

The Study on an Environmental Assessment and Monitoring
of Arabian Gulf in the KSA

LABORATORY ANALYSIS REPORT

Date: July 18, 2000

Report No. JMP-S00017

Sample Site : The Gulf Coast, JICA Project
Type of Sample : Sediment
Sample ID# : K3
Sampled by : Adel Kusti

Sampled : 14/06/00
Received : 14/06/00
Completed : 12/07/00
QA/QC ID# :

Analytical Results

Parameter	Method	Unit	Result	DLR	Note
Loss on Ignition	SM 2540 B	%	3.2	0.1	
TOC	MOOPAM IV.4	%	0.8	0.1	
Cadmium	EPA 3050 B	mg/kg	ND	1	
Cobalt	EPA 3050 B	mg/kg	ND	5	
Copper	EPA 3050 B	mg/kg	ND	5	
Lead	EPA 3050 B	mg/kg	ND	20	
Nickel	EPA 3050 B	mg/kg	ND	10	
Zinc	EPA 3050 B	mg/kg	22	1	
Chromium	EPA 3050 B	mg/kg	23	10	
Mercury	EPA 3050 B	mg/kg	-	0.05	
Arsenic	EPA 7471 A	mg/kg	-	0.1	
Vanadium	EPA 3050 B	mg/kg	-	100	
TPH	EPA 3550 B	mg/kg	-	5	
Benzene	EPA 5021	mg/kg	-	0.1	
Toluene	EPA 5021	mg/kg	-	0.1	
Ethylbenzene	EPA 5021	mg/kg	-	0.1	
Xylene	EPA 5021	mg/kg	-	0.1	

DLR: Detection Limit for Reporting

ND: Not Detected at the DLR

SM: Standard Methods for the Analysis of Water and Wastewater

MOOPAM: Manual of Oceanographic Observations and Pollutant Analysis Methods, ROPME

EPA: U.S. Environmental Protection Agency

MEPA Environmental

Laboratory Director

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LABORATORY ANALYSIS REPORT

Date: July 18, 2000

Report No. JMP-S00018

Sample Site : The Gulf Coast, JICA Project
Type of Sample : Sediment
Sample ID# : K4
Sampled by : Adel Kusti

Sampled : 12/06/00
Received : 12/06/00
Completed : 12/07/00
QA/QC ID# :

Analytical Results

Parameter	Method	Unit	Result	DLR	Note
Loss on Ignition	SM 2540 B	%	4.3	0.1	
TOC	MOOPAM IV.4	%	0.9	0.1	
Cadmium	EPA 3050 B	mg/kg	ND	1	
Cobalt	EPA 3050 B	mg/kg	ND	5	
Copper	EPA 3050 B	mg/kg	6	5	
Lead	EPA 3050 B	mg/kg	ND	20	
Nickel	EPA 3050 B	mg/kg	ND	10	
Zinc	EPA 3050 B	mg/kg	10	1	
Chromium	EPA 3050 B	mg/kg	ND	10	
Mercury	EPA 3050 B	mg/kg	-	0.05	
Arsenic	EPA 7471 A	mg/kg	-	0.1	
Vanadium	EPA 3050 B	mg/kg	-	100	
TPH	EPA 3550 B	mg/kg	-	5	
Benzene	EPA 5021	mg/kg	-	0.1	
Toluene	EPA 5021	mg/kg	-	0.1	
Ethylbenzene	EPA 5021	mg/kg	-	0.1	
Xylene	EPA 5021	mg/kg	-	0.1	

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Laboratory Director

Meteorology Environmental Protection Administration
Eastern Province
Tel: 03-857-6260
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LABORATORY ANALYSIS REPORT

Date: July 18, 2000

Report No. JMP-S00019

Sample Site : The Gulf Coast, JICA Project
Type of Sample : Sediment
Sample ID# : K5
Sampled by : Adel Kusti

Sampled : 12/06/00
Received : 12/06/00
Completed : 19/06/00
QA/QC ID# :

Analytical Results

Parameter	Method	Unit	Result	DLR	Note
Loss on Ignition	SM 2540 B	%	3.1	0.1	
TOC	MOOPAM IV.4	%	1.0	0.1	
Cadmium	EPA 3050 B	mg/kg	ND	1	
Cobalt	EPA 3050 B	mg/kg	ND	5	
Copper	EPA 3050 B	mg/kg	20	5	
Lead	EPA 3050 B	mg/kg	ND	20	
Nickel	EPA 3050 B	mg/kg	ND	10	
Zinc	EPA 3050 B	mg/kg	55	1	
Chromium	EPA 3050 B	mg/kg	ND	10	
Mercury	EPA 3050 B	mg/kg	-	0.05	
Arsenic	EPA 7471 A	mg/kg	-	0.1	
Vanadium	EPA 3050 B	mg/kg	-	100	
TPH	EPA 3550 B	mg/kg	110	5	
Benzene	EPA 5021	mg/kg	-	0.1	
Toluene	EPA 5021	mg/kg	-	0.1	
Ethylbenzene	EPA 5021	mg/kg	-	0.1	
Xylene	EPA 5021	mg/kg	-	0.1	

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LABORATORY ANALYSIS REPORT

Date: July 18, 2000

Report No. JMP-S00020

Sample Site : The Gulf Coast, JICA Project
Type of Sample : Sediment
Sample ID# : K6
Sampled by : Adel Kusti

Sampled : 12/06/00
Received : 12/06/00
Completed : 19/06/00
QA/QC ID# :

Analytical Results

Parameter	Method	Unit	Result	DLR	Note
Loss on Ignition	SM 2540 B	%	-	0.1	
TOC	MOOPAM IV.4	%	0.8	0.1	
Cadmium	EPA 3050 B	mg/kg	-	1	
Cobalt	EPA 3050 B	mg/kg	-	5	
Copper	EPA 3050 B	mg/kg	-	5	
Lead	EPA 3050 B	mg/kg	-	20	
Nickel	EPA 3050 B	mg/kg	-	10	
Zinc	EPA 3050 B	mg/kg	-	1	
Chromium	EPA 3050 B	mg/kg	-	10	
Mercury	EPA 3050 B	mg/kg	-	0.05	
Arsenic	EPA 7471 A	mg/kg	-	0.1	
Vanadium	EPA 3050 B	mg/kg	-	100	
TPH	EPA 3550 B	mg/kg	-	5	
Benzene	EPA 5021	mg/kg	-	0.1	
Toluene	EPA 5021	mg/kg	-	0.1	
Ethylbenzene	EPA 5021	mg/kg	-	0.1	
Xylene	EPA 5021	mg/kg	-	0.1	

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LABORATORY ANALYSIS REPORT

Date: July 18, 2000

Report No. JMP-S00021

Sample Site : The Gulf Coast, JICA Project
Type of Sample : Sediment
Sample ID# : K8
Sampled by : Adel Kusti

Sampled : 13/06/00
Received : 13/06/00
Completed : 12/07/00
QA/QC ID# :

Analytical Results

Parameter	Method	Unit	Result	DLR	Note
Loss on Ignition	SM 2540 B	%	2.5	0.1	
TOC	MOOPAM IV.4	%	0.5	0.1	
Cadmium	EPA 3050 B	mg/kg	ND	1	
Cobalt	EPA 3050 B	mg/kg	ND	5	
Copper	EPA 3050 B	mg/kg	21	5	
Lead	EPA 3050 B	mg/kg	ND	20	
Nickel	EPA 3050 B	mg/kg	20	10	
Zinc	EPA 3050 B	mg/kg	17	1	
Chromium	EPA 3050 B	mg/kg	11	10	
Mercury	EPA 3050 B	mg/kg	-	0.05	
Arsenic	EPA 7471 A	mg/kg	2.2	0.1	
Vanadium	EPA 3050 B	mg/kg	-	100	
TPH	EPA 3550 B	mg/kg	-	5	
Benzene	EPA 5021	mg/kg	-	0.1	
Toluene	EPA 5021	mg/kg	-	0.1	
Ethylbenzene	EPA 5021	mg/kg	-	0.1	
Xylene	EPA 5021	mg/kg	-	0.1	

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LABORATORY ANALYSIS REPORT

Date: July 18, 2000

Report No. JMP-S00022

Sample Site : The Gulf Coast, JICA Project
Type of Sample : Sediment
Sample ID# : H1
Sampled by : Adel Kusti

Sampled : 11/06/00
Received : 11/06/00
Completed : 19/06/00
QA/QC ID# :

Analytical Results

Parameter	Method	Unit	Result	DLR	Note
Loss on Ignition	SM 2540 B	%	-	0.1	
TOC	MOOPAM IV.4	%	0.2	0.1	
Cadmium	EPA 3050 B	mg/kg	-	1	
Cobalt	EPA 3050 B	mg/kg	-	5	
Copper	EPA 3050 B	mg/kg	-	5	
Lead	EPA 3050 B	mg/kg	-	20	
Nickel	EPA 3050 B	mg/kg	-	10	
Zinc	EPA 3050 B	mg/kg	-	1	
Chromium	EPA 3050 B	mg/kg	-	10	
Mercury	EPA 3050 B	mg/kg	-	0.05	
Arsenic	EPA 7471 A	mg/kg	-	0.1	
Vanadium	EPA 3050 B	mg/kg	-	100	
TPH	EPA 3550 B	mg/kg	-	5	
Benzene	EPA 5021	mg/kg	-	0.1	
Toluene	EPA 5021	mg/kg	-	0.1	
Ethylbenzene	EPA 5021	mg/kg	-	0.1	
Xylene	EPA 5021	mg/kg	-	0.1	

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LABORATORY ANALYSIS REPORT

Date: July 18, 2000

Report No. JMP-S00023

Sample Site : The Gulf Coast, JICA Project
Type of Sample : Sediment
Sample ID# : H50
Sampled by : Adel Kusti

Sampled : 10/06/00
Received : 10/06/00
Completed : 19/06/00
QA/QC ID# :

Analytical Results

Parameter	Method	Unit	Result	DLR	Note
Loss on Ignition	SM 2540 B	%	10.7	0.1	
TOC	MOOPAM IV.4	%	-	0.1	
Cadmium	EPA 3050 B	mg/kg	ND	1	
Cobalt	EPA 3050 B	mg/kg	ND	5	
Copper	EPA 3050 B	mg/kg	13	5	
Lead	EPA 3050 B	mg/kg	22	20	
Nickel	EPA 3050 B	mg/kg	18	10	
Zinc	EPA 3050 B	mg/kg	71	1	
Chromium	EPA 3050 B	mg/kg	-	10	
Mercury	EPA 3050 B	mg/kg	-	0.05	
Arsenic	EPA 7471 A	mg/kg	-	0.1	
Vanadium	EPA 3050 B	mg/kg	-	100	
TPH	EPA 3550 B	mg/kg	-	5	
Benzene	EPA 5021	mg/kg	-	0.1	
Toluene	EPA 5021	mg/kg	-	0.1	
Ethylbenzene	EPA 5021	mg/kg	-	0.1	
Xylene	EPA 5021	mg/kg	-	0.1	

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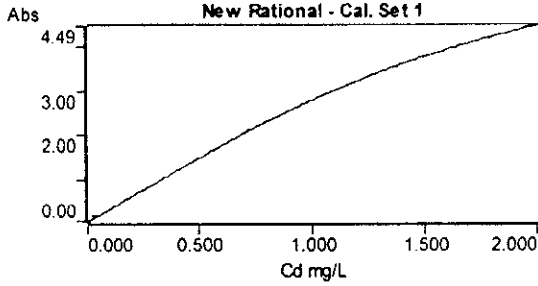
**Output Example of AAS
(Metal Analyses)**

Analyst
 Date Started 11:21 AM 6/19/00
 Worksheet 0619
 Comment Sato
 Methods Cd,Pb,Zn,Cu,Co,Ni

Nominal Weight = 1.0000 Nomnal Volume = 100.00

Method: Cd (Flame)

Sample ID	Conc mg/L	%RSD	Mean Abs	Weight	Volume	Readings
CAL ZERO	0.000	19.1	0.0127	1.0000	100.00	0.0146 0.0100 0.0135
STANDARD 1	1.000	0.4	2.7890	1.0000	100.00	2.7758 2.7910 2.8002
STANDARD 2	2.000	0.7	4.4705	1.0000	100.00	4.4887 4.4860 4.4368



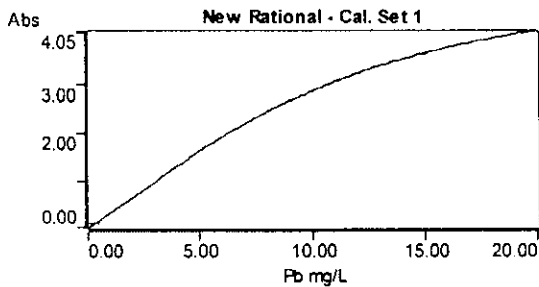
Curve Fit = New Rational
 Characteristic Conc = 0.002 mg/L
 r = 1.0000
 Calculated Conc = 0.005 1.000
 Residuals = -0.005 0.000

Sample 001	0.037	2.4	0.1047	1.0000	100.00	0.1028 0.1075 0.1038
Sample 002	0.034	1.3	0.0956	1.0000	100.00	0.0968 0.0957 0.0943
Sample 003	0.066	0.3	0.1864	1.0000	100.00	0.1868 0.1868 0.1858
Sample 004	0.055	2.5	0.1543	1.0000	100.00	0.1573 0.1556 0.1499
Sample 005	0.061	1.4	0.1729	1.0000	100.00	0.1711 0.1720 0.1757
Sample 006	0.054	2.0	0.1528	1.0000	100.00	0.1563 0.1510 0.1509
Sample 007	0.055	0.9	0.1556	1.0000	100.00	0.1555 0.1571 0.1542
Sample 008	0.013	4.3	0.0369	1.0000	100.00	0.0388 0.0360 0.0361
Sample 009	1.094	0.3	3.0005	1.0000	100.00	2.9898 3.0085 3.0032

150
 K8
 KK
 K5-1
 K5-2
 T6-1
 T6-2
 BT
 CAL 01

Method: Pb (Flame)

Sample ID	Conc mg/L	%RSD	Mean Abs	Weight	Volume	Readings
CAL ZERO	0.00	10.3	0.0344	1.0000	100.00	0.0364 0.0303 0.0364
STANDARD 1	10.00	0.8	2.8489	1.0000	100.00	2.8709 2.8270 2.8488
STANDARD 2	20.00	0.1	4.0444	1.0000	100.00	4.0473 4.0457 4.0402



Curve Fit = New Rational
 Characteristic Conc = 0.02 mg/L
 r = 1.0000

W/o BG correction

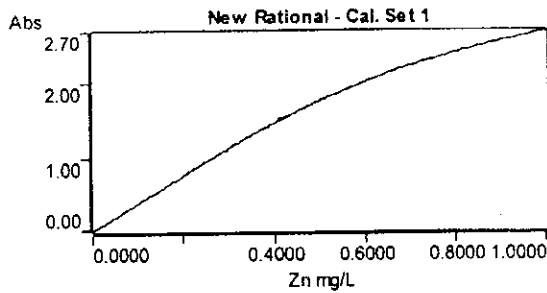
Calculated Conc = 0.12 10.00

Residuals = -0.12 0.00

Sample ID	Conc mg/L	%RSD	Mean Abs	Weight	Volume	Readings		
Sample 001	0.27	5.7	0.0770	1.0000	100.00	0.0796	0.0719	0.0796
Sample 002	0.22	4.2	0.0623	1.0000	100.00	0.0624	0.0596	0.0649
Sample 003	0.55	1.4	0.1597	1.0000	100.00	0.1584	0.1623	0.1583
Sample 004	0.62	2.4	0.1831	1.0000	100.00	0.1869	0.1784	0.1840
Sample 005	0.54	1.7	0.1564	1.0000	100.00	0.1534	0.1584	0.1575
Sample 006	0.82	1.1	0.2425	1.0000	100.00	0.2424	0.2398	0.2454
Sample 007	0.68	1.9	0.1985	1.0000	100.00	0.1945	0.2020	0.1990
Sample 008	-0.08	15.5	-0.0229	1.0000	100.00	-0.0239	-0.0189	-0.0257
Sample 009	10.13	0.4	2.8737	1.0000	100.00	2.8613	2.8833	2.8764

Method: Zn (Flame)

Sample ID	Conc mg/L	%RSD	Mean Abs	Weight	Volume	Readings		
CAL ZERO	0.0000	3.5	0.0591	1.0000	100.00	0.0612	0.0589	0.0570
STANDARD 1	0.5000	0.6	1.7417	1.0000	100.00	1.7497	1.7306	1.7448
STANDARD 2	1.0000	1.0	2.6836	1.0000	100.00	2.7049	2.6939	2.6521

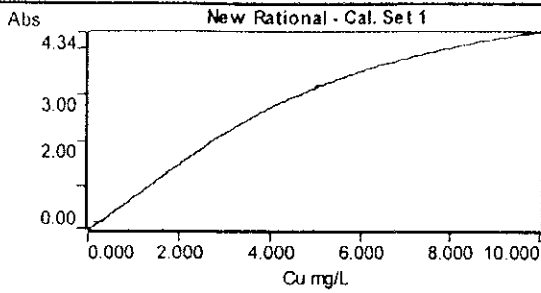


Curve Fit = New Rational
 Characteristic Conc = 0.0013 mg/L
 r = 1.0000
 Calculated Conc = 0.0168 0.5000
 Residuals = -0.0168 0.0000

Sample 001	0.4131	0.4	1.4883	1.0000	100.00	1.4901	1.4924	1.4824
Sample 002	0.3030	0.2	1.1219	1.0000	100.00	1.1228	1.1240	1.1190
Sample 003	0.2183	1.6	0.8127	1.0000	100.00	0.8089	0.8268	0.8023
W0545: Sample result OVER the calibration range								
Sample 004	OVER	0.0	3.3238	1.0000	100.00	3.3238		
Sample 005	0.8524	1.7	2.4775	1.0000	100.00	2.4291	2.5062	2.4974
W0545: Sample result OVER the calibration range								
Sample 006	OVER	0.0	3.0831	1.0000	100.00	3.0831		
W0545: Sample result OVER the calibration range								
Sample 007	OVER	0.0	3.3225	1.0000	100.00	3.3225		
Sample 008	0.0322	4.2	0.1139	1.0000	100.00	0.1094	0.1135	0.1189
Sample 009	0.5329	1.1	1.8292	1.0000	100.00	1.8168	1.8193	1.8516

Method: Cu (Flame)

Sample ID	Conc mg/L	%RSD	Mean Abs	Weight	Volume	Readings		
CAL ZERO	0.000	>100	-0.0001	1.0000	100.00	-0.0002	-0.0002	0.0002
STANDARD 1	5.000	1.2	3.1500	1.0000	100.00	3.1179	3.1906	3.1416
STANDARD 2	10.000	0.2	4.3319	1.0000	100.00	4.3441	4.3271	4.3246

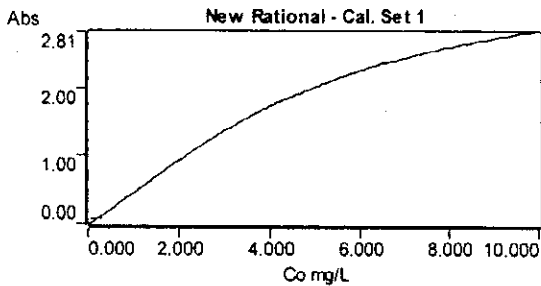


Curve Fit = New Rational
 Characteristic Conc = 0.007 mg/L
 r = 1.0000
 Calculated Conc = -0.000 5.000
 Residuals = 0.000 0.000

Sample ID	Conc mg/L	%RSD	Mean Abs	Weight	Volume	Readings
Sample 001	0.229	1.2	0.1485	1.0000	100.00	0.1506 0.1475 0.1474
Sample 002	0.571	0.6	0.3828	1.0000	100.00	0.3819 0.3812 0.3855
Sample 003	0.206	1.2	0.1332	1.0000	100.00	0.1341 0.1342 0.1314
Sample 004	0.479	1.4	0.3187	1.0000	100.00	0.3183 0.3233 0.3144
Sample 005	0.474	0.6	0.3147	1.0000	100.00	0.3158 0.3158 0.3125
Sample 006	0.346	0.7	0.2271	1.0000	100.00	0.2254 0.2276 0.2283
Sample 007	0.378	0.4	0.2486	1.0000	100.00	0.2487 0.2475 0.2495
Sample 008	0.007	4.4	0.0045	1.0000	100.00	0.0043 0.0047 0.0046
Sample 009	5.240	0.4	3.2415	1.0000	100.00	3.2395 3.2566 3.2286

Method: Co (Flame)

Sample ID	Conc mg/L	%RSD	Mean Abs	Weight	Volume	Readings
CAL ZERO	0.000	2.9	0.0098	1.0000	100.00	0.0097 0.0095 0.0101
STANDARD 1	5.000	0.6	2.0132	1.0000	100.00	2.0159 1.9995 2.0241
STANDARD 2	10.000	0.3	2.7997	1.0000	100.00	2.8075 2.7895 2.8020

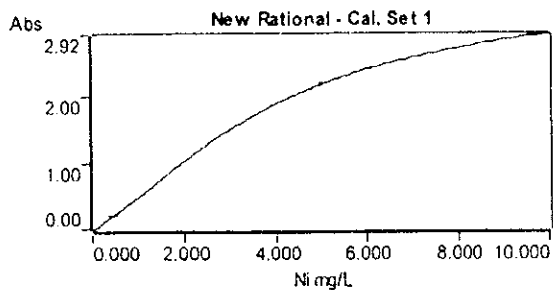


Curve Fit = New Rational
 Characteristic Conc = 0.011 mg/L
 r = 1.0000
 Calculated Conc = 0.024 5.000
 Residuals = -0.024 0.000

Sample 001	0.170	1.0	0.0698	1.0000	100.00	0.0700 0.0704 0.0691
Sample 002	0.152	4.6	0.0622	1.0000	100.00	0.0623 0.0650 0.0594
Sample 003	0.337	3.7	0.1406	1.0000	100.00	0.1415 0.1351 0.1452
Sample 004	0.267	1.9	0.1107	1.0000	100.00	0.1105 0.1130 0.1088
Sample 005	0.285	3.9	0.1181	1.0000	100.00	0.1128 0.1212 0.1203
Sample 006	0.266	0.6	0.1104	1.0000	100.00	0.1111 0.1103 0.1098
Sample 007	0.263	2.5	0.1089	1.0000	100.00	0.1071 0.1076 0.1121
Sample 008	0.005	87.2	0.0018	1.0000	100.00	0.0013 0.0036 0.0005
Sample 009	5.188	0.5	2.0606	1.0000	100.00	2.0526 2.0721 2.0571

Method: Ni (Flame)

Sample ID	Conc mg/L	%RSD	Mean Abs	Weight	Volume	Readings		
CAL ZERO	0.000	3.1	0.0260	1.0000	100.00	0.0253	0.0268	0.0259
STANDARD 1	5.000	0.6	2.1634	1.0000	100.00	2.1723	2.1487	2.1693
STANDARD 2	10.000	0.5	2.9108	1.0000	100.00	2.9183	2.9203	2.8939



Curve Fit = New Rational

Characteristic Conc = 0.010 mg/L

r = 1.0000

Calculated Conc = 0.060 5.000

Residuals = -0.060 0.000

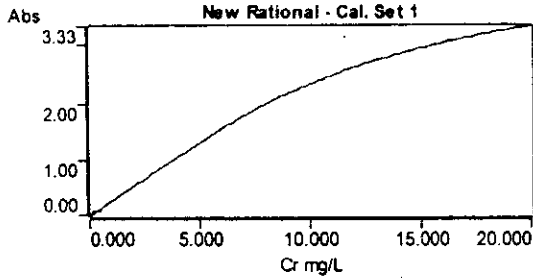
Sample 001	0.427	1.9	0.1955	1.0000	100.00	0.1929	0.1998	0.1937
Sample 002	0.449	0.9	0.2061	1.0000	100.00	0.2050	0.2084	0.2050
Sample 003	0.409	2.2	0.1866	1.0000	100.00	0.1819	0.1882	0.1898
Sample 004	0.371	2.0	0.1686	1.0000	100.00	0.1718	0.1690	0.1652
Sample 005	0.352	1.6	0.1596	1.0000	100.00	0.1607	0.1566	0.1613
Sample 006	0.513	0.5	0.2371	1.0000	100.00	0.2382	0.2357	0.2374
Sample 007	0.513	1.1	0.2371	1.0000	100.00	0.2369	0.2398	0.2345
Sample 008	-0.010	19.1	-0.0045	1.0000	100.00	-0.0053	-0.0047	-0.0036
Sample 009	4.869	0.7	2.1297	1.0000	100.00	2.1332	2.1129	2.1429

Analyst
 Date Started 12:58 PM 6/19/00
 Worksheet Cr in sed.
 Comment
 Methods Cr

Nominal Weight = 1.0000 Nominal Volume = 100.00

Method: Cr (Flame)

Sample ID	Conc mg/L	%RSD	Mean Abs	Weight	Volume	Readings
CAL ZERO	0.000	63.6	0.0009	1.0000	100.00	0.0007 0.0015 0.0004
STANDARD 1	10.000	0.8	2.3201	1.0000	100.00	2.3392 2.3042 2.3168
STANDARD 2	20.000	0.5	3.3158	1.0000	100.00	3.3348 3.3119 3.3008



Curve Fit = New Rational
 Characteristic Conc = 0.019 mg/L
 r = 1.0000
 Calculated Conc = 0.004 10.000 20.000
 Residuals = -0.004 0.000 0.000

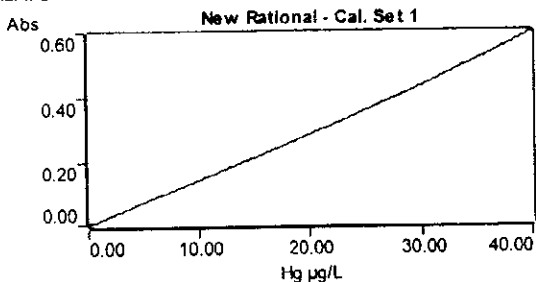
Sample 001	0.296	2.4	0.0695	1.0000	100.00	0.0714 0.0688 0.0684
Sample 002	0.264	1.0	0.0620	1.0000	100.00	0.0623 0.0613 0.0625
Sample 003	0.373	0.7	0.0879	1.0000	100.00	0.0881 0.0885 0.0872
Sample 004	0.309	3.8	0.0728	1.0000	100.00	0.0755 0.0730 0.0700
Sample 005	0.297	1.8	0.0698	1.0000	100.00	0.0691 0.0712 0.0691
Sample 006	0.464	0.3	0.1099	1.0000	100.00	0.1095 0.1101 0.1101
Sample 007	0.482	2.2	0.1143	1.0000	100.00	0.1120 0.1141 0.1170
Sample 008	0.004	15.5	0.0010	1.0000	100.00	0.0010 0.0009 0.0012
Sample 009	10.083	2.3	2.3331	1.0000	100.00	2.2719 2.3665 2.3610

Analyst
 Date Started 9:39 AM 7/3/00
 Worksheet 3-7hg
 Comment
 Methods Hg

Nominal Weight = 1.0000 Nominal Volume = 100.00

Method: Hg (Vapor)

Sample ID	Conc µg/L	%RSD	Mean Abs	Weight	Volume	Readings		
CAL ZERO	0.00	8.9	0.0004	1.0000	100.00	0.0004	0.0003	0.0004
STANDARD 1	20.00	0.8	0.2832	1.0000	100.00	0.2827	0.2814	0.2857
STANDARD 2	40.00	1.4	0.5972	1.0000	100.00	0.5981	0.6051	0.5882



Curve Fit = New Rational
 Characteristic Conc = 0.31 µg/L
 r = 1.0000
 Calculated Conc = 0.03 20.00 40.00
 Residuals = -0.03 0.00 0.00

Sample 001	0.44	6.2	0.0062	1.0000	100.00	0.0067	0.0062	0.0059
Sample 002	0.53	1.8	0.0074	1.0000	100.00	0.0076	0.0074	0.0074
Sample 003	2.09	1.0	0.0295	1.0000	100.00	0.0293	0.0294	0.0299
Sample 004	0.22	6.8	0.0031	1.0000	100.00	0.0030	0.0029	0.0033
Sample 005	19.33	5.0	0.2736	1.0000	100.00	0.2625	0.2691	0.2891
Sample 006	0.53	2.4	0.0074	1.0000	100.00	0.0073	0.0074	0.0076
Sample 007	21.84	2.7	0.3100	1.0000	100.00	0.3003	0.3148	0.3150

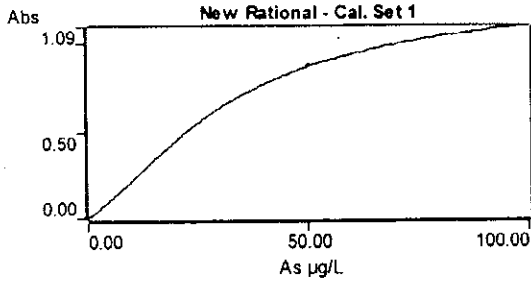
R40
 JSI
 JS
 JG
 JI spike
 BT
 CAL

Analyst
Date Started 1:28 PM 7/15/00
Worksheet Untitled
Comment
Methods As

Nominal Weight = 1.0000 Nominal Volume = 100.00

Method: As (Vapor)

Sample ID	Conc µg/L	%RSD	Mean Abs	BG Abs	Weight	Volume	Readings		
CAL ZERO	0.00	19.2	-0.0009	0.0041	1.0000	100.00	-0.0008	-0.0007	-0.0011
STANDARD 1	50.00	1.1	0.8671	0.0017	1.0000	100.00	0.8739	0.8558	0.8715
STANDARD 2	100.00	0.3	1.0922	0.0037	1.0000	100.00	1.0889	1.0948	1.0928



Curve Fit = New Rational
 Characteristic Conc = 0.25 µg/L
 r = 1.0000
 Calculated Conc = -0.05 50.00
 Residuals = 0.05 0.00

Sample 001	85.76	0.9	1.0519	0.0080	1.0000	100.00	1.0622	1.0491	1.0443
Sample 002	37.29	1.3	0.7390	0.0091	1.0000	100.00	0.7440	0.7451	0.7278
Sample 003	44.91	0.7	0.8221	0.0111	1.0000	100.00	0.8158	0.8251	0.8254
Sample 004	36.94	3.0	0.7346	0.0126	1.0000	100.00	0.7171	0.7591	0.7275
Sample 005	54.77	1.5	0.9032	0.0148	1.0000	100.00	0.9158	0.9045	0.8892
Sample 006	42.58	0.8	0.7989	0.0168	1.0000	100.00	0.8012	0.7914	0.8042
Sample 007	34.49	3.3	0.7023	0.0189	1.0000	100.00	0.7250	0.7026	0.6793
Sample 008	28.19	0.4	0.6055	0.0196	1.0000	100.00	0.6066	0.6072	0.6026
Sample 009	0.00	>100	0.0001	0.0204	1.0000	100.00	-0.0014	-0.0023	0.0039
W0545: Sample result OVER the calibration range									
Sa. 010	OVER	0.0	1.1711	0.0227	1.0000	100.00	1.1711		
Sample 011	57.28	0.5	0.9202	0.0213	1.0000	100.00	0.9165	0.9250	0.9191

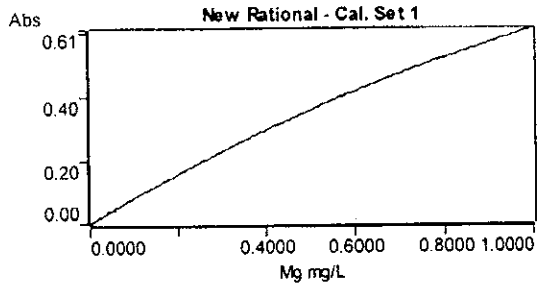
Kx
 K5
 K8
 T6
 K1
 K4
 T110
 K3
 BT
 K2
 STD 1

Analyst
 Date Started 1:20 PM 7/2/00
 Worksheet Untitled
 Comment
 Methods Mg

Nominal Weight = 1.0000 Nominal Volume = 100.00

Method: Mg (Flame)

Sample ID	Conc mg/L	%RSD	Mean Abs	Weight	Volume	Readings		
CAL ZERO	0.0000	7.5	0.0018	1.0000	100.00	0.0016	0.0019	0.0018
STANDARD 1	0.2000	1.8	0.1564	1.0000	100.00	0.1548	0.1549	0.1596
STANDARD 2	0.4000	1.9	0.2868	1.0000	100.00	0.2844	0.2831	0.2930
STANDARD 3	1.0000	1.6	0.6083	1.0000	100.00	0.6037	0.6017	0.6194



Curve Fit = New Rational
 Characteristic Conc = 0.0056 mg/L
 r = 0.9998
 Calculated Conc = 0.0022 0.2049 0.3922
 Residuals = -0.0022 -0.0049 0.0078

Sample 001	0.0486 ✗	0.7	0.0381	1.0000	100.00	0.0379	0.0379	0.0383
Sample 002	0.3971 ✓	1.2	0.2900	1.0000	100.00	0.2939	0.2890	0.2872
Sample 003	0.4305 ✓	1.1	0.3117	1.0000	100.00	0.3136	0.3137	0.3077
Sample 004	0.4988 ✓	1.1	0.3543	1.0000	100.00	0.3525	0.3516	0.3589
Sample 005	0.5624 ✓	1.0	0.3922	1.0000	100.00	0.3943	0.3879	0.3944
Sample 006	0.0239 ✗	0.6	0.0188	1.0000	100.00	0.0187	0.0187	0.0189
Sample 007	0.3169 ✗	1.3	0.2361	1.0000	100.00	0.2391	0.2363	0.2330
Sample 008	0.3201 ✗	1.3	0.2384	1.0000	100.00	0.2347	0.2404	0.2400
Sample 009	-0.0007	9.0	-0.0006	1.0000	100.00	-0.0005	-0.0006	-0.0006

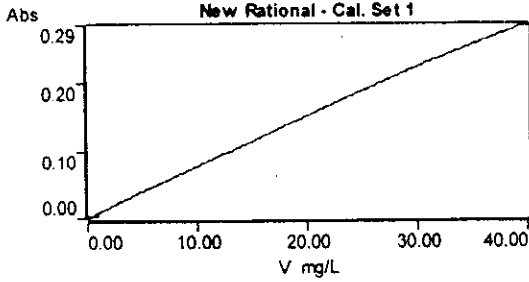
T6
 T12
 K6
 K7
 K8
 J2
 J5
 BT

Analyst
 Date Started 12:09 PM 6/27/00
 Worksheet 27-6v
 Comment
 Methods V

Nominal Weight = 1.0000 Nominal Volume = 100.00

Method: V (Flame)

Sample ID	Conc mg/L	%RSD	Mean Abs	BG Abs	Weight	Volume	Readings		
CAL ZERO	0.00	>100	0.0002	-0.0004	1.0000	100.00	0.0001	-0.0006	0.0010
STANDARD 1	20.00	0.4	0.1523	0.0083	1.0000	100.00	0.1518	0.1522	0.1529
STANDARD 2	40.00	2.1	0.2853	0.0158	1.0000	100.00	0.2798	0.2841	0.2919



Curve Fit = New Rational
 Characteristic Conc = 0.58 mg/L
 r = 1.0000
 Calculated Conc = 0.02 20.00 40.00
 Residuals = -0.02 0.00 0.00

4th

Sample 001	0.51	3.1	0.0039	0.0024	1.0000	100.00	0.0040	0.0039	0.0038	J5
Sample 002	0.20	39.2	0.0015	0.0015	1.0000	100.00	0.0011	0.0012	0.0022	J6
Sample 003	0.23	12.3	0.0017	-0.0011	1.0000	100.00	0.0020	0.0016	0.0017	B7

**Output Example of GC
(BTEX Analyses)**

Sample : sed)4a
ID : J1
IS Amount : 1
Sample Amount : 1
Dilution Factor : 1
Type : Unknown
Detector : WFID
Operator : qusai

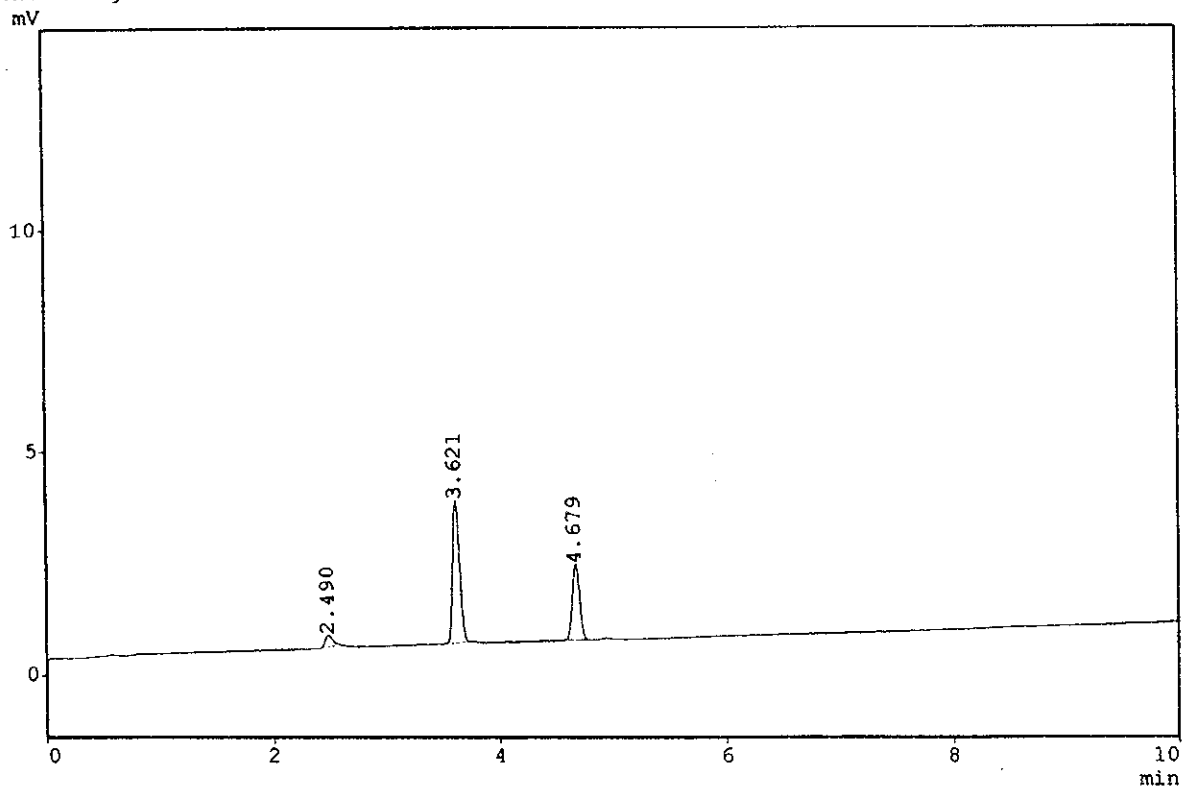
Sediment Sample
J1
J80
(A)201

*** Peak Report ***

PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC	NAME
1	2.490	1206	262				
2	3.621	13199	3193				
3	4.679	7375	1682	R	1		fluorobenzen

21781 5136

*** Chromatogram *** Filename: J1SA.C01

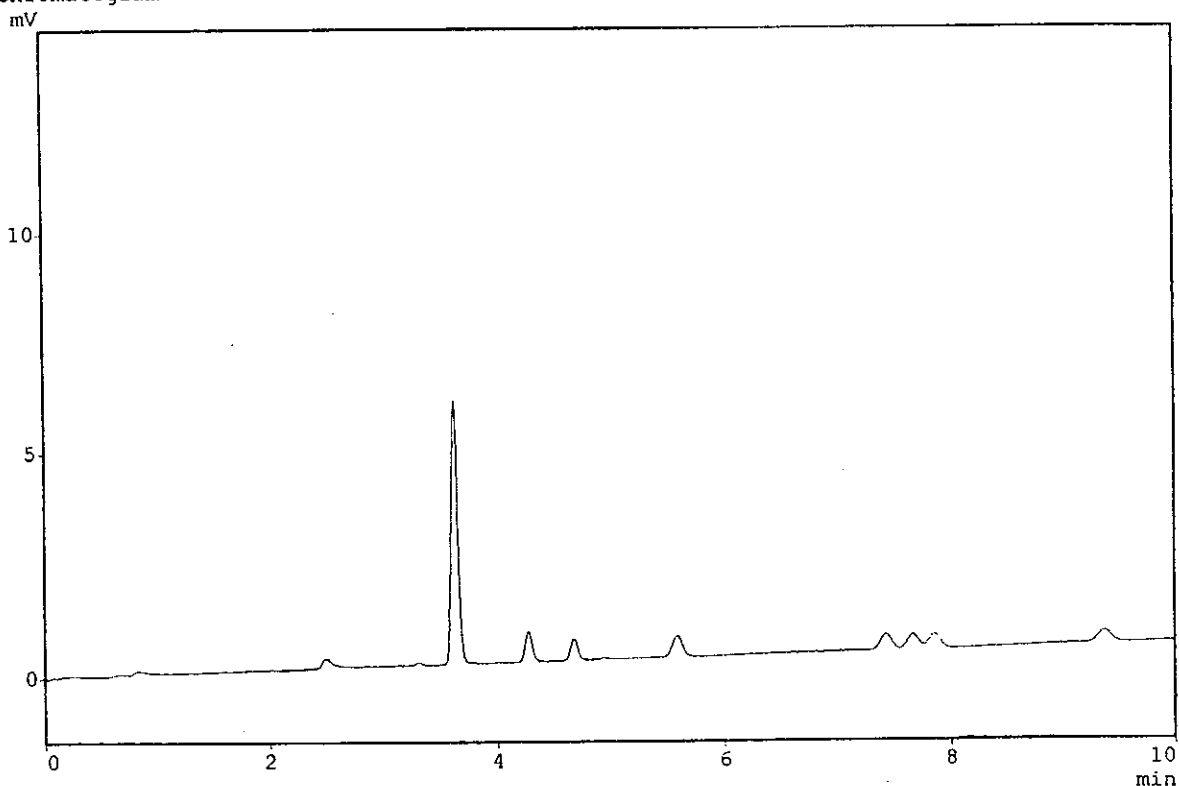


CLASS-GC10 Ver.=1.62 SYS=1 Ch=1 REPORT.NO=13 DATA=00A.D01 00/06/24 13:41:56
 Sample : spka
 ID : a *spike 0.036*
 IS Amount : 1
 Sample Amount : 1
 Dilution Factor: 1
 Type : Unknown
 Detector : WFID
 Operator : Qusai

*** Peak Report ***

PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC	NAME
1	3.616	24162	5864				
2	4.272	2956	684		2	0.0346	benzene
3	4.673	2127	488	R	1		fluorobenzen
4	5.581	2712	468		3	0.0368	toluene
5	7.430	2134	340		4	0.0354	ethylbenzene
6	7.661	2216	331	V	5	0.0402	p-xylene
7	7.853	2365	335	V	6	0.0395	m-xylene
8	9.368	1832	248		7	0.0315	o-xylene
		40503	8758			0.2181	

*** Chromatogram *** Filename:00A.C01



Sample : std1
ID : 0.036
IS Amount : 1
Sample Amount : 1
Dilution Factor: 1
Type : Standard
Detector : WFID
Operator : Qusai

STD001

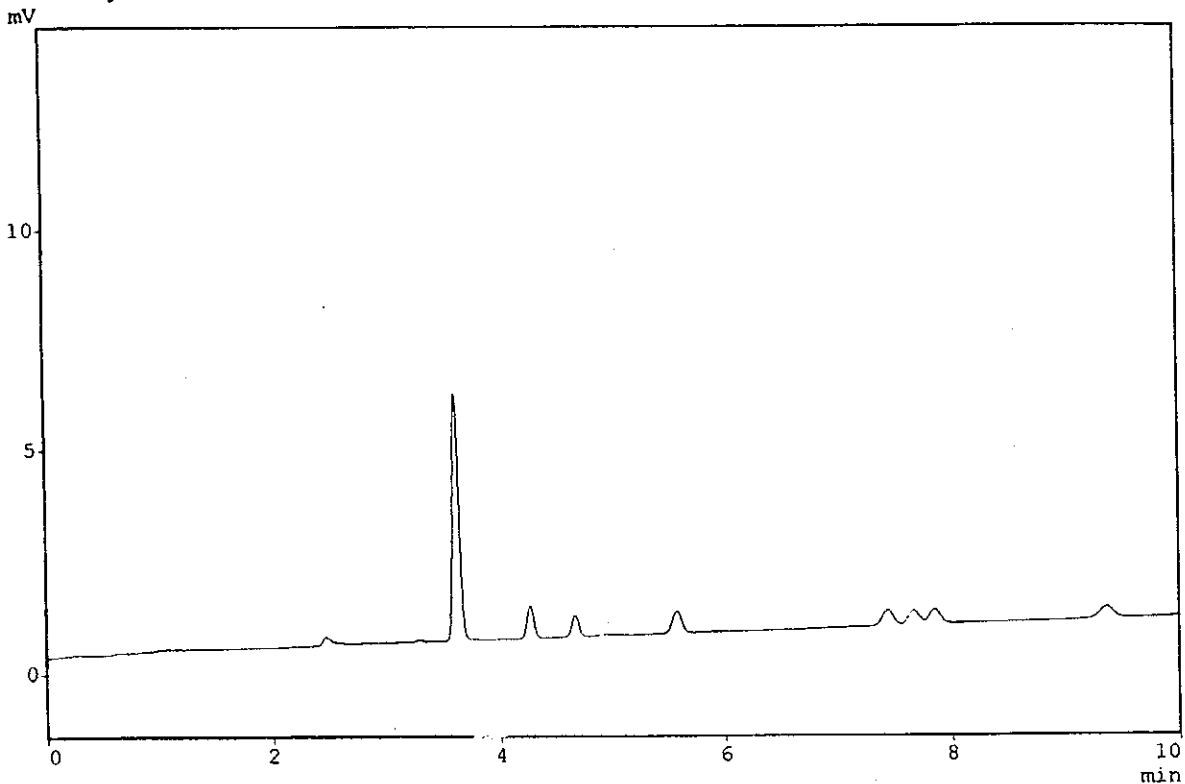
Calibration Curve

*** Peak Report ***

PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC	NAME
1	3.613	22095	5535				benzene
2	4.268	3176	741		2		fluorobenzen
3	4.672	2124	487	R	1		toluene
4	5.577	2847	493		3		ethylbenzene
5	7.424	2351	357		4		p-xylene
6	7.655	2191	319	V	5		m-xylene
7	7.845	2299	328	V	6		o-xylene
8	9.358	2170	264		7		

39254 8523

*** Chromatogram *** Filename:00C.C01



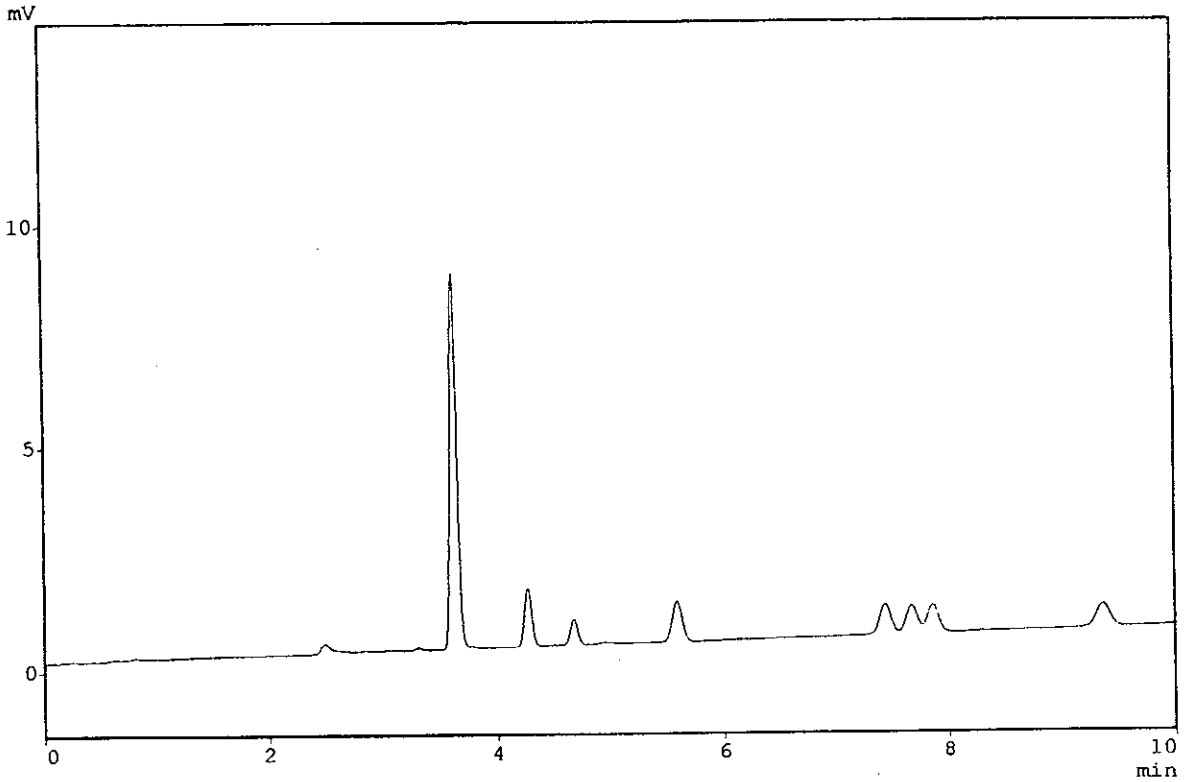
Sample : std2
ID : 0.072
IS Amount : 1
Sample Amount : 1
Dilution Factor: 1
Type : Standard
Detector : WFID
Operator : Qusai

*** Peak Report ***

PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC	NAME
1	3.615	34947	8399				
2	4.271	5898	1324				benzene
3	4.675	2591	578	R	1		fluorobenzen
4	5.579	5364	907		3		toluene
5	7.428	4594	675		4		ethylbenzene
6	7.661	4356	630	V	5		p-xylene
7	7.851	4650	633	V	6		m-xylene
8	9.366	4421	519		7		o-xylene

66821 13663

*** Chromatogram *** Filename:STD002.C01



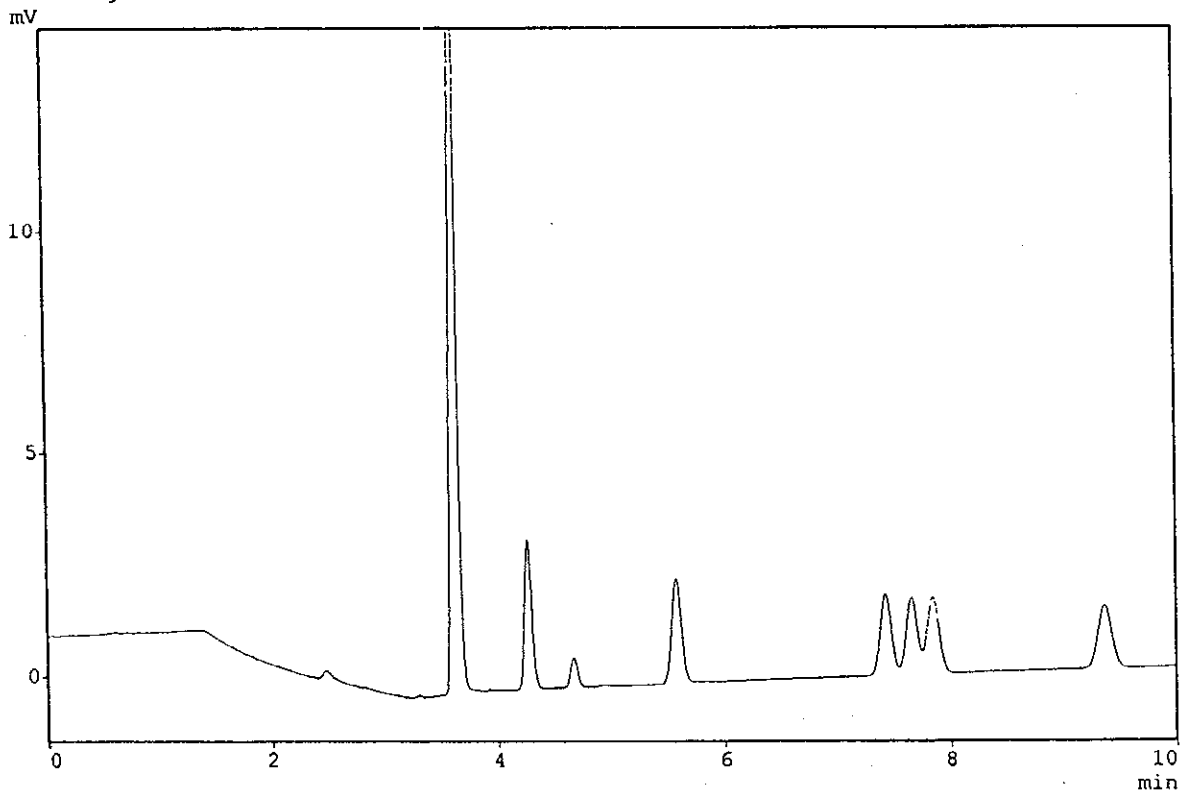
Sample : std3
 ID : 0.180
 IS Amount : 1
 Sample Amount : 1
 Dilution Factor: 1
 Type : Standard
 Detector : WFID
 Operator : Qusai

*** Peak Report ***

PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC	NAME
1	2.472	1105	203				
2	3.610	80311	19626				
3	4.266	14766	3364		2		benzene
4	4.669	2838	663	R	1		fluorobenzen
5	5.573	14140	2344		3		toluene
6	7.423	12801	1819		4		ethylbenzene
7	7.656	12397	1728	V	5		p-xylene
8	7.843	12420	1710	V	6		m-xylene
9	9.359	12048	1412		7		o-xylene

 162825 32870

*** Chromatogram *** Filename:STD003.C01



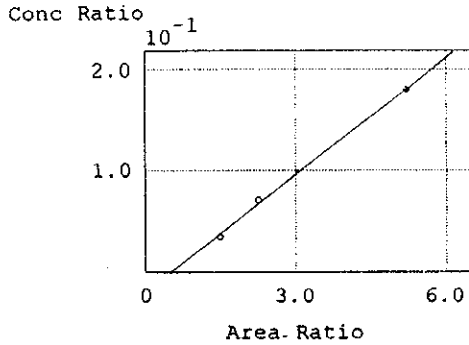
*** Calibration Result ***

** ID Table **

IDNO	NAME	TIME	CONC	RF1	RF2
1	fluorobenzen	4.67	1	1	0
			1		
			1		
2	benzene	4.27	0.036	0.03832047	-0.01863633
			0.072		
			0.18		
3	toluene	5.58	0.036	0.03884881	-0.01268215

4	ethylbenzene	7.43	0.072 0.18 0.036	0.04148558	-0.006200631
5	p-xylene	7.66	0.18 0.036 0.072	0.04230143	-0.003839016
6	m-xylene	7.85	0.18 0.036 0.072	0.04322435	-0.008505424
7	o-xylene	9.36	0.18 0.036 0.072	0.04410273	-0.006513745

** Calibration Curve Graph **

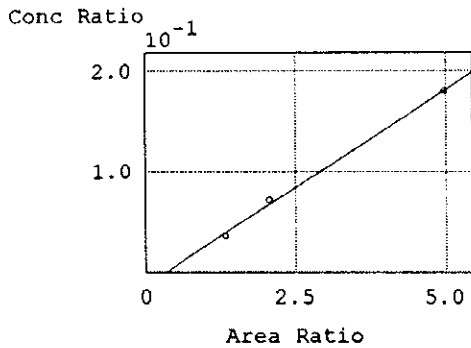


IDNO: 2
NAME: benzene
TIME: 4.27

	CONC RATIO	AREA RATIO
(1)	0.036	1.49576
(2)	0.072	2.27656
(3)	0.18	5.20223

RF1 RF2
(1) 0.0383205 -0.0186363

r2 = 0.998286

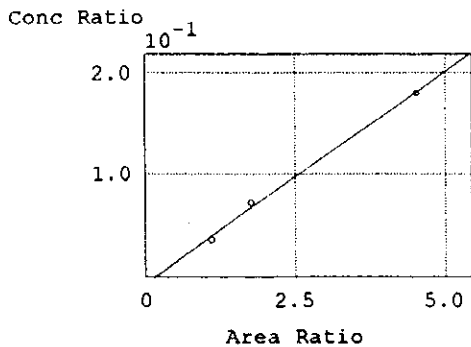


IDNO: 3
NAME: toluene
TIME: 5.58

	CONC RATIO	AREA RATIO
(1)	0.036	1.34074
(2)	0.072	2.07021
(3)	0.18	4.98175

RF1 RF2
(1) 0.0388488 -0.0126821

r2 = 0.99729

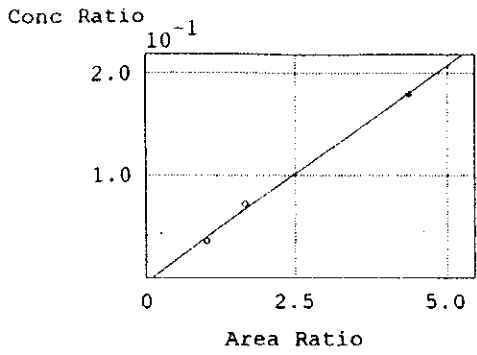


IDNO: 4
NAME: ethylbenzene
TIME: 7.43

	CONC RATIO	AREA RATIO
(1)	0.036	1.10713
(2)	0.072	1.77324
(3)	0.18	4.5102

RF1 RF2
(1) 0.0414856 -0.00620063

r2 = 0.996774

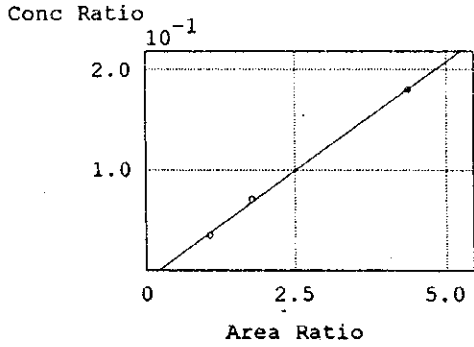


IDNO: 5
 NAME: p-xylene
 TIME: 7.66

	CONC RATIO	AREA RATIO
(1)	0.036	1.0316
(2)	0.072	1.6813
(3)	0.18	4.36765

	RF1	RF2
(1)	0.0423014	-0.00383902

$r^2 = 0.996658$

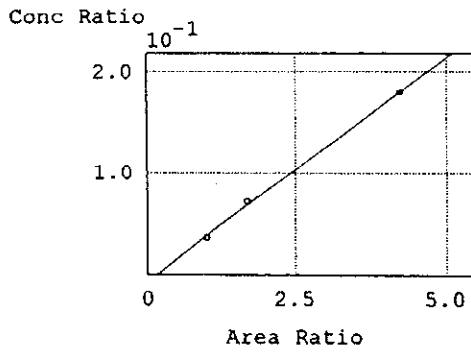


IDNO: 6
 NAME: m-xylene
 TIME: 7.85

	CONC RATIO	AREA RATIO
(1)	0.036	1.08278
(2)	0.072	1.7947
(3)	0.18	4.37575

	RF1	RF2
(1)	0.0432243	-0.00850542

$r^2 = 0.99873$



IDNO: 7
 NAME: o-xylene
 TIME: 9.36

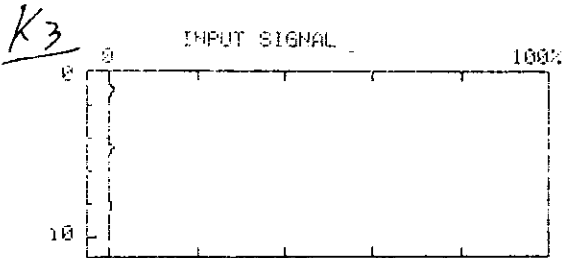
	CONC RATIO	AREA RATIO
(1)	0.036	1.02199
(2)	0.072	1.70658
(3)	0.18	4.24472

	RF1	RF2
(1)	0.0441027	-0.00651374

$r^2 = 0.998435$

Output Example of TOC Analyzer

POWER OFF 11(NDU)-04-1999 12:55
 POWER ON 11(NDU)-06-1999 08:44

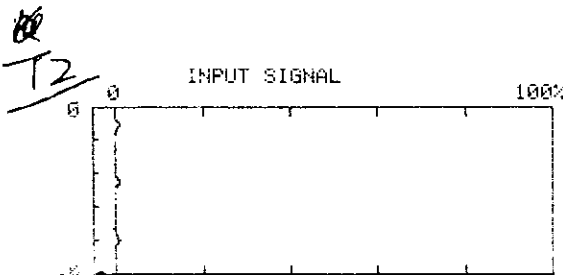


TIME [min]

SAMPLE# 5 NPOC
 [x30, 60µl, C# 1, #WASH 2, SP 10min]
 # AREA ppm C# µl RG
 1 716 3.449
 2 602 2.608
 3 549 2.214

MN 622 2.756
 SD 85 0.631
 CV 13.7 %
 COR CONC DIL 2.756 [x 1.0]
 COR CONC INJ 2.756 [x 1.0]

DATE 11(NDU)-06-1999 10:39

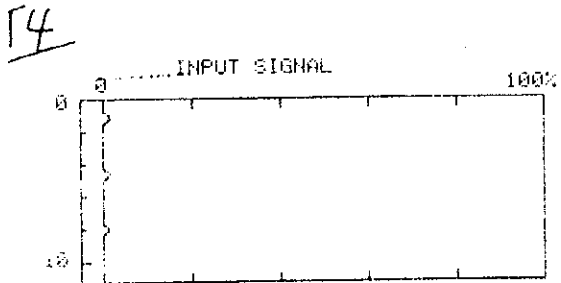


TIME [min]

SAMPLE# 5 NPOC
 [x30, 60µl, C# 1, #WASH 2, SP 10min]
 # AREA ppm C# µl RG
 1 681 3.190
 2 583 2.465
 3 543 2.170

MN 602 2.608
 SD 71 0.525
 CV 11.7 %
 COR CONC DIL 2.608 [x 1.0]
 COR CONC INJ 2.608 [x 1.0]

DATE 11(NDU)-06-1999 11:03



TIME [min]

SAMPLE# 5 NPOC
 [x30, 60µl, C# 1, #WASH 2, SP 10min]
 # AREA ppm C# µl RG
 1 910 4.883
 2 774 3.878
 3 714 3.434

MN 799 4.065
 SD 100 0.742
 CV 12.5 %
 COR CONC DIL 4.065 [x 1.0]
 COR CONC INJ 4.065 [x 1.0]

DATE 11(NDU)-06-1999 11:26

J1

SAMPLE# 6 NPOC
 [x30, 60µl, C# 1, #WASH 2, SP 10min]
 # AREA ppm C# µl RG
 1 688 3.242
 2 580 2.443
 3 495 1.815

MN 587 2.500
 SD 96 0.715
 CV 16.4 %
 COR CONC DIL 2.500 [x 1.0]
 COR CONC INJ 2.500 [x 1.0]

DATE 11(NDU)-06-1999 12:10

J4

SAMPLE# 6 NPOC
 [x30, 60µl, C# 1, #WASH 2, SP 10min]
 # AREA ppm C# µl RG
 1 385 1.001
 2 373 0.913
 3 383 0.987

MN 380 0.967
 SD 6 0.047
 CV 1.69 %
 COR CONC DIL 0.967 [x 1.0]
 COR CONC INJ 0.967 [x 1.0]

DATE 11(NDU)-06-1999 12:33

T110

SAMPLE# 6 NPOC
 [x30, 60µl, C# 1, #WASH 2, SP 10min]
 # AREA ppm C# µl RG
 1 941 5.112
 2 871 4.595
 3 825 4.255

Example of Laboratory Data Sheets

TKN, NH3 Test Results (4)

25-Jun-00

Sample ID	TKN or NH ₃	Volume of sample (ml)	Absorbance	Corrected	Nitrogen (µg)	n (mg/L)
J5	TKN	200	0.263	0.240	28.2	1.408
J6	TKN	200	0.068	0.045	5.3	0.264
J7	TKN	200	0.057	0.034	4.0	0.199
J5	NH ₃	300	0.028	0.020	2.3	0.095 pH>7
J5	NH ₃	300	0.009	0.001	0.1	0.005 pH<7

		Std.(µg-N)		
blank value		0	0.003	0
TKN	0.020	10	0.066	0.063
NH ₃	0.005	20	0.158	0.155
		50	0.438	0.435
		100	0.995	0.992
			slope (K)	117.3

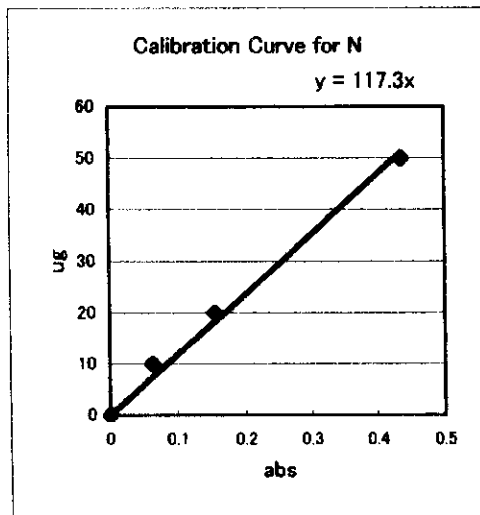
$$C_N = \frac{a \times 250 / 25}{V}$$

C_N: Nitrogen concentration of sample (mg-N/L)

a: calculated value from the standard curve (µg-N)

V: volume of sample (ml)

$$C_{NH_3} = C_N \times 1.22$$



Spike test for NH3

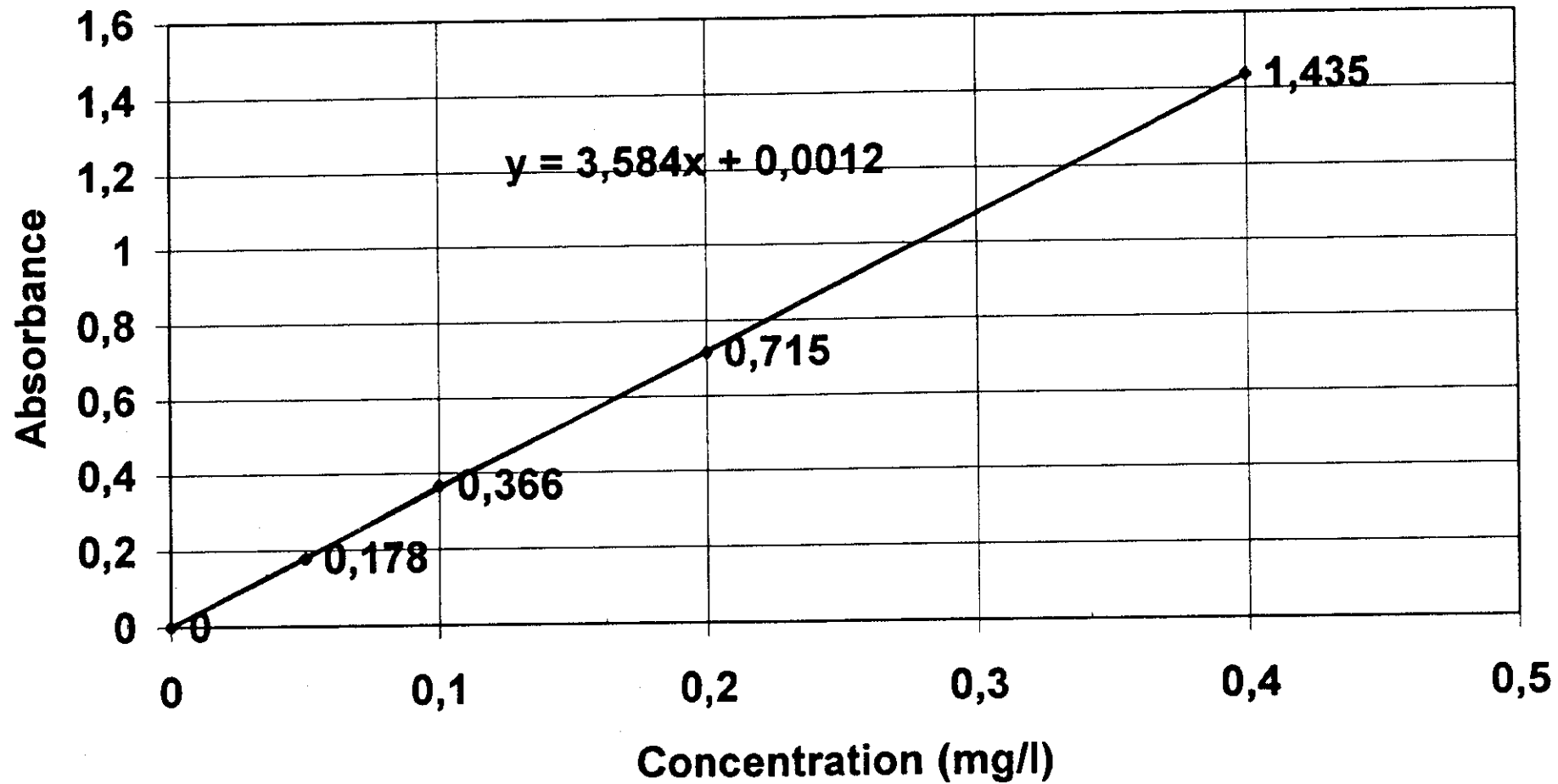
	ABS	ABS	ug	recovery	mg/l
blank	0.008	0.025	16.4	53.7%	
	0.005	0.040	29.0	96.7%	0.0967
	0.006	0.034	23.8	79.3%	0.0793
average	0.00633	0.027	29	96.7%	0.0967
STD	0.00153	0.025	26.9	89.7%	0.0897
		0.016	17.2	57.3%	
Ave+3STE	0.03117	0.02783	27.2	90.6%	0.091
Ave+10ST	0.08914	0.00828		STD	0.0082
		DL		CV	0.0905
		ML	0.29750		
sensitivity		equip DL			
E	0.02725	DLx	0.0109	9.6316	0.0321
		MDL	0.1682	148.38	0.4946

Total Phosphorus

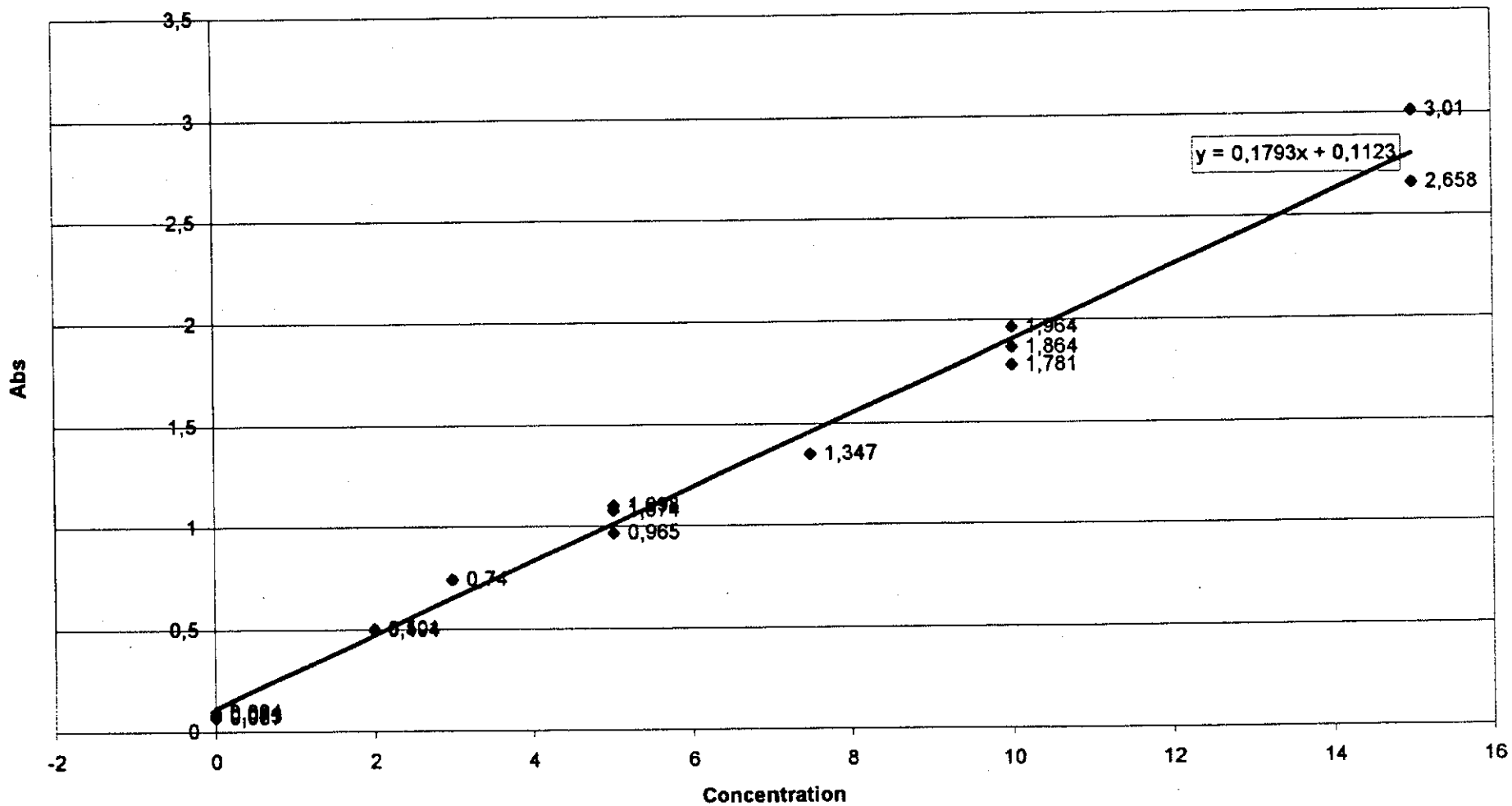
Date	Sample name	Sample Volume (ml)	Abs	Concentration in Solution (mg/l)	Dilution Factors	Concentration in Sample (mg/l)
14/06/2000	Standard	--	0.178	0.050	--	--
14/06/2000	Standard	--	0.356	0.100	--	--
14/06/2000	Standard	--	0.715	0.200	--	--
14/06/2000	Standard	--	1.435	0.400	--	--
14/06/2000	Blank	--	0.000	0.000	--	0.00
14/06/2000	H1	50	0.003	0.001	20	0.03
14/06/2000	K4	50	0.010	0.003	20	0.06
14/06/2000	K5	50	0.131	0.037	20	0.74
14/06/2000	K6	50	0.007	0.002	20	0.05
14/06/2000	T6	50	0.266	0.070	20	1.40
14/06/2000	T7	50	0.022	0.010	20	0.20
14/06/2000	T12O	50	0.004	0.002	20	0.03
17/06/2000	Blank	--	0.000	0.000	--	0.00
17/06/2000	H1	50	0.009	0.003	5	0.01
17/06/2000	K1	50	0.007	0.002	5	0.01
17/06/2000	K3	50	0.013	0.004	5	0.02
17/06/2000	K4	50	0.047	0.014	5	0.07
17/06/2000	K6	50	0.016	0.005	5	0.02
17/06/2000	KX	50	0.013	0.004	5	0.02
17/06/2000	T12O	50	0.021	0.006	5	0.03
21/06/2000	Blank	50	0.000	0.000	2	0.00
21/06/2000	K2	50	0.704	0.197	2	0.39
21/06/2000	T11O	50	0.072	0.020	2	0.04
21/06/2000	T11O(duplicate)	50	0.073	0.021	2	0.04
21/06/2000	H30-S	50	0.015	0.005	2	0.01
21/06/2000	H30-B	50	0.148	0.042	2	0.08
21/06/2000	T2	50	0.023	0.007	2	0.01
21/06/2000	T3	50	0.020	0.006	2	0.01
21/06/2000	T4	50	0.055	0.016	2	0.03
21/06/2000	T7	50	0.194	0.054	2	0.11

Phenol

Date	Sample name	Sample Volume (ml)	Abs	Concentration in Solution (mg/l)	Dilution Factors	Concentration in Sample (mg/l)
19/06/2000	Blank	500	0.047	-0.653		
19/06/2000	T110	500	0.046	-0.660		
	Balance	--	--	-0.007	0.02	< 0.005

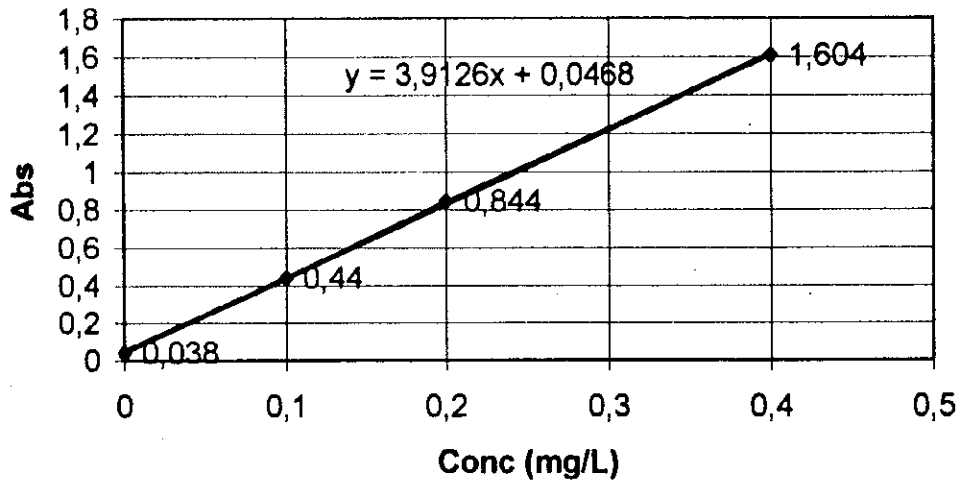
Calibration Curve for Total Phosphorous

Calibration curve for Phenol



0	0,1	0,2	0,4
0,038	0,44	0,844	1,604

Calibration Curve for Cynide



Oil & Grease and TPH

Date	Sample name	Sample Volume (ml)	Measured Conc. (mg/l)	Dilution Factors	Conc. in Sample (mg/l)	Concentration to be reported (mg/l)
18/06/2000	H50	1,000	0.50	0.2	0.10	< 0.2
18/06/2000	K4	1,000	0.60	0.2	0.12	< 0.2
18/06/2000	K5	1,000	1.20	0.2	0.24	0.2
18/06/2000	K2	1,000	4.00	0.2	0.80	0.8
18/06/2000	T110	1,000	1.00	0.2	0.20	0.2
18/06/2000	T110(TPH)	1,000	0.80	0.2	0.16	< 0.2

TPH in Sediment

Date	Sample name	Sample Weight (g)	Measured Conc. (mg/l)	Volume of Solvent (ml)	Measured TPH (mg)	Concentration in Sediment (ppm)
20/06/2000	T6	10.9	15.3	70	2.142	197
20/06/2000	K5	11.1	8.7	70	1.218	110
20/06/2000	KX	10.4	3.5	70	0.490	47
20/06/2000	T110	10.1	2.4	70	0.336	33
20/06/2000	T4	10.8	13.7	70	1.918	178
20/06/2000	R1	11.0	2.4	70	0.336	31
20/06/2000	R2	10.5	1.6	70	0.224	21
20/06/2000	R40	10.1	2.3	70	0.322	32

Table : Results of Loss on Ignition (LOI)

No.	Sample ID	Sample Date	Sample Weight (g)	Loss of Ignition at 550°C: = % Organic Carbon	Loss of Ignition at 1050°C: = % Inorganic C (carbonate)	Remaining non-Carbon Components (%) (silica sand, stones, etc)	Comments
1	DD2O	-	3.140	5.9%	29.2%	64.9%	silt with sand
2	J1	-	2.990	10.5%	30.8%	58.7%	very fine silts and some clays
3	J2	-	2.777	5.3%	28.8%	65.9%	sand with shell
4	J5	-	2.766	9.8%	24.8%	65.4%	silt
5	J6	-	2.978	3.0%	22.8%	74.2%	sand with shell
6	J7	-	2.983	3.0%	29.2%	67.8%	sand with shell
7	J8O	-	3.238	1.5%	7.9%	90.5%	coarse sand
8	R1	-	2.959	5.2%	35.9%	58.9%	silt with sand
9	R2	-	2.317	2.2%	32.2%	65.6%	sand with shell
10	R4O	-	3.046	3.0%	34.0%	63.1%	sand, fine
11	T2	-	4.010	4.1%	34.7%	61.2%	sand, fine
12	T4	-	3.433	9.7%	33.7%	56.6%	very silty
13	T6	-	1.701	6.1%	20.0%	74.0%	silty sand
14	T11O	-	3.136	3.6%	28.4%	68.0%	silty sand
15	K1	-	2.087	5.6%	28.5%	65.9%	coarse sand
16	K2	-	2.023	18.2%	23.4%	58.3%	silty clay
17	K3	-	1.961	3.2%	36.3%	60.5%	sand, black
18	K4	-	2.003	4.3%	35.2%	60.5%	silty sand
19	K5	-	3.019	3.1%	25.4%	71.5%	coarse sand
20	K8	-	3.015	2.5%	11.2%	86.3%	sand
21	KX	-	3.061	12.4%	30.0%	57.7%	silt
22	H5O	-	2.117	10.7%	14.3%	75.0%	silt with sand

Date of Analysis: 20 June to 8 July 2000

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RESULTS OF SEDIMENT PSA ANALYSIS

No.	Sample ID	Particle Size Classes - Units are the percentage (%) of the total dry weight of sample								Moisture Content (% wt)	QA Checks	
		Gravel / shell >2 mm	Coarse Sands >1 mm	Medium Sands >300 um >200 um		Fine sands >150um >75 um		Silts >4 um	Clays <4 um		Total <150 um	Accounted For
1	J1	0.0%	0.3%	0.6%	0.3%	0.6%	9.6%	88.0%	<0.5%	43.6%	98.1%	100%
2	J80	5.9%	5.2%	22.9%	25.1%	15.5%	23.9%	1.4%	<0.1%	82.7%	25.4%	100%
3	J2	2.8%	9.5%	20.3%	20.2%	14.0%	30.2%	2.8%	<0.1%	72.7%	33.2%	100%
4	K3	1.2%	2.3%	8.7%	21.7%	29.0%	33.7%	3.3%	<0.2%	74.6%	37.2%	100%
5	T4	0.2%	0.2%	0.2%	0.5%	0.5%	9.3%	88.6%	<0.5%	64.9%	98.4%	100%
6	T6	14.3%	2.3%	5.2%	8.7%	13.7%	51.4%	4.3%	<0.2%	60.5%	55.9%	100%
7	T110	2.9%	6.7%	15.1%	14.4%	15.1%	42.1%	3.5%	<0.2%	73.5%	45.8%	100%
8	H50	6.9%	3.9%	19.4%	25.2%	16.2%	18.9%	9.4%	<0.1%	55.3%	28.4%	100%
9	R1	2.9%	11.1%	17.7%	10.9%	8.0%	44.9%	4.2%	<0.2%	66.9%	49.3%	100%
10	R2	14.2%	13.9%	28.0%	16.8%	17.5%	8.9%	0.6%	<0.0%	82.5%	9.5%	100%
11	R40	1.6%	1.4%	13.7%	35.6%	35.9%	11.2%	0.5%	<0.0%	80.2%	11.8%	100%
12	K6	1.3%	5.5%	17.9%	21.9%	18.7%	34.1%	0.6%	<0.0%	69.6%	34.7%	100%
13	K1	20.4%	5.7%	29.0%	29.7%	8.1%	6.3%	0.9%	<0.0%	69.3%	7.2%	100%
14	K4	2.6%	11.8%	34.8%	12.0%	12.8%	24.8%	1.1%	<0.1%	65.9%	26.0%	100%
15	K5	13.5%	9.8%	18.3%	15.2%	17.7%	23.5%	2.0%	<0.0%	73.6%	25.5%	100%
16	K2	0.9%	3.3%	4.2%	8.1%	4.8%	15.9%	59.2%	<3.7%	46.5%	78.8%	100%
17	K8	0.8%	0.5%	2.0%	5.7%	20.3%	69.2%	1.3%	<0.1%	75.9%	70.6%	100%
18	J5	1.3%	1.0%	3.5%	8.3%	5.3%	17.8%	61.3%	<1.5%	51.4%	80.7%	100%
19	J6	4.9%	8.8%	33.2%	26.6%	11.1%	14.3%	1.0%	<0.0%	75.2%	15.3%	100%
20	J7	4.8%	8.0%	35.4%	25.6%	12.8%	12.8%	0.6%	<0.0%	76.4%	13.5%	100%
21	T2	5.3%	2.1%	4.4%	12.6%	25.6%	49.5%	0.5%	<0.0%	70.0%	50.0%	100%
22	DD20	3.7%	2.3%	13.1%	23.5%	25.2%	29.5%	2.6%	<0.1%	74.5%	32.2%	100%
23	H1	0.8%	0.5%	2.0%	5.7%	20.3%	67.2%	3.3%	<0.1%	75.9%	70.6%	100%
24	Kx	4.7%	13.0%	16.8%	14.8%	6.8%	30.5%	13.2%	<0.1%	54.1%	43.9%	100%

Footnote:

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Results of Cross Check Study

QA Analysis for Cross-Checking Data, Oct - Nov, 1999

Seawater Analysis

Sample ID		J5			J80			T110			K5			R1		
Item	(unit)	BecA/h	MEPA	RPD(%)	BecA/h	MEPA	RPD(%)	BecA/h	MEPA	RPD(%)	BecA/h	MEPA	RPD(%)	BecA/h	MEPA	RPD(%)
R.Cl	(ppm)	<0.05	<0.5	-												
TSS	(ppm)	0.6	3	66.7	<0.5	<1	-	9.2	3	50.8	19	8	40.7			
TDS	(g/l)										35.53	33.6	2.8			
COD	(ppm)	630	-	-				670	-	-						
TOC	(ppm)	11	2	69.2				18	5	56.5	10	5	33.3			
NH3	(ppm)	0.5	<0.2	>42.9				0.2	<0.2	-	1.5	0.4	57.9			
TKN	(ppm)	1	-	-				0.3	-	-	2.3	-	-			
T-P	(ppm)	<0.1	0.01	-				<0.1	0.04	-	0.67	1.03	21.2			
BTEX	(ppm)							<0.001	<0.01	-						
TPH	(ppm)				8	<0.1	>97.5	11.2	0.2	96.5				9.1	<0.1	>97.8
O&G	(ppm)				15.1	<0.2	>97.4	15.5	<0.2	>97.5				16.1	<0.2	>97.5
Cd	(ppm)	<0.01	<0.01	-												
Cr	(ppm)	<0.01	<0.1	-												
Co	(ppm)	<0.01	<0.05	-												
Pb	(ppm)	<0.03	<0.1	-												
Zn	(ppm)	0.05	<0.01	-												
Ni	(ppm)	<0.01	<0.05	-												
Cu	(ppm)	<0.01	<0.05	-												
Hg	(ppm)	<0.01	<0.005	-												
As	(ppm)	<0.01	-	-												
Mg	(ppm)	1739	1500	7.4												
CN	(ppm)	<0.05	<0.01	-												
Phenol	(ppm)	<0.5	<0.005	-												
Coliform											9 MPN	8000 pcs	NA			

Sediment Analysis

Sample ID		J2			J5			J80			T110			K5		
Item	(unit)	BecA/h	MEPA	RPD(%)	BecA/h	MEPA	RPD(%)	BecA/h	MEPA	RPD(%)	BecA/h	MEPA	RPD(%)	BecA/h	MEPA	RPD(%)
Ignition Loss	(%)				1.4	2.7	31.7				1.2	2.7	38.5	2.5	4.3	26.5
COD	(mg/kg)				4045	-	-				1030	-	-	18566	-	-
TOC	(%)				0.0034	0.36	98.1				0.0021	0.15	97.2			
BTEX	(ppm)							<0.1	<2	-						
TPH	(ppm)	4.7	17	56.7				5.6	9	23.3						
Cd	(ppm)				3.37	<1	>54.2				3	<1	>50	5.11	3	26.0
Cr	(ppm)				11.72	<50	-				12.83	<50	-	12	<50	-
Co	(ppm)				13.16	11	8.9				12.67	10	11.8	21.03	17	10.6
Pb	(ppm)				<0.03	21	99.7				<0.03	27	>99.8	<0.03	36	>99.8
Zn	(ppm)				20.22	13	21.7				9	24	45.5	20.7	13	22.8
Ni	(ppm)				28.89	25	7.2				26	29	5.5	35.92	25	17.9
Cu	(ppm)				5.78	6	1.9				2.3	6	44.6	8	10	11.1
Hg	(ppm)				0.22	<0.05	>63				0.43	0.28	21.1			
As	(ppm)				0.83	-	-				1.88	-	-	0.9	-	-
V	(ppm)				<0.05	<100	-				<0.05	<100	-			

RPD: Relative Percent Difference

$$RPD [\%] = |C_1 - C_2| / ((C_1 + C_2) * 100)$$

QA Analysis/Cross-Checking Data, June - July, 2000

Seawater Analysis

Sample ID		J5			J80			T110			K5			R1		
Item	(unit)	BceA'h	MEPA	RPD(%)	BceA'h	MEPA	RPD(%)	BceA'h	MEPA	RPD(%)	BceA'h	MEPA	RPD(%)	BceA'h	MEPA	RPD(%)
R.CI	(ppm)	0.01	0.10	81.8												
TSS	(ppm)	1	2	33.3	2	3	20.0	12	8	20.0	12	9	14.3			
TOC	(ppm)	-	3	-				7	5	16.7	6	6	0.0			
NH3	(ppm)	-	0.1	-				0.5	0.1	66.7	2	2.4	9.1			
TKN	(ppm)	1	1.4	16.7				0.5	0.4	11.1	2.2	3.4	21.4			
T-P	(ppm)	<0.01	<0.01	-				0.02	0.04	33.3	0.8	0.75	3.2			
BTEX	(ppm)							<0.001	<0.01	-						
O&G	(ppm)							4	0.2	90.5				2	0.2	81.8
TPH	(ppm)							<1	<0.2	-						
Mg	(ppm)	1512	1600	2.8												
CN	(ppm)	<0.05	<0.01	-												
Phenol	(ppm)	0.02	0.005	60.0												
Coliform											<3 MPN	900 pcs	NA			

Sediment Analysis

Sample ID		J2			J5			J80			T110			K5		
Item	(unit)	BceA'h	MEPA	RPD(%)	BceA'h	MEPA	RPD(%)	BceA'h	MEPA	RPD(%)	BceA'h	MEPA	RPD(%)	BceA'h	MEPA	RPD(%)
LOI	(%)										0.6	3.6	71.4	1	3.1	51.2
BTEX	(ppm)							<0.01	<0.1	-						
TPH	(ppm)	6	14	40.0				4	70	89.2						
Cd	(ppm)				5.1	1	67.2				5.1	1	67.2	3.8	1	58.3
Cr	(ppm)				7.7	18	40.1				2	11	69.2	1.6	10	72.4
Co	(ppm)				17.6	5	55.8				19.3	5	58.8	13.7	5	46.5
Pb	(ppm)				<0.005	<20	-				<0.005	<20	-	<0.005	<20	-
Zn	(ppm)				33.6	39	7.4				29.1	33	6.3	117	55	36.0
Ni	(ppm)				55.8	31	28.6				35.8	13	46.7	25.3	10	43.3
Cu	(ppm)				29	24	9.4				8.9	9	0.6	28.7	20	17.9
Hg	(ppm)										0.66	0.52	11.9			
As	(ppm)				2.6	1.6	23.8				1.9	1.7	5.6	1.8	1.9	2.7
V	(ppm)										<0.05	<100	-			

RPD: Relative Percent Difference

$$RPD [\%] = |C_1 - C_2| / (C_1 + C_2) * 100$$

Minutes of Meeting in BeeA'h

Date: Jul. 22, 2000

Subject: Testing results of Cross Check

Participants:

Dr. Khan, Mr. Farhan, Mr. Nabisab and Mr. Tirao (Beeh'A)
Mr. Q. Bohlaiqah, Mr. A Nizami, Mr. Ohi and Mr. Sato (MEPA)

1. Oil and Grease

Beeh'A followed the procedure which is described in HORIBA instruction.

Beeh'A proposed that it is better to check the sensitivity in the low concentration range.

MEPA will measure the lower concentration of standard solution

1,2,4 and 8ppm standard solution

MEPA will confirm the instruction of HORIBA 350 which is used in Beeh'A.

2. TPH

Extraction method which Beeh'A used is Soxhlet.

MEPA used ultrasonic agitation.

Beeh'A used dried sample, dried at 70 degrees.

MEPA used wet sample.

MEPA will confirm the sample preparation method, which is described in EPA or SM.

MEPA will measure TPH with dried sample.

3. Phenol

Beeh'A extract Phenol from seawater directly, without distillation.

MEPA will confirm the interference for measurement from matrix (seawater).

4. LOI

Beeh'A made no sieving before heating at 550 degrees.

MEPA will confirm water residue in dried sample.

Use dried sample, heat at 105 degrees again and check the weight loss.

5. Metals in sediment

Beeh'A did not use back ground correction.

MEPA will measure the lower concentration standard solution to confirm the sensitivity in that level.

Cd 0.1, 0.2 and 0.4 ppm

Cr 1, 2 and 4 ppm

Cu 0.2, 0.4 and 0.8 ppm

Zn 0.05, 0.1 and 0.2 ppm

Pb 1, 2 and 4 ppm

Ni 0.5, 1 and 2 ppm

Co 0.5, 1 and 2 ppm

6. Others

MEPA has doubt that how Beeh'A decide their reporting limit.

Pb, V in sediment and Phenol, metals, NH₃, T-P in seawater

Meeting memorandum

(Discussion with Beeh'A on Cross-Checking Data)

Date: 22 Jul., 2000

Place: Beeh'A, Jubail

Dr. Khan, Mr. Farhan, Mr. Nabisab and Mr. Tirao (Beeh'A)

Mr. Q. Bohlaiqah, Mr. A. Nizami, Mr. Ohi and Mr. Sato (MEPA/JICA Team)

1. Oil and Grease

Beeh'A followed the procedure which is described in HORIBA instruction.

Beeh'A proposed that it is better to check the sensitivity in the low concentration range.

MEPA will measure the lower concentration of standard solution

1,2,4 and 8ppm standard solution

MEPA will confirm the instruction of HORIBA 300 which is used in Beeh'A.

2. TPH

Extraction method which Beeh'A used is Soxhlet.

MEPA used ultrasonic agitation.

Beeh'A used dried sample, dried at 70 degrees.

MEPA used wet sample.

MEPA will confirm the sample preparation method, which is described in EPA or SM.

MEPA will measure TPH with dried sample.

3. Phenol

Beeh'A extract Phenol from seawater directly, without distillation.

MEPA will confirm the interference for measurement from matrix (seawater).

4. LOI

Beeh'A made no sieving before heating at 550 degrees.

MEPA will confirm water residue in dried sample.

Use dried sample, heat at 105 degrees again and check the weight loss.

5. Metals in sediment

Beeh'A did not use back ground correction.

MEPA will measure the lower concentration standard solution to confirm the sensitivity in that level.

Cd 0.1, 0.2 and 0.4 ppm

Cr 1, 2 and 4 ppm

Cu 0.2, 0.4 and 0.8 ppm

Zn 0.05, 0.1 and 0.2 ppm

Pb 1, 2 and 4 ppm

Ni 0.5, 1 and 2 ppm

Co 0.5, 1 and 2 ppm

6. Others

MEPA has doubt that how Beeh'A decide their reporting limit.

Pb, V in sediment and Phenol, metals, NH3, T-P in seawater

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