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START AnalyticalTechnologies, Inc. 225 Commerce Drive Fort Collins, Colorado 80524 (303) 490-1511

NMWMP - Hanford

OCT - 9 1995

Kennewick

September 29, 1995

Mr. Jerry Yokel
Washington State Department of Ecology
1315 West 4th
Kennewick, WA 99336

RE: ATI Workorder: 95-08-179, 180
Client Project Name: 100-BC-1 Demo Project
Client Project Number: Work Assignment 9

Dear Mr. Yokel:

Thirteen soil samples were received from the Washington State Department of Ecology on August 18, 1995. The samples were scheduled for Strontium 89/90, Gamma Spectroscopy, TCLP Metals and Total Metals analysis. The results for these analyses are contained in the enclosed report.

Please note that all results are reported on a dry weight basis. Sample "H95028 was received broken and no analyses could be performed.

Thank you for your confidence in Analytical Technologies, Inc. Should you have any questions, please call.

Sincerely,

Lance Steere
Project Manager

LS/drb

Enclosures

OCT 1995
RECEIVED
EDMC

9513383.2420

AnalyticalTechnologies,Inc.

QUALITY ASSURANCE
DATA REVIEW

Date: 9-21-95

ATI Workorder: 95-08-180, 179 Analysis: 89/90 Sr in Soil

The data contained in the following report have been reviewed and approved by the personnel listed below:

Sandy Bailey
Radiochemistry Instrumentation/Reporting

Terry J. Klein
Radiochemistry Final Data Review

CERTIFICATION

Analytical Technologies, Inc. certifies that the analyses reported herein are true, complete, and correct within the limits of the methods employed.

A case narrative ✓ is __ is not included with this report.

ATI FM 145FC1 (03/13/95)

9513383.2421

Narrative Comments for Work Order 95-08-180
Project name: 100-BC-1 Demo Project
$^{89/90}$Sr Analysis in Soil
09/21/95

Work Order 95-08-180 was received on 08/18/95 and scheduled for several analyses, including $^{89/90}$Sr analysis. Both containers of ATI Sample 95-08-180-06 (H95-028) were broken upon receipt, so no results for this sample are included in the data package. The $^{89/90}$Sr analyses were completed on 09/20/95 with no problems encountered.

The sample date and time were not included on the chain of custody so the date of receipt was used for the sample date.

Emily Bailey

Emily Bailey
Radiochemistry Instrumentation Technician

9513383.2422

Sr-89/90 ANALYSIS RESULTS SUMMARY

Method 905.0 (Modified)

Lab Name: Analytical Technologies, Inc. Date Collected: 08/18/95

Client Name: WA Dept. of Ecology Date Analyzed : 09/20/95

Client Project ID: 100-BC-1 Demo Project Sample Matrix : Soil

Lab Sample ID Series: 95-08-180 Count Duration: 100 Min.

Analyzed by: EB

Client Sample ID	Lab Sample ID	Sr-90 (pCi/g)	Sr-89 (pCi/g)
H95-023	08-180-01	< 0.60(BDL)	< 0.95(BDL)
H95-024	08-180-02	< 0.60(BDL)	< 0.94(BDL)
H95-025	08-180-03	< 0.60(BDL)	< 0.95(BDL)
H95-026	08-180-04	< 0.59(BDL)	< 0.93(BDL)
H95-027	08-180-05	< 0.61(BDL)	< 0.96(BDL)
Blank	08-180-B1	< 0.56(BDL)	< 0.67(BDL)
Duplicate	08-180-D2	< 0.59(BDL)	< 0.93(BDL)

Reported Uncertainties are the Estimated Total Propagated Uncertainties (2σ). See ATI SOP 743FC for details of TPU determinations.

These samples were prepared using ATI SOP721FC and ATI SOP717FC and analyzed using ATI SOP724FC.

BDL = Below Detection Limit; see method for DL determination

Remarks:

Sample 95-08-180-D2 is a duplicate of 95-08-180-05.

9513383.2423

Sr-89/90 ANALYSIS RESULTS SUMMARY

Method 905.0 (Modified)

Lab Name: Analytical Technologies, Inc. Date Collected: 08/18/95

Client Name: WA Dept. of Ecology Date Analyzed : 09/20/95

Client Project ID: 100-BC-1 Demo Project Sample Matrix : Soil

Lab Sample ID Series: 95-08-179 Count Duration: 100 Min.

Analyzed by: EB

Client Sample ID	Lab Sample ID	Sr-90 (pCi/g)	Sr-89 (pCi/g)
H95-029	08-179-01	1.12 ± 0.69	< 1.1(BDL)
H95-030	08-179-02	3.11 ± 0.83	< 1.0(BDL)
H95-031	08-179-03	1.40 ± 0.62	< 0.95(BDL)
H95-032	08-179-04	1.50 ± 0.66	< 1.0(BDL)
H95-033	08-179-05	1.94 ± 0.68	< 0.93(BDL)
H95-034	08-179-06	3.08 ± 0.81	< 0.97(BDL)
H95-035	08-179-07	3.48 ± 0.85	< 0.95(BDL)
Duplicate	08-179-D1	2.49 ± 0.73	< 0.96(BDL)

Reported Uncertainties are the Estimated Total Propagated Uncertainties (2σ). See ATI SOP 743FC for details of TPU determinations.

These samples were prepared using ATI SOP721FC and ATI SOP717FC and analyzed using ATI SOP724FC.

BDL = Below Detection Limit; see method for DL determination

Remarks:

Sample 95-08-179-D1 is a duplicate of 95-08-179-01.

9513383.2424

Sr-89/90 BLANK SPIKE RESULTS

Method 905.0 (Modified)

Lab Name: Analytical Technologies, Inc. Date Collected: 09/07/95

Client Name: WA Dept. of Ecology Date Analyzed : 09/20/95

Client Project ID : 100-BC-1 Demo Project Sample Matrix : Soil

Lab Workorder Number : 95-08-180 Count Duration: 100 Min.

Lab Sample ID	Sr-89 Known Value	Sr-89 Rep't Value	Sr-89 Recovery	Flag
95-08-180-S1	25.0 ± 11.5	25.0 ± 3.36	99.9%	Pass

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
95-08-180-S1	23.5 ± 6.81	25.9 ± 3.40	110%	Pass

Reported Uncertainties are the Estimated Total Propagated Uncertainties (2σ). See ATI SOP 743FC for details of TPU determinations.

ATI sets control limits for Sr-89/90 measurements based on Historical Data.

Control Limits = Known ± 46% for Sr-90, Known ± 29% for Sr-89.

Acceptance Range for blank spike samples is the known value ± the control limits stated above. The reported value, without the uncertainty, should be compared to that range.

9513383.2425

Sr-89/90 ANALYSIS RESULTS SUMMARY

Method 905.0 (Modified)

Lab Name: Analytical Technologies, Inc. Date Collected: 09/07/95

Client Name: WA Dept. of Ecology Date Analyzed : 09/20/95

Client Project ID: 100-BC-1 Demo Project Sample Matrix : Soil

Lab Sample ID Series: 95-08-180 Count Duration: 100 Min.

Analyzed by: EB

Client Sample ID	Lab Sample ID	Sr-90 (pCi/g)	Sr-89 (pCi/g)
Blank	08-180-B1	< 0.56(BDL)	< 0.67(BDL)

Reported Uncertainties are the Estimated Total Propagated Uncertainties (2σ). See ATI SOP 743FC for details of TPU determinations.

These samples were prepared using ATI SOP721FC and ATI SOP717FC and analyzed using ATI SOP724FC.

BDL = Below Detection Limit; see method for DL determination

Remarks:

Blank for work orders 95-08-179 and 95-08-180.

9513383.2426

Sr-89/90 BLANK SPIKE RESULTS

Method 905.0 (Modified)

Lab Name: Analytical Technologies, Inc. Date Collected: 09/07/95

Client Name: WA Dept. of Ecology Date Analyzed : 09/20/95

Client Project ID : 100-BC-1 Demo Project Sample Matrix : Soil

Lab Workorder Number : 95-08-180 Count Duration: 100 Min.

Lab Sample ID	Sr-89 Known Value	Sr-89 Rep't Value	Sr-89 Recovery	Flag
95-08-180-S1	25.0 ± 11.5	25.0 ± 3.36	99.9%	Pass

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
95-08-180-S1	23.5 ± 6.81	25.9 ± 3.40	110%	Pass

Reported Uncertainties are the Estimated Total Propagated Uncertainties (2σ). See ATI SOP 743FC for details of TPU determinations.

ATI sets control limits for Sr-89/90 measurements based on Historical Data.

Control Limits = Known ± 46% for Sr-90, Known ± 29% for Sr-89.

Acceptance Range for blank spike samples is the known value ± the control limits stated above. The reported value, without the uncertainty, should be compared to that range.

Remarks:

Blank spike for work orders 95-08-179 and 95-08-180.

9513383.2427

AnalyticalTechnologies,Inc.

QUALITY ASSURANCE
DATA REVIEW

Date: 9-14-95

ATI Workorder: 95-08-179 Analysis: γ SPEC

The data contained in the following report have been reviewed and approved by the personnel listed below:

Radiochemistry Instrumentation/Reporting

Radiochemistry Final Data Review

CERTIFICATION

Analytical Technologies, Inc. certifies that the analyses reported herein are true, complete, and correct within the limits of the methods employed.

A case narrative ✓ is __ is not included with this report.

ATI FM 145FC1 (03/13/95)

9513383.2428

Narrative Comments for Work Order 95-08-179
Gamma Spectroscopy Analysis in Soil Samples
09/14/95

Samples under ATI Work Order 95-08-179 were received on 09/14/95 and scheduled for gamma spectroscopy analysis, which was completed 09/13/95 with no problems encountered.

The collection date for these samples was not available from the Chain of Custody so the samples were reported with the date received at ATI as the sampling date.

David C. Burns
Radiochemistry Resource Manager

9513383.2429

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc.

Date Collected: 08/18/95 12:00

Client Name: Washington Dept. of Ecology

Date Analyzed: 09/13/95 18:05

Lab Sample ID: 95-08-179-01

Sample Matrix: Soil

Client Sample ID: H95-029

Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Co-57	17.5 ± 1.13	6.45
Cs-137	16.1 ± 1.09	6.76
Eu-154	6.45 ± 0.623	9.66
Zr-95	2.04 ± 0.410	20.1
Eu-152	47.2 ± 3.19	6.77
Co-60	27.6 ± 1.79	6.49
Na-22	2.31 ± 0.264	11.4
K-40	9.84 ± 1.62	16.5
Am-241	< 0.517	BDL
Eu-155	< 0.270	BDL
Ce-144	< 0.599	BDL
Ce-141	< 0.224	BDL
Ce-139	< 0.093	BDL
Cr-51	< 1.64	BDL
Sb-125	< 0.406	BDL
Sr-85	< 0.187	BDL
Ba-140	< 2.18	BDL
Sb-124	< 0.195	BDL
Cs-134	< 0.146	BDL
Ru-106	< 1.76	BDL
Ag-110m	< 0.251	BDL
Nb-95	< 0.258	BDL
Co-58	< 0.260	BDL
Cs-136	< 0.841	BDL
Mn-54	< 0.232	BDL
Fe-59	< 0.700	BDL
Zn-65	< 1.36	BDL
Co-56	< 0.399	BDL
La-140	< 123	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

9513383.2430

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc.

Date Collected: 08/18/95 12:00

Client Name: Washington Dept. of Ecology

Date Analyzed: 09/13/95 18:06

Lab Sample ID: 95-08-179-02

Sample Matrix: Soil

Client Sample ID: H95-030

Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Co-57	100 ± 6.34	6.35
Cs-137	270 ± 17.1	6.35
Eu-154	26.8 ± 1.93	7.20
Zr-95	7.34 ± 0.913	12.4
Co-58	1.24 ± 0.578	46.5
Eu-152	274 ± 17.5	6.39
Co-60	148 ± 9.39	6.35
Na-22	9.41 ± 0.726	7.72
K-40	11.4 ± 2.02	17.8
Am-241	< 1.51	BDL
Eu-155	< 0.826	BDL
Ce-144	< 1.48	BDL
Ce-141	< 0.550	BDL
Ce-139	< 0.230	BDL
Cr-51	< 4.19	BDL
Sb-125	< 1.12	BDL
Sr-85	< 0.438	BDL
Ba-140	< 5.23	BDL
Sb-124	< 0.443	BDL
Cs-134	< 0.333	BDL
Ru-106	< 3.43	BDL
Ag-110m	< 0.468	BDL
Nb-95	< 0.487	BDL
Cs-136	< 1.83	BDL
Mn-54	< 0.490	BDL
Fe-59	< 1.33	BDL
Zn-65	< 2.35	BDL
Co-56	< 0.691	BDL
La-140	< 183	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

9513383.2431

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc. Date Collected: 08/18/95 12:00

Client Name: Washington Dept. of Ecology Date Analyzed: 09/13/95 21:53

Lab Sample ID: 95-08-179-D1 Sample Matrix: Soil

Client Sample ID: Dup of 08-179-02 Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Co-57	99.5 ± 6.32	6.35
Cs-137	270 ± 17.1	6.35
Eu-154	25.8 ± 1.91	7.39
Zr-95	7.37 ± 1.04	14.1
Co-58	1.29 ± 0.566	43.7
Eu-152	266 ± 17.0	6.41
Co-60	149 ± 9.48	6.36
Na-22	9.12 ± 0.720	7.90
K-40	14.2 ± 2.27	15.9
Am-241	< 1.41	BDL
Eu-155	< 0.825	BDL
Ce-144	< 1.53	BDL
Ce-141	< 0.573	BDL
Ce-139	< 0.234	BDL
Cr-51	< 4.26	BDL
Sb-125	< 1.16	BDL
Sr-85	< 0.454	BDL
Ba-140	< 5.57	BDL
Sb-124	< 0.452	BDL
Cs-134	< 0.350	BDL
Ru-106	< 3.61	BDL
Ag-110m	< 0.542	BDL
Nb-95	< 0.605	BDL
Cs-136	< 1.93	BDL
Mn-54	< 0.513	BDL
Fe-59	< 1.60	BDL
Zn-65	< 2.53	BDL
Co-56	< 0.714	BDL
La-140	< 213	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

9513383.2452

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc.

Date Collected: 08/18/95 12:00

Client Name: Washington Dept. of Ecology

Date Analyzed: 09/13/95 17:01

Lab Sample ID: 95-08-179-03

Sample Matrix: Soil

Client Sample ID: H95-031

Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Co-57	73.2 ± 4.66	6.36
Cs-137	454 ± 28.8	6.34
Eu-154	21.2 ± 1.59	7.49
Zr-95	5.68 ± 0.850	15.0
Co-58	0.872 ± 0.551	63.2
Eu-152	216 ± 13.9	6.42
Co-60	116 ± 7.39	6.36
Na-22	7.56 ± 0.610	8.07
K-40	17.0 ± 2.12	12.4
Am-241	< 1.31	BDL
Eu-155	< 0.634	BDL
Ce-144	< 1.54	BDL
Ce-141	< 0.574	BDL
Ce-139	< 0.238	BDL
Cr-51	< 4.59	BDL
Sb-125	< 1.28	BDL
Sr-85	< 0.460	BDL
Ba-140	< 5.40	BDL
Sb-124	< 0.432	BDL
Cs-134	< 0.335	BDL
Ru-106	< 3.41	BDL
Ag-110m	< 0.761	BDL
Nb-95	< 0.514	BDL
Cs-136	< 1.68	BDL
Mn-54	< 0.440	BDL
Fe-59	< 1.37	BDL
Zn-65	< 2.45	BDL
Co-56	< 0.591	BDL
La-140	< 173	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

9513383.2433

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc.

Date Collected: 08/18/95 12:00

Client Name: Washington Dept. of Ecology

Date Analyzed: 09/13/95 17:01

Lab Sample ID: 95-08-179-04

Sample Matrix: Soil

Client Sample ID: H95-032

Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Am-241	6.58 ± 1.13	17.1
Co-57	39.0 ± 2.50	6.40
Cs-137	177 ± 11.3	6.36
Eu-154	12.7 ± 1.00	7.88
Zr-95	3.41 ± 0.554	16.3
Co-58	0.604 ± 0.319	52.8
Eu-152	104 ± 6.77	6.52
Co-60	5.96 ± 0.444	7.45
Na-22	4.69 ± 0.419	8.92
K-40	11.2 ± 1.75	15.6
Eu-155	< 0.565	BDL
Ce-144	< 1.04	BDL
Ce-141	< 0.386	BDL
Ce-139	< 0.162	BDL
Cr-51	< 3.04	BDL
Sb-125	< 0.874	BDL
Sr-85	< 0.315	BDL
Ba-140	< 3.61	BDL
Sb-124	< 0.287	BDL
Cs-134	< 0.217	BDL
Ru-106	< 2.24	BDL
Ag-110m	< 0.414	BDL
Nb-95	< 0.306	BDL
Cs-136	< 0.938	BDL
Mn-54	< 0.255	BDL
Fe-59	< 0.653	BDL
Zn-65	< 1.60	BDL
Co-56	< 0.364	BDL
La-140	< 105	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

9513383.2434

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc.

Date Collected: 08/18/95 12:00

Client Name: Washington Dept. of Ecology

Date Analyzed: 09/13/95 17:00

Lab Sample ID: 95-08-179-05

Sample Matrix: Soil

Client Sample ID: H95-033

Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Am-241	0.782 ± 0.140	17.9
Co-57	14.2 ± 0.911	6.42
Cs-137	120 ± 7.66	6.36
Eu-154	4.34 ± 0.415	9.56
Eu-152	38.4 ± 2.57	6.68
Co-60	3.82 ± 0.282	7.40
Na-22	1.60 ± 0.183	11.4
K-40	7.83 ± 1.49	19.0
Eu-155	< 0.138	BDL
Ce-144	< 0.378	BDL
Ce-141	< 0.148	BDL
Ce-139	< 0.065	BDL
Cr-51	< 1.67	BDL
Sb-125	< 0.504	BDL
Sr-85	< 0.180	BDL
Ba-140	< 2.02	BDL
Sb-124	< 0.151	BDL
Cs-134	< 0.114	BDL
Ru-106	< 1.17	BDL
Ag-110m	< 0.191	BDL
Zr-95	< 0.323	BDL
Nb-95	< 0.172	BDL
Co-58	< 0.167	BDL
Cs-136	< 0.507	BDL
Mn-54	< 0.127	BDL
Fe-59	< 0.401	BDL
Zn-65	< 0.825	BDL
Co-56	< 0.205	BDL
La-140	< 82.5	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

9513383.2435

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc.

Date Collected: 08/18/95 12:00

Client Name: Washington Dept. of Ecology

Date Analyzed: 09/13/95 17:01

Lab Sample ID: 95-08-179-06

Sample Matrix: Soil

Client Sample ID: H95-034

Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Co-57	21.5 ± 1.37	6.37
Cs-137	99.7 ± 6.32	6.34
Eu-154	7.61 ± 0.528	6.94
Zr-95	2.16 ± 0.218	10.1
Co-58	0.310 ± 0.110	35.4
Eu-152	66.9 ± 4.28	6.39
Co-60	3.17 ± 0.216	6.82
Na-22	2.76 ± 0.205	7.45
K-40	8.72 ± 0.898	10.3
Am-241	< 0.258	BDL
Eu-155	< 0.207	BDL
Ce-144	< 0.523	BDL
Ce-141	< 0.196	BDL
Ce-139	< 0.080	BDL
Cr-51	< 1.33	BDL
Sb-125	< 0.341	BDL
Sr-85	< 0.132	BDL
Ba-140	< 1.44	BDL
Sb-124	< 0.115	BDL
Cs-134	< 0.089	BDL
Ru-106	< 0.868	BDL
Ag-110m	< 0.251	BDL
Nb-95	< 0.123	BDL
Cs-136	< 0.374	BDL
Mn-54	< 0.096	BDL
Fe-59	< 0.259	BDL
Zn-65	< 0.802	BDL
Co-56	< 0.203	BDL
La-140	< 47.0	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

9513383.2436

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc.

Date Collected: 08/18/95 12:00

Client Name: Washington Dept. of Ecology

Date Analyzed: 09/13/95 20:35

Lab Sample ID: 95-08-179-07

Sample Matrix: Soil

Client Sample ID: H95-035

Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Am-241	0.675 ± 0.157	23.3
Co-57	29.8 ± 1.90	6.36
Cs-137	80.4 ± 5.12	6.37
Eu-154	9.51 ± 0.730	7.67
Zr-95	2.48 ± 0.367	14.8
Nb-95	0.214 ± 0.196	91.6
Co-58	0.425 ± 0.220	51.9
Eu-152	81.5 ± 5.27	6.47
Co-60	4.30 ± 0.315	7.32
Na-22	3.30 ± 0.292	8.87
K-40	6.62 ± 1.42	21.4
Eu-155	< 0.160	BDL
Ce-144	< 0.399	BDL
Ce-141	< 0.156	BDL
Ce-139	< 0.072	BDL
Cr-51	< 1.63	BDL
Sb-125	< 0.452	BDL
Sr-85	< 0.176	BDL
Ba-140	< 2.11	BDL
Sb-124	< 0.167	BDL
Cs-134	< 0.130	BDL
Ru-106	< 1.33	BDL
Ag-110m	< 0.188	BDL
Cs-136	< 0.659	BDL
Mn-54	< 0.179	BDL
Fe-59	< 0.464	BDL
Zn-65	< 1.16	BDL
Co-56	< 0.289	BDL
La-140	< 79.3	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

9513383.2437

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc.

Date Collected: 09/13/95 12:00

Client Name: Washington Dept. of Ecology

Date Analyzed: 09/13/95 20:36

Lab Sample ID: 95-08-179-B1

Sample Matrix: Soil

Client Sample ID: Blank

Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Am-241	< 0.103	BDL
Eu-155	< 0.069	BDL
Ce-144	< 0.171	BDL
Ce-141	< 0.041	BDL
Ce-139	< 0.024	BDL
Cr-51	< 0.242	BDL
Sb-125	< 0.103	BDL
Sr-85	< 0.066	BDL
Ba-140	< 0.131	BDL
Sb-124	< 0.049	BDL
Cs-134	< 0.049	BDL
Ru-106	< 0.391	BDL
Ag-110m	< 0.035	BDL
Cs-137	< 0.039	BDL
Zr-95	< 0.064	BDL
Nb-95	< 0.043	BDL
Co-58	< 0.042	BDL
Cs-136	< 0.039	BDL
Mn-54	< 0.044	BDL
Fe-59	< 0.081	BDL
Zn-65	< 0.099	BDL
Co-60	< 0.040	BDL
Co-56	< 0.079	BDL
Eu-154	< 0.129	BDL
Na-22	< 0.046	BDL
Eu-152	< 0.219	BDL
K-40	< 0.501	BDL
La-140	< 0.064	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

9513383.2438

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc.

Date Collected: 04/01/94 10:00

Client Name: Washington Dept. of Ecology

Date Analyzed : 09/13/95 20:24

Lab Sample ID: 95-08-179-S1

Sample Matrix : Soil

Client Sample ID: Lab Control

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	940	1010	92.8	Pass
Cd-109	14200	14400	98.8	Pass
Co-57	296	317	93.4	Pass
Ce-139	402	421	95.5	Pass
Sn-113	898	920	97.6	Pass
Cs-137	413	414	99.8	Pass
Y-88	1350	1450	92.7	Pass
Co-60	602	632	95.2	Pass

ATI sets control limits for gamma spectroscopy as follows :
Control Limits = Known ± 10%

Data stored in file \gdr\prt\S08179S1.95P

9513383.2439

AnalyticalTechnologies,Inc.

QUALITY ASSURANCE
DATA REVIEW

Date: 9/17/95

ATI Workorder: 95-08-180 Analysis: Y Spec

The data contained in the following report have been reviewed and approved by the personnel listed below:

Terry [illegible]
Radiochemistry Instrumentation/Reporting

John Mitchell
Radiochemistry Final Data Review

CERTIFICATION

Analytical Technologies, Inc. certifies that the analyses reported herein are true, complete, and correct within the limits of the methods employed.

A case narrative ✓ is __ is not included with this report.

ATI FM 145FC1 (03/13/95)

9513383.2440

Narrative Comments for ATI Work Order 95-08-180
Gamma Spectroscopy Analysis in Soil
09/19/95

Samples were received on 08/18/95 and scheduled for gamma spectroscopy. The gamma spectroscopy analysis was completed 09/08/95.

A sampling date was not indicated on the COC. ATI chose to use 08/12/95 as an approximate sampling date for the purpose of decay correction.

The slight discrepancies associated with the results of 95-08-180-D1 and 95-08-180-01 can be primarily attributed to the fact that 95-08-180-D1 had been counted on a more efficient gamma spectroscopy detector.

All daily instrument quality control checks passed for the analysis system used for these analyses and the accompanying quality control analyses.

John Mitchell
Radiochemistry Instrument Technician

9513383.2441

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc. Date Collected: 08/12/95 12:00

Client Name: Washington Dept. of Ecology Date Analyzed: 09/08/95 11:22

Lab Sample ID: 95-08-180-01 Sample Matrix: Soil

Client Sample ID: H95-023 Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Co-57	1.11 ± 0.087	7.83
Eu-152	3.11 ± 0.370	11.9
Co-60	0.457 ± 0.076	16.6
K-40	12.8 ± 1.59	12.4
Am-241	< 0.044	BDL
Eu-155	< 0.059	BDL
Ce-144	< 0.146	BDL
Ce-141	< 0.058	BDL
Ce-139	< 0.023	BDL
Cr-51	< 0.501	BDL
Sb-125	< 0.127	BDL
Sr-85	< 0.086	BDL
Ba-140	< 0.748	BDL
Sb-124	< 0.074	BDL
Cs-134	< 0.051	BDL
Ru-106	< 0.534	BDL
Ag-110m	< 0.059	BDL
Cs-137	< 0.060	BDL
Zr-95	< 0.177	BDL
Nb-95	< 0.102	BDL
Co-58	< 0.081	BDL
Cs-136	< 0.258	BDL
Mn-54	< 0.068	BDL
Fe-59	< 0.228	BDL
Zn-65	< 0.348	BDL
Co-56	< 0.174	BDL
Eu-154	< 0.270	BDL
Na-22	< 0.097	BDL
La-140	< 72.2	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

9513383.2442

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc. Date Collected: 08/12/95 12:00

Client Name: Washington Dept. of Ecology Date Analyzed: 09/14/95 08:49

Lab Sample ID: 95-08-180-D1 Sample Matrix: Soil

Client Sample ID: Dup of 08-180-01 Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Co-57	1.15 ± 0.086	7.47
Ce-141	0.099 ± 0.097	97.9
Eu-154	0.284 ± 0.088	30.9
Eu-152	3.45 ± 0.302	8.76
Co-60	0.630 ± 0.059	9.32
Na-22	0.128 ± 0.047	37.0
K-40	11.9 ± 1.13	9.56
Am-241	< 0.118	BDL
Eu-155	< 0.093	BDL
Ce-144	< 0.213	BDL
Ce-139	< 0.033	BDL
Cr-51	< 0.538	BDL
Sb-125	< 0.101	BDL
Sr-85	< 0.086	BDL
Ba-140	< 0.739	BDL
Sb-124	< 0.061	BDL
Cs-134	< 0.044	BDL
Ru-106	< 0.386	BDL
Ag-110m	< 0.041	BDL
Cs-137	< 0.037	BDL
Zr-95	< 0.117	BDL
Nb-95	< 0.064	BDL
Co-58	< 0.056	BDL
Cs-136	< 0.233	BDL
Mn-54	< 0.048	BDL
Fe-59	< 0.151	BDL
Zn-65	< 0.232	BDL
Co-56	< 0.102	BDL
La-140	< 42.4	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

9513383.2443

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc. Date Collected: 08/12/95 12:00

Client Name: Washington Dept. of Ecology Date Analyzed: 09/08/95 12:18

Lab Sample ID: 95-08-180-02 Sample Matrix: Soil

Client Sample ID: H95-024 Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Cs-137	3.25 ± 0.238	7.31
Eu-154	1.07 ± 0.142	13.3
Eu-152	10.7 ± 0.758	7.08
Co-60	1.59 ± 0.122	7.66
Na-22	0.382 ± 0.065	17.1
K-40	13.1 ± 1.24	9.44
Am-241	< 0.398	BDL
Eu-155	< 0.145	BDL
Ce-144	< 0.195	BDL
Ce-141	< 0.075	BDL
Ce-139	< 0.039	BDL
Cr-51	< 0.630	BDL
Sb-125	< 0.137	BDL
Sr-85	< 0.073	BDL
Ba-140	< 0.726	BDL
Sb-124	< 0.064	BDL
Cs-134	< 0.048	BDL
Ru-106	< 0.451	BDL
Ag-110m	< 0.055	BDL
Zr-95	< 0.136	BDL
Nb-95	< 0.079	BDL
Co-58	< 0.070	BDL
Cs-136	< 0.224	BDL
Mn-54	< 0.061	BDL
Fe-59	< 0.181	BDL
Zn-65	< 0.351	BDL
Co-56	< 0.109	BDL
La-140	< 41.6	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

Ka

9513383.2444

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc.

Date Collected: 08/12/95 12:00

Client Name: Washington Dept. of Ecology

Date Analyzed: 09/08/95 12:18

Lab Sample ID: 95-08-180-03

Sample Matrix: Soil

Client Sample ID: H95-025

Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Eu-154	0.165 ± 0.065	39.1
Eu-152	1.80 ± 0.183	10.2
Co-60	0.545 ± 0.050	9.19
Na-22	0.054 ± 0.030	55.5
K-40	8.25 ± 0.832	10.1
Am-241	< 0.165	BDL
Eu-155	< 0.073	BDL
Ce-144	< 0.140	BDL
Ce-141	< 0.053	BDL
Ce-139	< 0.020	BDL
Cr-51	< 0.307	BDL
Sb-125	< 0.072	BDL
Sr-85	< 0.041	BDL
Ba-140	< 0.372	BDL
Sb-124	< 0.036	BDL
Cs-134	< 0.027	BDL
Ru-106	< 0.251	BDL
Ag-110m	< 0.026	BDL
Cs-137	< 0.026	BDL
Zr-95	< 0.063	BDL
Nb-95	< 0.036	BDL
Co-58	< 0.041	BDL
Cs-136	< 0.135	BDL
Mn-54	< 0.032	BDL
Fe-59	< 0.092	BDL
Zn-65	< 0.121	BDL
Co-56	< 0.069	BDL
La-140	< 27.3	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

9513383.2445

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc.

Date Collected: 08/12/95 12:00

Client Name: Washington Dept. of Ecology

Date Analyzed: 09/08/95 13:13

Lab Sample ID: 95-08-180-04

Sample Matrix: Soil

Client Sample ID: H95-026

Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Co-57	3.15 ± 0.216	6.87
Cs-137	1.53 ± 0.145	9.47
Eu-154	0.898 ± 0.160	17.8
Eu-152	8.96 ± 0.683	7.62
Co-60	1.56 ± 0.129	8.26
Na-22	0.329 ± 0.074	22.6
K-40	13.6 ± 1.42	10.4
Am-241	< 0.252	BDL
Eu-155	< 0.154	BDL
Ce-144	< 0.256	BDL
Ce-141	< 0.103	BDL
Ce-139	< 0.039	BDL
Cr-51	< 0.662	BDL
Sb-125	< 0.142	BDL
Sr-85	< 0.080	BDL
Ba-140	< 0.836	BDL
Sb-124	< 0.075	BDL
Cs-134	< 0.056	BDL
Ru-106	< 0.529	BDL
Ag-110m	< 0.064	BDL
Zr-95	< 0.148	BDL
Nb-95	< 0.091	BDL
Co-58	< 0.087	BDL
Cs-136	< 0.281	BDL
Mn-54	< 0.071	BDL
Fe-59	< 0.210	BDL
Zn-65	< 0.422	BDL
Co-56	< 0.137	BDL
La-140	< 58.2	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

(Ka)

9513383.2446

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc.

Date Collected: 08/12/95 12:00

Client Name: Washington Dept. of Ecology

Date Analyzed: 09/11/95 15:48

Lab Sample ID: 95-08-180-05

Sample Matrix: Soil

Client Sample ID: H95-027

Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Cs-137	1.63 ± 0.132	8.13
Eu-154	0.481 ± 0.105	21.8
Eu-152	5.77 ± 0.438	7.60
Co-60	0.596 ± 0.058	9.78
Na-22	0.171 ± 0.050	29.3
K-40	10.7 ± 1.07	9.93
Am-241	< 0.317	BDL
Eu-155	< 0.116	BDL
Ce-144	< 0.162	BDL
Ce-141	< 0.062	BDL
Ce-139	< 0.032	BDL
Cr-51	< 0.523	BDL
Sb-125	< 0.105	BDL
Sr-85	< 0.059	BDL
Ba-140	< 0.651	BDL
Sb-124	< 0.052	BDL
Cs-134	< 0.037	BDL
Ru-106	< 0.353	BDL
Ag-110m	< 0.048	BDL
Zr-95	< 0.109	BDL
Nb-95	< 0.065	BDL
Co-58	< 0.053	BDL
Cs-136	< 0.203	BDL
Mn-54	< 0.044	BDL
Fe-59	< 0.130	BDL
Zn-65	< 0.263	BDL
Co-56	< 0.074	BDL
La-140	< 48.2	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

K

9513383.2447

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc. Date Collected: 09/05/95 12:00

Client Name: Washington Dept. of Ecology Date Analyzed: 09/12/95 18:20

Lab Sample ID: 95-08-230-B1 Sample Matrix: Soil

Client Sample ID: Blank Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
K-40	0.201 ± 0.365	181
Am-241	< 0.135	BDL
Eu-155	< 0.051	BDL
Ce-144	< 0.094	BDL
Ce-141	< 0.027	BDL
Ce-139	< 0.013	BDL
Cr-51	< 0.148	BDL
Sb-125	< 0.058	BDL
Sr-85	< 0.031	BDL
Ba-140	< 0.096	BDL
Sb-124	< 0.025	BDL
Cs-134	< 0.024	BDL
Ru-106	< 0.186	BDL
Ag-110m	< 0.021	BDL
Cs-137	< 0.021	BDL
Zr-95	< 0.038	BDL
Nb-95	< 0.024	BDL
Co-58	< 0.025	BDL
Cs-136	< 0.032	BDL
Mn-54	< 0.025	BDL
Fe-59	< 0.047	BDL
Zn-65	< 0.042	BDL
Co-60	< 0.022	BDL
Co-56	< 0.048	BDL
Eu-154	< 0.074	BDL
Na-22	< 0.026	BDL
Eu-152	< 0.099	BDL
La-140	< 0.515	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

Remarks: Blank for work orders 95-08-230 and 95-08-180.

9513383.2448

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc. Date Collected: 09/05/95 12:00

Client Name: Washington Dept. of Ecology Date Analyzed: 09/13/95 11:51

Lab Sample ID: 95-08-230-B2 Sample Matrix: Soil

Client Sample ID: Blank Count Duration: 180 Min.

Nuclide	Activity (pCi/gram)	% Uncertainty
Am-241	< 0.102	BDL
Eu-155	< 0.071	BDL
Ce-144	< 0.182	BDL
Ce-141	< 0.049	BDL
Ce-139	< 0.027	BDL
Cr-51	< 0.278	BDL
Sb-125	< 0.103	BDL
Sr-85	< 0.072	BDL
Ba-140	< 0.196	BDL
Sb-124	< 0.056	BDL
Cs-134	< 0.051	BDL
Ru-106	< 0.431	BDL
Ag-110m	< 0.035	BDL
Cs-137	< 0.036	BDL
Zr-95	< 0.074	BDL
Nb-95	< 0.042	BDL
Co-58	< 0.043	BDL
Cs-136	< 0.063	BDL
Mn-54	< 0.049	BDL
Fe-59	< 0.079	BDL
Zn-65	< 0.091	BDL
Co-60	< 0.048	BDL
Co-56	< 0.073	BDL
Eu-154	< 0.109	BDL
Na-22	< 0.039	BDL
Eu-152	< 0.237	BDL
K-40	< 0.462	BDL
La-140	< 1.63	BDL

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See ATI SOP 743FC for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

Remarks: Blank for work orders 95-08-230 and 95-08-180.

6

9513383.2449

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc. Date Collected: 04/01/94 10:01

Client Name: Washington Dept. of Ecology Date Analyzed : 09/12/95 22:17

Lab Sample ID: 95-08-230-S1 Sample Matrix : Soil

Client Sample ID: Lab Control Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	462	501	92.2	Pass
Cd-109	7730	7110	109	Pass
Co-57	151	157	96.0	Pass
Ce-139	211	209	101	Pass
Sn-113	490	456	107	Pass
Cs-137	220	205	107	Pass
Y-88	666	720	92.5	Pass
Co-60	300	313	96.0	Pass

ATI sets control limits for gamma spectroscopy as follows :
Control Limits = Known ± 10%

Remarks:
Blank spike for work orders 95-08-230 and 95-08-180.

(Ka)

9513383.2450

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Analytical Technologies, Inc.

Date Collected: 04/01/94 10:00

Client Name: Washington Dept. of Ecology

Date Analyzed : 09/13/95 10:23

Lab Sample ID: 95-08-230-S2

Sample Matrix : Soil

Client Sample ID: Lab Control

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	980	1010	96.8	Pass
Cd-109	14500	14400	101	Pass
Co-57	308	317	97.0	Pass
Ce-139	393	421	93.4	Pass
Sn-113	938	920	102	Pass
Cs-137	442	414	107	Pass
Y-88	1370	1450	94.3	Pass
Co-60	602	632	95.2	Pass

ATI sets control limits for gamma spectroscopy as follows :
Control Limits = Known ± 10%

Remarks:
Lab control sample for work orders 95-08-230 and 95-08-180.

(16)

9513383.2451

AnalyticalTechnologies,Inc.

QUALITY ASSURANCE
DATA REVIEW

Date: 9/13/95

ATI Workorder: 95-08-179 +180 Analysis: METALS

The data contained in the following report have been reviewed and approved by the personnel listed below:

Inorganic Chemist

CERTIFICATION

Analytical Technologies, Inc. certifies that the analyses reported herein are true, complete, and correct within the limits of the methods employed.

A case narrative X is ___ is not included with this report.

9513383.2452

Narrative Comments for Work Orders 95-08-179, 95-08-180
Metals

Work Order 95-08-179 was received on August 18, 1995 and scheduled for metals analysis. No sampling date was entered on the chain of custody. Without a sampling date we can not determine if samples were analyzed within hold time.

Work Order 95-08-180 was received on August 18, 1995 and scheduled for metals analysis. No sampling date was entered on the chain of custody. Without a sampling date we can not determine if samples were analyzed within hold time. One container each of client samples H95023 and H95025 were broken in transit. Analyses were run on these samples. Both containers of client sample H95028 were broken in transit. No analysis could be run on this sample.

Inorganics Resource Manager

9513383.2453 **TOTAL METALS**

Sample ID

Reagent Blank

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Lab Sample ID: RB 95-08-180

Samples are reported on a dry weight basis.

Date Collected: N/A

Prep Date: 08/29/95
09/06/95

Date Analyzed: 08/31/95
09/02,07/95

Percent Solids: 100%

Analyte	Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum	6010	ND	20
Antimony	6010	ND	2
Arsenic	6010	ND	1
Barium	6010	ND	10
Beryllium	6010	ND	0.5
Cadmium	6010	ND	0.5
Calcium	6010	ND	100
Chromium	6010	ND	1
Cobalt	6010	ND	1
Copper	6010	ND	1
Iron	6010	ND	10
Lead	6010	ND	0.3
Magnesium	6010	ND	100
Manganese	6010	ND	1
Mercury	7471	ND	0.2
Nickel	6010	ND	2
Potassium	6010	ND	100
Selenium	6010	ND	0.5
Silver	6010	ND	1
Sodium	6010	ND	100
Thallium	6010	ND	1
Vanadium	6010	ND	1
Zinc	6010	ND	2

ND = Not Detected

9513383.2454

TOTAL METALS

Sample ID

H95023

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Lab Sample ID: 95-08-180-01

Sample Matrix: Solid

Date Collected: N/A

Prep Date: 08/29/95
09/06/95

Date Analyzed: 08/31/95
09/02,07/95

Percent Solids: 92%

Samples are reported on a dry weight basis.

Analyte	Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum	6010	7800	30
Antimony	6010	ND	3
Arsenic	6010	3	2
Barium	6010	130	20
Beryllium	6010	ND	0.6
Cadmium	6010	ND	0.6
Calcium	6010	6300	200
Chromium	6010	30	2
Cobalt	6010	15	2
Copper	6010	29	2
Iron ^	6010	33000	60
Lead	6010	5.6	0.4
Magnesium	6010	5500	200
Manganese	6010	440	2
Mercury	7471	3.0	0.3
Nickel	6010	12	3
Potassium	6010	1300	200
Selenium	6010	2.7	0.6
Silver	6010	ND	2
Sodium	6010	400	200
Thallium *	6010	ND	6
Vanadium	6010	56	2
Zinc	6010	130	3

ND = Not Detected

^ Detection limit raised. Dilution required due to analyte concentration.

* Detection limit raised due to matrix interference.

9513383.20FF

TOTAL METALS

Sample ID

H95024

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Lab Sample ID: 95-08-180-02

Sample Matrix: Solid

Date Collected: N/A

Prep Date: 08/29/95
09/06/95

Date Analyzed: 08/31/95
09/02,07/95

Percent Solids: 88%

Samples are reported on a dry weight basis.

Analyte		Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum		6010	7800	30
Antimony		6010	ND	3
Arsenic		6010	5	2
Barium		6010	130	20
Beryllium		6010	ND	0.6
Cadmium		6010	ND	0.6
Calcium		6010	6900	200
Chromium		6010	140	2
Cobalt		6010	11	2
Copper		6010	30	2
Iron	^	6010	27000	60
Lead		6010	14	0.4
Magnesium		6010	5700	200
Manganese		6010	290	2
Mercury	^	7471	9	0.5
Nickel		6010	11	3
Potassium		6010	1400	200
Selenium		6010	2.1	0.6
Silver		6010	ND	2
Sodium		6010	400	200
Thallium	*	6010	ND	6
Vanadium		6010	54	2
Zinc		6010	100	3

ND = Not Detected
^ Detection limit raised. Dilution required due to analyte concentration.
* Detection limit raised due to matrix interference.

9513383.2856

TOTAL METALS

Sample ID

H95025

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Lab Sample ID: 95-08-180-03

Sample Matrix: Solid

Date Collected: N/A

Prep Date: 08/29/95
09/06/95

Date Analyzed: 08/31/95
09/02,07/95

Percent Solids: 95%

Samples are reported on a dry weight basis.

Analyte	Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum	6010	6100	30
Antimony	6010	ND	3
Arsenic	6010	2	2
Barium	6010	160	20
Beryllium	6010	ND	0.6
Cadmium	6010	ND	0.6
Calcium	6010	7800	200
Chromium	6010	9	2
Cobalt	6010	16	2
Copper	6010	34	2
Iron ^	6010	36000	60
Lead	6010	2.5	0.4
Magnesium	6010	4700	200
Manganese	6010	410	2
Mercury	7471	1.9	0.3
Nickel	6010	9	3
Potassium	6010	700	200
Selenium	6010	3.4	0.6
Silver	6010	ND	2
Sodium	6010	400	200
Thallium *	6010	ND	6
Vanadium	6010	68	2
Zinc	6010	150	3

ND = Not Detected
^ Detection limit raised. Dilution required due to analyte concentration.
* Detection limit raised due to matrix interference.

9513383.2462

TOTAL METALS

Sample ID

H95026

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Lab Sample ID: 95-08-180-04

Sample Matrix: Solid

Date Collected: N/A

Prep Date: 08/29/95
09/06/95

Date Analyzed: 08/31/95
09/02,07/95

Percent Solids: 86%

Samples are reported on a dry weight basis.

Analyte		Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum		6010	9500	30
Antimony		6010	ND	3
Arsenic		6010	4	2
Barium		6010	180	20
Beryllium		6010	ND	0.6
Cadmium		6010	ND	0.6
Calcium		6010	7400	200
Chromium		6010	95	2
Cobalt		6010	12	2
Copper		6010	48	2
Iron	^	6010	29000	60
Lead		6010	16	0.4
Magnesium		6010	6300	200
Manganese		6010	340	2
Mercury	^	7471	12	3
Nickel		6010	13	3
Potassium		6010	1500	200
Selenium		6010	1.8	0.6
Silver		6010	ND	2
Sodium		6010	600	200
Thallium	*	6010	ND	6
Vanadium		6010	54	2
Zinc		6010	220	3

ND = Not Detected
^ Detection limit raised. Dilution required due to analyte concentration.
* Detection limit raised due to matrix interference.

9513383.2868

TOTAL METALS

Sample ID

H95027

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Lab Sample ID: 95-08-180-05

Sample Matrix: Solid

Date Collected: N/A

Prep Date: 08/29/95
09/06/95

Date Analyzed: 08/31/95
09/02,07/95

Percent Solids: 92%

Samples are reported on a dry weight basis.

Analyte	Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum	6010	7800	30
Antimony	6010	ND	3
Arsenic	6010	3	2
Barium	6010	200	20
Beryllium	6010	ND	0.6
Cadmium	6010	ND	0.6
Calcium	6010	8800	200
Chromium	6010	57	2
Cobalt	6010	11	2
Copper	6010	25	2
Iron ^	6010	24000	60
Lead	6010	9.8	0.4
Magnesium	6010	5100	200
Manganese	6010	350	2
Mercury	7471	8.0	0.5
Nickel	6010	10	3
Potassium	6010	1300	200
Selenium	6010	1.4	0.6
Silver	6010	ND	2
Sodium	6010	400	200
Thallium *	6010	ND	6
Vanadium	6010	47	2
Zinc	6010	62	3

ND = Not Detected
^ Detection limit raised. Dilution required due to analyte concentration.
* Detection limit raised due to matrix interference.

9513383.245P

TOTAL METALS

Sample ID

Reagent Blank

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Lab Sample ID: RB 95-08-179

Samples are reported on a dry weight basis.

Date Collected: N/A

Prep Date: 08/29/95

Date Analyzed: 08/31/95
09/01,02/95

Percent Solids: 100%

Analyte	Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum	6010	ND	20
Antimony	6010	ND	2
Arsenic	6010	ND	1
Barium	6010	ND	10
Beryllium	6010	ND	0.5
Cadmium	6010	ND	0.5
Calcium	6010	ND	100
Chromium	6010	ND	1
Cobalt	6010	ND	1
Copper	6010	ND	1
Iron	6010	ND	10
Lead	6010	ND	0.3
Magnesium	6010	ND	100
Manganese	6010	ND	1
Mercury	7471	ND	0.2
Nickel	6010	ND	2
Potassium	6010	ND	100
Selenium	6010	ND	0.5
Silver	6010	ND	1
Sodium	6010	ND	100
Thallium	6010	ND	1
Vanadium	6010	ND	1
Zinc	6010	ND	2

ND = Not Detected

9513383.2460

TOTAL METALS

Sample ID

H95029

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Date Collected: N/A

Client Project ID: 100-BC-1 Demo Project

Prep Date: 08/29/95

Lab Sample ID: 95-08-179-01

Date Analyzed: 08/31/95
09/01,02/95

Sample Matrix: Solid

Percent Solids: 91%

Samples are reported on a dry weight basis.

Analyte	Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum	6010	8800	30
Antimony	6010	ND	3
Arsenic	6010	4	2
Barium	6010	340	20
Beryllium	6010	ND	0.6
Cadmium	6010	ND	0.6
Calcium	6010	13000	200
Chromium	6010	13	2
Cobalt	6010	12	2
Copper	6010	25	2
Iron ^	6010	26000	60
Lead	6010	7.7	0.4
Magnesium	6010	5200	200
Manganese	6010	360	2
Mercury	7471	ND	0.3
Nickel	6010	13	3
Potassium	6010	1200	200
Selenium	6010	1.7	0.6
Silver	6010	ND	2
Sodium	6010	500	200
Thallium *	6010	ND	6
Vanadium	6010	56	2
Zinc	6010	53	3

ND = Not Detected
^ Detection limit raised. Dilution required due to analyte concentration.
* Detection limit raised due to matrix interference.

9513383.2461

TOTAL METALS

Sample ID

H95030

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Lab Sample ID: 95-08-179-02

Sample Matrix: Solid

Date Collected: N/A

Prep Date: 08/29/95

Date Analyzed: 08/31/95
09/01,02/95

Percent Solids: 86%

Samples are reported on a dry weight basis.

Analyte	Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum	6010	2800	30
Antimony	6010	ND	3
Arsenic	6010	3	2
Barium	6010	ND	20
Beryllium	6010	ND	0.6
Cadmium	6010	ND	0.6
Calcium	6010	900	200
Chromium	6010	20	2
Cobalt	6010	6	2
Copper	6010	7	2
Iron ^	6010	14000	60
Lead	6010	23	0.4
Magnesium	6010	1000	200
Manganese	6010	100	2
Mercury	7471	ND	0.3
Nickel	6010	3	3
Potassium	6010	500	200
Selenium	6010	0.7	0.6
Silver	6010	ND	2
Sodium	6010	200	200
Thallium *	6010	ND	6
Vanadium	6010	51	2
Zinc	6010	28	3

ND = Not Detected
^ Detection limit raised. Dilution required due to analyte concentration.
* Detection limit raised due to matrix interference.

9513383 TOTAL METALS

Sample ID

H95031

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Date Collected: N/A

Client Project ID: 100-BC-1 Demo Project

Prep Date: 08/29/95

Lab Sample ID: 95-08-179-03

Date Analyzed: 08/31/95
09/01,02/95

Sample Matrix: Solid

Percent Solids: 78%

Samples are reported on a dry weight basis.

Analyte	Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum	6010	3900	30
Antimony	6010	ND	3
Arsenic	6010	4	2
Barium	6010	60	20
Beryllium	6010	ND	0.7
Cadmium	6010	ND	0.7
Calcium	6010	2400	200
Chromium	6010	19	2
Cobalt	6010	6	2
Copper	6010	10	2
Iron ^	6010	13000	70
Lead	6010	29	0.4
Magnesium	6010	1600	200
Manganese	6010	130	2
Mercury	7471	ND	0.3
Nickel	6010	4	3
Potassium	6010	700	200
Selenium	6010	ND	0.7
Silver	6010	ND	2
Sodium	6010	300	200
Thallium *	6010	ND	7
Vanadium	6010	36	2
Zinc	6010	25	3

ND = Not Detected
^ Detection limit raised. Dilution required due to analyte concentration.
* Detection limit raised due to matrix interference.

9513383.2463

TOTAL METALS

Sample ID

H95032

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Lab Sample ID: 95-08-179-04

Sample Matrix: Solid

Date Collected: N/A

Prep Date: 08/29/95

Date Analyzed: 08/31/95
09/01,02/95

Percent Solids: 78%

Samples are reported on a dry weight basis.

Analyte	Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum	6010	5200	30
Antimony	6010	ND	3
Arsenic	6010	4	2
Barium	6010	60	20
Beryllium	6010	ND	0.7
Cadmium	6010	ND	0.7
Calcium	6010	1200	200
Chromium	6010	90	2
Cobalt	6010	11	2
Copper	6010	9	2
Iron ^	6010	43000	70
Lead	6010	220	0.4
Magnesium	6010	2100	200
Manganese	6010	140	2
Mercury	7471	ND	0.3
Nickel	6010	5	3
Potassium	6010	900	200
Selenium	6010	5.5	0.7
Silver	6010	ND	2
Sodium	6010	300	200
Thallium *	6010	ND	20
Vanadium	6010	190	2
Zinc	6010	33	3

ND = Not Detected
^ Detection limit raised. Dilution required due to analyte concentration.
* Detection limit raised due to matrix interference.

9513383 2464

TOTAL METALS

Sample ID

H95033

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Date Collected: N/A

Client Project ID: 100-BC-1 Demo Project

Prep Date: 08/29/95

Lab Sample ID: 95-08-179-05

Date Analyzed: 08/31/95
09/01,02/95

Sample Matrix: Solid

Percent Solids: 92%

Samples are reported on a dry weight basis.

Analyte		Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum		6010	5500	30
Antimony		6010	2	3
Arsenic		6010	2	2
Barium		6010	60	20
Beryllium		6010	ND	0.6
Cadmium	*	6010	ND	3
Calcium		6010	2500	200
Chromium		6010	130	2
Cobalt		6010	11	2
Copper		6010	14	2
Iron	^	6010	51000	60
Lead	*	6010	460	2
Magnesium		6010	3000	200
Manganese		6010	220	2
Mercury		7471	ND	0.3
Nickel		6010	8	3
Potassium		6010	500	200
Selenium	*	6010	ND	3
Silver		6010	ND	2
Sodium		6010	200	200
Thallium	*	6010	ND	6
Vanadium		6010	100	2
Zinc		6010	40	3

ND = Not Detected
^ Detection limit raised. Dilution required due to analyte concentration.
* Detection limit raised due to matrix interference.

9513383.2865

TOTAL METALS

Sample ID

H95034

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Lab Sample ID: 95-08-179-06

Sample Matrix: Solid

Date Collected: N/A

Prep Date: 08/29/95

Date Analyzed: 08/31/95
09/01,02/95

Percent Solids: 92%

Samples are reported on a dry weight basis.

Analyte	Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum	6010	5500	30
Antimony	6010	ND	3
Arsenic	6010	3	2
Barium	6010	60	20
Beryllium	6010	ND	0.6
Cadmium	6010	ND	0.6
Calcium	6010	3100	200
Chromium	6010	130	2
Cobalt	6010	10	2
Copper	6010	16	2
Iron ^	6010	43000	60
Lead	6010	270	0.4
Magnesium	6010	3100	200
Manganese	6010	230	2
Mercury	7471	ND	0.3
Nickel	6010	6	3
Potassium	6010	600	200
Selenium	6010	8.7	0.6
Silver	6010	ND	2
Sodium	6010	300	200
Thallium *	6010	ND	6
Vanadium	6010	72	2
Zinc	6010	39	3

ND = Not Detected
^ Detection limit raised. Dilution required due to analyte concentration.
* Detection limit raised due to matrix interference.

9513385.2466

TOTAL METALS

Sample ID

H95035

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Lab Sample ID: 95-08-179-07

Sample Matrix: Solid

Date Collected: N/A

Prep Date: 08/29/95

Date Analyzed: 08/31/95
09/01,02/95

Percent Solids: 91%

Samples are reported on a dry weight basis.

Analyte	Modified Method	Concentration mg/kg	Detection Limit mg/kg
Aluminum	6010	6200	30
Antimony	6010	ND	3
Arsenic	6010	4	2
Barium	6010	60	20
Beryllium	6010	ND	0.6
Cadmium	6010	ND	0.6
Calcium	6010	3900	200
Chromium	6010	240	2
Cobalt	6010	11	2
Copper	6010	19	2
Iron ^	6010	41000	60
Lead	6010	330	0.4
Magnesium	6010	3400	200
Manganese	6010	220	2
Mercury	7471	ND	0.4
Nickel	6010	8	3
Potassium	6010	700	200
Selenium	6010	5.2	0.6
Silver	6010	ND	2
Sodium	6010	200	200
Thallium *	6010	ND	6
Vanadium	6010	60	2
Zinc	6010	48	3

ND = Not Detected
^ Detection limit raised. Dilution required due to analyte concentration.
* Detection limit raised due to matrix interference.

9513383.2467

TOTAL METALS
MATRIX SPIKE

Sample ID

H95023

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Prep Date: 08/29/95

Lab Sample ID: 95-08-180-01

Date Analyzed: 08/31/95
09/02/95

Sample Matrix: Solid

Samples are reported on a wet weight basis.

Analyte	Spike Added mg/kg	Sample Conc. mg/kg	MS Conc. mg/kg	% Rec (limits 80-120%)	Flags
Aluminum	200	7200	7600	200	See Note
Antimony	50	< 2	40	80	
Arsenic	200	3	200	99	
Barium	200	120	310	95	
Beryllium	5.0	< 0.5	5.2	104	
Cadmium	5.0	< 0.5	4.5	90	
Calcium	4000	5800	9900	103	
Chromium	20	28	50	110	
Cobalt	50	14	64	100	
Copper	25	27	55	112	
Iron	100	30000	32000	2000	See Note
Lead	50	5.2	54	98	
Magnesium	4000	5000	9500	113	
Manganese	50	410	500	180	See Note
Nickel	50	11	61	100	
Potassium	4000	1200	4600	85	
Selenium	200	2.5	190	94	
Silver	20	< 1	21	105	
Sodium	4000	330	4100	94	
Thallium	200	< 5	190	95	
Vanadium	50	52	100	96	
Zinc	50	120	170	100	

Flags described on following page.

9513383.0968

TOTAL METALS
MATRIX SPIKE DUPLICATE

Sample ID

H95023

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Lab Sample ID: 95-08-180-01

Prep Date: 08/29/95

Sample Matrix: Solid

Date Analyzed: 08/31/95
09/02/95

Samples are reported on a wet weight basis.

Analyte	MSD Conc.	MSD % Rec (limits 80-120%)	Relative % Difference (limits 0-20%)	Flags
Aluminum	7800	300	3	See Note
Antimony	35	70	13	P
Arsenic	200	99	0	
Barium	330	105	6	
Beryllium	5.2	104	0	
Cadmium	4.6	92	2	
Calcium	9400	90	5	
Chromium	51	115	2	
Cobalt	64	100	0	
Copper	53	104	4	
Iron	29000	-1000	10	See Note
Lead	54	98	0	
Magnesium	9200	105	3	
Manganese	640	460	25	See Note M
Nickel	62	102	2	
Potassium	4600	85	0	
Selenium	200	99	5	
Silver	20	100	5	
Sodium	4100	94	0	
Thallium	190	95	0	
Vanadium	100	96	0	
Zinc	180	120	6	

Note: Due to the large concentration of analyte in the sample, matrix spike recovery may not be accurate. The Laboratory Control Sample (LCS) is included on a separate page to show that the digestion and analysis were in control.
P: Matrix spike duplicate recovery is outside acceptance limits. Since the Matrix spike recovered within acceptance limits and the Relative Percent Difference is acceptable no further action was taken.
M: Relative percent difference between matrix spike and matrix spike duplicate is outside the control limits. No further action.

9513383.2469

TOTAL METALS
MATRIX SPIKE

Sample ID

H95-029

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Prep Date: 08/29/95

Lab Sample ID: 95-08-179-01

Date Analyzed: 09/01/95

Sample Matrix: Solid

Samples are reported on a wet weight basis.

Analyte	Spike Added mg/kg	Sample Conc. mg/kg	MS Conc. mg/kg	% Rec (limits 80-120%)	Flags
Mercury	2.5	< 0.2	2.4	96	

Analyte	MSD Conc. mg/kg	MSD % Rec (limits 80-120%)	Relative % Difference (limits 0-20%)	Flags
Mercury	2.4	96	0	

9513383.2470

TOTAL METALS
MATRIX SPIKE

Sample ID

H95025

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Prep Date: 09/06/95

Lab Sample ID: 95-08-180-03

Date Analyzed: 09/07/95

Sample Matrix: Solid

Samples are reported on a wet weight basis.

Analyte	Spike Added mg/kg	Sample Conc. mg/kg	MS Conc. mg/kg	% Rec (limits 80-120%)	Flags
Mercury	2.5	1.8	4.0	88	

Analyte	MSD Conc. mg/kg	MSD % Rec (limits 80-120%)	Relative % Difference (limits 0-20%)	Flags
Mercury	4.4	104	10	

9513383.2471

METALS
LABORATORY CONTROL SAMPLE

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Work Order Number: 95-08-179

Date Analyzed: 08/31/95
09/02/95

Analyte	LCS Result mg/kg	LCS True Value mg/kg	LCS % Recovery	LCS Acceptance Limits mg/kg
Aluminum	3100	3,420	91	1,700 - 4,890
Iron	6100	7,530	81	1,890 - 13,200
Manganese	220	215	102	149 - 290

Note: All analytes recovered within acceptance criteria.

9513383.2472

TCLP METALS

Sample ID

TCLP Blank

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Date Collected: N/A

Client Project ID: 100-BC-1 Demo Project

Prep Date: 09/01,11/95

Lab Sample ID: RB 95-08-179

Date Analyzed: 09/03,11/95

Sample Matrix: TCLP Leachate

EPA HW Number	CAS Number	Analyte	Modified Method	Concentration mg/L	Detection Limit (mg/L)
D004	7440-38-2	Arsenic	6010	ND	0.1
D005	7440-39-3	Barium	6010	ND	1
D006	7440-43-9	Cadmium	6010	ND	0.05
D007	7440-47-3	Chromium	6010	ND	0.1
D008	7439-92-1	Lead	6010	ND	0.03
D009	7439-97-6	Mercury	7470	ND	0.002
D010	7782-49-2	Selenium	6010	ND	0.05
D011	7440-22-4	Silver	6010	ND	0.1

ND= Not Detected

9513583.2473

TCLP METALS

Sample ID

H95029

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Date Collected: N/A

Client Project ID: 100-BC-1 Demo Project

Prep Date: 09/01,11/95

Lab Sample ID: 95-08-179-01

Date Analyzed: 09/03,11/95

Sample Matrix: TCLP Leachate

EPA HW Number	CAS Number	Analyte	Modified Method	Concentration mg/L	Detection Limit (mg/L)
D004	7440-38-2	Arsenic	6010	ND	0.1
D005	7440-39-3	Barium	6010	2	1
D006	7440-43-9	Cadmium	6010	ND	0.05
D007	7440-47-3	Chromium	6010	ND	0.1
D008	7439-92-1	Lead	6010	ND	0.03
D009	7439-97-6	Mercury	7470	ND	0.002
D010	7782-49-2	Selenium	6010	ND	0.05
D011	7440-22-4	Silver	6010	ND	0.1

ND= Not Detected

9513383.2474

TCLP METALS

Sample ID

H95030

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Date Collected: N/A

Client Project ID: 100-BC-1 Demo Project

Prep Date: 09/01,11/95

Lab Sample ID: 95-08-179-02

Date Analyzed: 09/03,11/95

Sample Matrix: TCLP Leachate

EPA HW Number	CAS Number	Analyte	Modified Method	Concentration mg/L	Detection Limit (mg/L)
D004	7440-38-2	Arsenic	6010	ND	0.1
D005	7440-39-3	Barium	6010	ND	1
D006	7440-43-9	Cadmium	6010	ND	0.05
D007	7440-47-3	Chromium	6010	ND	0.1
D008	7439-92-1	Lead	6010	ND	0.03
D009	7439-97-6	Mercury	7470	ND	0.002
D010	7782-49-2	Selenium	6010	0.06	0.05
D011	7440-22-4	Silver	6010	ND	0.1

ND= Not Detected

9513383.2475

TCLP METALS

Sample ID

H95031

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Date Collected: N/A

Client Project ID: 100-BC-1 Demo Project

Prep Date: 09/01,11/95

Lab Sample ID: 95-08-179-03

Date Analyzed: 09/03,11/95

Sample Matrix: TCLP Leachate

EPA HW Number	CAS Number	Analyte	Modified Method	Concentration mg/L	Detection Limit (mg/L)
D004	7440-38-2	Arsenic	6010	ND	0.1
D005	7440-39-3	Barium	6010	ND	1
D006	7440-43-9	Cadmium	6010	ND	0.05
D007	7440-47-3	Chromium	6010	ND	0.1
D008	7439-92-1	Lead	6010	ND	0.03
D009	7439-97-6	Mercury	7470	ND	0.002
D010	7782-49-2	Selenium	6010	ND	0.05
D011	7440-22-4	Silver	6010	ND	0.1

ND= Not Detected

9513383.2476

TCLP METALS

Sample ID

H95032

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Date Collected: N/A

Client Project ID: 100-BC-1 Demo Project

Prep Date: 09/01,11/95

Lab Sample ID: 95-08-179-04

Date Analyzed: 09/03,11/95

Sample Matrix: TCLP Leachate

EPA HW Number	CAS Number	Analyte	Modified Method	Concentration mg/L	Detection Limit (mg/L)
D004	7440-38-2	Arsenic	6010	ND	0.1
D005	7440-39-3	Barium	6010	ND	1
D006	7440-43-9	Cadmium	6010	ND	0.05
D007	7440-47-3	Chromium	6010	ND	0.1
D008	7439-92-1	Lead	6010	ND	0.03
D009	7439-97-6	Mercury	7470	ND	0.002
D010	7782-49-2	Selenium	6010	ND	0.05
D011	7440-22-4	Silver	6010	ND	0.1

ND= Not Detected

9513383.2477

TCLP METALS

Sample ID

H95033

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Date Collected: N/A

Client Project ID: 100-BC-1 Demo Project

Prep Date: 09/01,11/95

Lab Sample ID: 95-08-179-05

Date Analyzed: 09/03,11/95

Sample Matrix: TCLP Leachate

EPA HW Number	CAS Number	Analyte	Modified Method	Concentration mg/L	Detection Limit (mg/L)
D004	7440-38-2	Arsenic	6010	ND	0.1
D005	7440-39-3	Barium	6010	ND	1
D006	7440-43-9	Cadmium	6010	ND	0.05
D007	7440-47-3	Chromium	6010	ND	0.1
D008	7439-92-1	Lead	6010	ND	0.03
D009	7439-97-6	Mercury	7470	ND	0.002
D010	7782-49-2	Selenium	6010	ND	0.05
D011	7440-22-4	Silver	6010	ND	0.1

ND= Not Detected

9513383.2478

TCLP METALS

Sample ID

H95034

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Lab Sample ID: 95-08-179-06

Sample Matrix: TCLP Leachate

Date Collected: N/A

Prep Date: 09/01,11/95

Date Analyzed: 09/03,11/95

EPA HW Number	CAS Number	Analyte	Modified Method	Concentration mg/L	Detection Limit (mg/L)
D004	7440-38-2	Arsenic	6010	ND	0.1
D005	7440-39-3	Barium	6010	ND	1
D006	7440-43-9	Cadmium	6010	ND	0.05
D007	7440-47-3	Chromium	6010	ND	0.1
D008	7439-92-1	Lead	6010	ND	0.03
D009	7439-97-6	Mercury	7470	ND	0.002
D010	7782-49-2	Selenium	6010	ND	0.05
D011	7440-22-4	Silver	6010	ND	0.1

ND= Not Detected

9513383.2479

TCLP METALS

Sample ID

H95035

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Date Collected: N/A

Client Project ID: 100-BC-1 Demo Project

Prep Date: 09/01,11/95

Lab Sample ID: 95-08-179-07

Date Analyzed: 09/03,11/95

Sample Matrix: TCLP Leachate

EPA HW Number	CAS Number	Analyte	Modified Method	Concentration mg/L	Detection Limit (mg/L)
D004	7440-38-2	Arsenic	6010	ND	0.1
D005	7440-39-3	Barium	6010	ND	1
D006	7440-43-9	Cadmium	6010	ND	0.05
D007	7440-47-3	Chromium	6010	ND	0.1
D008	7439-92-1	Lead	6010	ND	0.03
D009	7439-97-6	Mercury	7470	ND	0.002
D010	7782-49-2	Selenium	6010	ND	0.05
D011	7440-22-4	Silver	6010	ND	0.1

ND= Not Detected

9513383.2480

TCLP METALS
MATRIX SPIKE

Sample ID

H95029

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Lab Sample ID: 95-08-179-01

Prep Date: 09/01,11/95

Sample Matrix: TCLP Leachate

Date Analyzed: 09/03,11/95

Analyte	Spike Added mg/L	Sample Conc. mg/L	MS Conc. mg/L	% Rec (limits 80-120%)	Flags
Arsenic	20	< 0.1	21	105	
Barium	20	2	20	90	
Cadmium	0.50	< 0.05	0.50	100	
Chromium	2.0	< 0.1	1.8	90	
Lead	5.0	< 0.03	4.9	98	
Mercury	0.020	< 0.002	0.019	95	
Selenium	20	< 0.05	22	110	
Silver	2.0	< 0.1	2.0	100	

Analyte	MSD Conc. mg/L	MSD % Rec (limits 80-120 %)	Relative % Difference (limits 0-20%)	Flags
Arsenic	21	105	0	
Barium	20	90	0	
Cadmium	0.50	100	0	
Chromium	1.8	90	0	
Lead	4.9	98	0	
Mercury	0.022	110	15	
Selenium	22	110	0	
Silver	2.0	100	0	

9513383.2481

TCLP MERCURY

Modified Method 7470

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Client Project ID: 100-BC-1 Demo Project

Work Order Number: 95-08-180

Sample Matrix: TCLP Leachate

Date Collected: N/A

Prep Date: 09/05/95

Date Analyzed: 09/06/95

EPA HW Number: D009

CAS Number: 7439-97-6

Analyte	Client Sample ID	Lab Sample ID	Concentration mg/L	Detection Limit mg/L
Mercury	Reagent Blank	RB 95-08-180	ND	0.002
Mercury	H95023	95-08-180-01	ND	0.002
Mercury	H95024	95-08-180-02	ND	0.002
Mercury	H95025	95-08-180-03	ND	0.002
Mercury	H95026	95-08-180-04	ND	0.002
Mercury	H95027	95-08-180-05	ND	0.002

ND = Not Detected

9513383.2482

TCLP METALS
MATRIX SPIKE

Sample ID

H95023

Lab Name: Analytical Technologies, Inc.

Client Name: Washington Dept. of Ecology

Lab Sample ID: 95-08-180-01

Prep Date: 09/05/95

Sample Matrix: TCLP Leachate

Date Analyzed: 09/06/95

Analyte	Spike Added mg/L	Sample Conc. mg/L	MS Conc. mg/L	% Rec (limits 80-120%)	Flags
Mercury	0.020	< 0.002	0.020	100	

Analyte	MSD Conc. mg/L	MSD % Rec (limits 80-120 %)	Relative % Difference (limits 0-20%)	Flags
Mercury	0.018	90	11	

AnalyticalTechnologies,Inc.
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1 (800) 443-1511

Chain of Custody

DATE 8/10/95 PAGE 1 OF 1

ACCESSION NUMBER: 95-08-179

PROJECT MANAGER: JERRY YORKEL
COMPANY: ECOLOGY
ADDRESS: 1315 W. 4TH
KENNEWICK, WA
99336
SAMPLER: BECHTEL
PHONE NUMBER
FAX NUMBER

ANALYSIS REQUESTED

SAMPLE ID	SAMPLE DATE	SAMPLE TIME	MATRIX	LAB ID	9070/9071 — Oil & Grease	418.1 — TRPH	8015 Mod. — Gasoline	8015 Mod. — Diesel	8015/8020 — Gasoline/BTEX	8020 — BTEX	8240 — GC/MS VOC's	8270 — GC/MS SVOC's	8080 — Pesticides/PCB's	8080 — PCB Only	8310 — PNA's	8150 — Herbicides	8140 — OP Pesticides	TOX — EOX — TX	Total Metals:	TCLP: Metals	Gross Alpha	Gross Beta	Radium 226	Radium 228	Tritium	Strontium 89/90 (FP)	~~% Moisture~~ GAMMA SPEC	~~Total Alpha~~						Number of Containers
H9 5029				01															✓	✓						✓	✓							1
H9 5030				02															✓	✓						✓	✓							1
H9 5031				03															✓	✓						✓	✓							1
H9 5032				04															✓	✓						✓	✓							1
H9 5033				05															✓	✓						✓	✓							1
H9 5034				06															✓	✓						✓	✓							1
H9 5035				07															✓	✓						✓	✓							1

PROJECT INFORMATION	SAMPLE RECEIPT	
PROJECT NUMBER:	TOTAL NUMBER OF CONTAINERS	7
PROJECT NAME:	CHAIN OF CUSTODY SEALS Y/N	Y
PURCHASE ORDER NUMBER:	SEALS INTACT? Y/N/NA	Y
TAT: ☐ STANDARD ☐ RUSH DUE:	RECEIVED GOOD COND./COLD	Y

SAMPLE DISPOSAL: ☐ HAZ WASTE $5.00 ☐ RAD CHEM $15.00 ☐ RETURN

Comments:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Jerry Yorkel Time: 10:15	Signature: Time:	Signature: Time:
Printed Name: JERRY YORKEL Date: 8/10/95	Printed Name: Date:	Printed Name: Date:
Company: ECOLOGY	Company: UPS	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: 3.**
Signature: Time:	Signature: D Hill Time: 10 30	Signature: Time:
Printed Name: Date:	Printed Name: D Hill Date: 8/10/95	Printed Name: Date:
Company: ~~ATI~~ UPS	Company: ATI-CO	Company:

DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

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1 (800) 443-1511

Chain of Custody

DATE 8/17/95 PAGE 1 OF 1

ACCESSION NUMBER: 95-08-180

PROJECT MANAGER: JEREMY YORKEL
COMPANY: ECOLOGY
ADDRESS: 1315 W. 4TH
KENNEWICK, WA.
99336
SAMPLER: BECHTEL
(509) 736-3004
PHONE NUMBER
FAX NUMBER

ANALYSIS REQUESTED

SAMPLE ID	SAMPLE DATE	SAMPLE TIME	MATRIX	LAB ID	9070/9071 — Oil & Grease	418.1 — TRPH	8015 Mod. — Gasoline	8015 Mod. — Diesel	8015/8020 — Gasoline/BTEX	8020 — BTEX	8240 — GC/MS VOC's	8270 — GC/MS SVOC's	8080 — Pesticides/PCB's	8080 — PCB Only	8310 — PNA's	8150 — Herbicides	8140 — OP Pesticides	TOX — EOX — TX	Total Metals:	TCLP:	Gross Alpha	Gross Beta	Radium 226	Radium 228	Tritium	Strontium	% Moisture	TCLP Hg	GAMMA SVOC	GFP Sub 8/90				Number of Containers	
H95023 *				01															✓									✓	✓	✓				3	TCLP Hg GAMMA SVOC GFP
H95024				02															✓									✓	✓	✓				4	TCLP Hg GAMMA SVOC GFP
H95025 *				03															✓									✓	✓	✓				3	*
H95026				04															✓									✓	✓	✓				4	L
H95027				05															✓									✓	✓	✓				2	TCLP Hg GAMMA
H95028 **				06															✓									✓	✓	✓				Ø	

PROJECT INFORMATION	SAMPLE RECEIPT	
PROJECT NUMBER:	TOTAL NUMBER OF CONTAINERS	
PROJECT NAME:	CHAIN OF CUSTODY SEALS Y/N	
PURCHASE ORDER NUMBER:	SEALS INTACT? Y/N/NA	
TAT: ☐ STANDARD ☐ RUSH DUE:	RECEIVED GOOD COND./COLD	

SAMPLE DISPOSAL: ☐ HAZ WASTE $5.00 ☐ RAD CHEM $15.00 ☐ RETURN

Comments: * Samples 01-&-03 Had 1 container of 4 Broken
** Sample 06 Had Both Containers Broken

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Jeremy Yorkel Time: 8/17	Signature: Time:	Signature: Time:
Printed Name: JEREMY YORKEL Date: 8/17/95	Printed Name: Date:	Printed Name: Date:
Company: ECOLOGY	Company: UPS	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: 3.**
Signature: Time:	Signature: Time: 1030	Signature: Time:
Printed Name: Date:	Printed Name: D. Hill Date: 8/18/95	Printed Name: Date:
Company: UPS	Company: ATI-10	Company:

DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

9513383.2485

Analytical Technologies, Inc. - Fort Collins, Colorado

CONDITION OF SAMPLE UPON RECEIPT

CLIENT: WDOE

SHIPPING CONTAINER ID: Cooler

WORKORDER NO. 9C08179

INITIALS: DA

DATE: 8/18/95

1.	Does this project require special handling according to NEESA, Level 3, or CLP protocols? If yes, complete a. and b. a. Cooler Temperature_____ b. Lot No's._____		Yes	No
2.	Are custody seals on the cooler intact?	N/A	Yes	No
3.	Are custody seals on sample containers intact?	N/A	Yes	No
4.	Is there a Chain of Custody (COC) or other representative documents, letters or shipping memos?		Yes	No
5.	Is the COC complete? Relinquished: Yes ✓ No Requested Analysis: Yes ✓ No		Yes	No
6.	Is the COC in agreement with the samples received? No. of Samples: Yes ✓ No___ Sample ID's: Yes ✓ No___ Matrix: Yes ✓ No No. of Containers: Yes ✓ No		Yes	No
7.	Are the samples preserved correctly?	N/A	Yes	No
8.	Is there enough sample for all the requested analyses?		Yes	No
9.	Are all samples within holding times for the requested analyses?		Yes	No
10.	Were the sample received on ice?		Yes	No
11.	Were all sample containers received intact? (not broken or leaking, etc.)		Yes	No
12.	Are samples requiring no headspace, headspace free?	N/A	Yes	No
13.	Do the samples require quarantine?		Yes	No
14.	Do samples require ATI disposal?		Yes	No
15.	Did the client return any unused bottles?		Yes	No

Describe "NO" items (except No's 1, 13, &14): 9 - unknown no Date on C.O.C

Was the client contacted? Yes____ No____

If yes, Date:_____ Name of person contacted:_____

Describe actions taken or client instructions:_____

Group Leader's Signature: [signature] Date: 8-18

Cooler Temperature: 15°C

9513383.2486

Analytical Technologies, Inc. - Fort Collins, Colorado

CONDITION OF SAMPLE UPON RECEIPT

CLIENT: LEDOE

SHIPPING CONTAINER ID: Cooler

WORKORDER NO. 95-08180

INITIALS: DH

DATE: 8/18/95

1.	Does this project require special handling according to NEESA, Level 3, or CLP protocols? If yes, complete a. and b. a. Cooler Temperature_____ b. Lot No's._____		Yes	No
2.	Are custody seals on the cooler intact?	N/A	Yes	No
3.	Are custody seals on sample containers intact?	N/A	Yes	No
4.	Is there a Chain of Custody (COC) or other representative documents, letters or shipping memos?		Yes	No
5.	Is the COC complete? Relinquished: Yes ✓ No Requested Analysis: Yes ✓ No		Yes	No
6.	Is the COC in agreement with the samples received? No. of Samples: Yes ✓ No__ Sample ID's: Yes ✓ No__ Matrix: Yes ✓ No No. of Containers: Yes ✓ No		Yes	No
7.	Are the samples preserved correctly?	N/A	Yes	No
8.	Is there enough sample for all the requested analyses?		Yes	No
9.	Are all samples within holding times for the requested analyses?		Yes	No
10.	Were the sample received on ice?		Yes	No
11.	Were all sample containers received intact? (not broken or leaking, etc.)		Yes	No
12.	Are samples requiring no headspace, headspace free?	N/A	Yes	No
13.	Do the samples require quarantine?		Yes	No
14.	Do samples require ATI disposal?		Yes	No
15.	Did the client return any unused bottles?		Yes	No

Describe "NO" items (except No's 1, 13, &14): 9 - Unknown - Not on C.O.C.
11 - See COC for Containers Broken - Samples were in glass jars placed on top of Each other & Not Secured; No Bubble Wrap to Keep from Breaking! Cooler Packed Very Poorly

Was the client contacted? Yes X No____

If yes, Date: 8/30 Name of person contacted: Jerry Yokel

Describe actions taken or client instructions: Told Jerry that H95028 was total loss - He said no replacement avail. at their end; Just cancel.

Group Leader's Signature: [signature] Date: 8-18-95

Cooler Temperature: 9°C