE
NUTRIENTS IN MILLIGRAMS PER LITER:						
AMMONIA-NITROGEN	1	7.62	7.70	6.10- 9.16	6.47- 8.79	ACCEPTABLE
	2	0.725	0.730	0.491-0.932	0.559-0.823	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 12/27/93

WATER POLLUTION STUDY NUMBER WP931

LABORATORY: PA023

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
NUTRIENTS IN MILLIGRAMS PER LITER:						
NITRATE-NITROGEN	1	0.622	0.520	0.378-0.650	0.412-0.625	ACCEPTABLE
	2	12.1	11.0	8.88- 13.0	9.38- 12.5	ACCEPTABLE
ORTHOPHOSPHATE	1	0.151	0.150	0.114-0.197	0.122-0.179	ACCEPTABLE
	2	4.43	4.10	3.48- 4.68	3.62- 4.54	ACCEPTABLE
KJELDAHL-NITROGEN	3	14.1	14.0	10.3- 17.1	11.1- 16.3	ACCEPTABLE
	4	0.744	0.710	0.226- 1.32	0.357- 1.19	ACCEPTABLE
TOTAL PHOSPHORUS	3	6.89	7.40	5.57- 8.05	5.86- 7.75	ACCEPTABLE
	4	0.516	0.490	0.341-0.569	0.369-0.542	ACCEPTABLE
DEMANDS IN MILLIGRAMS PER LITER:						
COD	1	95.8	79.8	52.4- 88.5	56.5- 80.5	NOT ACCEPTABLE
	2	202	207	163- 230	172- 221	ACCEPTABLE
TOC	1	26.0	28.0	23.9- 32.9	25.0- 31.6	ACCEPTABLE
	2	84.9	82.0	69.5- 95.3	72.8- 91.9	ACCEPTABLE
5-DAY BOD	1	45.0	44.9	26.1- 60.1	30.3- 55.8	ACCEPTABLE
	2	115	131	75.4- 193	88.5- 167	ACCEPTABLE
PCB'S IN MICROGRAMS PER LITER:						
PCB-AROCLOR 1254	1	1.63	1.87	0.988- 2.71	1.21- 2.49	ACCEPTABLE
PCB-AROCLOR 1260	2	4.21	4.63	2.79- 5.96	3.19- 5.56	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 12/27/73

WATER POLLUTION STUDY NUMBER [illegible]

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- 1254	1	39.9	43.9	13.5- 61.8	19.8- 55.5	ACCEPTABLE
PESTICIDES IN MICROGRAMS PER LITER:						
CHLORDANE	3	6.06	8.21	4.91- 9.72	5.59- 9.11	ACCEPTABLE
	4	1.43	2.21	1.07- 2.77	1.39- 2.56	ACCEPTABLE
ALDRIN	1	0.820	0.539	0.122-0.758	0.203-0.674	ACCEPTABLE
	2	0.070	0.086	.0171-0.121	.0303-0.139	ACCEPTABLE
DIELDRIN	1	0.430	0.475	0.203-0.710	0.267-0.685	ACCEPTABLE
	2	0.170	0.173	.0861-0.239	0.106-0.219	ACCEPTABLE
DDD	1	0.870	0.866	0.433- 1.15	0.524- 1.06	ACCEPTABLE
	2	0.220	0.202	.0956-0.268	0.117-0.286	ACCEPTABLE
DDE	1	0.530	0.539	0.235-0.756	0.301-0.690	ACCEPTABLE
	2	0.190	0.173	.0788-0.236	.0999-0.216	ACCEPTABLE
DDT	1	0.800	0.796	0.362- 1.06	0.450-0.972	ACCEPTABLE
	2	0.160	0.142	.0570-0.216	.0772-0.196	ACCEPTABLE
HEPTACHLOR	1	0.550	0.669	0.147-0.910	0.273-0.825	ACCEPTABLE
	2	0.180	0.216	.0756-0.269	0.100-0.285	ACCEPTABLE
HEPTACHLOR EPOXIDE	1	0.410	0.478	0.260-0.680	0.308-0.592	ACCEPTABLE
	2	0.160	0.174	.0858-0.235	0.105-0.216	ACCEPTABLE
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
1,2 DICHLOROETHANE	1	15.4	15.1	10.2- 20.8	11.5- 19.1	ACCEPTABLE
	2	69.2	55.8	36.2- 73.8	40.9- 69.7	CHECK FOR ERROR

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

PERFORMANCE EVALUATION REPORT DATE: 12/27/83

WATER POLLUTION STUDY NUMBER 48033

LABORATORY: PA023

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
CHLOROFORM	1	12.5	11.8	7.85- 15.9	8.96- 18.8	ACCEPTABLE
	2	66.3	64.0	38.3- 86.7	48.0- 80.6	ACCEPTABLE
1,1,1 TRICHLOROETHANE	1	13.7	13.0	8.68- 19.2	9.89- 17.6	ACCEPTABLE
	2	42.0	37.8	22.7- 50.9	26.2- 46.6	ACCEPTABLE
TRICHLOROETHENE	1	7.41	7.57	5.10- 10.3	5.75- 1.62	ACCEPTABLE
	2	70.2	62.7	34.6- 80.5	43.9- 75.2	ACCEPTABLE
CARBONTETRACHLORIDE	1	16.9	16.8	10.9- 22.2	12.3- 20.6	ACCEPTABLE
	2	42.0	37.1	23.0- 53.1	26.4- 46.6	ACCEPTABLE
TETRACHLOROETHENE	1	9.05	9.24	6.08- 12.5	6.89- 11.7	ACCEPTABLE
	2	57.6	51.3	31.2- 66.7	35.7- 62.2	ACCEPTABLE
BROMODICHLOROETHANE	1	11.1	10.9	7.33- 14.2	8.21- 13.3	ACCEPTABLE
	2	41.5	38.1	28.9- 53.6	28.5- 50.9	ACCEPTABLE
DIBROMOCHLOROMETHANE	1	12.1	13.1	8.88- 17.9	9.55- 15.9	ACCEPTABLE
	2	61.2	59.1	38.1- 80.2	39.9- 78.8	ACCEPTABLE
BROMOFORM	1	15.3	14.5	7.45- 20.3	9.08- 19.8	ACCEPTABLE
	2	48.6	42.3	25.5- 59.9	29.9- 55.6	ACCEPTABLE
METHYLENE CHLORIDE	1	10.7	10.6	6.59- 16.1	7.73- 14.9	ACCEPTABLE
	2	59.6	54.1	30.7- 76.5	36.5- 70.7	ACCEPTABLE
CHLOROBENZENE	1	15.7	16.0	11.4- 20.1	12.5- 19.0	ACCEPTABLE
	2	66.5	63.7	41.3- 79.8	46.2- 78.0	ACCEPTABLE
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
BENZENE	1	35.0	40.1	25.7- 56.0	29.5- 52.2	ACCEPTABLE
	2	9.20	8.25	5.24- 11.6	6.08- 10.8	ACCEPTABLE

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

PERFORMANCE EVALUATION REPORT DATE: 12/27/93

WATER POLLUTION STUDY NUMBER 02031

LABORATORY: PA023

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
ETHYLBENZENE	1	55.0	66.0	36.0- 98.3	43.8- 96.9	ACCEPTABLE
	2	9.38	14.0	9.26- 19.0	10.5- 17.8	CHECK FOR ERROR
TOLUENE	1	50.6	49.2	30.2- 65.2	38.6- 60.8	ACCEPTABLE
	2	10.3	9.51	6.09- 12.4	6.93- 11.9	ACCEPTABLE
1,2-DICHLOROBENZENE	1	58.6	65.5	32.7- 91.0	40.5- 86.2	ACCEPTABLE
	2	8.43	8.88	5.85- 11.7	6.59- 11.0	ACCEPTABLE
1,3-DICHLOROBENZENE	1	40.7	47.9	29.4- 61.7	33.5- 57.6	ACCEPTABLE
	2	17.0	16.5	11.6- 21.1	12.9- 19.9	ACCEPTABLE
1,4-DICHLOROBENZENE	1	53.1	62.5	34.4- 85.8	41.0- 79.3	ACCEPTABLE
	2	11.1	12.8	7.49- 17.8	8.79- 16.5	ACCEPTABLE
MISCELLANEOUS PARAMETERS:						
NON-FILTERABLE RESIDUE (IN MG/L)	1	60.0	61.0	47.7- 68.6	49.8- 62.5	ACCEPTABLE
	2	81.5	83.0	62.8- 91.3	66.4- 87.8	ACCEPTABLE
OIL AND GREASE (IN MG/L)	1	15.1	8.30	3.07- 12.2	4.22- 11.0	NOT ACCEPTABLE
	2	37.3	48.4	33.7- 56.0	36.5- 53.2	ACCEPTABLE
TOTAL PHENOLICS (IN MG/L)	1	0.677	0.595	0.312-0.879	0.398-0.805	ACCEPTABLE
	2	3.59	3.13	1.66- 4.69	2.08- 4.23	ACCEPTABLE
TOTAL RESIDUAL CHLORINE (IN MG/L)	1	4.50	3.70	3.06- 4.52	3.25- 4.12	CHECK FOR ERROR
	2	1.60	1.50	1.09- 1.77	1.18- 1.68	ACCEPTABLE

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

WESTON

Mary Jefferson
cc: Keith Ryan
Mary Reichner
Nicki Perrone
Peter Hershey

Ray Siery April 5, 1994

PES - WP031

Inorganics Corrective Action Responses for RFW# 9310L181

Sodium

Assessment: Sodium in sample 1 was reported high outside the acceptance limits which was 11.3% above the true value. Sodium in sample 2 was correspondingly high outside warning limits but below acceptance limits.

Root Cause: Based on review of the ICP data and all associated QC checks the analysis appears acceptable. A reference standard was run with this PE and it recovered within acceptance limits although on the high side at 109%. Contamination of the PE samples is suspected as the calibration and the independent second source standards (LCS, CRI, ICV/CCV, ISA/ISB) demonstrate proper recoveries. The PE samples and the reference standard preparation is performed by the wet chemistry unit where sodium salts are routinely in use.

Corrective Action: The metals unit will prepare it's own aliquot from the Minerals ampule for sodium analyses.

Responsible Person(s): Nicki Perrone/Amy Swisher/Mary Reichner

Chemical Oxygen Demand

Assessment: The COD value for sample 1 was reported above the acceptance limits at 95.8 mg/L which was 35% above the true

value of 70.8 mg/L. Sample 2 did not exhibit the same bias and was reported at 202 mg/L vs the true value of 207 mg/L.

Root Cause: Based on review of the COD data and associated QC checks the analysis appears acceptable. Sample 1 was diluted 1:1 which produced a COD concentration at the upper concentration limit of 50 mg/L of the calibration curve. It is suspected that a larger dilution would have improved recovery because the method used was for levels less than 50 mg/L.

Corrective Action: The lab has, since the analysis of these PE samples, revised it's COD SOP to follow Standard Methods 5220-C which is appropriate for COD values greater than 50 mg/L.

Responsible Person(s): Nicki Perrone/Judi Henderson

Oil & Grease

Assessment: The Oil and Grease value for sample 1 was reported above the acceptance limits at 15.1 mg/L which was 82% above the true value of 8.3 mg/L. Sample 2 did not exhibit the same bias and was reported at 37.3 mg/L vs the true value of 48.4 mg/L.

Root Cause: Based on review of the Oil and Grease data and associated QC checks the analysis appears acceptable. Sample 1 was analyzed in duplicate with a result of 14.2 mg/L. The recoveries in LCS and reference standards were low but acceptable. Although possible, it is highly unlikely that a preparation error in the make-up of the PE sample had occurred. The lab has a program in place that requires a witness in the preparation of the PE samples to ensure instructions are clearly understood and followed.

Corrective Action: (1) Analyst will monitor the procedure and technique for positive interefences.
(2) Supervisor will check witness spiking program to ensure strict adherence.

Responsible Person(s): Nicki Perrone/Mike LeClerc

MARTIN MARIETA
K-25

PERFORMANCE EVALUATION SUMMARY SHEET

Laboratory: Martin Marietta/K-25 Laboratory

Laboratory Code: NK

	EMSL-LV Acceptance Range (%)	% of EMSL-LV True Value	% of all Participating Laboratory's Grand Average
January 28, 1994			
Alpha	42.0 to 158.0	73.3	80.0
Beta	72.1 to 127.9	95.2	105.1
Februay 11, 1994			
Uranium	79.2 to 120.8	98.7	96.7

PE Sample	EPA/CLP Score
EMSL-LV QB2 FY94	
Organic	95.5

PE sample	Number Acceptable	Number Analyzed	% Acceptable
WS-033			
Metals	12	12	100.0
Inorganic/Minerals	11	11	100.0
Organic	34	38	89.5
APG-April 1994			
Metals	41	42	97.6
Inorganic/Mineral	54	54	100.0

EPA EMSL-LV

JAN. 28, 1994
AND
FEB. 11, 1994

United States
Environmental Protection
Agency

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

EPA 600/R-94/041
January 1994

Research and Development

EPA

Gross Alpha-Beta in Water Performance Evaluation Study

A Statistical Evaluation of the January 28, 1994 Data

100% Acceptable

Sample I.D. 940203-025
Lab Code is NK

Analyte	True Value	Reported Average	Rating
Gross Alpha	15 pCi/L	11.00 pCi/L	Acceptable
Gross Beta	62 pCi/L	59.00 pCi/L	Acceptable

cc:
L. P. Burnett
E. E. Clark
D. K. Mann
G. L. Grametbauer
D. F. Hoffman
R. L. Howell
C. R. Kirkpatrick
M. R. Powell
H.R. Waddle
E. S. Williams

9312-0138nrd041

Uranium-Radium in Water

Performance Evaluation Study

February 11, 1994

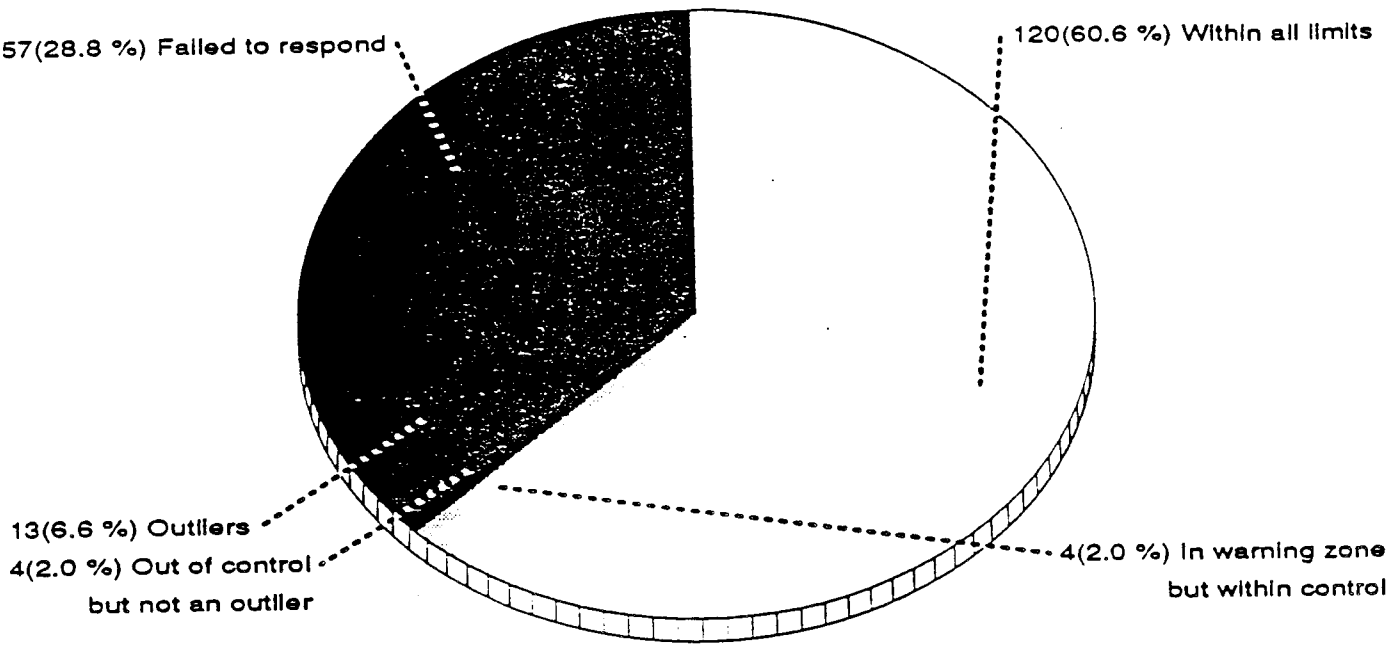
Environmental Protection Agency

Environmental Monitoring Systems Laboratory

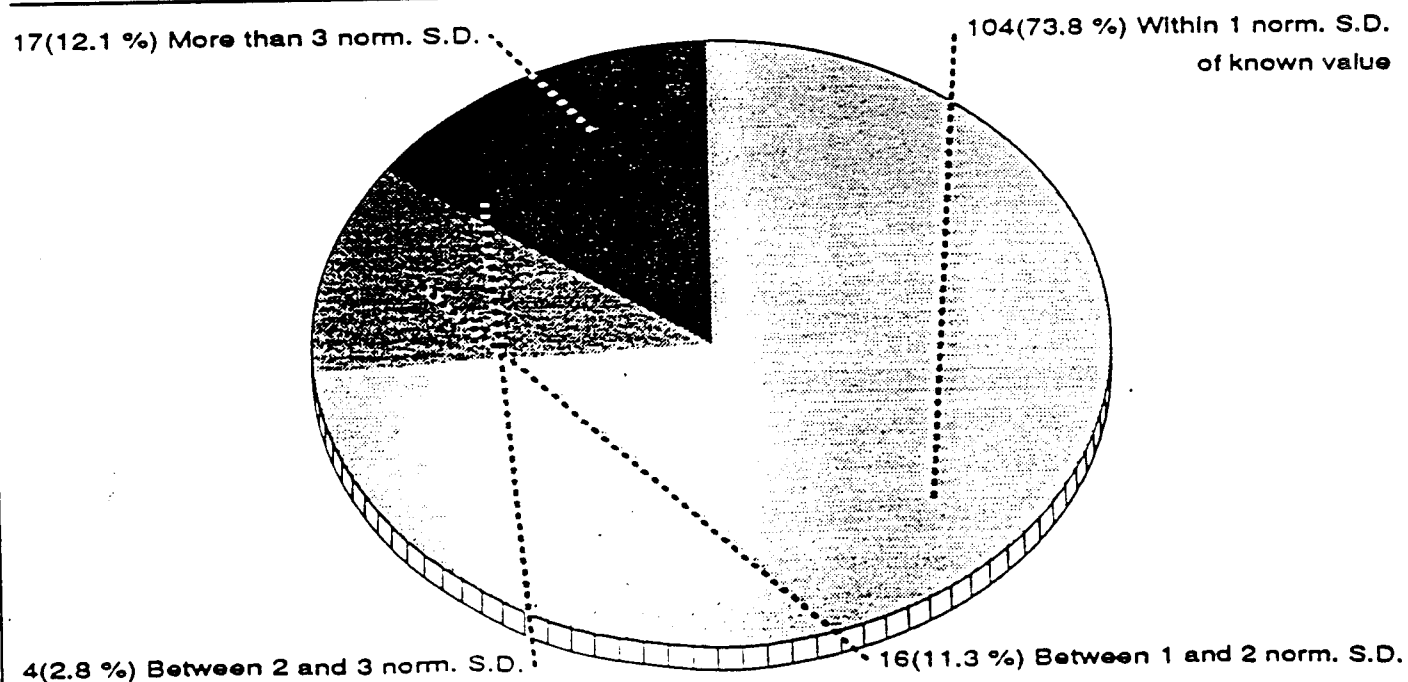
Las Vegas, Nevada

Uranium (Natural) Statistical Summary 198 Participants

The known value of this nuclide is 10.1 pCi/l with an expected precision of 3.0; the control limits are 4.9 to 15.3; the warning regions are 4.9 to 6.6 and 13.6 to 15.3



Statistic	Respondents	Non-outliers
Mean	9.92	Grand Avg 9.64
Std. Dev.	3.75	1.70
Variance	14.09	2.90
% Coef. of Var.	37.85	17.65
% deviation of mean from known value	-1.80	-4.54
Norm. dev. of mean from known value	-0.05	-0.27
Median	9.90	9.88
% deviation of median from known value	-1.98	-2.15
Norm. dev. of median from known value	-0.05	-0.13



Uranium (Natural)

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
M									•
MN									•
MS	10.0	9.9	10.2	0.15	0.059	10.03	0.23	-0.04	
MY									•
N	9.4	9.0	9.7	0.35	0.138	9.37	-0.16	-0.42	
NA	8.6	9.4	8.3	0.57	0.217	8.77	-0.51	-0.77	
NC									•
NG	13.8	15.1	14.8	0.68	0.256	14.57	2.84	2.58	
NH	10.0	10.2	10.5	0.25	0.098	10.23	0.34	0.08	
NJ	10.0	10.0	10.0	0.00	0.000	10.00	0.21	-0.06	
NK	10.4	9.3	10.2	0.59	0.217	9.97	0.19	-0.08	
NO	8.9	10.0	11.1	1.10	0.433	10.00	0.21	-0.06	
NT	7.2	7.1	7.0	0.10	0.039	7.10	-1.47	-1.73	
OB	9.2	9.0	9.0	0.12	0.039	9.07	-0.33	-0.60	
OF	8.8	8.6	8.3	0.25	0.098	8.57	-0.62	-0.89	
OK									•
OS	8.8	10.2	8.2	1.03	0.394	9.07	-0.33	-0.60	
OX	7.1	6.6	6.3	0.40	0.158	6.67	-1.72	-1.98	
OY	11.4	10.6	11.8	0.61	0.236	11.27	0.94	0.67	
OZ	8.6	8.6	9.3	0.40	0.138	8.83	-0.47	-0.73	
P	12.1	12.6	14.5	1.27	0.473	13.07	1.98	1.71	
PB	10.2	10.2	10.4	0.12	0.039	10.27	0.36	0.10	
PC	32.2	34.1	36.1	1.95	0.768	34.13	14.14	13.88	×
PE									•
PG									•
PP	22.4	22.4	22.5	0.06	0.020	22.43	7.39	7.12	×
PQ	10.2	10.1	9.9	0.15	0.059	10.07	0.25	-0.02	
PT	6.7	6.8	7.2	0.26	0.098	6.90	-1.58	-1.85	
PV	5.1	5.3	5.5	0.20	0.079	5.30	-2.51	-2.77	
PW	13.3	12.8	13.1	0.25	0.098	13.07	1.98	1.71	
PX	22.7	21.7	22.3	0.50	0.197	22.23	7.27	7.01	×
PY									•
Q	3.8	5.3	3.6	0.93	0.335	4.23	-3.12	-3.39	⇓
QB	2.2	2.3	1.9	0.21	0.079	2.13	-4.33	-4.60	×
QJ	9.5	7.5	8.5	1.00	0.394	8.50	-0.66	-0.92	
QM	10.1	11.1	11.3	0.64	0.236	10.83	0.69	0.42	
QQ	5.0	5.1	5.6	0.32	0.118	5.23	-2.55	-2.81	
QU	7.7	9.4	12.5	2.43	0.945	9.87	0.13	-0.13	
QX	8.5	8.4	8.3	0.10	0.039	8.40	-0.72	-0.98	
QZ	10.5	10.4	10.3	0.10	0.039	10.40	0.44	0.17	
R	9.7	6.5	8.1	1.60	0.630	8.10	-0.89	-1.15	
RC	10.8	11.3	13.3	1.32	0.492	11.80	1.25	0.98	
RD									•
RF									•
RG	11.7	11.3	12.2	0.45	0.177	11.73	1.21	0.94	

TAG SYMBOLS

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

Gross Alpha-Beta in Water

Performance Evaluation Study

January 28, 1994

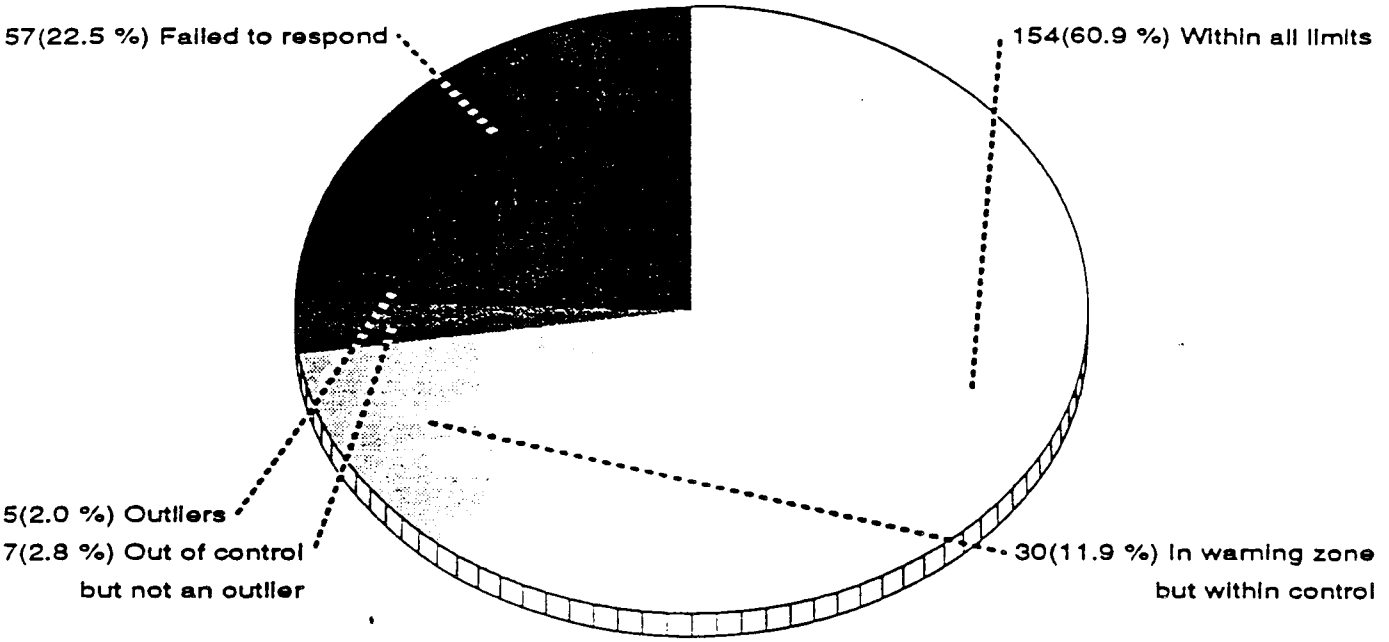
Environmental Protection Agency

Environmental Monitoring Systems Laboratory

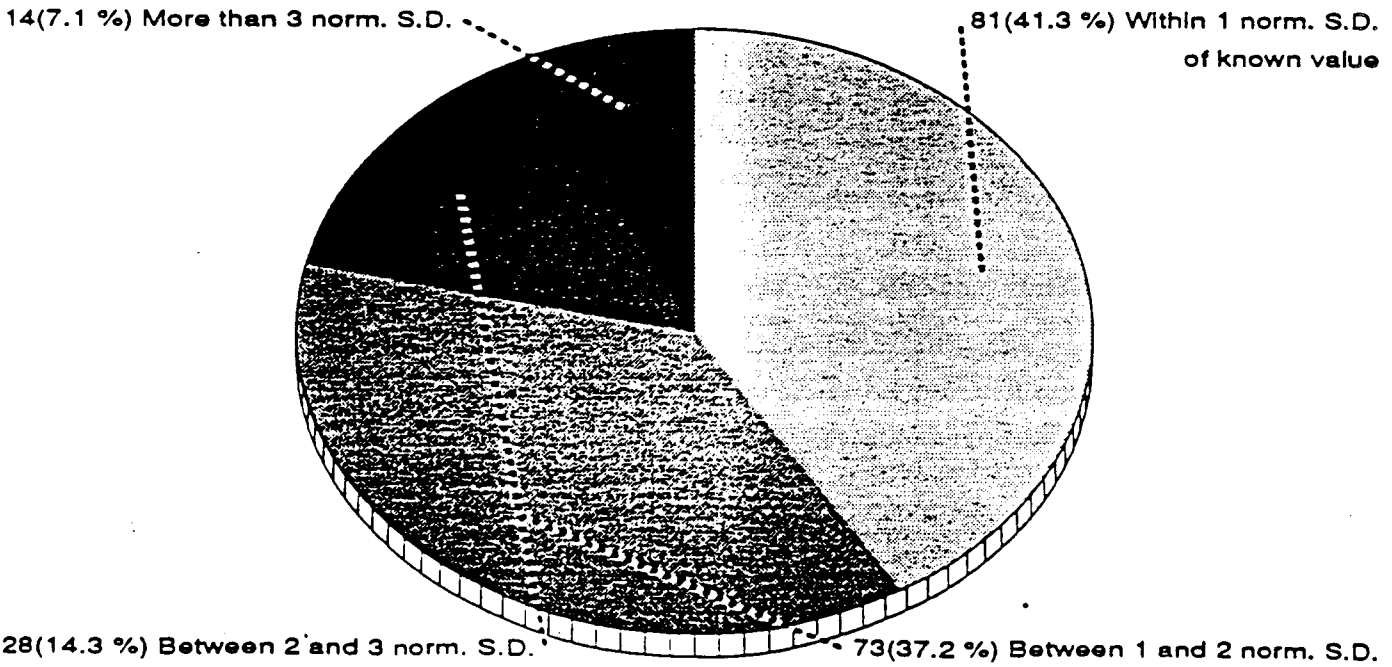
Las Vegas, Nevada

Gross Alpha Statistical Summary 253 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	14.38	Grand Avg 13.75
Std. Dev.	5.97	4.25
Variance	35.68	18.08
% Coef. of Var.	41.55	30.92
% deviation of mean from known value	-4.15	-8.32
Norm. dev. of mean from known value	-0.10	-0.29
Median	13.00	13.00
% deviation of median from known value	-13.33	-13.33
Norm. dev. of median from known value	-0.33	-0.47



Gross Alpha

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
NJ									•
NK	10.0	12.0	11.0	1.00	0.236	11.00	-0.95	-1.39	
NO	12.0	15.0	18.0	3.00	0.709	15.00	0.43	0.00	
NT	20.0	21.0	21.0	0.58	0.118	20.67	2.40	1.96	
O	17.0	19.0	18.0	1.00	0.236	18.00	1.47	1.04	
OA	10.0	10.0	10.0	0.00	0.000	10.00	-1.30	-1.73	
OB	9.0	8.0	9.0	0.58	0.118	8.67	-1.76	-2.19	
OF	14.0	15.0	16.0	1.00	0.236	15.00	0.43	0.00	
OM									•
OS	13.0	13.0	11.0	1.15	0.236	12.33	-0.49	-0.92	
OT									•
OX	11.0	13.0	18.0	3.61	0.827	14.00	0.09	-0.35	
OY	16.0	17.0	16.0	0.58	0.118	16.33	0.89	0.46	
P	12.0	7.0	16.0	4.51	1.120	11.67	-0.72	-1.15	
PA									•
PB	20.0	19.0	20.0	0.58	0.118	19.67	2.05	1.62	
PC									•
PD									•
PE	5.0	4.0	6.0	1.00	0.236	5.00	-3.03	-3.46	⇓
PG	12.0	10.0	11.0	1.00	0.236	11.00	-0.95	-1.39	
PM	9.0	9.0	12.0	1.73	0.354	10.00	-1.30	-1.73	
PP									•
PQ	10.0	10.0	9.0	0.58	0.118	9.67	-1.42	-1.85	
PR	20.0	20.0	18.0	1.15	0.236	19.33	1.93	1.50	
PT	8.0	11.0	13.0	2.52	0.591	10.67	-1.07	-1.50	
PV	16.0	17.0	18.0	1.00	0.236	17.00	1.13	0.69	
Q	12.0	13.0	14.0	1.00	0.236	13.00	-0.26	-0.69	
QA	12.0	14.0	13.0	1.00	0.236	13.00	-0.26	-0.69	
QB	8.0	10.0	9.0	1.00	0.236	9.00	-1.65	-2.08	
QC	12.0	9.0	12.0	1.73	0.354	11.00	-0.95	-1.39	
QI	9.0	7.0	8.0	1.00	0.236	8.00	-1.99	-2.42	
QJ	13.0	16.0	15.0	1.53	0.354	14.67	0.32	-0.12	
QK									•
QM	4.0	5.0	5.0	0.58	0.118	4.67	-3.15	-3.58	⇓
QP	17.0	17.0	14.0	1.73	0.354	16.00	0.78	0.35	
QQ	11.0	12.0	12.0	0.58	0.118	11.67	-0.72	-1.15	
QT	13.0	13.0	14.0	0.58	0.118	13.33	-0.15	-0.58	
QU	20.0	24.0	28.0	4.00	0.945	24.00	3.55	3.12	⇑
QW	32.0	37.0	31.0	3.21	0.709	33.33	6.78	6.35	×
QX	11.0	9.0	9.0	1.15	0.236	9.67	-1.42	-1.85	
QZ	12.0	12.0	12.0	0.00	0.000	12.00	-0.61	-1.04	
R	16.0	19.0	14.0	2.52	0.591	16.33	0.89	0.46	
RB	9.0	11.0	9.0	1.15	0.236	9.67	-1.42	-1.85	
RC	7.0	10.0	6.0	2.08	0.473	7.67	-2.11	-2.54	
RD									•

• ≡ No data submitted

TAG SYMBOLS

⇑ ≡ Above control limit

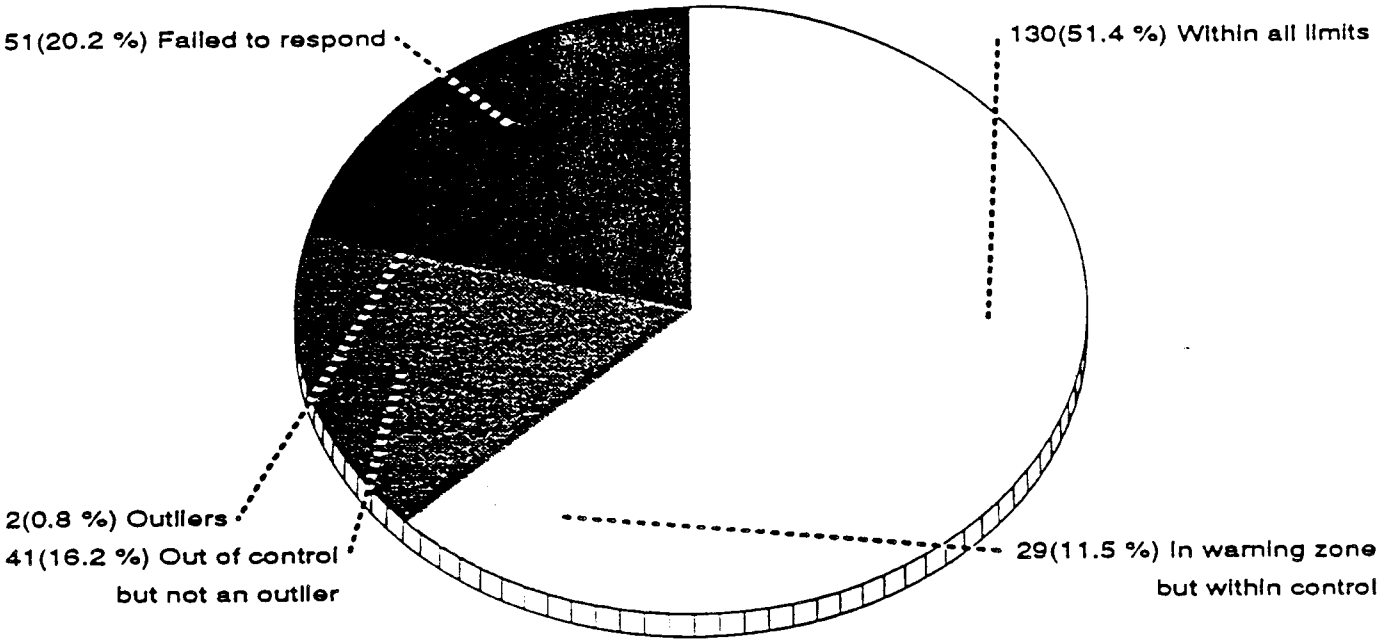
∅ ≡ Insufficient data

× ≡ Determined to be an outlier

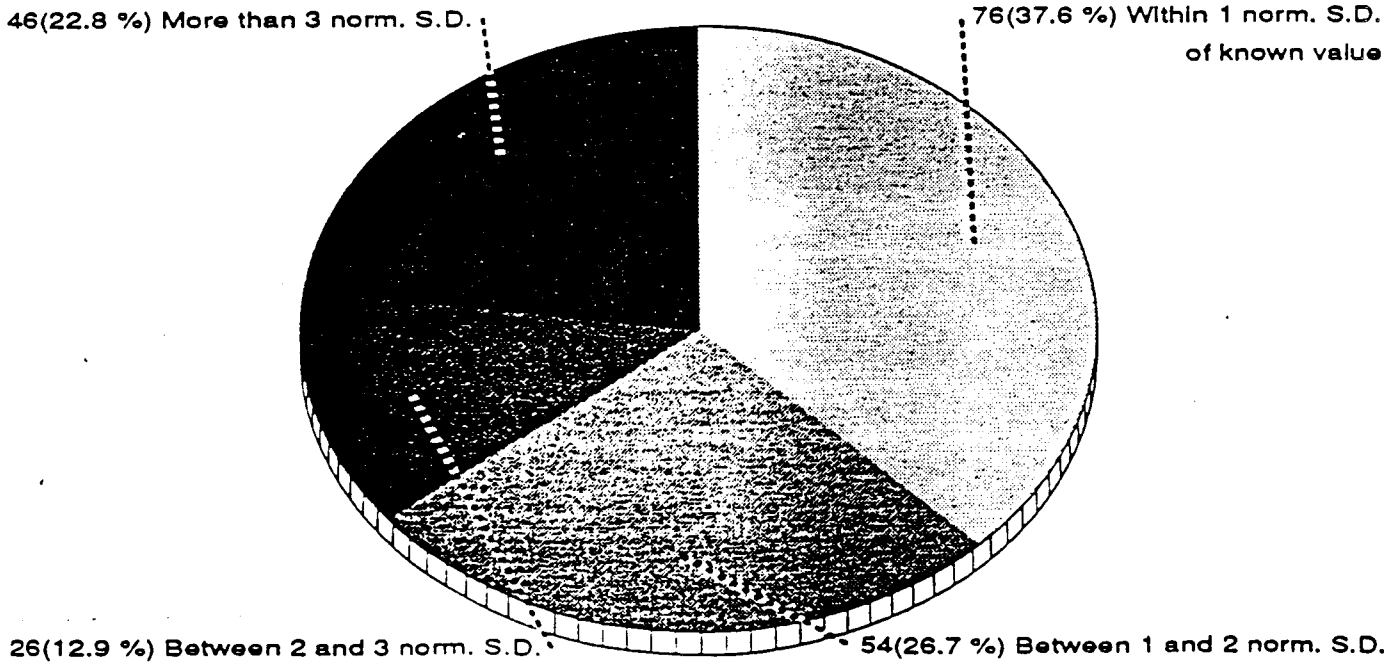
⇓ ≡ Below control limit

Gross Beta Statistical Summary 253 Participants

The known value of this nuclide is 62.0 pCi/l with an expected precision of 10.0; the control limits are 44.7 to 79.3; the warning regions are 44.7 to 50.4 and 73.6 to 79.3



Statistic	Respondents	Non-outliers
Mean	56.86	Grand Avg 56.14
Std. Dev.	15.85	14.15
Variance	251.07	200.24
% Coef. of Var.	27.87	25.21
% deviation of mean from known value	-8.29	-9.45
Norm. dev. of mean from known value	-0.32	-0.41
Median	57.67	57.67
% deviation of median from known value	-6.99	-6.99
Norm. dev. of median from known value	-0.27	-0.31



Gross Beta

Lab	Res. 1	Res. 2	Res. 3	Exper. Sigma	Rng anal (R + SR)	Average	Normalized deviation (grand-avg)	(known)	Tag
NJ									•
NK	58.0	58.0	61.0	1.73	0.177	59.00	0.50	-0.52	
NO	58.0	60.0	62.0	2.00	0.236	60.00	0.67	-0.35	
NT	41.0	41.0	41.0	0.00	0.000	41.00	-2.62	-3.64	⇓
O	67.0	64.0	62.0	2.52	0.295	64.33	1.42	0.40	
OA	53.0	41.0	50.0	6.24	0.709	48.00	-1.41	-2.42	
OB	44.0	45.0	50.0	3.21	0.354	46.33	-1.70	-2.71	
OF	57.0	58.0	64.0	3.79	0.413	59.67	0.61	-0.40	
OM									•
OS	60.0	63.0	58.0	2.52	0.295	60.33	0.73	-0.29	
OT									•
OX	52.0	51.0	52.0	0.58	0.059	51.67	-0.77	-1.79	
OY	56.0	58.0	59.0	1.53	0.177	57.67	0.26	-0.75	
P	34.0	28.0	38.0	5.03	0.591	33.33	-3.95	-4.97	⇓
PA									•
PB	52.0	54.0	53.0	1.00	0.118	53.00	-0.54	-1.56	
PC									•
PD									•
PE	74.0	75.0	78.0	2.08	0.236	75.67	3.38	2.37	
PG	54.0	53.0	56.0	1.53	0.177	54.33	-0.31	-1.33	
PM	52.0	58.0	58.0	3.46	0.354	56.00	-0.02	-1.04	
PP									•
PQ	64.0	64.0	65.0	0.58	0.059	64.33	1.42	0.40	
PR	53.0	53.0	49.0	2.31	0.236	51.67	-0.77	-1.79	
PT	59.0	58.0	64.0	3.21	0.354	60.33	0.73	-0.29	
PV	42.0	42.0	45.0	1.73	0.177	43.00	-2.28	-3.29	⇓
Q	68.0	70.0	73.0	2.52	0.295	70.33	2.46	1.44	
QA	69.0	70.0	71.0	1.00	0.118	70.00	2.40	1.39	
QB	51.0	56.0	51.0	2.89	0.295	52.67	-0.60	-1.62	
QC	59.0	51.0	53.0	4.16	0.473	54.33	-0.31	-1.33	
QI	23.0	23.0	24.0	0.58	0.059	23.33	-5.68	-6.70	⇓
QJ	67.0	72.0	70.0	2.52	0.295	69.67	2.34	1.33	
QK	65.0	58.0	69.0	5.57	0.650	64.00	1.36	0.35	
QM	52.0	49.0	38.0	7.37	0.827	46.33	-1.70	-2.71	
QP	55.0	51.0	58.0	3.51	0.413	54.67	-0.26	-1.27	
QQ	65.0	65.0	63.0	1.15	0.118	64.33	1.42	0.40	
QT	59.0	57.0	59.0	1.15	0.118	58.33	0.38	-0.64	
QU	55.0	60.0	63.0	4.04	0.473	59.33	0.55	-0.46	
QW	62.0	57.0	54.0	4.04	0.473	57.67	0.26	-0.75	
QX	61.0	61.0	60.0	0.58	0.059	60.67	0.78	-0.23	
QZ	81.0	80.0	79.0	1.00	0.118	80.00	4.13	3.12	⇑
R	65.0	68.0	62.0	3.00	0.354	65.00	1.53	0.52	
RB	59.0	51.0	51.0	4.62	0.473	53.67	-0.43	-1.44	
RC	67.0	65.0	62.0	2.52	0.295	64.67	1.48	0.46	
RD									•

• ≡ No data submitted

TAG SYMBOLS

⇑ ≡ Above control limit

∅ ≡ Insufficient data

× ≡ Determined to be an outlier

⇓ ≡ Below control limit

EPA/CLP

QB2, FY94

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

MAR 30 1994

cc: L. P. Burnett
R. L. Howell
C. R. Kirkpatrick
C. Meehan
M. R. Powell
D.S. Zingg

Ms. Larissa Welch
Martin Marietta Energy Systems
K-25, Bldg. K-1004-D
Oak Ridge, TN 37831

Dear Mr. Harper:

The Individual Laboratory Summary Report (ILSR) summarizing your laboratory's results for the most recent Quarterly Blind (QB) Performance Evaluation (PE) Sample (QB2, FY94) 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 for CLP Contracts:

- Acceptable, No Response Required (Score greater than or equal to 90 percent):

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

- Acceptable, Response Explaining Deficiency(ies) Required (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)

- Unacceptable, Response Explaining Deficiency(ies) Required (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.

EPA/CLP 2/94 ORGANIC

REGION 4
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 2 FY 94

LABORATORY: Martin Marietta ORGDP (TN)
PERFORMANCE: ACCEPTABLE - No Response Required
RANK: Above = 4 Same = 1 Below = 6

% SCORE: 95.5
REPORT DATE: 03/26/94
MATRIX: WATER

COMPOUND	PREDICTION 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										
1,1-DICHLOROETHENE	NU	NU	NU	NU	4		0	3	27	30
DIBROMOCHLOROMETHANE	72	87	70	89	78		2	0	30	30
2-HEXANONE	280	400	260	410	360		6	0	30	30
1,1,2,2-TETRACHLOROETHANE	27	34	26	35	34		3	0	30	30
STYRENE	91	100	89	100	99		4	0	30	30
XYLENES (TOTAL)	140	170	140	170	150		0	0	30	30
TCL SEMIVOLATILE										
BIS(2-CHLOROETHYL)ETHER	15	22	13	24	18		0	0	30	30
2-CHLOROPHENOL	20	28	19	32	22		0	0	30	30
1,3-DICHLOROBENZENE	22	34	20	42	33		3	0	30	30
NITROBENZENE	42	59	40	62	54		1	0	30	30
2-NITROPHENOL	28	43	26	45	31		1	0	30	30
2,4-DIMETHYLPHENOL	42	75	37	80	57		1	0	30	30
2,4,5-TRICHLOROPHENOL	65	89	62	100	73		1	0	30	30
DIMETHYL PHTHALATE	62	94	57	98	7	X	4	0	30	30
ACENAPHTHYLENE	26	37	25	39	36		4	0	30	30
2,4-DINITROPHENOL	60	120	49	140	60		2	0	30	30
4,6-DINITRO-2-METHYLPHENOL	26	38	25	44	19	S	0	0	30	30
4-BROMOPHENYL PHENYL ETHER	24	37	22	39	37		1	0	30	30
PHENANTHRENE	12	16	12	17	16		3	0	30	30
PYRENE	66	130	56	160	110		0	0	30	30
BENZO(K)FLUORANTHENE	11	14	10	15	15	S	1	2	28	30
INDENO(1,2,3-CD)PYRENE	11	21	10	23	19		0	1	29	30
TCL PESTICIDES										
DELTA-BHC	0.098	0.15	0.09	0.16	0.12		1	0	30	30
HEPTACHLOR	0.098	0.15	0.09	0.16	0.09	S	2	0	30	30
ALDRIN	0.25	0.38	0.24	0.45	0.28		0	0	30	30
HEPTACHLOR EPOXIDE	0.26	0.35	0.25	0.37	0.3		2	1	29	30
4,4'-DDE	0.28	0.41	0.26	0.43	0.33		2	0	30	30
ENDOSULFAN SULFATE	0.42	0.61	0.39	0.64	0.6		3	0	30	30
AROCLOR-1260	1.3	1.8	1.2	2.2	1.8		2	0	30	30
NON-TCL VOLATILE										
ACETONITRILE					30			16	14	30
NON-TCL SEMIVOLATILE										
BENZOIC ACID					24			3	27	30
DIBENZOTHIOPHENE					11			1	29	30
TCL VOLATILE (Contaminants)										
METHYLENE CHLORIDE					2			21	9	30

REGION 4
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 2 FY 94

LABORATORY: Martin Marietta ORGDP (TN)
PERFORMANCE: ACCEPTABLE - No Response Required
RANK: Above = 4 Same = 1 Below = 6

% SCORE: 95.5
REPORT DATE: 03/26/94
MATRIX: WATER

COMPOUND	PREDICTION 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
TRICHLOROETHENE					2			17	13	30
TCL SEMIVOLATILE (Contaminants)										
DI-N-BUTYLPHTHALATE					13			27	3	30
TCL PESTICIDES (Contaminants)										
BETA-BHC					0.01			29	1	30

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

WS-033

STATE OF TENNESSEE
LABORATORY SERVICES
630 BEN ALLEN ROAD
TENNESSEE DEPARTMENT OF HEALTH
NASHVILLE, TENNESSEE 37247-0801
FAX # (615) 262-6393

April 20, 1994

MM ORGDP
Ms. Larissa Welch
P.O. Box 2003
(K-1004-C,Ms 7440)
Oak Ridge, Tn 37831-7440

Tennessee Laboratory Number 02019
EPA Laboratory Number TN043

Dear Ms. Welch:

Enclosed is your laboratory's performance evaluation report for Water Supply Study 33 (WS033).

Based on the results of this study, your laboratory certification status will change as follows:

- No changes.

The raw data for parameters missed in this study, if any, should be examined carefully to determine the cause for analytical errors. **A report of your findings should be sent to this office.**

Your laboratory will be included in the next Water Supply Study, WS034, for any parameters missed. The study is to be shipped March 8, 1994.

Sincerely,

Charles E. Mickle
Laboratory Certification Officer
Laboratory Quality Assurance

TENNESSEE DEPARTMENT OF HEALTH

MM ORGDP
April, 94

EPA No. TN043 TN No. 02019

WS033

Parameter	Certification Status
Trace Metals	
Antimony	Certified
Arsenic	Certified
Barium	Certified
Beryllium	Certified
Cadmium	Certified
Chromium	Certified
Copper	Certified
Lead	Certified
Mercury	Certified
Nickel	Certified
Selenium	Certified
Thallium	Certified
Inorganics	
Asbestos	Not Certified
Nitrate as N	Certified
Nitrite as N	Certified
Fluoride	Certified
Total Cyanide	Certified
Insecticides	
Alachlor	Not Certified
Atrazine	Not Certified
Chlordane	Not Certified
Endrin	Certified
Heptachlor	Certified
Heptachlor Epoxide	Certified
Hexachlorobenzene	Not Certified
Hexachlorocyclopentadiene	Not Certified
Lindane	Certified
Methoxychlor	Certified
Simazine	Not Certified
Toxaphene	Certified
Carbamates	Not Certified
Aldicarb	Not Certified
Aldicarb Sulfone	Not Certified
Aldicarb Sulfoxide	Not Certified
Carbofuran	Not Certified

Oxamyl (Vydate)	Not Certified
Herbicides	
2,4-D	Certified
2,4,5-TP (Silvex)	Certified
Dalapon	Not Certified
Dinoseb	Not Certified
Pentachlorophenol	Not Certified
Picloram	Not Certified
Polychlorinated Biphenyls	
Decachlorobiphenyl	Not Certified
PAH's	
Benzo(a)pyrene	Not Certified
Adipate/Phthalates	
Bis(2-Ethylhexy)Adipate	Not Certified
Bis(2-Ethylhexy)Phthalate	Not Certified
Miscellaneous SOC's	
Dioxin (2, 3, 7, 8 TCDD)	Not Certified
Diquat	Not Certified
Endothall	Not Certified
Glyphosate	Not Certified
Trihalomethanes	
Bromodichloromethane	Certified
Bromoform	Certified
Chlorodibromomethane	Certified
Chloroform	Certified
Total Trihalomethanes	Certified
Volatile Organic Compounds	
Benzene	Certified
Carbon Tetrachloride	Certified
Chlorobenzene	Certified
1, 2 Dichlorobenzene	Certified
1, 4 Dichlorobenzene	Certified
1, 2 Dichloroethane	Certified
1, 1 Dichloroethylene	Certified
C 1, 2 Dichloroethylene	Certified
T 1, 2 Dichloroethylene	Certified
Dichloromethane	Certified
1, 2 Dichloropropane	Certified
Ethylbenzene	Certified
Styrene	Certified
Tetrachloroethylene	Certified
Toluene	Certified
1, 2, 4 - Trichlorobenzene	Certified
1, 1, 1 - Trichloroethane	Certified
1, 1, 2 - Trichloroethane	Certified
Trichloroethylene	Certified
Vinyl Chloride	Certified
Total Xylenes	Certified
1, 2Dibromo3chloropropane (DBCP)	Not Certified
Ethylene Dibromide (EDB)	Not Certified

Sodium and Corrosivity	
Total Filterable residue	Certified
Calcium Hardness	Certified
pH	Certified
Alkalinity	Certified
Corrosivity	Certified
Sodium	Certified
Sulfate	Certified
Radiochemistry	
Gross Alpha	Certified
Gross Beta	Certified
Cesium 134	Certified
Uranium	Certified

NOTES: YOU MUST BE CERTIFIED FOR ALL THM'S TO REPORT TTHM
YOU MUST BE CERTIFIED FOR ALL THM'S TO REPORT VOC'S

MARTIN MARIETTA

Internal Correspondence

MARTIN MARIETTA ENERGY SYSTEMS, INC.

Date: April 28, 1994

To: N. P. Buddin III, E. E. Clark, G. L. Emerson, M. H. Feller, G. A. Gibson, R. L. Howell, J. M. LaBauve, C. Meehan, T. J. Oatts, D. S. Zingg

cc: L. P. Burnett, G. L. Grametbauer, C. R. Kirkpatrick, M. R. Powell

From: L. D. Welch, K1004D, Rm. 26, MS-7440

Subject: **K-25 Site Water Supply 033 (WS-033) Results**

The K-25 Site Analytical Services Organization has received the results for WS-033. The laboratory reported 61 analytes and received an acceptable rating on 57 analytes thus achieving an overall acceptable score of 93.4% acceptable for this study. In addition, the laboratory has maintained its current certification status. The 4 analytes for which unacceptable ratings were assigned were:

Analyte	DDS Number
Chlordane (total)	931014-038
Lindane	931014-036
Chloromethane	931014-035
Dichloromethane	931014-035

Attached is a copy of the WS-033 evaluation report and certification status listing. As noted in the report, the laboratory must respond to the State of Tennessee with its findings concerning the unacceptable results. Please review the data for the unacceptable analytes listed above and report your findings to me (WELCHLD on e-mail) by May 13, 1994 so that I can compile the information and report it to the State of Tennessee's Laboratory Certification Officer as required.

If you have any questions please contact me at 6-3099 (pager 564-2983).

ldw

Attachment

MARTIN MARIETTA

Internal Correspondence

MARTIN MARIETTA ENERGY SYSTEMS, INC.

Date: June 30, 1994

To: T. J. Oatts

CC: A. Chambles, M. H. Feller, M. R. Powell

From: L. D. Welch, K1004D, MS-7440

Subject: **WS-033 Low Level Arsenic Results**

Attached is the report containing the low level arsenic result for the K-25 Site, Analytical Services Organization laboratory's participation in Water Supply 033. The reported value of 4.0 ug/L was within acceptable limits. The DDS number for this sample was 931014-042.

ldw

Attachment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
CINCINNATI, OHIO 45268

DATE: February 14, 1994

SUBJECT: Report on WS033 Data for Low-Level Arsenic in Trace Metals, Sample 3

FROM: Paul W. Britton, Statistician
Development and Evaluation Branch
Quality Assurance Research Division

TO: Regional and State Coordinators for WS033

THRU: Robert L. Graves, Chief
Development and Evaluation Branch
Quality Assurance Research Division

RLG

Water Supply Study 33 results for low-level arsenic (Trace Metals Sample 3) were not intended to be used for certification, and therefore, these data were not included in the official performance evaluation reports. However, a report on these study data is enclosed with this memorandum and summarized below for your information and use. Please provide a copy to laboratories that submitted low-level arsenic data and to anyone else that is interested.

Analyte	True Value	Numbers of Results Available	Biweight Mean	Biweight Std. Dev.	95% Prediction Interval
Arsenic (TM Sample 3)	4.09µg/L	389	4.0688	0.8732	2.35 - 5.79

Please do not hesitate to call me at (513) 569-7216 if I can be of any further assistance.

Attachments (1):
As Stated

cc: Richard Reding, TSD
Baldev Bathija, OGWDW
Ivan Deloatch, OGWDW

Printed on Recycled Paper

APG PERFORMANCE SAMPLE

April 1994

Prepared for

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

8254

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 of each element of the analytical process is

indicated. If we can assist you in resolving why a value was an Outlier, please contact APG.

Solids Standards: Solids standards are individually prepared 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 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.

Performances Evaluation Summary: This 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.

Certification: This program meets the requirements ISO/REMCO N263 which is the protocol for Proficiency Testing of Analytical Laboratories. This program is also a part of the ISO 9001 registered quality system of APG as audited by the American Association for Laboratory Accreditation.

Submitted: May 13, 1994

Thomas V. Coyner
General Manager

APG The Measure of Quality
Analytical Products Group, Inc.
2730 Washington Blvd., Belpre, OH 45714 800-272-4442 614-423-4200

PERFORMANCE EVALUATION

Performance Evaluation Summary

Customer Code: 8254 April, 1994

Parameter	Level	Reported	Ref Value	Mean	Std Dev	Acceptance Range	Comment
Standard: Demand mg/L							
Biochemical Oxygen Demand	1	207.94	275.600	252.333	46.598	132.111 - 372.555	
Biochemical Oxygen Demand	2	17.08	33.040	31.591	5.847	16.506 - 46.677	Warning
Chemical Oxygen Demand	1	418	443.800	418.471	25.611	352.395 - 484.548	
Chemical Oxygen Demand	2	48	53.200	49.196	9.119	25.669 - 72.723	
Total Organic Carbon	1	165.85	167.100	164.934	11.758	134.599 - 195.268	
Total Organic Carbon	2	20.070	20.300	20.132	1.154	17.153 - 23.110	
Standard: Nutrients mg/L							
Ammonia Nitrogen as N	1	0.82	0.901	0.899	0.062	0.740 - 1.058	
Ammonia Nitrogen as N	2	4.82	5.000	5.017	0.390	4.011 - 6.024	
Nitrate Nitrogen as N	1	0.984	0.962	0.926	0.097	0.674 - 1.177	
Nitrate Nitrogen as N	2	8.505	8.005	7.812	0.821	5.694 - 9.931	
Orthophosphate as P	1	0.43	0.404	0.407	0.020	0.355 - 0.458	
Orthophosphate as P	2	9.59	9.027	9.093	0.408	8.040 - 10.147	
Total Kjeldahl Nitrogen	1	0.420	0.356	0.449	0.175	0.000 - 0.901	
Total Kjeldahl Nitrogen	2	2.184	2.529	2.520	0.469	1.311 - 3.730	
Total Phosphorus as P	1	0.44	0.403	0.396	0.038	0.299 - 0.493	
Total Phosphorus as P	2	3.65	3.261	3.346	0.231	2.750 - 3.943	
Standard: Solids mg/L							
Total Suspended Solids	1	77	92.400	84.431	7.766	64.393 - 104.468	
Total Suspended Solids	2	289	323.900	306.446	16.298	264.396 - 348.496	

Customer Code: 8254 April, 1994

Parameter	Level	Reported	Ref Value	Mean	Std Dev	Acceptance Range	Comment
Total Dissolved Solids	1	194	180.200	187.314	19.134	137.948 - 236.681	
Total Dissolved Solids	2	336	309.400	312.787	24.150	250.479 - 375.095	
Standard: Oil & Grease mg/L							
Oil & Grease	1	19.5	18.992	16.470	2.971	8.805 - 24.136	
Oil & Grease	2	30.1	33.100	29.710	4.307	18.599 - 40.821	
Standard: Minerals mg/L							
Alkalinity as CaCO3	1	11	10.920	11.798	1.648	7.547 - 16.050	
Alkalinity as CaCO3	2	132	134.380	131.352	3.745	121.688 - 141.015	
Calcium	1	17.1	15.030	15.447	1.316	12.051 - 18.842	
Calcium	2	61.2	55.360	55.206	3.649	45.792 - 64.620	
Chloride	1	145.7	148.190	148.360	7.947	127.857 - 168.863	
Chloride	2	112.5	113.640	113.015	5.705	98.297 - 127.734	
Conductivity umho/cm	1	570	596.330	596.201	22.571	537.968 - 654.435	
Conductivity umho/cm	2	777	797.670	811.964	21.155	757.383 - 866.545	
Magnesium	1	13.1	12.110	12.042	0.781	10.029 - 14.056	
Magnesium	2	1.23	1.150	1.176	0.077	0.978 - 1.375	
Potassium	1	100	95.260	92.068	5.789	77.132 - 107.003	
Potassium	2	12.9	13.060	12.896	0.772	10.905 - 14.887	
Sodium	1	10.2	10.030	10.188	0.730	8.306 - 12.071	
Sodium	2	107	106.240	103.275	8.524	81.285 - 125.266	
Sulfate	1	9.1	10.250	10.651	1.342	7.188 - 14.113	
Sulfate	2	84.6	93.160	92.303	7.327	73.398 - 111.207	
Total Hardness as CaCO3	1	83	87.410	87.361	4.102	76.778 - 97.943	
Total Hardness as CaCO3	2	135	142.980	141.400	5.659	126.801 - 155.999	

APG The Measure of Quality
Analytical Products Group, Inc.
2730 Washington Blvd., Belpre, OH 45714 800-272-4442 614-423-4200

PERFORMANCE EVALUATION

Parameter	Level	Reported	Ref Value	Mean	Std Dev	Acceptance Range	Comment
Standard: pH Units							
pH	1	2.99	3.001	2.988	0.104	2.721 - 3.255	
pH	2	9.06	9.046	8.871	0.233	8.269 - 9.473	
Standard: Trace Metals ug/L							
Aluminum	1	41.5	54.670	54.845	12.201	23.368 - 86.323	
Aluminum	2	310	341.680	339.824	31.025	259.780 - 419.869	
Antimony	1	269	289.160	273.115	27.562	202.005 - 344.225	
Antimony	2	1140	1144.600	1109.476	87.955	882.553 - 1336.399	
Arsenic	1	62.9	61.960	63.058	6.720	45.721 - 80.395	
Arsenic	2	104	101.620	107.571	10.271	81.073 - 134.070	
Barium	1	928	966.200	943.040	46.911	822.010 - 1064.070	
Barium	2	1940	2003.590	1987.942	98.002	1735.098 - 2240.786	
Beryllium	1	11.3	11.700	11.450	1.203	8.346 - 14.554	
Beryllium	2	354	371.110	361.555	17.361	316.763 - 406.347	
Boron	1	20.1	22.270	24.474	3.366	15.790 - 33.157	
Boron	2	548	570.690	568.224	21.992	511.486 - 624.963	
Cadmium	1	11.0	12.150	12.151	1.245	8.938 - 15.364	
Cadmium	2	287	291.710	288.527	10.637	261.084 - 315.969	
Chromium	1	65.2	74.210	74.676	8.709	52.207 - 97.144	
Chromium	2	142	157.690	154.592	11.663	124.501 - 184.683	
Cobalt	1	107	110.400	109.068	7.599	89.464 - 128.672	
Cobalt	2	284	291.330	288.496	16.253	246.564 - 330.427	
Copper	1	91.8	96.000	96.300	6.132	80.479 - 112.120	
Copper	2	217	222.320	222.725	12.833	189.614 - 255.835	
Iron	1	NR	21.680	24.448	4.705	12.309 - 36.587	Unreported
Iron	2	723	791.140	782.690	41.056	676.766 - 888.613	

APG The Measure of Quality
Analytical Products Group, Inc.
2730 Washington Blvd., Belpre, OH 45714 800-272-4442 614-423-4200

PERFORMANCE EVALUATION

Parameter	Level	Reported	Ref Value	Mean	Std Dev	Acceptance Range	Comment
Lead	1	194	194.900	190.997	11.822	160.496 - 221.498	
Lead	2	210	203.450	207.667	13.169	173.692 - 241.642	
Manganese	1	90.4	95.070	93.238	6.300	76.984 - 109.491	
Manganese	2	101	105.630	105.751	4.629	93.808 - 117.694	
Mercury	1	0.61	0.590	0.702	0.195	0.199 - 1.206	
Mercury	2	4.99	4.880	4.827	0.466	3.625 - 6.030	
Molybdenum	1	22.8	25.590	25.355	5.214	11.904 - 38.807	
Molybdenum	2	208	213.260	207.906	13.657	172.670 - 243.141	
Nickel	1	26.3	27.930	28.148	3.735	18.513 - 37.784	
Nickel	2	118	119.710	122.679	9.492	98.189 - 147.169	
Selenium	1	10.6	11.170	11.645	1.445	7.917 - 15.372	
Selenium	2	112	111.660	111.012	14.973	72.382 - 149.642	
Silver	1	91.3	95.250	92.159	4.616	80.249 - 104.069	
Silver	2	106	105.450	104.591	5.854	89.489 - 119.693	
Thallium	1	78.2	80.210	74.797	13.844	39.079 - 110.515	
Thallium	2	989	992.090	947.008	90.696	713.012 - 1181.003	
Vanadium	1	733	748.830	737.629	33.652	650.808 - 824.450	
Vanadium	2	1770	1790.690	1792.983	84.209	1575.723 - 2010.243	
Zinc	1	25.5	31.090	32.937	6.426	16.357 - 49.516	
Zinc	2	95.9	103.630	108.030	10.924	79.847 - 136.213	
Standard: Phenol mg/L							
Phenol	1	0.105	0.100	0.102	0.013	0.067 - 0.136	
Phenol	2	1.511	1.502	1.491	0.105	1.220 - 1.762	
Standard: Cyanide mg/L							
Cyanide	1	0.684	0.703	0.667	0.121	0.354 - 0.980	

APG The Measure of Quality
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PERFORMANCE EVALUATION

Parameter	Level	Reported	Ref Value	Mean	Std Dev	Acceptance Range	Comment
Cyanide	2	2.018	1.968	1.977	0.468	0.769 - 3.185	
Standard: Residual Chlorine mg/L							
Residual Chlorine	1	0.21	0.201	0.193	0.058	0.044 - 0.342	
Residual Chlorine	2	4.08	4.549	4.260	0.669	2.534 - 5.986	
Standard: Fluoride mg/L							
Fluoride	1	2.64	2.505	2.539	0.183	2.066 - 3.011	
Fluoride	2	10.6	10.006	10.114	0.387	9.116 - 11.111	
Standard: Total Organic Halide ug/L							
Total Organic Halide	1	44.7	45.710	41.135	7.744	21.155 - 61.115	
Total Organic Halide	2	429	455.630	407.514	38.131	309.137 - 505.891	
Standard: Hexavalent Chromium mg/L							
Hexavalent Chromium	1	NR	0.092	0.090	0.010	0.065 - 0.115	Unreported
Hexavalent Chromium	2	NR	0.401	0.402	0.023	0.342 - 0.461	Unreported
Standard: Uranium ug/L							
Uranium	1	63	60.060	58.300	7.891	37.941 - 78.659	
Uranium	2	887	900.900	887.500	12.819	854.426 - 920.574	

APG The Measure of Quality
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2730 Washington Blvd., Belpre, OH 45714 800-272-4442 614-423-4200

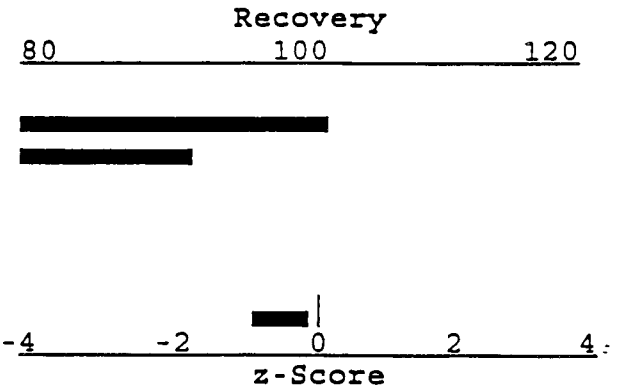
PERFORMANCE EVALUATION

Customer Code: 8254 April 1994 Page: 1

Standard: Demand

Parameter: Biochemical Oxygen Demand mg/L Level 1

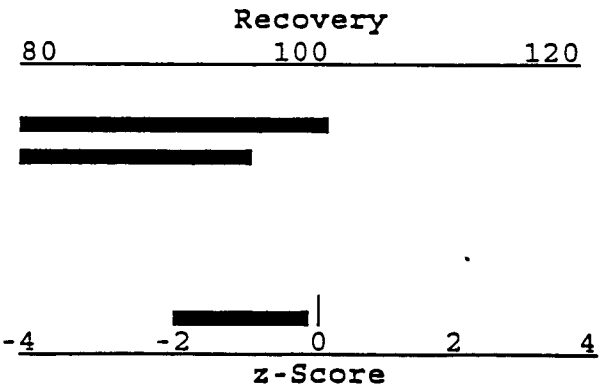
Your Result:	207.94
Reference Value:	275.600
Mean of Reporting Laboratories:	252.333
Actual Standard Deviation:	46.598
Number Reporting:	113
Average % Recovery:	91.558
Your % Recovery:	75.450
Deviation from Mean - z Score:	0.953



Comment:

Parameter: Biochemical Oxygen Demand mg/L Level 2

Your Result:	17.08
Reference Value:	33.040
Mean of Reporting Laboratories:	31.591
Actual Standard Deviation:	5.847
Number Reporting:	117
Average % Recovery:	95.616
Your % Recovery:	51.695
Deviation from Mean - z Score:	2.482



Comment: Warning

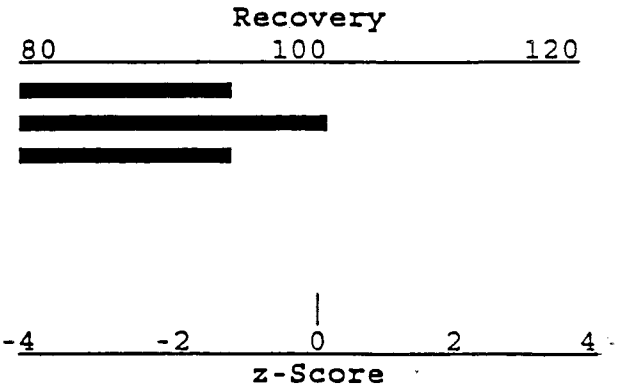
PERFORMANCE EVALUATION

Customer Code: 8254 April 1994 Page: 2

Standard: Demand

Parameter: Chemical Oxygen Demand mg/L Level 1

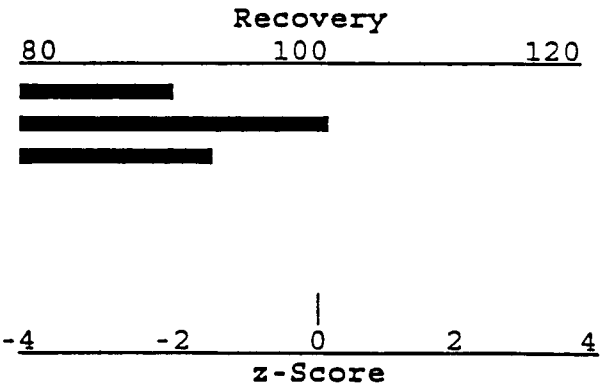
Your Result:	418
Reference Value:	443.800
Mean of Reporting Laboratories:	418.471
Actual Standard Deviation:	25.611
Number Reporting:	67
Average % Recovery:	94.293
Your % Recovery:	94.187
Deviation from Mean - z Score:	0.018



Comment:

Parameter: Chemical Oxygen Demand mg/L Level 2

Your Result:	48
Reference Value:	53.200
Mean of Reporting Laboratories:	49.196
Actual Standard Deviation:	9.119
Number Reporting:	75
Average % Recovery:	92.474
Your % Recovery:	90.226
Deviation from Mean - z Score:	0.131



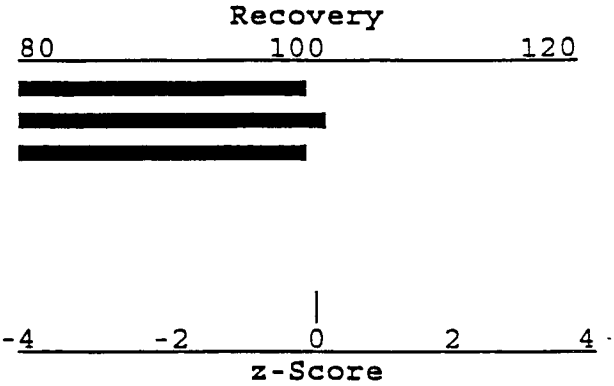
Comment:

Customer Code: 8254 April 1994 Page: 3

Standard: Demand

Parameter: Total Organic Carbon mg/L Level 1

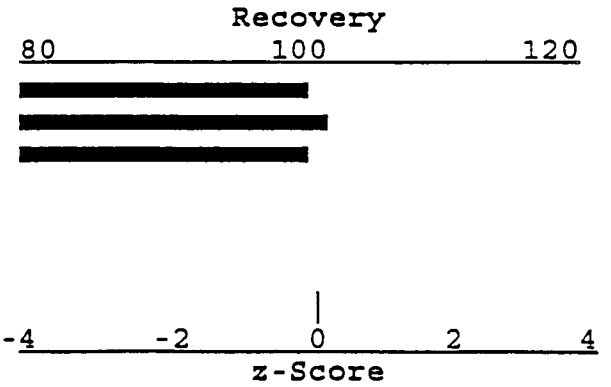
Your Result:	165.85
Reference Value:	167.100
Mean of Reporting Laboratories:	164.934
Actual Standard Deviation:	11.758
Number Reporting:	43
Average % Recovery:	98.703
Your % Recovery:	99.252
Deviation from Mean - z Score:	0.078



Comment:

Parameter: Total Organic Carbon mg/L Level 2

Your Result:	20.070
Reference Value:	20.300
Mean of Reporting Laboratories:	20.132
Actual Standard Deviation:	1.154
Number Reporting:	43
Average % Recovery:	99.171
Your % Recovery:	98.867
Deviation from Mean - z Score:	0.054



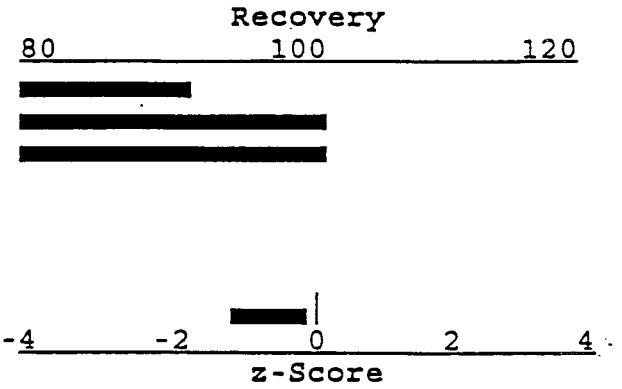
Comment:

Customer Code: 8254 April 1994 Page: 4

Standard: Nutrients

Parameter: Ammonia Nitrogen as N mg/L Level 1

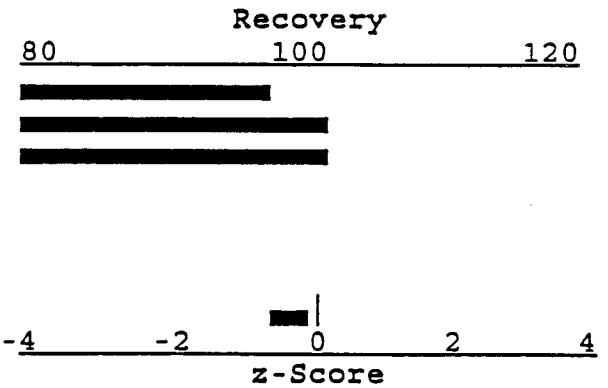
Your Result:	0.82
Reference Value:	0.901
Mean of Reporting Laboratories:	0.899
Actual Standard Deviation:	0.062
Number Reporting:	71
Average % Recovery:	99.787
Your % Recovery:	91.010
Deviation from Mean - z Score:	1.286



Comment:

Parameter: Ammonia Nitrogen as N mg/L Level 2

Your Result:	4.82
Reference Value:	5.000
Mean of Reporting Laboratories:	5.017
Actual Standard Deviation:	0.390
Number Reporting:	85
Average % Recovery:	100.349
Your % Recovery:	96.400
Deviation from Mean - z Score:	0.506



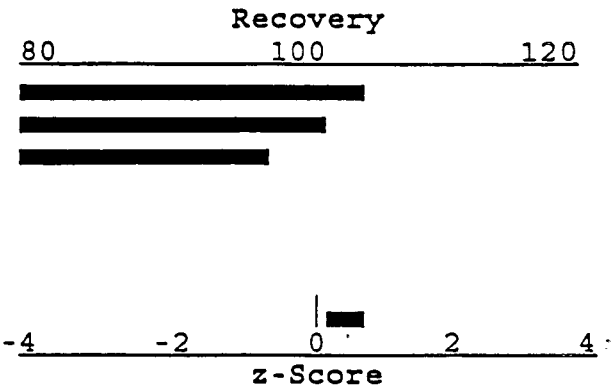
Comment:

Customer Code: 8254 April 1994 Page: 5

Standard: Nutrients

Parameter: Nitrate Nitrogen as N mg/L Level 1

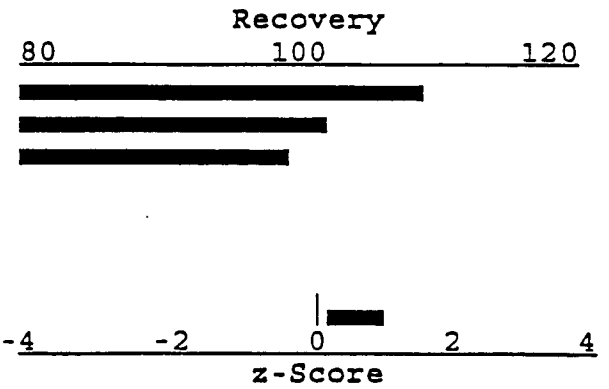
Your Result:	0.984
Reference Value:	0.962
Mean of Reporting Laboratories:	0.926
Actual Standard Deviation:	0.097
Number Reporting:	52
Average % Recovery:	96.210
Your % Recovery:	102.287
Deviation from Mean - z Score:	0.600



Comment:

Parameter: Nitrate Nitrogen as N mg/L Level 2

Your Result:	8.505
Reference Value:	8.005
Mean of Reporting Laboratories:	7.812
Actual Standard Deviation:	0.821
Number Reporting:	52
Average % Recovery:	97.594
Your % Recovery:	106.246
Deviation from Mean - z Score:	0.843



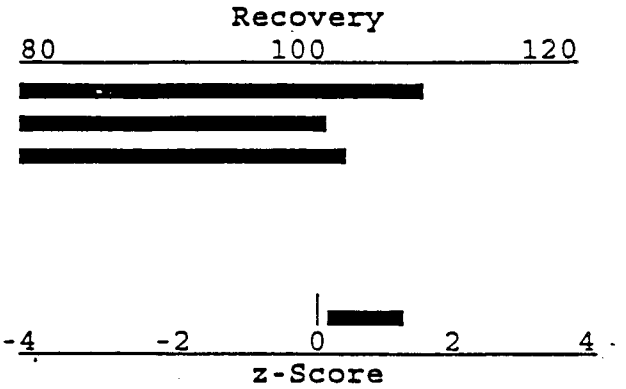
Comment:

Customer Code: 8254 April 1994 Page: 6

Standard: Nutrients

Parameter: Orthophosphate as P mg/L Level 1

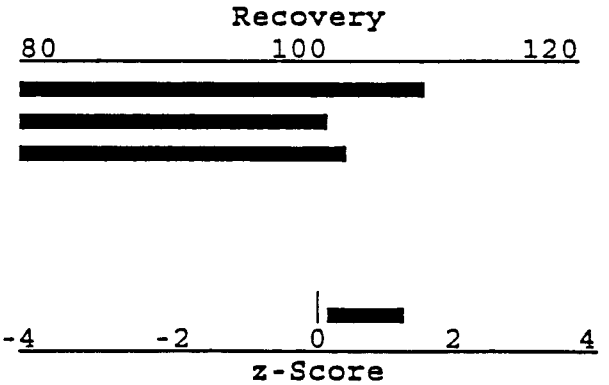
Your Result:	0.43
Reference Value:	0.404
Mean of Reporting Laboratories:	0.407
Actual Standard Deviation:	0.020
Number Reporting:	44
Average % Recovery:	100.628
Your % Recovery:	106.436
Deviation from Mean - z Score:	1.185



Comment:

Parameter: Orthophosphate as P mg/L Level 2

Your Result:	9.59
Reference Value:	9.027
Mean of Reporting Laboratories:	9.093
Actual Standard Deviation:	0.408
Number Reporting:	43
Average % Recovery:	100.735
Your % Recovery:	106.237
Deviation from Mean - z Score:	1.216



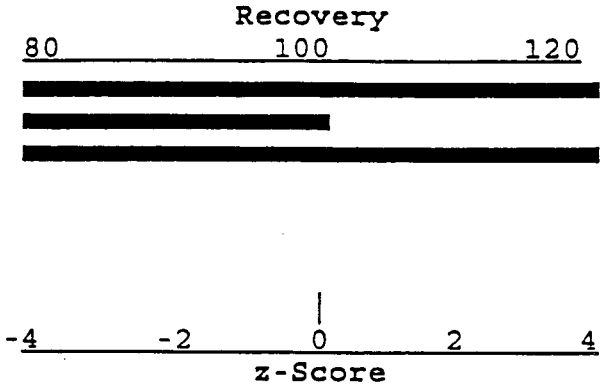
Comment:

Customer Code: 8254 April 1994 Page: 7

Standard: Nutrients

Parameter: Total Kjeldahl Nitrogen mg/L Level 1

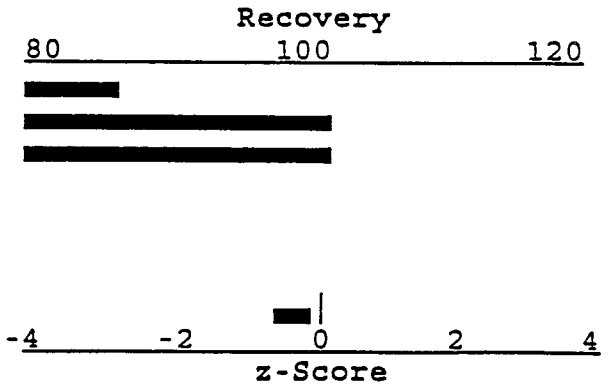
Your Result:	0.420
Reference Value:	0.356
Mean of Reporting Laboratories:	0.449
Actual Standard Deviation:	0.175
Number Reporting:	44
Average % Recovery:	126.138
Your % Recovery:	117.978
Deviation from Mean - z Score:	0.166



Comment:

Parameter: Total Kjeldahl Nitrogen mg/L Level 2

Your Result:	2.184
Reference Value:	2.529
Mean of Reporting Laboratories:	2.520
Actual Standard Deviation:	0.469
Number Reporting:	47
Average % Recovery:	99.660
Your % Recovery:	86.358
Deviation from Mean - z Score:	0.718



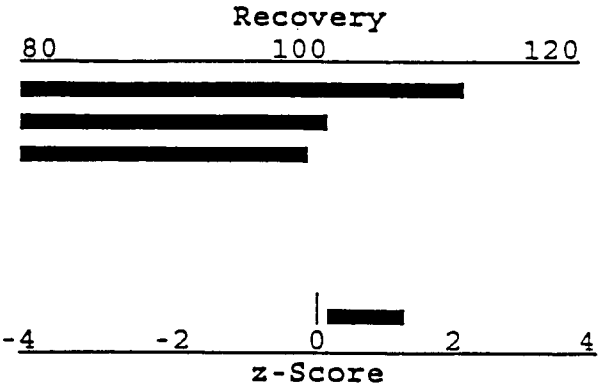
Comment:

Customer Code: 8254 April 1994 Page: 8

Standard: Nutrients

Parameter: Total Phosphorus as P mg/L Level 1

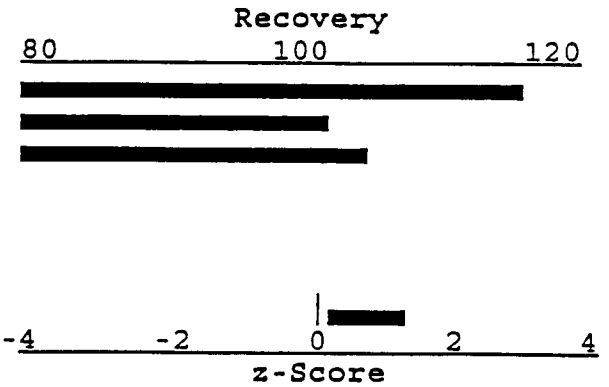
Your Result:	0.44
Reference Value:	0.403
Mean of Reporting Laboratories:	0.396
Actual Standard Deviation:	0.038
Number Reporting:	60
Average % Recovery:	98.193
Your % Recovery:	109.181
Deviation from Mean - z Score:	1.178



Comment:

Parameter: Total Phosphorus as P mg/L Level 2

Your Result:	3.65
Reference Value:	3.261
Mean of Reporting Laboratories:	3.346
Actual Standard Deviation:	0.231
Number Reporting:	58
Average % Recovery:	102.610
Your % Recovery:	111.929
Deviation from Mean - z Score:	1.314



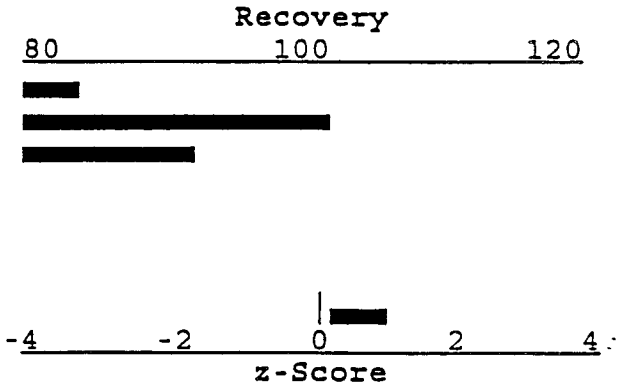
Comment:

Customer Code: 8254 April 1994 Page: 9

Standard: Solids

Parameter: Total Suspended Solids mg/L Level 1

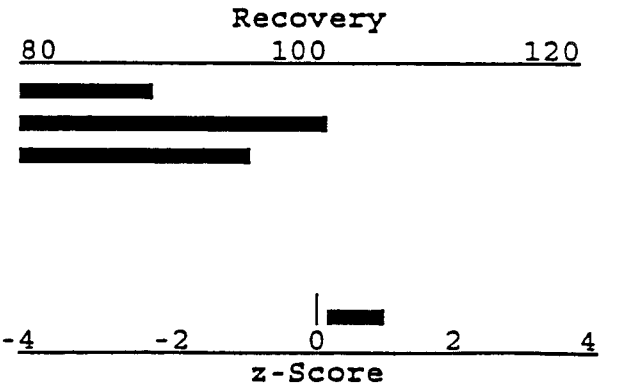
Your Result:	77
Reference Value:	92.400
Relative Error % :	8.625
Relative Deviation % :	8.405
Number Reporting:	157
Average % Recovery:	91.375
Your % Recovery:	83.333
Deviation from Mean - z Score:	0.957



Comment:

Parameter: Total Suspended Solids mg/L Level 2

Your Result:	289
Reference Value:	323.900
Relative Error % :	5.389
Relative Deviation % :	5.032
Number Reporting:	143
Average % Recovery:	94.611
Your % Recovery:	89.225
Deviation from Mean - z Score:	1.070



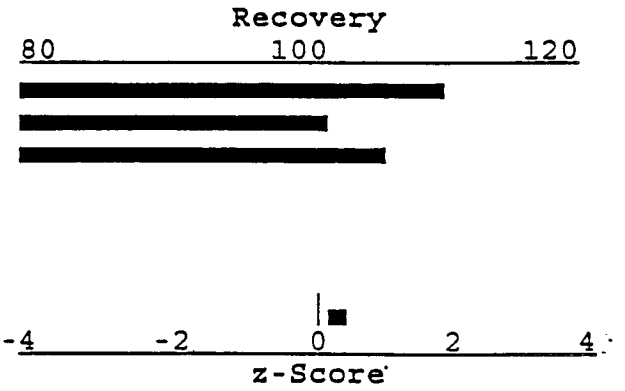
Comment:

Customer Code: 8254 April 1994 Page: 10

Standard: Solids

Parameter: Total Dissolved Solids mg/L Level 1

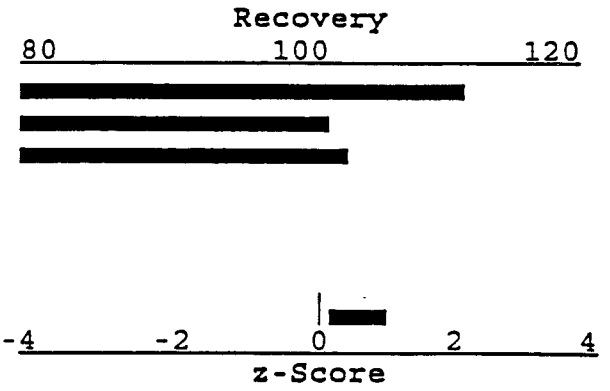
Your Result:	194
Reference Value:	180.200
Relative Error % :	3.948
Relative Deviation % :	10.618
Number Reporting:	63
Average % Recovery:	103.948
Your % Recovery:	107.658
Deviation from Mean - z Score:	0.349



Comment:

Parameter: Total Dissolved Solids mg/L Level 2

Your Result:	336
Reference Value:	309.400
Relative Error % :	1.095
Relative Deviation % :	7.806
Number Reporting:	64
Average % Recovery:	101.095
Your % Recovery:	108.597
Deviation from Mean - z Score:	0.961



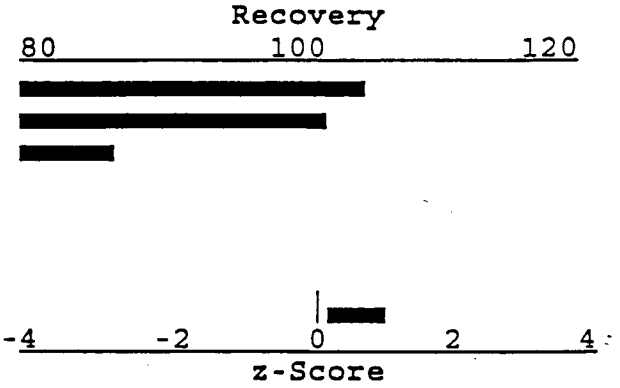
Comment:

Customer Code: 8254 April 1994 Page: 11

Standard: Oil & Grease

Parameter: Oil & Grease mg/L Level 1

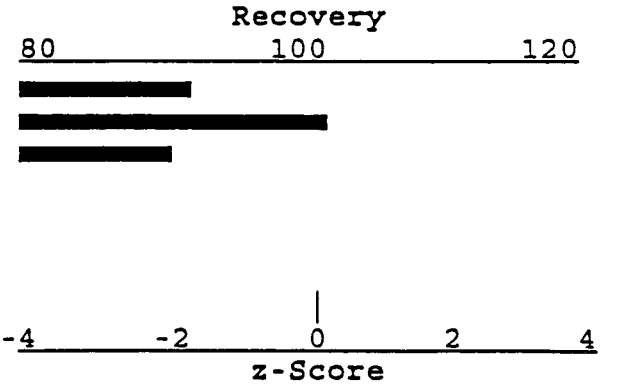
Your Result:	19.5
Reference Value:	18.992
Mean of Reporting Laboratories:	16.470
Actual Standard Deviation:	2.971
Number Reporting:	82
Average % Recovery:	86.722
Your % Recovery:	102.675
Deviation from Mean - z Score:	1.020



Comment:

Parameter: Oil & Grease mg/L Level 2

Your Result:	30.1
Reference Value:	33.100
Mean of Reporting Laboratories:	29.710
Actual Standard Deviation:	4.307
Number Reporting:	79
Average % Recovery:	89.759
Your % Recovery:	90.937
Deviation from Mean - z Score:	0.090



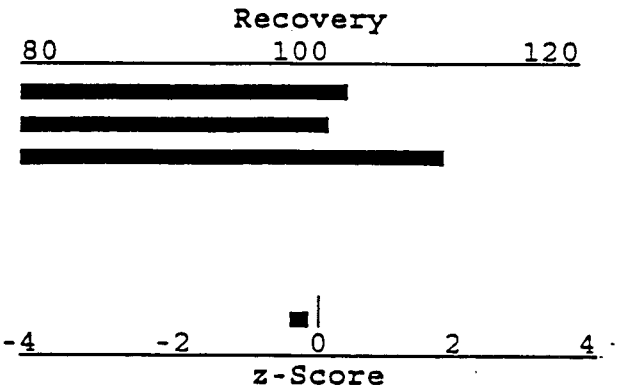
Comment:

Customer Code: 8254 April 1994 Page: 12

Standard: Minerals

Parameter: Alkalinity as CaCO3 mg/L Level 1

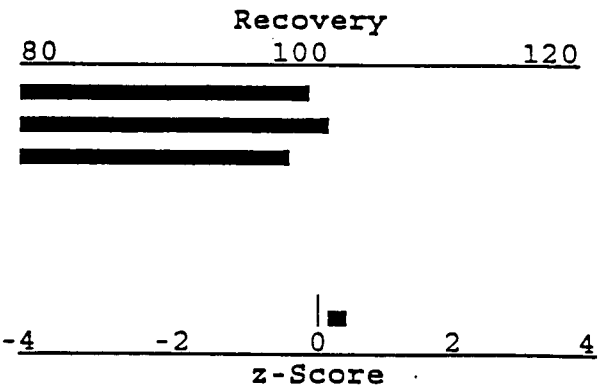
Your Result:	11
Reference Value:	10.920
Mean of Reporting Laboratories:	11.798
Actual Standard Deviation:	1.648
Number Reporting:	53
Average % Recovery:	108.045
Your % Recovery:	100.733
Deviation from Mean - z Score:	0.485



Comment:

Parameter: Alkalinity as CaCO3 mg/L Level 2

Your Result:	132
Reference Value:	134.380
Mean of Reporting Laboratories:	131.352
Actual Standard Deviation:	3.745
Number Reporting:	46
Average % Recovery:	97.746
Your % Recovery:	98.229
Deviation from Mean - z Score:	0.173



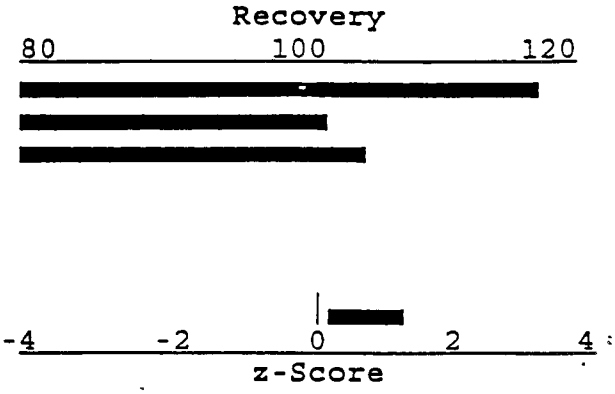
Comment:

Customer Code: 8254 April 1994 Page: 13

Standard: Minerals

Parameter: Calcium mg/L Level 1

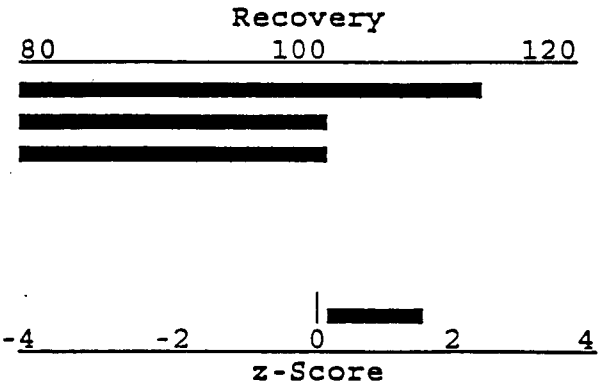
Your Result:	17.1
Reference Value:	15.030
Mean of Reporting Laboratories:	15.447
Actual Standard Deviation:	1.316
Number Reporting:	45
Average % Recovery:	102.772
Your % Recovery:	113.772
Deviation from Mean - z Score:	1.256



Comment:

Parameter: Calcium mg/L Level 2

Your Result:	61.2
Reference Value:	55.360
Mean of Reporting Laboratories:	55.206
Actual Standard Deviation:	3.649
Number Reporting:	42
Average % Recovery:	99.722
Your % Recovery:	110.549
Deviation from Mean - z Score:	1.643



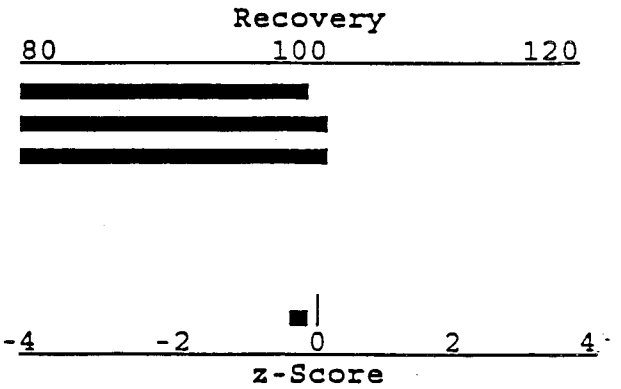
Comment:

Customer Code: 8254 April 1994 Page: 14

Standard: Minerals

Parameter: Chloride mg/L Level 1

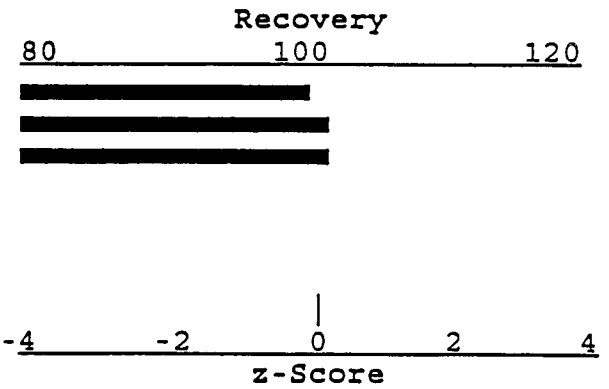
Your Result:	145.7
Reference Value:	148.190
Mean of Reporting Laboratories:	148.360
Actual Standard Deviation:	7.947
Number Reporting:	62
Average % Recovery:	100.115
Your % Recovery:	98.320
Deviation from Mean - z Score:	0.335



Comment:

Parameter: Chloride mg/L Level 2

Your Result:	112.5
Reference Value:	113.640
Mean of Reporting Laboratories:	113.015
Actual Standard Deviation:	5.705
Number Reporting:	62
Average % Recovery:	99.450
Your % Recovery:	98.997
Deviation from Mean - z Score:	0.090



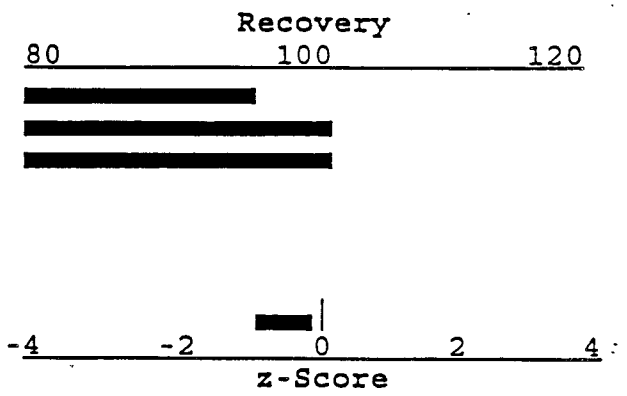
Comment:

Customer Code: 8254 April 1994 Page: 15

Standard: Minerals

Parameter: Conductivity umho/cm umhos/cm Level 1

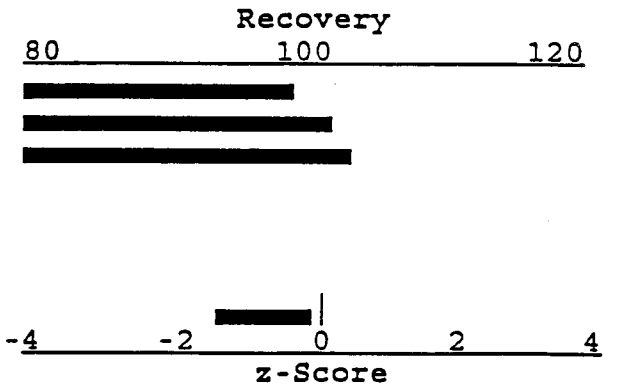
Your Result:	570
Reference Value:	596.330
Mean of Reporting Laboratories:	596.201
Actual Standard Deviation:	22.571
Number Reporting:	58
Average % Recovery:	99.978
Your % Recovery:	95.585
Deviation from Mean - z Score:	1.161



Comment:

Parameter: Conductivity umho/cm umhos/cm Level 2

Your Result:	777
Reference Value:	797.670
Mean of Reporting Laboratories:	811.964
Actual Standard Deviation:	21.155
Number Reporting:	55
Average % Recovery:	101.792
Your % Recovery:	97.409
Deviation from Mean - z Score:	1.653



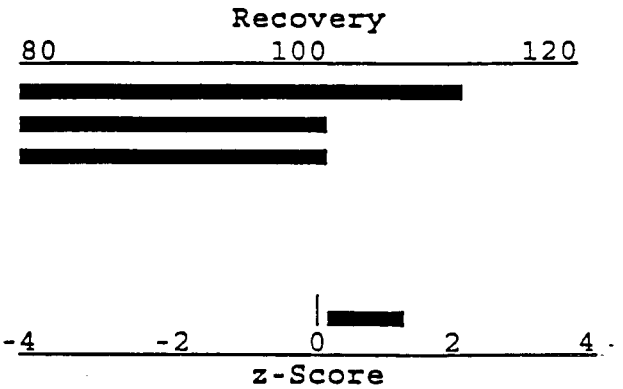
Comment:

Customer Code: 8254 April 1994 Page: 16

Standard: Minerals

Parameter: Magnesium mg/L Level 1

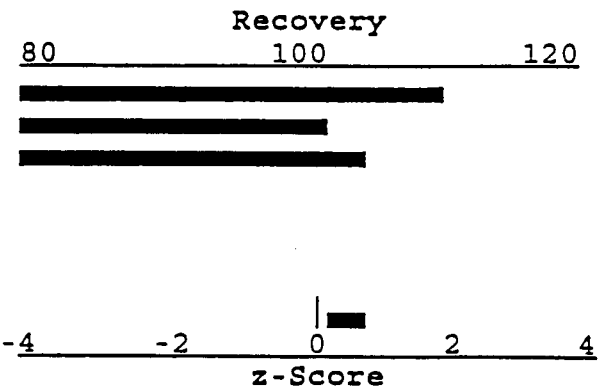
Your Result:	13.1
Reference Value:	12.110
Mean of Reporting Laboratories:	12.042
Actual Standard Deviation:	0.781
Number Reporting:	40
Average % Recovery:	99.443
Your % Recovery:	108.175
Deviation from Mean - z Score:	1.355



Comment:

Parameter: Magnesium mg/L Level 2

Your Result:	1.23
Reference Value:	1.150
Mean of Reporting Laboratories:	1.176
Actual Standard Deviation:	0.077
Number Reporting:	40
Average % Recovery:	102.285
Your % Recovery:	106.957
Deviation from Mean - z Score:	0.698



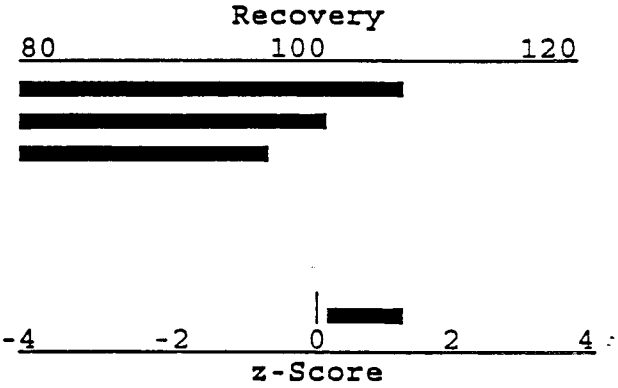
Comment:

Customer Code: 8254 April 1994 Page: 17

Standard: Minerals

Parameter: Potassium mg/L Level 1

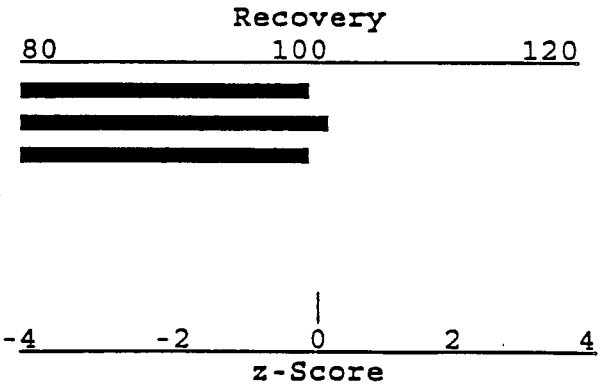
Your Result:	100
Reference Value:	95.260
Mean of Reporting Laboratories:	92.068
Actual Standard Deviation:	5.789
Number Reporting:	40
Average % Recovery:	96.649
Your % Recovery:	104.976
Deviation from Mean - z Score:	1.370



Comment:

Parameter: Potassium mg/L Level 2

Your Result:	12.9
Reference Value:	13.060
Mean of Reporting Laboratories:	12.896
Actual Standard Deviation:	0.772
Number Reporting:	41
Average % Recovery:	98.745
Your % Recovery:	98.775
Deviation from Mean - z Score:	0.005



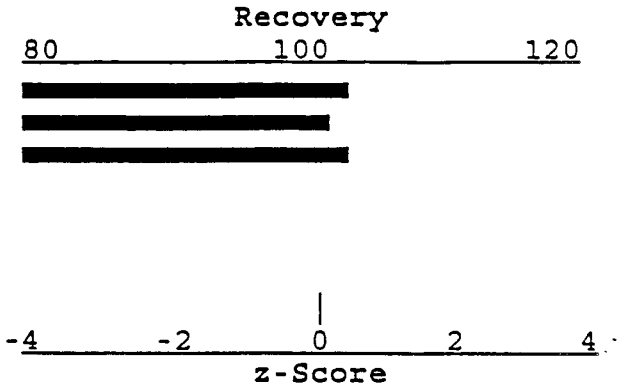
Comment:

Customer Code: 8254 April 1994 Page: 18

Standard: Minerals

Parameter: Sodium mg/L Level 1

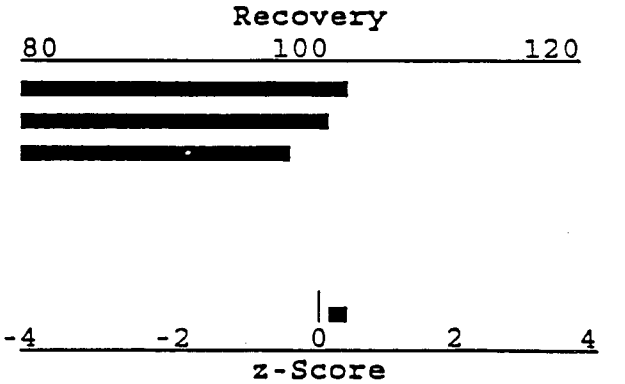
Your Result:	10.2
Reference Value:	10.030
Mean of Reporting Laboratories:	10.188
Actual Standard Deviation:	0.730
Number Reporting:	46
Average % Recovery:	101.578
Your % Recovery:	101.695
Deviation from Mean - z Score:	0.016



Comment:

Parameter: Sodium mg/L Level 2

Your Result:	107
Reference Value:	106.240
Mean of Reporting Laboratories:	103.275
Actual Standard Deviation:	8.524
Number Reporting:	49
Average % Recovery:	97.210
Your % Recovery:	100.715
Deviation from Mean - z Score:	0.437



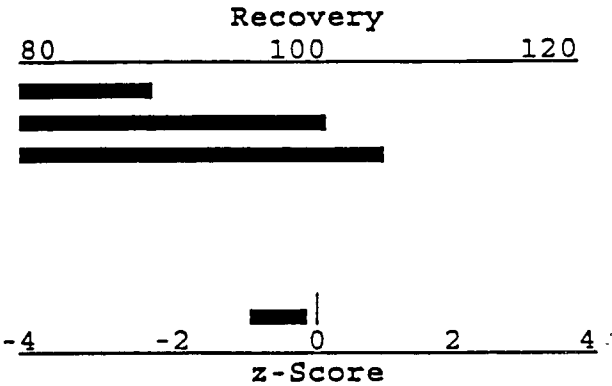
Comment:

Customer Code: 8254 April 1994 Page: 19

Standard: Minerals

Parameter: Sulfate mg/L Level 1

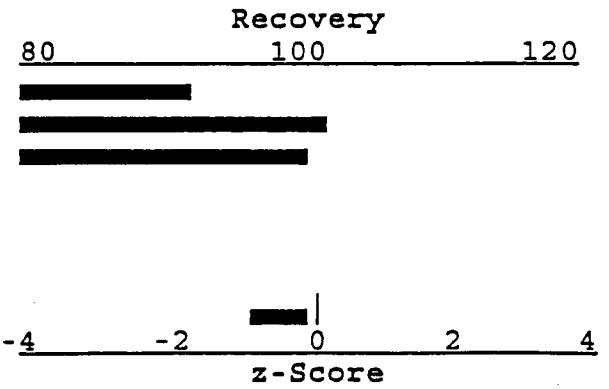
Your Result:	9.1
Reference Value:	10.250
Mean of Reporting Laboratories:	10.651
Actual Standard Deviation:	1.342
Number Reporting:	52
Average % Recovery:	103.910
Your % Recovery:	88.780
Deviation from Mean - z Score:	1.156



Comment:

Parameter: Sulfate mg/L Level 2

Your Result:	84.6
Reference Value:	93.160
Mean of Reporting Laboratories:	92.303
Actual Standard Deviation:	7.327
Number Reporting:	51
Average % Recovery:	99.080
Your % Recovery:	90.812
Deviation from Mean - z Score:	1.051



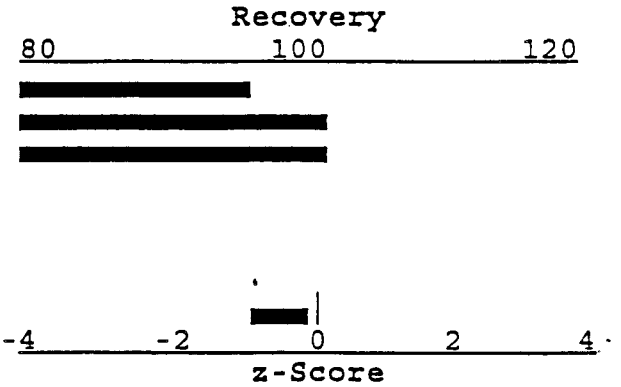
Comment:

Customer Code: 8254 April 1994 Page: 20

Standard: Minerals

Parameter: Total Hardness as CaCO3 mg/L Level 1

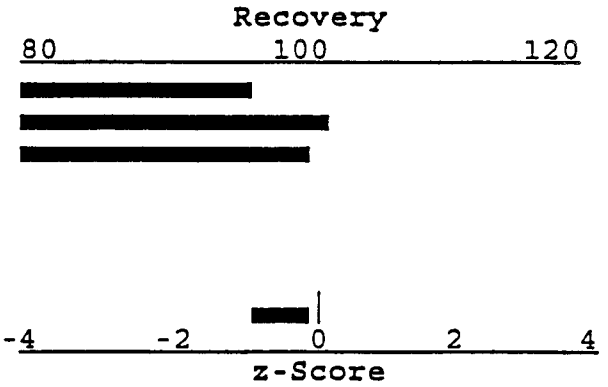
Your Result:	83
Reference Value:	87.410
Mean of Reporting Laboratories:	87.361
Actual Standard Deviation:	4.102
Number Reporting:	52
Average % Recovery:	99.943
Your % Recovery:	94.955
Deviation from Mean - z Score:	1.063



Comment:

Parameter: Total Hardness as CaCO3 mg/L Level 2

Your Result:	135
Reference Value:	142.980
Mean of Reporting Laboratories:	141.400
Actual Standard Deviation:	5.659
Number Reporting:	49
Average % Recovery:	98.895
Your % Recovery:	94.419
Deviation from Mean - z Score:	1.131



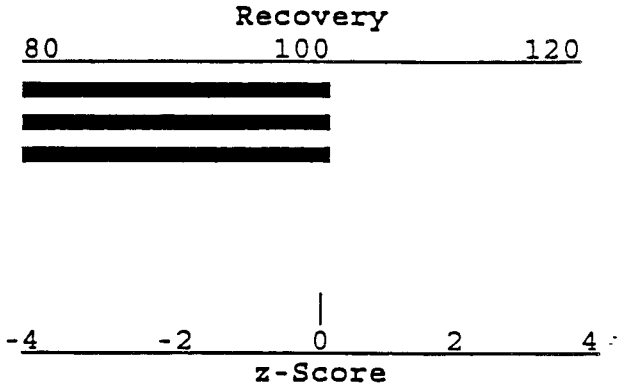
Comment:

Customer Code: 8254 April 1994 Page: 21

Standard: pH

Parameter: pH Units Level 1

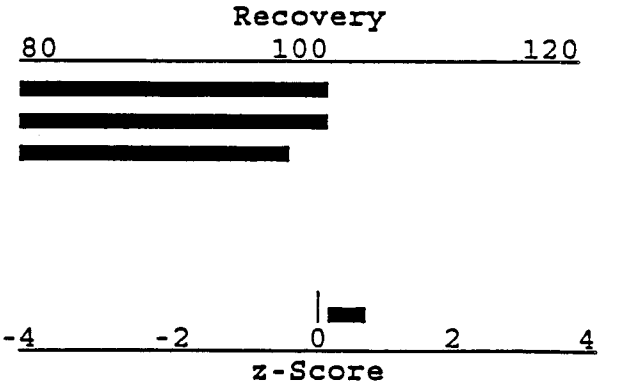
Your Result:	2.99
Reference Value:	3.001
Mean of Reporting Laboratories:	2.988
Actual Standard Deviation:	0.104
Number Reporting:	154
Average % Recovery:	99.558
Your % Recovery:	99.633
Deviation from Mean - z Score:	0.022



Comment:

Parameter: pH Units Level 2

Your Result:	9.06
Reference Value:	9.046
Mean of Reporting Laboratories:	8.871
Actual Standard Deviation:	0.233
Number Reporting:	152
Average % Recovery:	98.067
Your % Recovery:	100.155
Deviation from Mean - z Score:	0.810



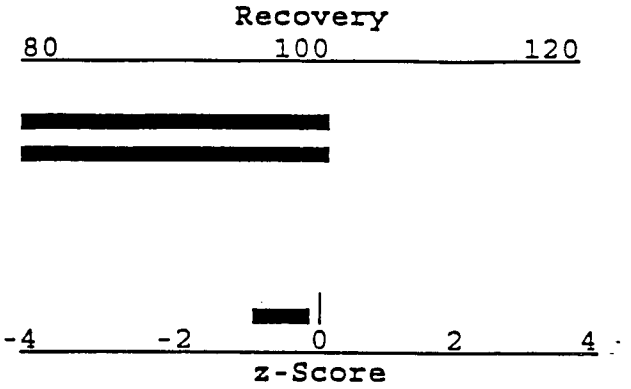
Comment:

Customer Code: 8254 April 1994 Page: 22

Standard: Trace Metals

Parameter: Aluminum ug/L Level 1

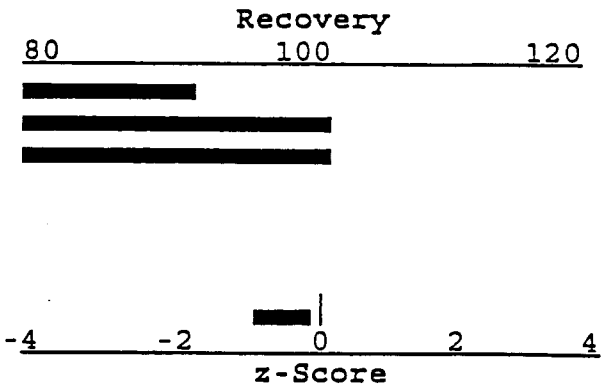
Your Result:	41.5
Reference Value:	54.670
Mean of Reporting Laboratories:	54.845
Actual Standard Deviation:	12.201
Number Reporting:	46
Average % Recovery:	100.321
Your % Recovery:	75.910
Deviation from Mean - z Score:	1.094



Comment:

Parameter: Aluminum ug/L Level 2

Your Result:	310
Reference Value:	341.680
Mean of Reporting Laboratories:	339.824
Actual Standard Deviation:	31.025
Number Reporting:	52
Average % Recovery:	99.457
Your % Recovery:	90.728
Deviation from Mean - z Score:	0.961



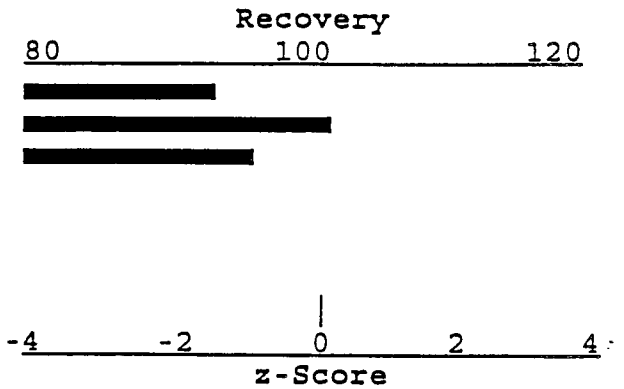
Comment:

Customer Code: 8254 April 1994 Page: 23

Standard: Trace Metals

Parameter: Antimony ug/L Level 1

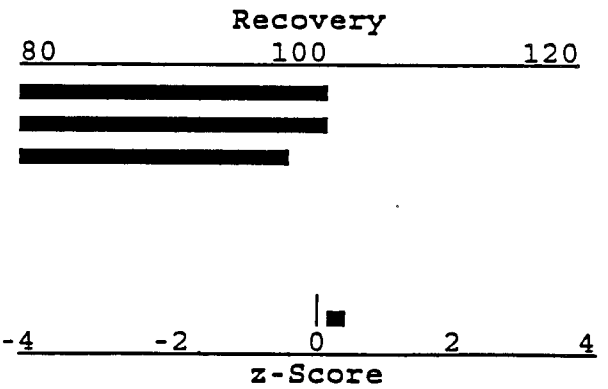
Your Result:	269
Reference Value:	289.160
Mean of Reporting Laboratories:	273.115
Actual Standard Deviation:	27.562
Number Reporting:	43
Average % Recovery:	94.451
Your % Recovery:	93.028
Deviation from Mean - z Score:	0.149



Comment:

Parameter: Antimony ug/L Level 2

Your Result:	1140
Reference Value:	1144.600
Mean of Reporting Laboratories:	1109.476
Actual Standard Deviation:	87.955
Number Reporting:	45
Average % Recovery:	96.931
Your % Recovery:	99.598
Deviation from Mean - z Score:	0.347



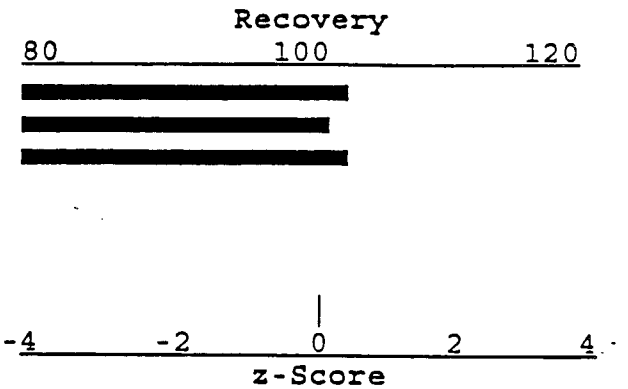
Comment:

Customer Code: 8254 April 1994 Page: 24

Standard: Trace Metals

Parameter: Arsenic ug/L Level 1

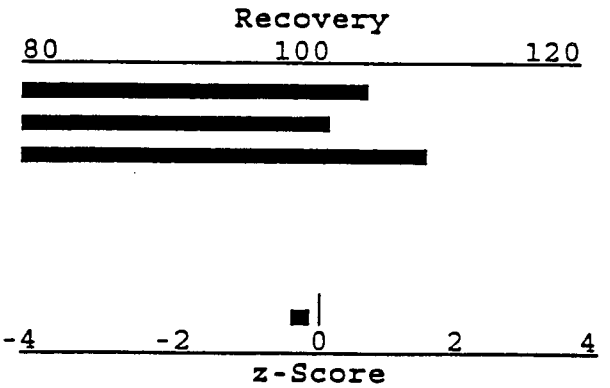
Your Result:	62.9
Reference Value:	61.960
Mean of Reporting Laboratories:	63.058
Actual Standard Deviation:	6.720
Number Reporting:	52
Average % Recovery:	101.773
Your % Recovery:	101.517
Deviation from Mean - z Score:	0.024



Comment:

Parameter: Arsenic ug/L Level 2

Your Result:	104
Reference Value:	101.620
Mean of Reporting Laboratories:	107.571
Actual Standard Deviation:	10.271
Number Reporting:	52
Average % Recovery:	105.857
Your % Recovery:	102.342
Deviation from Mean - z Score:	0.348

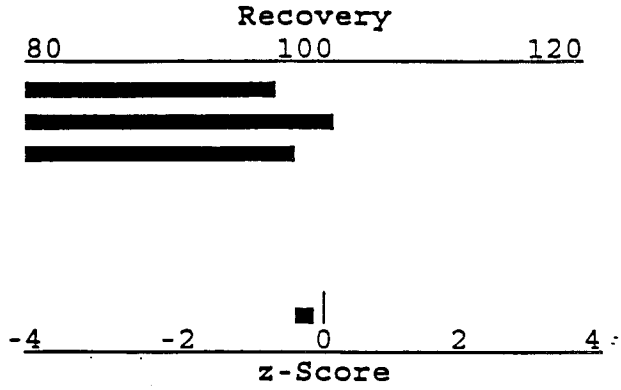


Comment:

Customer Code: 8254 April 1994 Page: 25

Standard: Trace Metals

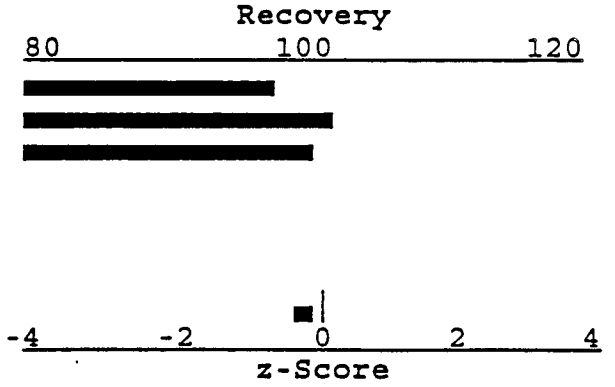
Parameter: Barium ug/L Level 1



Your Result:	928
Reference Value:	966.200
Mean of Reporting Laboratories:	943.040
Actual Standard Deviation:	46.911
Number Reporting:	47
Average % Recovery:	97.603
Your % Recovery:	96.046
Deviation from Mean - z Score:	0.321

Comment:

Parameter: Barium ug/L Level 2



Your Result:	1940
Reference Value:	2003.590
Mean of Reporting Laboratories:	1987.942
Actual Standard Deviation:	98.002
Number Reporting:	51
Average % Recovery:	99.219
Your % Recovery:	96.826
Deviation from Mean - z Score:	0.489

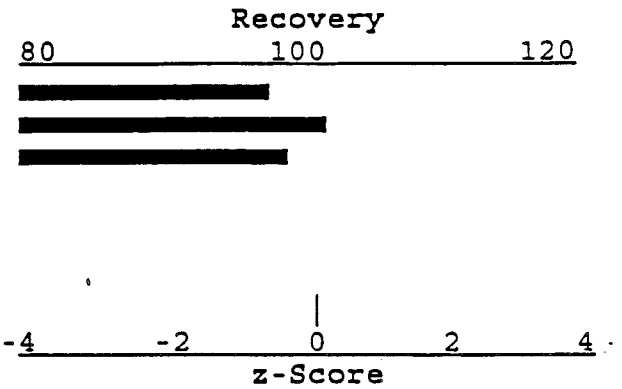
Comment:

Customer Code: 8254 April 1994 Page: 26

Standard: Trace Metals

Parameter: Beryllium ug/L Level 1

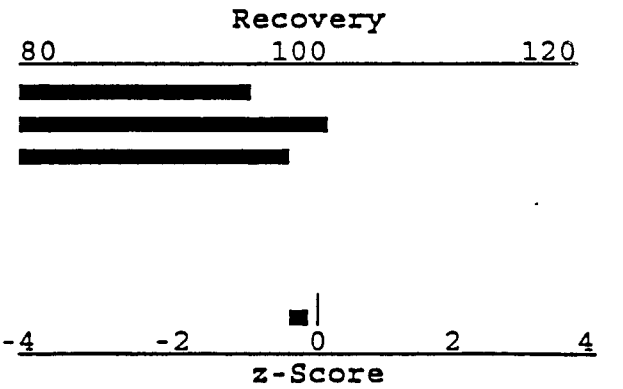
Your Result:	11.3
Reference Value:	11.700
Mean of Reporting Laboratories:	11.450
Actual Standard Deviation:	1.203
Number Reporting:	48
Average % Recovery:	97.865
Your % Recovery:	96.581
Deviation from Mean - z Score:	0.125



Comment:

Parameter: Beryllium ug/L Level 2

Your Result:	354
Reference Value:	371.110
Mean of Reporting Laboratories:	361.555
Actual Standard Deviation:	17.361
Number Reporting:	53
Average % Recovery:	97.425
Your % Recovery:	95.390
Deviation from Mean - z Score:	0.435



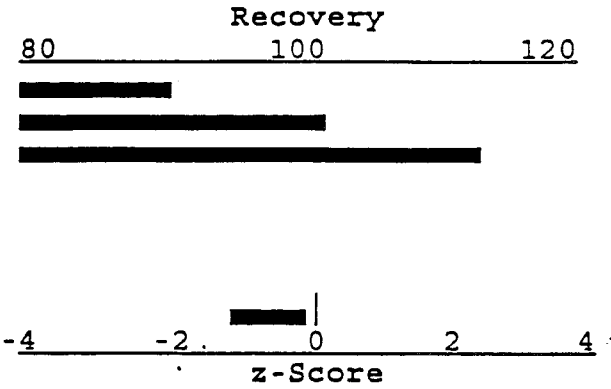
Comment:

Customer Code: 8254 April 1994 Page: 27

Standard: Trace Metals

Parameter: Boron ug/L Level 1

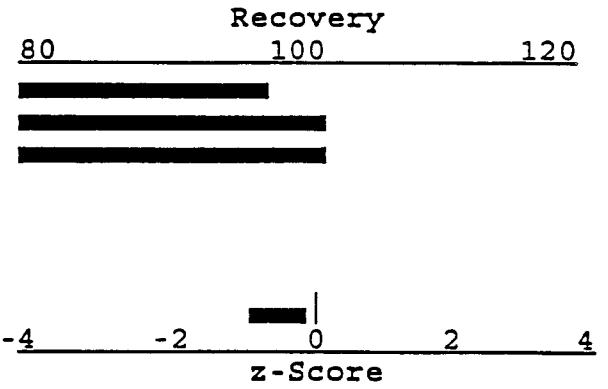
Your Result:	20.1
Reference Value:	22.270
Mean of Reporting Laboratories:	24.474
Actual Standard Deviation:	3.366
Number Reporting:	19
Average % Recovery:	109.895
Your % Recovery:	90.256
Deviation from Mean - z Score:	1.299



Comment:

Parameter: Boron ug/L Level 2

Your Result:	548
Reference Value:	570.690
Mean of Reporting Laboratories:	568.224
Actual Standard Deviation:	21.992
Number Reporting:	29
Average % Recovery:	99.568
Your % Recovery:	96.024
Deviation from Mean - z Score:	0.920



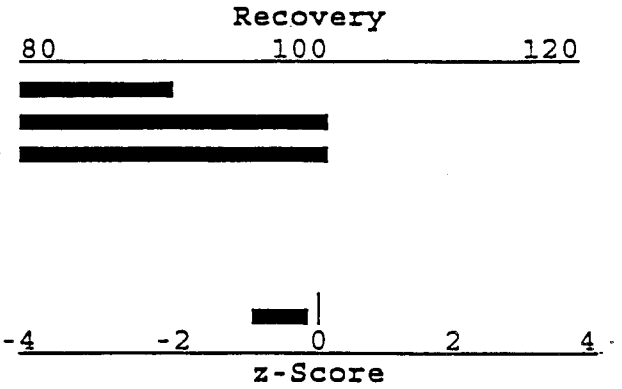
Comment:

Customer Code: 8254 April 1994 Page: 28

Standard: Trace Metals

Parameter: Cadmium ug/L Level 1

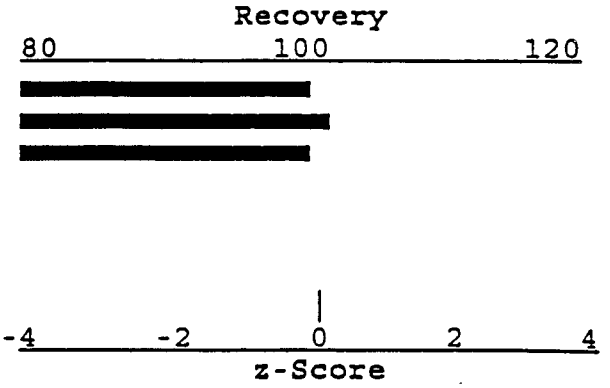
Your Result:	11.0
Reference Value:	12.150
Mean of Reporting Laboratories:	12.151
Actual Standard Deviation:	1.245
Number Reporting:	57
Average % Recovery:	100.010
Your % Recovery:	90.535
Deviation from Mean - z Score:	0.924



Comment:

Parameter: Cadmium ug/L Level 2

Your Result:	287
Reference Value:	291.710
Mean of Reporting Laboratories:	288.527
Actual Standard Deviation:	10.637
Number Reporting:	64
Average % Recovery:	98.909
Your % Recovery:	98.385
Deviation from Mean - z Score:	0.144



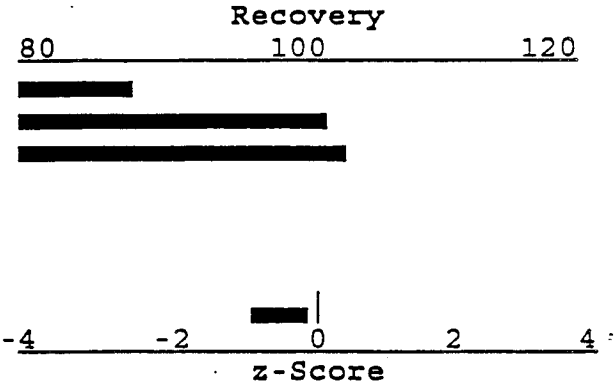
Comment:

Customer Code: 8254 April 1994 Page: 29

Standard: Trace Metals

Parameter: Chromium ug/L Level 1

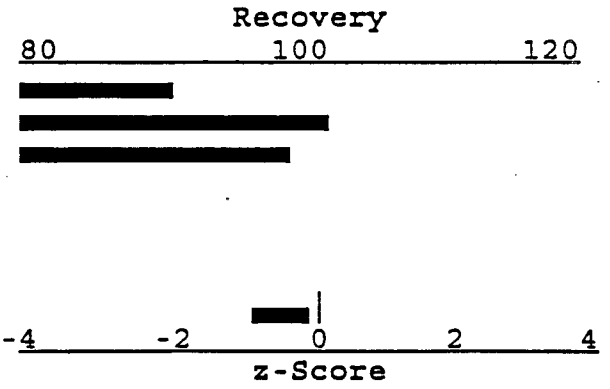
Your Result:	65.2
Reference Value:	74.210
Mean of Reporting Laboratories:	74.676
Actual Standard Deviation:	8.709
Number Reporting:	71
Average % Recovery:	100.628
Your % Recovery:	87.859
Deviation from Mean - z Score:	1.088



Comment:

Parameter: Chromium ug/L Level 2

Your Result:	142
Reference Value:	157.690
Mean of Reporting Laboratories:	154.592
Actual Standard Deviation:	11.663
Number Reporting:	71
Average % Recovery:	98.036
Your % Recovery:	90.050
Deviation from Mean - z Score:	1.080



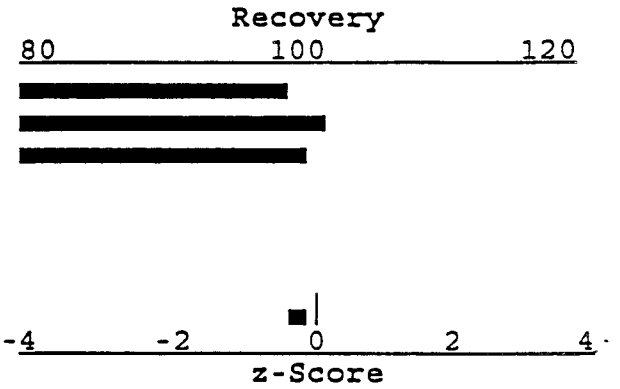
Comment:

Customer Code: 8254 April 1994 Page: 30

Standard: Trace Metals

Parameter: Cobalt ug/L Level 1

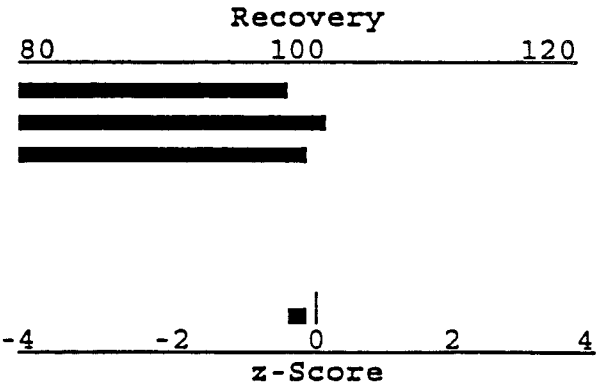
Your Result:	107
Reference Value:	110.400
Mean of Reporting Laboratories:	109.068
Actual Standard Deviation:	7.599
Number Reporting:	44
Average % Recovery:	98.794
Your % Recovery:	96.920
Deviation from Mean - z Score:	0.272



Comment:

Parameter: Cobalt ug/L Level 2

Your Result:	284
Reference Value:	291.330
Mean of Reporting Laboratories:	288.496
Actual Standard Deviation:	16.253
Number Reporting:	44
Average % Recovery:	99.027
Your % Recovery:	97.484
Deviation from Mean - z Score:	0.277



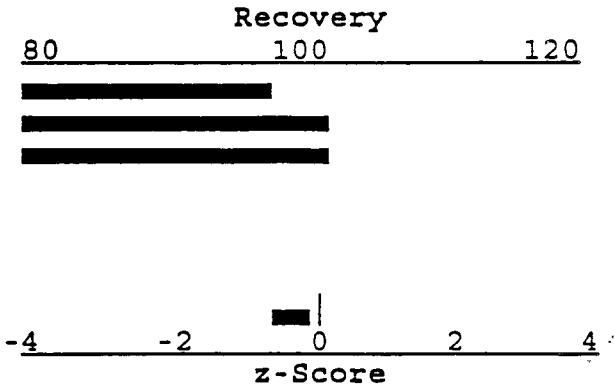
Comment:

Customer Code: 8254 April 1994 Page: 31

Standard: Trace Metals

Parameter: Copper ug/L Level 1

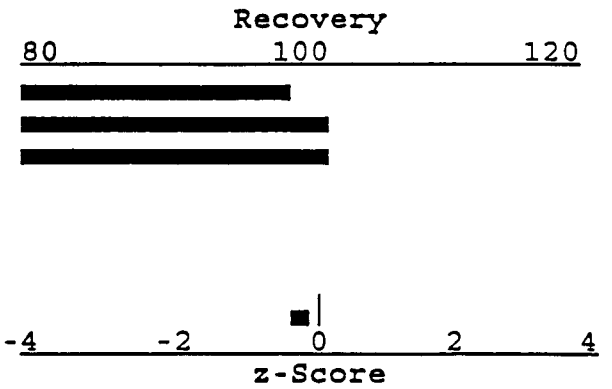
Your Result:	91.8
Reference Value:	96.000
Mean of Reporting Laboratories:	96.300
Actual Standard Deviation:	6.132
Number Reporting:	74
Average % Recovery:	100.312
Your % Recovery:	95.625
Deviation from Mean - z Score:	0.734



Comment:

Parameter: Copper ug/L Level 2

Your Result:	217
Reference Value:	222.320
Mean of Reporting Laboratories:	222.725
Actual Standard Deviation:	12.833
Number Reporting:	79
Average % Recovery:	100.182
Your % Recovery:	97.607
Deviation from Mean - z Score:	0.446



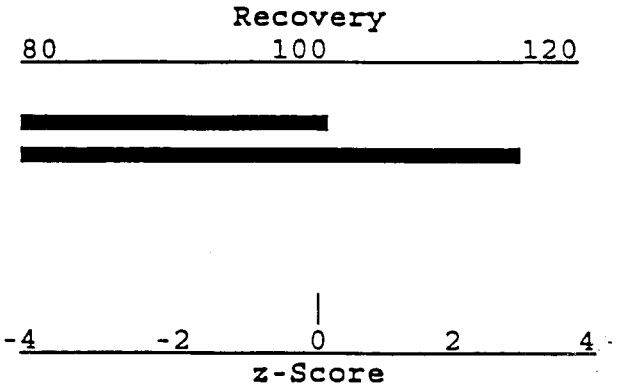
Comment:

Customer Code: 8254 April 1994 Page: 32

Standard: Trace Metals

Parameter: Iron ug/L Level 1

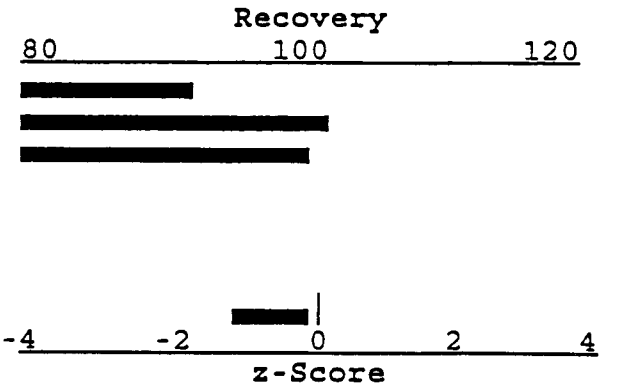
Your Result:	NR
Reference Value:	21.680
Mean of Reporting Laboratories:	24.448
Actual Standard Deviation:	4.705
Number Reporting:	52
Average % Recovery:	112.767
Your % Recovery:	
Deviation from Mean - z Score:	0.000



Comment: Unreported

Parameter: Iron ug/L Level 2

Your Result:	723
Reference Value:	791.140
Mean of Reporting Laboratories:	782.690
Actual Standard Deviation:	41.056
Number Reporting:	69
Average % Recovery:	98.932
Your % Recovery:	91.387
Deviation from Mean - z Score:	1.454



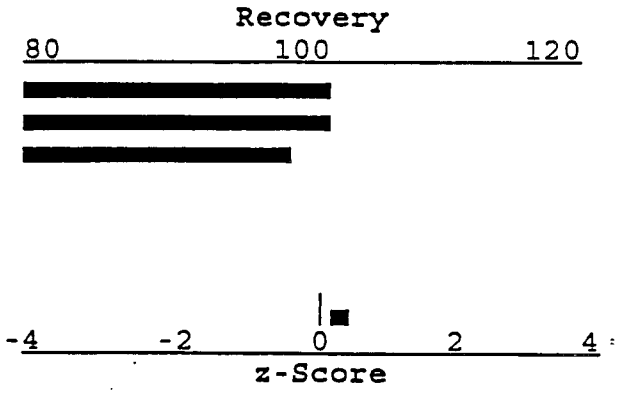
Comment:

Customer Code: 8254 April 1994 Page: 33

Standard: Trace Metals

Parameter: Lead ug/L Level 1

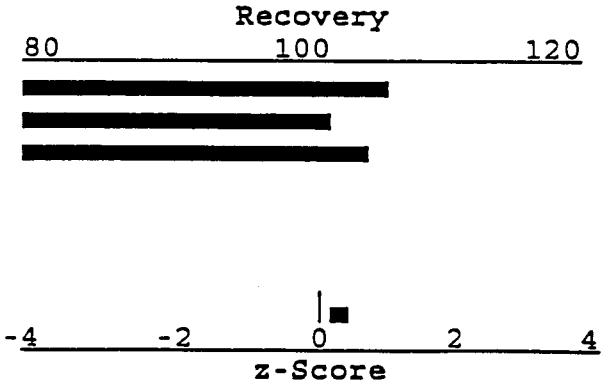
Your Result:	194
Reference Value:	194.900
Mean of Reporting Laboratories:	190.997
Actual Standard Deviation:	11.822
Number Reporting:	67
Average % Recovery:	97.997
Your % Recovery:	99.538
Deviation from Mean - z Score:	0.254



Comment:

Parameter: Lead ug/L Level 2

Your Result:	210
Reference Value:	203.450
Mean of Reporting Laboratories:	207.667
Actual Standard Deviation:	13.169
Number Reporting:	67
Average % Recovery:	102.073
Your % Recovery:	103.219
Deviation from Mean - z Score:	0.177



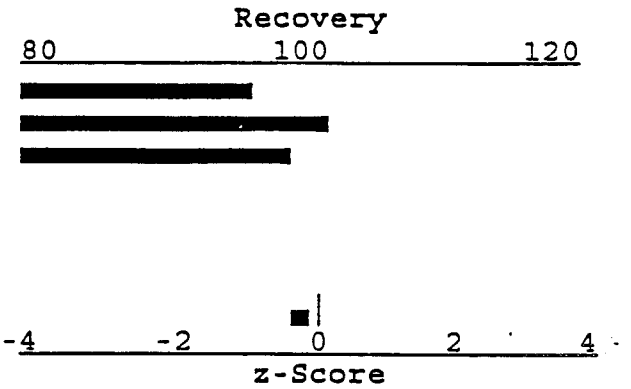
Comment:

Customer Code: 8254 April 1994 Page: 34

Standard: Trace Metals

Parameter: Manganese ug/L Level 1

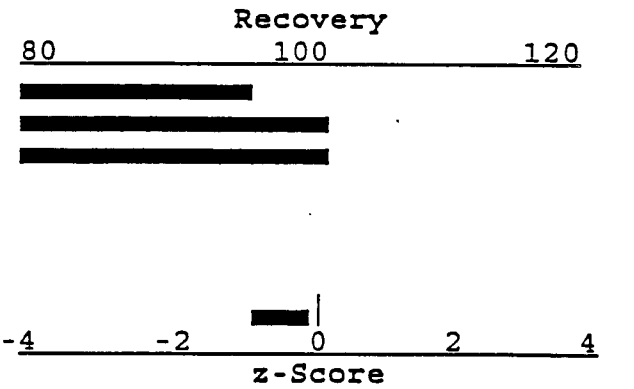
Your Result:	90.4
Reference Value:	95.070
Mean of Reporting Laboratories:	93.238
Actual Standard Deviation:	6.300
Number Reporting:	56
Average % Recovery:	98.072
Your % Recovery:	95.088
Deviation from Mean - z Score:	0.450



Comment:

Parameter: Manganese ug/L Level 2

Your Result:	101
Reference Value:	105.630
Mean of Reporting Laboratories:	105.751
Actual Standard Deviation:	4.629
Number Reporting:	56
Average % Recovery:	100.114
Your % Recovery:	95.617
Deviation from Mean - z Score:	1.026



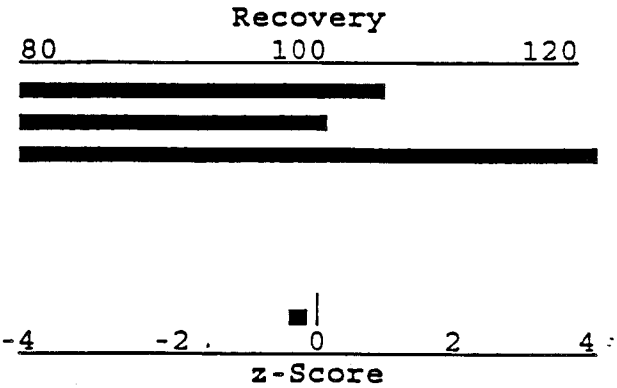
Comment:

Customer Code: 8254 April 1994 Page: 35

Standard: Trace Metals

Parameter: Mercury ug/L Level 1

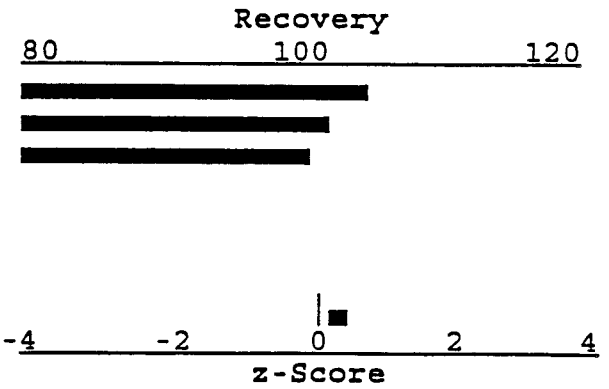
Your Result:	0.61
Reference Value:	0.590
Mean of Reporting Laboratories:	0.702
Actual Standard Deviation:	0.195
Number Reporting:	51
Average % Recovery:	119.056
Your % Recovery:	103.390
Deviation from Mean - z Score:	0.473



Comment:

Parameter: Mercury ug/L Level 2

Your Result:	4.99
Reference Value:	4.880
Mean of Reporting Laboratories:	4.827
Actual Standard Deviation:	0.466
Number Reporting:	49
Average % Recovery:	98.922
Your % Recovery:	102.254
Deviation from Mean - z Score:	0.349



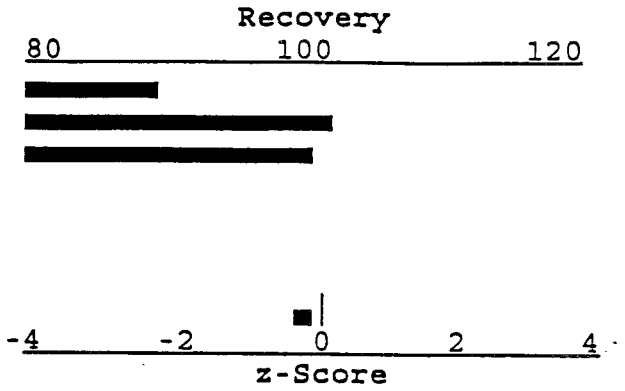
Comment:

Customer Code: 8254 April 1994 Page: 36

Standard: Trace Metals

Parameter: Molybdenum ug/L Level 1

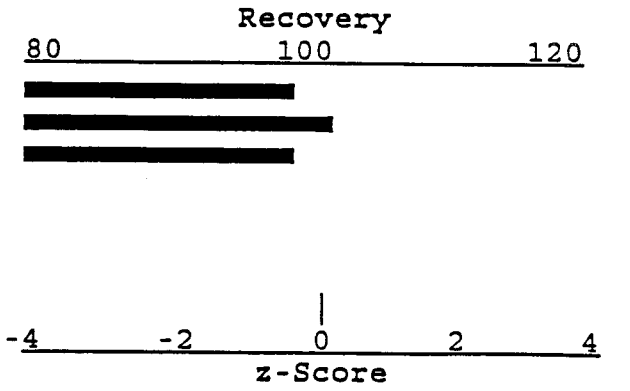
Your Result:	22.8
Reference Value:	25.590
Mean of Reporting Laboratories:	25.355
Actual Standard Deviation:	5.214
Number Reporting:	37
Average % Recovery:	99.083
Your % Recovery:	89.097
Deviation from Mean - z Score:	0.490



Comment:

Parameter: Molybdenum ug/L Level 2

Your Result:	208
Reference Value:	213.260
Mean of Reporting Laboratories:	207.906
Actual Standard Deviation:	13.657
Number Reporting:	40
Average % Recovery:	97.489
Your % Recovery:	97.534
Deviation from Mean - z Score:	0.007



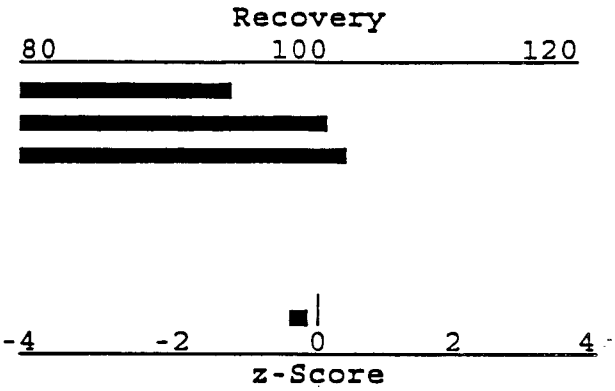
Comment:

Customer Code: 8254 April 1994 Page: 37

Standard: Trace Metals

Parameter: Nickel ug/L Level 1

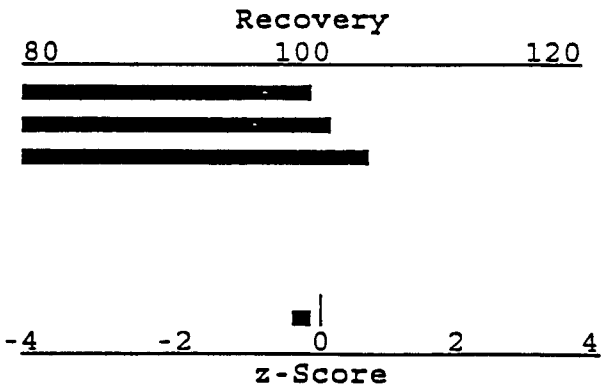
Your Result:	26.3
Reference Value:	27.930
Mean of Reporting Laboratories:	28.148
Actual Standard Deviation:	3.735
Number Reporting:	63
Average % Recovery:	100.782
Your % Recovery:	94.164
Deviation from Mean - z Score:	0.495



Comment:

Parameter: Nickel ug/L Level 2

Your Result:	118
Reference Value:	119.710
Mean of Reporting Laboratories:	122.679
Actual Standard Deviation:	9.492
Number Reporting:	72
Average % Recovery:	102.480
Your % Recovery:	98.572
Deviation from Mean - z Score:	0.493



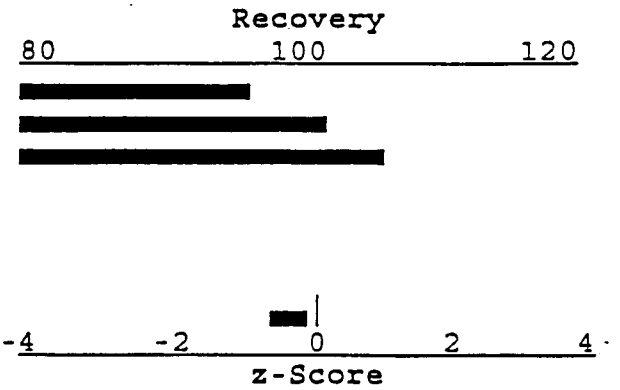
Comment:

Customer Code: 8254 April 1994 Page: 38

Standard: Trace Metals

Parameter: Selenium ug/L Level 1

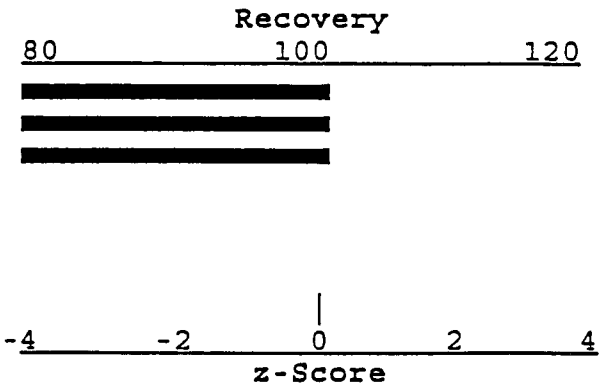
Your Result:	10.6
Reference Value:	11.170
Mean of Reporting Laboratories:	11.645
Actual Standard Deviation:	1.445
Number Reporting:	42
Average % Recovery:	104.250
Your % Recovery:	94.897
Deviation from Mean - z Score:	0.723



Comment:

Parameter: Selenium ug/L Level 2

Your Result:	112
Reference Value:	111.660
Mean of Reporting Laboratories:	111.012
Actual Standard Deviation:	14.973
Number Reporting:	52
Average % Recovery:	99.420
Your % Recovery:	100.304
Deviation from Mean - z Score:	0.066



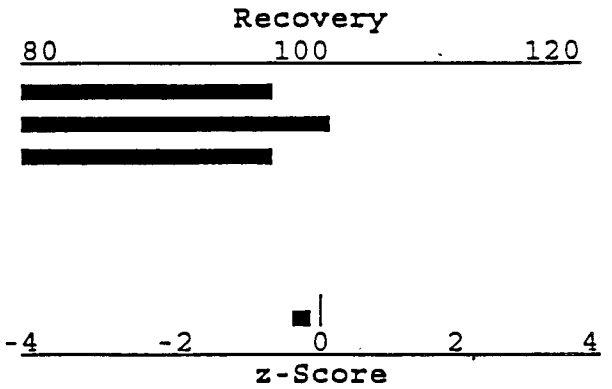
Comment:

Customer Code: 8254 April 1994 Page: 39

Standard: Trace Metals

Parameter: Silver ug/L Level 1

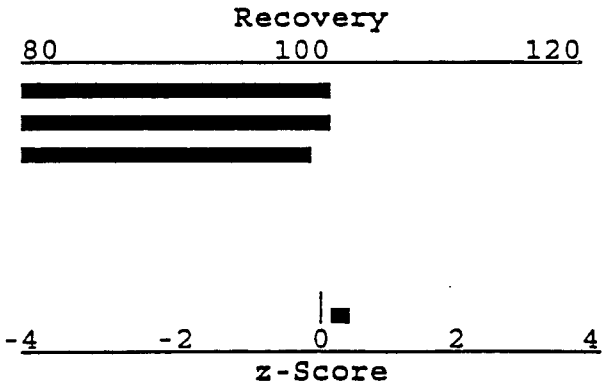
Your Result:	91.3
Reference Value:	95.250
Mean of Reporting Laboratories:	92.159
Actual Standard Deviation:	4.616
Number Reporting:	57
Average % Recovery:	96.755
Your % Recovery:	95.853
Deviation from Mean - z Score:	0.186



Comment:

Parameter: Silver ug/L Level 2

Your Result:	106
Reference Value:	105.450
Mean of Reporting Laboratories:	104.591
Actual Standard Deviation:	5.854
Number Reporting:	59
Average % Recovery:	99.185
Your % Recovery:	100.522
Deviation from Mean - z Score:	0.241



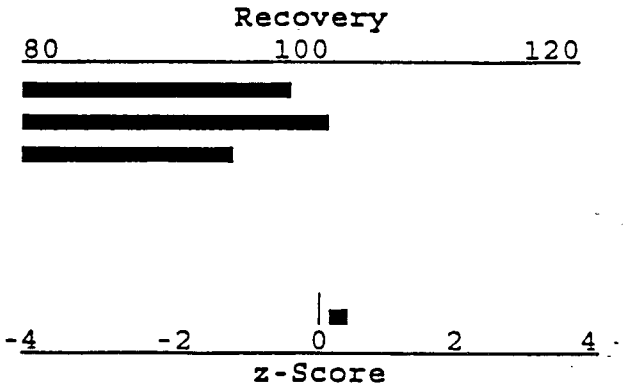
Comment:

Customer Code: 8254 April 1994 Page: 40

Standard: Trace Metals

Parameter: Thallium ug/L Level 1

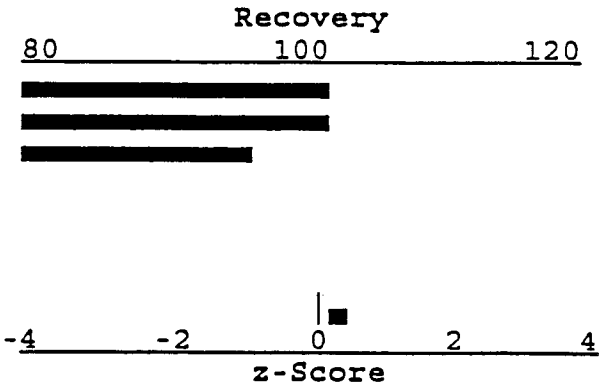
Your Result:	78.2
Reference Value:	80.210
Mean of Reporting Laboratories:	74.797
Actual Standard Deviation:	13.844
Number Reporting:	38
Average % Recovery:	93.252
Your % Recovery:	97.494
Deviation from Mean - z Score:	0.246



Comment:

Parameter: Thallium ug/L Level 2

Your Result:	989
Reference Value:	992.090
Mean of Reporting Laboratories:	947.008
Actual Standard Deviation:	90.696
Number Reporting:	38
Average % Recovery:	95.456
Your % Recovery:	99.689
Deviation from Mean - z Score:	0.463



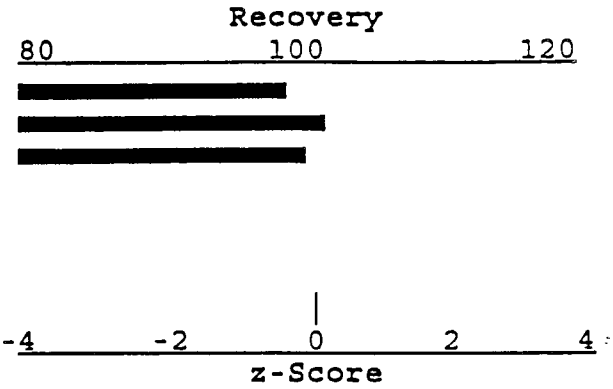
Comment:

Customer Code: 8254 April 1994 Page: 41

Standard: Trace Metals

Parameter: Vanadium ug/L Level 1

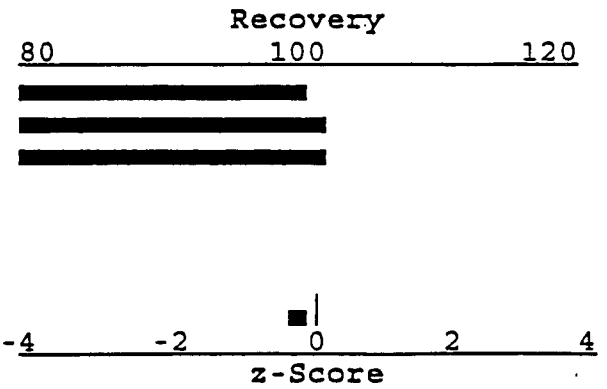
Your Result:	733
Reference Value:	748.830
Mean of Reporting Laboratories:	737.629
Actual Standard Deviation:	33.652
Number Reporting:	38
Average % Recovery:	98.504
Your % Recovery:	97.886
Deviation from Mean - z Score:	0.138



Comment:

Parameter: Vanadium ug/L Level 2

Your Result:	1770
Reference Value:	1790.690
Mean of Reporting Laboratories:	1792.983
Actual Standard Deviation:	84.209
Number Reporting:	42
Average % Recovery:	100.128
Your % Recovery:	98.845
Deviation from Mean - z Score:	0.273



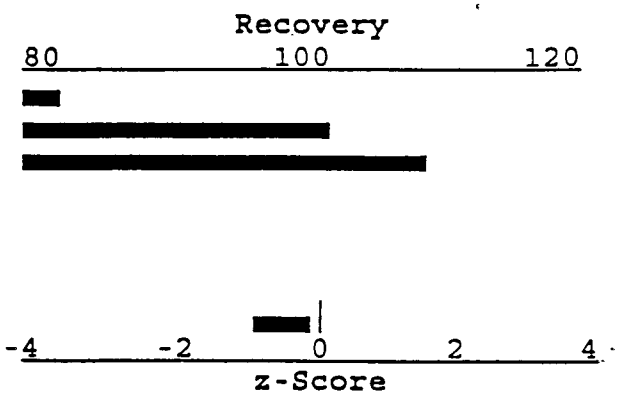
Comment:

Customer Code: 8254 April 1994 Page: 42

Standard: Trace Metals

Parameter: Zinc ug/L Level 1

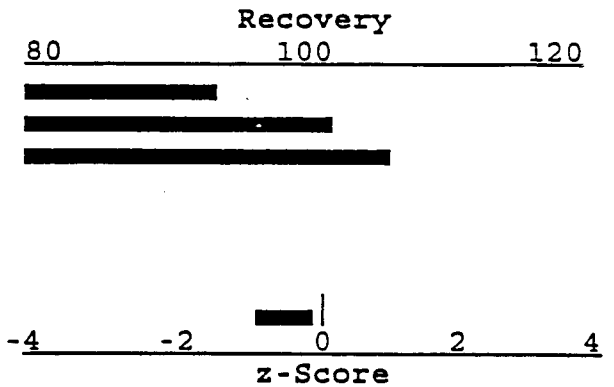
Your Result:	25.5
Reference Value:	31.090
Mean of Reporting Laboratories:	32.937
Actual Standard Deviation:	6.426
Number Reporting:	68
Average % Recovery:	105.940
Your % Recovery:	82.020
Deviation from Mean - z Score:	1.157



Comment:

Parameter: Zinc ug/L Level 2

Your Result:	95.9
Reference Value:	103.630
Mean of Reporting Laboratories:	108.030
Actual Standard Deviation:	10.924
Number Reporting:	75
Average % Recovery:	104.246
Your % Recovery:	92.541
Deviation from Mean - z Score:	1.110



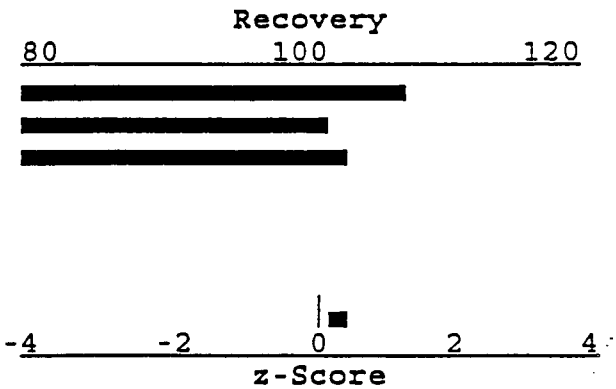
Comment:

Customer Code: 8254 April 1994 Page: 43

Standard: Phenol

Parameter: Phenol mg/L Level 1

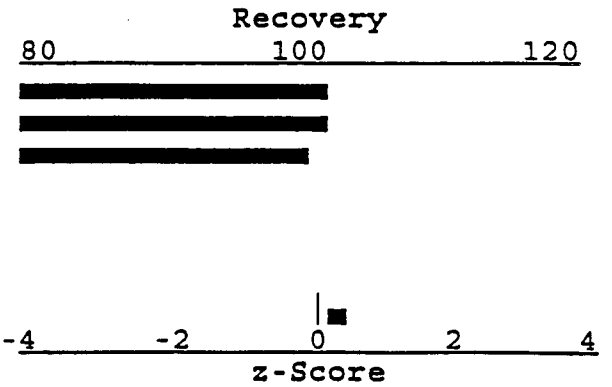
Your Result:	0.105
Reference Value:	0.100
Mean of Reporting Laboratories:	0.102
Actual Standard Deviation:	0.013
Number Reporting:	47
Average % Recovery:	101.663
Your % Recovery:	105.000
Deviation from Mean - z Score:	0.252



Comment:

Parameter: Phenol mg/L Level 2

Your Result:	1.511
Reference Value:	1.502
Mean of Reporting Laboratories:	1.491
Actual Standard Deviation:	0.105
Number Reporting:	45
Average % Recovery:	99.280
Your % Recovery:	100.599
Deviation from Mean - z Score:	0.188



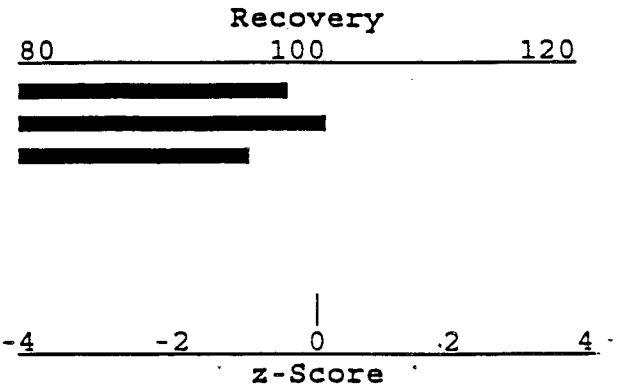
Comment:

Customer Code: 8254 April 1994 Page: 44

Standard: Cyanide

Parameter: Cyanide mg/L Level 1

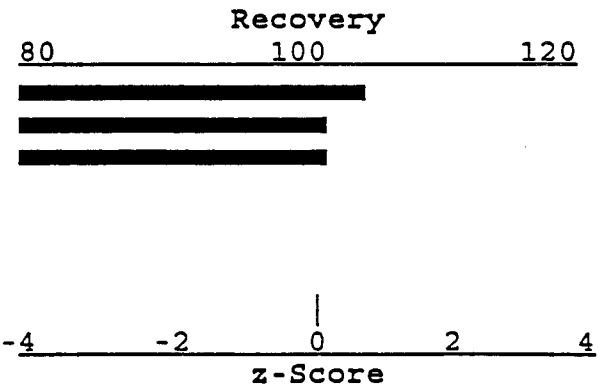
Your Result:	0.684
Reference Value:	0.703
Mean of Reporting Laboratories:	0.667
Actual Standard Deviation:	0.121
Number Reporting:	45
Average % Recovery:	94.920
Your % Recovery:	97.297
Deviation from Mean - z Score:	0.138



Comment:

Parameter: Cyanide mg/L Level 2

Your Result:	2.018
Reference Value:	1.968
Mean of Reporting Laboratories:	1.977
Actual Standard Deviation:	0.468
Number Reporting:	46
Average % Recovery:	100.469
Your % Recovery:	102.541
Deviation from Mean - z Score:	0.087



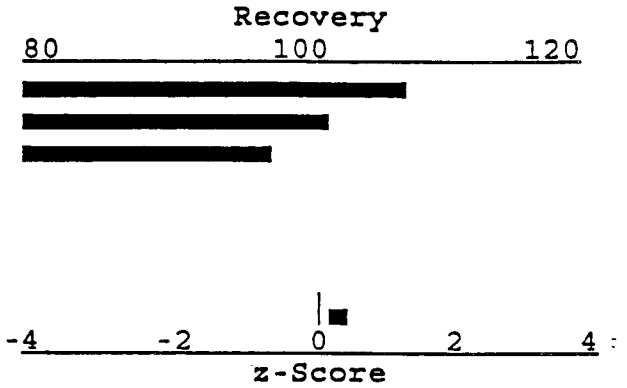
Comment:

Customer Code: 8254 April 1994 Page: 45

Standard: Residual Chlorine

Parameter: Residual Chlorine mg/L Level 1

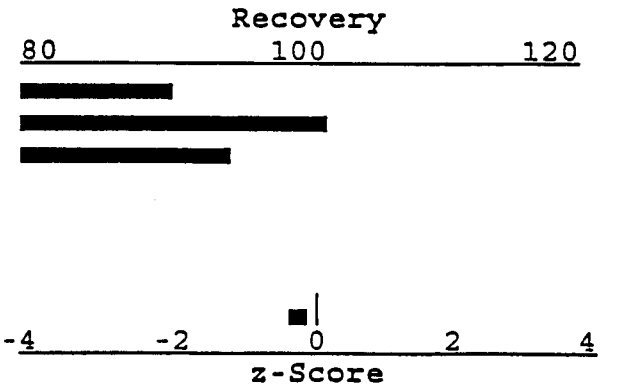
Your Result:	0.21
Reference Value:	0.201
Mean of Reporting Laboratories:	0.193
Actual Standard Deviation:	0.058
Number Reporting:	70
Average % Recovery:	95.835
Your % Recovery:	104.478
Deviation from Mean - z Score:	0.301



Comment:

Parameter: Residual Chlorine mg/L Level 2

Your Result:	4.08
Reference Value:	4.549
Mean of Reporting Laboratories:	4.260
Actual Standard Deviation:	0.669
Number Reporting:	62
Average % Recovery:	93.653
Your % Recovery:	89.698
Deviation from Mean - z Score:	0.269



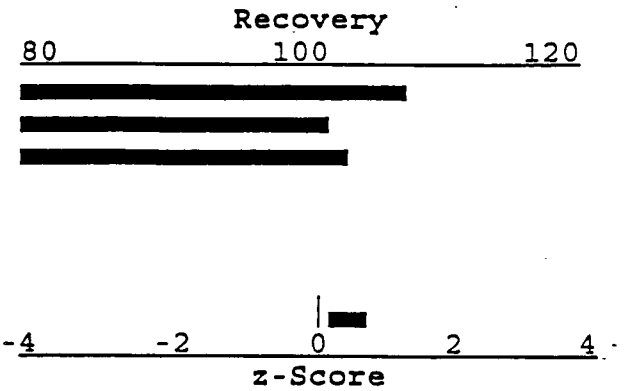
Comment:

Customer Code: 8254 April 1994 Page: 46

Standard: Fluoride

Parameter: Fluoride mg/L Level 1

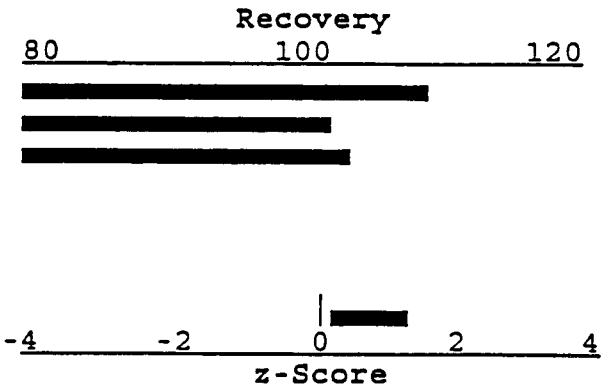
Your Result:	2.64
Reference Value:	2.505
Mean of Reporting Laboratories:	2.539
Actual Standard Deviation:	0.183
Number Reporting:	37
Average % Recovery:	101.353
Your % Recovery:	105.389
Deviation from Mean - z Score:	0.552



Comment:

Parameter: Fluoride mg/L Level 2

Your Result:	10.6
Reference Value:	10.006
Mean of Reporting Laboratories:	10.114
Actual Standard Deviation:	0.387
Number Reporting:	35
Average % Recovery:	101.078
Your % Recovery:	105.936
Deviation from Mean - z Score:	1.258



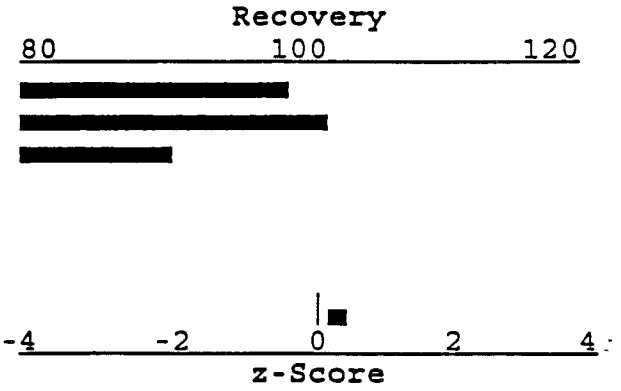
Comment:

Customer Code: 8254 April 1994 Page: 47

Standard: Total Organic Halide

Parameter: Total Organic Halide ug/L Level 1

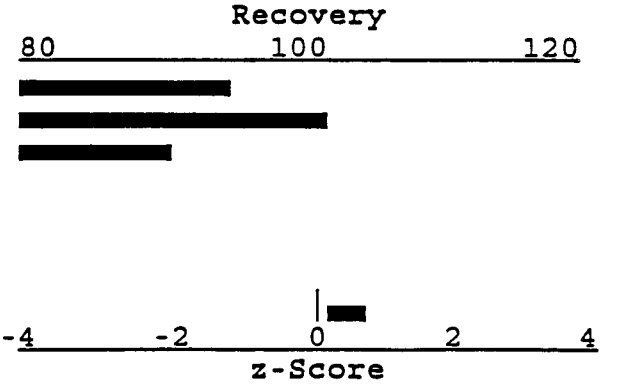
Your Result:	44.7
Reference Value:	45.710
Mean of Reporting Laboratories:	41.135
Actual Standard Deviation:	7.744
Number Reporting:	12
Average % Recovery:	89.991
Your % Recovery:	97.790
Deviation from Mean - z Score:	0.460



Comment:

Parameter: Total Organic Halide ug/L Level 2

Your Result:	429
Reference Value:	455.630
Mean of Reporting Laboratories:	407.514
Actual Standard Deviation:	38.131
Number Reporting:	13
Average % Recovery:	89.440
Your % Recovery:	94.155
Deviation from Mean - z Score:	0.563



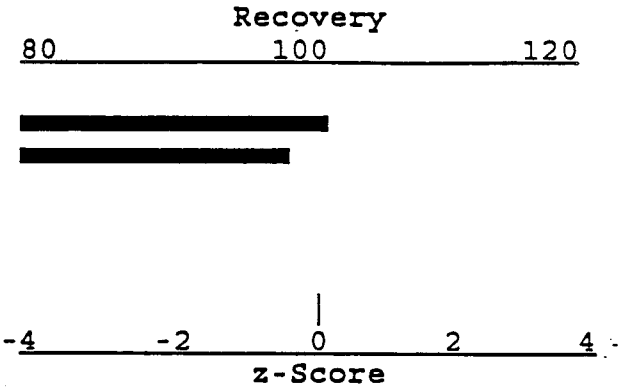
Comment:

Customer Code: 8254 April 1994 Page: 48

Standard: Hexavalent Chromium

Parameter: Hexavalent Chromium mg/L **Level 1**

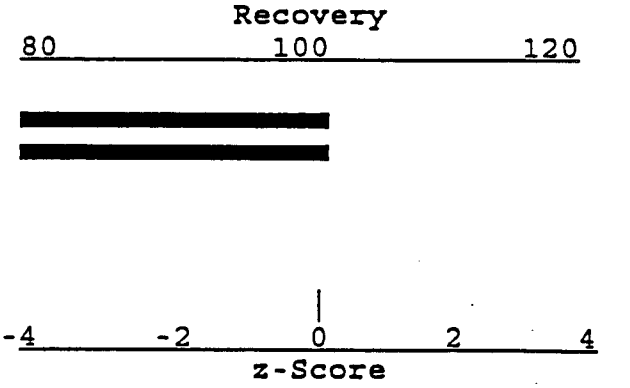
Your Result:	NR
Reference Value:	0.092
Mean of Reporting Laboratories:	0.090
Actual Standard Deviation:	0.010
Number Reporting:	25
Average % Recovery:	97.722
Your % Recovery:	
Deviation from Mean - z Score:	0.000



Comment: **Unreported**

Parameter: Hexavalent Chromium mg/L **Level 2**

Your Result:	NR
Reference Value:	0.401
Mean of Reporting Laboratories:	0.402
Actual Standard Deviation:	0.023
Number Reporting:	24
Average % Recovery:	100.184
Your % Recovery:	
Deviation from Mean - z Score:	0.000



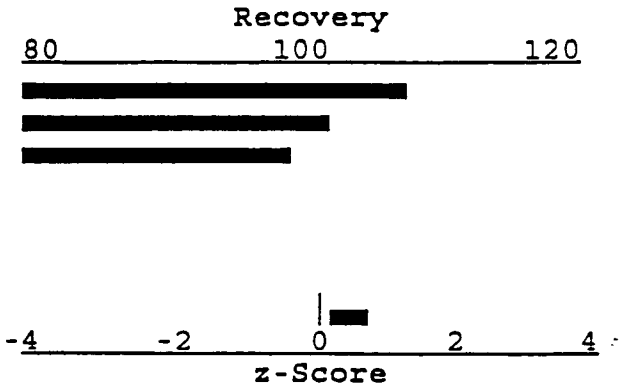
Comment: **Unreported**

Customer Code: 8254 April 1994 Page: 49

Standard: Uranium

Parameter: Uranium ug/L Level 1

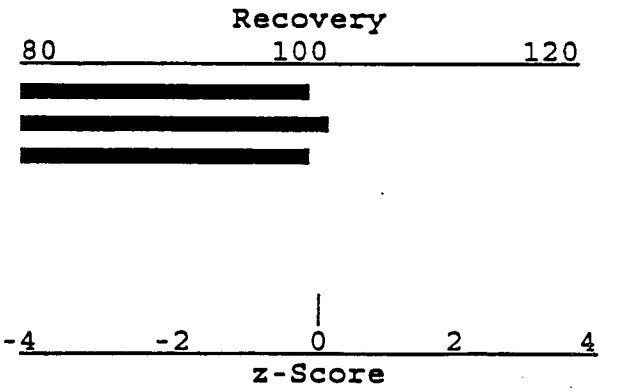
Your Result:	63
Reference Value:	60.060
Mean of Reporting Laboratories:	58.300
Actual Standard Deviation:	7.891
Number Reporting:	5
Average % Recovery:	97.070
Your % Recovery:	104.895
Deviation from Mean - z Score:	0.596



Comment:

Parameter: Uranium ug/L Level 2

Your Result:	887
Reference Value:	900.900
Mean of Reporting Laboratories:	887.500
Actual Standard Deviation:	12.819
Number Reporting:	4
Average % Recovery:	98.513
Your % Recovery:	98.457
Deviation from Mean - z Score:	0.039



Comment:

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. 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:

MAY 9 1994

LAB SUPERVISOR:

Demand		Level 1	Level 2	Test Method
Biochemical Oxygen Demand	mg/L	207.94	17.08	EPA - 405.1
Chemical Oxygen Demand	mg/L	418	48	EPA - 410.4
Total Organic Carbon	mg/L	165.85	20.070	EPA - 415.1
Nutrients				
Ammonia Nitrogen as N	mg/L	0.82	4.82	EPA - 350.3
Nitrate Nitrogen as N	mg/L	0.984	8.505	EPA - 300.0
Orthophosphate as P	mg/L	0.43	9.59	SM - 4500 PE
Total Kjeldahl Nitrogen	mg/L	0.420	2.184	EPA - 351.3
Total Phosphorus as P	mg/L	0.44	3.65	SM - 4500 - PF
Solids				
Total Suspended Solids	mg/L	77	289	EPA - 160.2
Total Dissolved Solids	mg/L	194	336	EPA - 160.1
Oil & Grease				
Oil & Grease	mg/L	19.5	30.1	EPA - 413.1
Minerals				
Alkalinity as $CaCO_3$	mg/L	11	132	EPA - 310.1
Calcium	mg/L	17.1	61.2	EPA - 200.7
Chloride	mg/L	145.7	112.5	EPA - 325.3
Conductivity	umho/cm	570	777	EPA - 120.1
Magnesium	mg/L	13.1	1.23	EPA - 200.7
Potassium	mg/L	100	12.9	EPA - 200.7
Sodium	mg/L	10.2	107	EPA - 200.7
Sulfate	mg/L	9.1	84.6	EPA - 300.0
Total Hardness as $CaCO_3$	mg/L	83	135	SM - 2340 C
pH				
pH	units	2.99	9.06	EPA - 150.1

Report ALL results as mg/L except as indicated

Trace Metals		Level 1	Level 2	Test Method
Aluminum	ug/L	41.5	310	EPA-200.7
Antimony	ug/L	269	1140	EPA-200.7
Arsenic	ug/L	62.9	104	EPA-206.2
Barium	ug/L	928	1940	EPA-200.7
Beryllium	ug/L	11.3	354	
Boron	ug/L	20.1	548	
Cadmium	ug/L	11.0	287	
Chromium	ug/L	65.2	142	
Cobalt	ug/L	167	284	
Copper	ug/L	91.8	217	
Iron	ug/L	Not Reported	723	
Lead	ug/L	194	210	EPA-239.2
Manganese	ug/L	90.4	101	EPA-200.7
Mercury	ug/L	0.61	4.99	
Molybdenum	ug/L	22.8	208	
Nickel	ug/L	26.3	118	
Selenium	ug/L	10.6	112	EPA-270.2
Silver	ug/L	91.3	106	EPA-200.7
Thallium	ug/L	78.2	989	EPA-279.2
Vanadium	ug/L	733	1770	EPA-200.7
Zinc	ug/L	25.5	95.9	EPA-200.7

Phenol	mg/L	0.105	1.511	EPA-420.1
Cyanide	mg/L	0.684	2.018	EPA-335.2
Residual Chlorine	mg/L	0.21	4.08	EPA-330.1
Aluminum High Level	mg/L	Not Analyzed		
Fluoride	mg/L	2.64	10.6	EPA-340.2
Total Organic Halides (TOX)	ug/L	44.7	429	EPA-9020
Hexavalent Chromium	mg/L	Not Reported		
Uranium	ug/L	63	887	ACD-183708

APR 1994

VOLATILES

		Level 1	Level 2	Test Method
Benzene	ug/L			
Chlorobenzene	ug/L			
1,2-Dichlorobenzene	ug/L			
1,3-Dichlorobenzene	ug/L			
1,4-Dichlorobenzene	ug/L			
Ethyl benzene	ug/L			
Toluene	ug/L			
Bromodichloromethane	ug/L			
Bromoform	ug/L			
Bromomethane	ug/L			
Carbon tetrachloride	ug/L			
Chloroethane	ug/L			
2-Chloroethylvinyl ether	ug/L			
Chloroform	ug/L			
Chloromethane	ug/L			
Dibromochloromethane	ug/L			
Dichlorodifluoromethane	ug/L			
1,1-Dichloroethane	ug/L			
1,2-Dichloroethane	ug/L			
1,1-Dichloroethene	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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Subject: QUARTERLY PERFORMANCE EVALUATION (PE) RESULTS

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