RCRA-2002-0029-0007
4

Appendix B. Raw Data,
Technical Background Document: Mercury Wastes,
Evaluation of Treatment of Bulk Elemental Mercury,
Final Report

February 8, 2002

01-31-03P12:30 RCVD

Submitted to:

U.S. Environmental Protection Agency
Ariel Rios Building
Office of Solid Waste
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Submitted by:

Science Applications International Corporation
Engineering and Environmental Management Group
11251 Roger Bacon Drive
Reston, Virginia 20190

EPA Contract No. 68-W-98-025
Work Assignment No. 3-8
SAIC Project No. 06-0758-08-1373-000

RCRA-2002-0029

APPENDIX B. RAW DATA

OSWI- 020 - (1)

Page 1 EEI REPORT Work Order # 01-10-676

Received: 10/15/01 11/09/01 14:34:59

REPORT UC, ALTER FACILITY
TO DEPT. OF CIVIL & ENVIR. ENG.
CINCINNATI, OHIO 45221-0071

ATTEN LINDA RIESER

CLIENT SCIE02 SAMPLES 6
COMPANY SCIENCE APPLICATIONS INT'L
FACILITY

WORK ID RE-CHECK SX'S : WO# 01-10-360
TAKEN CUSTOMER
TRANS DELIVERED
TYPE LIQUID
P.O. # 4400038593
INVOICE under separate cover

PREPARED Environmental Enterprises
BY 10163 Cincinnati-Dayton Rd.
Cincinnati, Ohio 45241

Jason M. Hykes
CERTIFIED BY

ATTEN Debbe Jones
PHONE (513) 772-2818 CONTACT JASON

Enclosed are the results of specified samples submitted for analysis. If you have any questions please use Order # for faster identification.
OHIO EPA CERTIFICATION: CHEMICAL #4095, MICROBIOLOGICAL #850

QA/QC ENCLOSURES.

SAMPLE IDENTIFICATION	TEST CODES and NAMES used on this workorder	
01 Vendor A B1 pH2	HG	Mercury (Cold vapor)
02 Vendor A B1 pHCD		
03 Vendor A AM pH2		
04 Vendor A AM pHCD		
05 Vendor A B1 pH2		
06 Vendor A B1 pHCD		

RAW DATA

Page 2 EEI REPORT Work Order # 01-10-676

Received: 10/15/01 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
HG mg/l	2.22	0.811	30.8	2.280	15.1

TEST CODE default units	Sample 06 (entered units)
HG mg/l	0.507

Page 1 EEI REPORT Work Order # 01-10-674

Received: 10/29/01 11/13/01 11:59:43

REPORT UC, ALTER FACILITY
TO DEPT. OF CIVIL & ENVIR. ENG.
CINCINNATI, OHIO 45221-0071

ATTEN LINDA RIESER

CLIENT SCIE02 SAMPLES 44
COMPANY SCIENCE APPLICATIONS INT'L
FACILITY

WORK ID 10/17-29/01 EPA HG (ALTER)
TAKEN CUSTOMER
TRANS DELIVERED
TYPE LIQUID/SOLID/LEACHATE
P.O. # 4400038593
INVOICE under separate cover

PREPARED Environmental Enterprises
BY 10163 Cincinnati-Dayton Rd.
Cincinnati, Ohio 45241

CERTIFIED BY

ATTEN Debbe Jones
PHONE (513) 772-2818 CONTACT JASON

Enclosed are the results of specified samples submitted for analysis. If you have any questions please use Order # for faster identification.
OHIO EPA CERTIFICATION: CHEMICAL #4095, MICROBIOLOGICAL #850

QA/QC ENCLOSURES.

SAMPLE IDENTIFICATION	TEST CODES and NAMES used on this workorder	
01 Vendor A P-pH2B CON pH LEACH	HG	Mercury (Cold vapor)
02 Vendor A P-pH2 CON pH LEACH		
03 Vendor A P-pH2D CON pH LEACH		
04 Vendor A P-pH4 CON pH LEACH		
05 Vendor A P-pH6 CON pH LEACH		
06 Vendor A P-pH8 CON pH LEACH		
07 Vendor A P-pH8D CON pH LEACH		
08 Vendor A P-pH10 CON pH LEACH		
09 Vendor A P-pH12 CON pH LEACH		
10 Vendor A P-pH12D CON pH LEACH		
11 Vendor A C-pH2B CON pH LEACH		
12 Vendor A C-pH2 CON pH LEACH		
13 Vendor A C-pH2T CON pH LEACH		
14 Vendor A C-pH4 CON pH LEACH		
15 Vendor A C-pH6 CON pH LEACH		
16 Vendor A C-pH8 CON pH LEACH		
17 Vendor A C-pH8T CON pH LEACH		
18 Vendor A C-pH10 CON pH LEACH		
19 Vendor A C-pH12 CON pH LEACH		
20 Vendor A C-pH12T CON pH LEACH		
21 Vendor A P-1T TCLP LEACHATE		
22 Vendor A P-2T TCLP LEACHATE		
23 Vendor A P-3T TCLP LEACHATE		
24 Vendor A P-3TD TCLP LEACHATE		
25 Vendor A C-1T TCLP LEACHATE		
26 Vendor A C-2T TCLP LEACHATE		

Page 2 EEI REPORT Work Order # 01-10-674

Received: 10/29/01 11/13/01 11:59:43

SAMPLE IDENTIFICATION

27 Vendor A C-3T TCLP LEACHATE
28 TCLP BLANK TCLP LEACHATE
29 Vendor C 2-1T TCLP LEACHATE
30 Vendor C 2-2T TCLP LEACHATE
31 Vendor C 2-3T TCLP LEACHATE
32 Vendor A P-S1 SOLID
33 Vendor A P-S2 SOLID
34 Vendor A P-S3 SOLID
35 Vendor A P-S4 SOLID
36 Vendor A P-S5 SOLID
37 Vendor A C-S1 SOLID
38 Vendor A C-S2 SOLID
39 Vendor A C-S3 SOLID
40 Vendor A C-S4 SOLID
41 Vendor A C-S5 SOLID
42 Vendor A RAW-S1 SOLID
43 Vendor A RAW-S2 SOLID
44 Vendor A RAW-S3 SOLID

Page 3 ERI REPORT Work Order # 01-10-674

Received: 10/29/01 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
HG mg/l	<0.0005	0.00251	0.00856	0.00483	0.00425

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)	Sample 10 (entered units)
HG mg/l	0.0127	0.00424	0.00734	0.111	0.157

TEST CODE default units	Sample 11 (entered units)	Sample 12 (entered units)	Sample 13 (entered units)	Sample 14 (entered units)	Sample 15 (entered units)
HG mg/l	<0.0005	0.00682	0.00294	0.00555	0.0140

TEST CODE default units	Sample 16 (entered units)	Sample 17 (entered units)	Sample 18 (entered units)	Sample 19 (entered units)	Sample 20 (entered units)
HG mg/l	0.00180	0.00139	0.00378	0.781	0.136

TEST CODE default units	Sample 21 (entered units)	Sample 22 (entered units)	Sample 23 (entered units)	Sample 24 (entered units)	Sample 25 (entered units)
HG mg/l	0.00116	0.00429	0.00223	0.00237	0.00266

TEST CODE default units	Sample 26 (entered units)	Sample 27 (entered units)	Sample 28 (entered units)	Sample 29 (entered units)	Sample 30 (entered units)
HG mg/l	0.00157	0.00142	<0.0005	0.00086	0.00133

TEST CODE default units	Sample 31 (entered units)	Sample 32 (entered units)	Sample 33 (entered units)	Sample 34 (entered units)	Sample 35 (entered units)
HG mg/l	0.00186	153 mg/kg	73.5 mg/kg	354 mg/kg	243 mg/kg

TEST CODE default units	Sample 36 (entered units)	Sample 37 (entered units)	Sample 38 (entered units)	Sample 39 (entered units)	Sample 40 (entered units)
HG mg/l	183 mg/kg	301 mg/kg	312 mg/kg	480 mg/kg	615 mg/kg

Page 4 EEI REPORT Work Order # 01-10-674

Received: 10/29/01 Results By Test

TEST CODE default units	Sample 41 (entered units)	Sample 42 (entered units)	Sample 43 (entered units)	Sample 44 (entered units)
HG mg/l	804 mg/kg	3,910 mg/kg	4,140 mg/kg	4,700 mg/kg

OSWI-020-②

ENVIRONMENTAL ENTERPRISES, INC.

QC REPORT
UNIVERSITY OF CINCINNATI
SCIE02

CASE NARRATIVE

PROJECT: Science Applications Int'L (SCIE02) (Work Order # 0110674-01 to 44 and 0110676-01 to 06)

METAL

Mercury analyses were performed in accordance with SW 846 Method 7470A and meet the required QC criteria.

Initial calibrations were performed within 0.9997 to 0.9998 Correlation Coefficient.

The daily calibration were verified by Initial Calibration Verification (ICV) standard and Continuing Calibration Verification (CCV) standard. ICV and all CCV recoveries were within the acceptable control limits.

All the laboratory control samples recoveries were within the acceptable control limits.

RPD calculated for all duplicate analyses were within the acceptable control limits.

All matrix spike samples recoveries were within the acceptable control limits.

For two analytical batches Post Digestion Spikes (PDS) were performed due to the high level of mercury present.

All method blanks were free of contamination.

Jyoti Desai 11/13/01

Jyoti Desai (Date)
QA Coordinator

TABLE OF CONTENTS

METAL

	PAGE #
Work Order # 0110474-01 to 44	
Initial and Continuing Calibration Verification Recovery Data	1
Quality Assurance Report	2
Sample Dilution Record	3 - 5
Sample Digestion Log	6 - 8
Mercury Analysis Data	9 – 16
Work Order # 0110676-01 to 06	
Initial and Continuing Calibration Verification Recovery Data	17
Quality Assurance Report	18
Sample Dilution Record	19
Sample Digestion Log	20
Mercury Analysis Data	21 – 22

ENVIRONMENTAL ENTERPRISES, INC.

(2)

Quality Assurance Report
Project: SCIE02

Analysis Date	Sample #	Digestion Batch #	D. L. ppb	Method Blank ppb	Sample Results ppb	Sample Dup ppb	Sample Ave. ppb	RPD	Dilution Factor	Spike Added ppb	Matrix Sp. Result ppb	Matrix Sp. Dup. Result ppb	Matrix Spike % Rec	Dup Spike % Rec	LCS Conc. ppb	LCS % Rec	LCS Acceptance % Limits
11/6/01	0110674-16	1459HAA	0.5	<0.5	1.84	1.75	1.8	5.01	1	5	6.72	NA	98.5	NA	10	89.5	85 - 115
11/8/01	0110674-31	1461HAA	0.5	<0.5	1.88	1.84	1.86	2.15	1	5	6.19	NA	86.6	NA	10	105	85 - 115
11/12/01	0110674-39	281HMA	0.5	<0.5	4.36	5.23	4.80(1)	18.1	100,000	40	46.36	NA	103(2)	NA	3940(3)	89.3	68-132

Method # SW 7470A Analyte: Hg Analyst: HAJ

Note:
(1) Dilution factors were applied to average reported sample results.
(2) Post Digestion Spikes (PDS) were performed on the diluted sample due to the high levels of mercury present in the sample.
(3) Soil LCS.
NA - Not Available.

Digestion Batch #	Sample Fractions Included
1459HAA	0110674-01 through 0110674-16
1461HAA	0110674-17 through 0110674-31
281HMA	0110674-32 through 0110674-44

RPD = Relative Percent Difference RPD Control Limits = 0-20%

LCS = Laboratory Control Sample Spike Control Limits = +/-25%

An Employee-Owned Company

Sample Dilution Record 0110-674-1A / 16A | 11-6-01 | HAN

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
0110-674-1A	1X	—			
2A	1X	—			
3A	1X	—			
4A	1X	—			
5A	1X	—			
6A	1X	—			
7A	1X	—			
8A	1X	—			
9A	10X	—			
10A	10X	—			
11A	1X	—			
12A	1X	—			
13A	1X	—			
14A	1X	—			
15A	1X	—			
16A	1X	—			
16AD	1X	—			
16AS	1X	—			

3

17A-31A

Sample Dilution Record Hg 7470A HAM 11-8-01

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
OUD-674-17A	1x	–			
18A		–			
19A		100x			
20A		100x			
21A		–			
22A		–			
23A		–			
24A		–			
25A		–			
26A		–			
27A		–			
28A		–			
29A		–			
30A		–			
31A		–			
31AD		–			
31AS	↓	–			

4

11-12-01 HA1 [illegible]

Sample Dilution Record 0111-[illegible]-32A/44A 7470A

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
0111-[illegible]-32A	100x	[illegible]00x			100,000x
33A	1	100x			10,000x
34A	1	1000x			100,000x
35A	1	1000x			↓
36A	1	1000x			
37A	1	1000x			
38A	1	1000x			
39A	1	1000x			
39AD	1	1000x			↓
39AS	1	(1000x)			2.0mL/2.0mL
40A	1	1000x			100,000x
41A	1	1000x			↓
42A	1	1000x			
43A	1	1000x	10x		1,000,000x
44A	↓	1000x	10x		↓

(5)

RAW DATA

COPY

Environmental Enterprises | Hg Aqueous Digestion Log | Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-1459 HAA	11-6-01	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg		
03-			0110-1174-1A	Hg		
04-			" 2A	Hg		
05-			" 3A	Hg		
06-			" 4A	Hg		
07-			" 5A	Hg		
08-			" 6A	Hg		
09-			" 7A	Hg		
10-			" 8A	Hg		
11-			" 9A	Hg	*	Reset @ 2ml/20ml HM
12-			" 10A	Hg	*	" " "
13-			" 11A	Hg		
14-			" 12A	Hg		
15-			" 13A	Hg		
16-			" 14A	Hg		
17-			" 15A	Hg		
18-			" 16A	Hg		
19-			" 16AD	Hg		
20-			" 16AS	Hg		

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
8m (LCS)	N204	.20 ml of 100ppb/20ml
8m (Spk)	N204	.10 ml " " "

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx + sp	%rec
	1.84	1.75	1.795	5.01	5.00ug/L	98.5	5.00

DATE ANALYZED 11-6-01
SAMPLE NUMBER 0111-1674-16A

ANALYIST HM DEPT. SUPER _____ INORGANIC SUPER. _____

Page _____

(6)

Environmental Enterprises — Hg Aqueous Digestion Log — Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-1461-HAA	11-8-01	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg		
03-			0111-1674-17A	Hg		
04-			" -18A	Hg		
05-			" -19A	Hg		
06-			" -20A	Hg		
07-			" -21A	Hg		
08-			" -22A	Hg		
09-			" -23A	Hg		
10-			" -24A	Hg		
11-			" -25A	Hg		
12-			" -26A	Hg		
13-			" -27A	Hg		
14-			" -28A	Hg		
15-			" -29A	Hg		
16-			" -30A	Hg		
17-			" -31A	Hg		
18-			" -31AD	Hg		
19-			" -31AS	Hg		
20-				Hg		

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
Em (SpK)	N204	.10ml of 100ppb / 20ml
Em (LCS)	N204	.20 " " "

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx +sp	%rec
	1.88	1.84	1.86	2.15	5.00ug/L	~~1.86~~ 6.19	86.6%

DATE ANALYZED 11-8-01
SAMPLE NUMBER 0111-1674-31A

ANALYIST HM DEPT. SUPER ____ INORGANIC SUPER. ____

Page ____

7

RAW DATA

Environmental Enterprises

Hg Miscellaneous

Metals Department

Weighed up 11/9
digested 11/12

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-GSI-HMA	11/9/01	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg	20g/20ml	
03-			0110-674-32A	Hg		
04-			" 33A	Hg		
05-			" 34A	Hg		
06-			" 35A	Hg		
07-			" 36A	Hg		
08-			" 37A	Hg		
09-			" 38A	Hg		
10-			" 39A	Hg		
11-			" 39AD	Hg		
12-			" 39AS	Hg		
13-			" 40A	Hg		
14-			" 41A	Hg		
15-			" 42A	Hg		
16-			" 43A	Hg		
17-			" 44A	Hg		
18-			0111-035-1A	Hg		
19-			" 2A	Hg		
20-				Hg		

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
Spike (Em)	N3DH	10ml of 1000ppb / 20ml
LCS (EPA)	050F	20g Soil LCS / 20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx +sp	%rec
	4.36	5.23	4.80	18.1	5.00ug/L	23.18	103%

5ml dup
5ml 40.0ppb
23.18 x2 = 46.36 - 5.23 / 40 = 103%

DATE ANALYZED 11-12-01
SAMPLE NUMBER 0111-674-39A

ANALYIST HM DEPT. SUPER ____ INORGANIC SUPER. ____

Page ____

8

Varian 20
Hg - Cold Vapor

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. James II

OPERATOR	
DATE	11.06.2001
BATCH NO	1459
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP
PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 387.8

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

RE SCALE

OPTIMIZE SIGNAL

STANDARDS

9

RAW DATA

BLANK	0.00		-0.000	-0.001	-0.000 W210
STANDARD 1	0.50	1.1	0.010	0.010	0.010 S210
STANDARD 2	2.00	0.0	0.042	0.042	0.042 T210
STANDARD 3	5.00	0.4	0.106	0.106	0.106 U210
STANDARD 4	10.00	0.5	0.206	0.205	0.207 V210
STANDARD 5	40.00	0.7	0.767	0.763	0.771 W210

Fisher

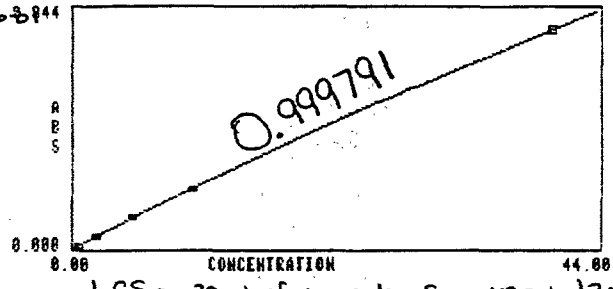
Std's made 11-6-01

8m

made 11-6-8844

LdL = Q210

ICV/CCV = R210



Hg 7470 A

HAM 11-6-01

VERIFIED ~~STARTED~~ 11-13-01

INITIAL

DATE

LCS = .20ml of 1000ppb 8m N2O4 120ml T.V. 10ppb

SpK = .10ml " " " " T.V. 3ppb

HM	~~5.00~~	~~4.67~~ void		0.2	0.099	0.099	0.099
	5.00 ICV	4.80 96.0%		0.1	0.102	0.102	0.102
	....ICB....	0.02		69.1	0.000	0.001	0.000
	0.50 LdL	0.48 96.0%		0.7	0.009	0.009	0.009
MB	1.1459: HAA..	0.01		0.0	0.000	0.000	0.000
LCS	2.1459: HAA..	8.95 89.5%		0.1	0.186	0.185	0.186
01	10.674.1A	1✓ 0.19		2.3	0.004	0.004	0.004
	10.674.2A	1✓ 2.51		1.6	0.052	0.052	0.053
	10.674.3A	1✓ 8.56		0.5	0.178	0.177	0.178
	10.674.4A	1✓ 4.83		0.9	0.102	0.102	0.103
	10.674.5A	1✓ 4.25		0.2	0.090	0.090	0.090
	10.674.6A	1✓ 12.70		0.9	0.260	0.258	0.262
	10.674.7A	1✓ 4.24		0.4	0.089	0.089	0.090
	10.674.8A	1✓ 7.34		0.9	0.154	0.153	0.155
	5.00 CCV	4.65 93.0%		0.4	0.098	0.098	0.099
	....CCB.....	0.06		8.0	0.001	0.001	0.001
01	10.674.9A	10✓ 11.09		0.7	0.228	0.227	0.229
	10.674.10A	10✓ 15.71		0.0	0.319	0.319	0.319
	10.674.11A	1✓ 0.14		14.1	0.003	0.003	0.002
	10.674.12A	1✓ 6.82		0.7	0.143	0.142	0.144
	10.674.13A	1✓ 2.94		0.0	0.062	0.062	0.062
	10.674.14A	1✓ 5.55		0.0	0.117	0.117	0.117
	10.674.15A	1✓ 13.96		0.6	0.285	0.284	0.286
	10.674.16A	1✓ 1.84	>1.795	0.3	5.01 RPD 0.038	0.038	0.038
	10.674.16AD	1✓ 1.75		0.0	0.036	0.036	0.036
	10.674.16AS	1✓ 6.72	98.5%	0.5	0.141	0.141	0.142
	5.00 CCV	4.66	93.2%	0.0	0.099	0.099	0.098
	....CCB....	0.06		5.5	0.001	0.001	0.001
	X210.....	-0.00		99.9	-0.000	-0.000	0.000

(10)

All Sx's ~~prepped w/~~ .5ml HNO_3 1.6ml 5% $K_2S_2O_8$

1.0ml H_2SO_4 1.2ml 12% $NH_2OH \cdot HCl$

3.0ml 5% $KMnO_4$

COPY

Varian 20
Hg - Cold Vapor

0.000	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. James II

OPERATOR	
DATE	11.08.2001
BATCH NO.	1461 1462
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP

PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 384.7

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

OPTIMIZE

11

RAW DATA

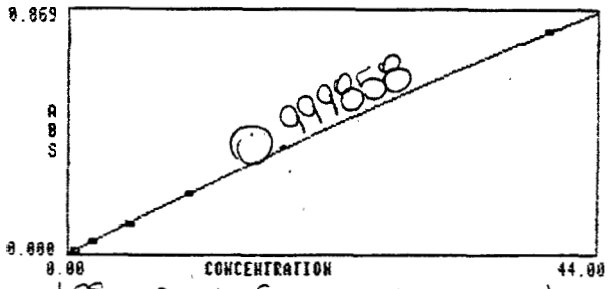
	SCALE		SIGNAL		
BLANK	0.00		0.000	-0.000	0.000 N210
STANDARD 1	0.50	9.9	0.010	0.010	0.011 S210
~~STANDARD 2~~	~~2.00~~	~~0.6~~	~~-0.000~~	~~-0.000~~	~~-0.000~~
STANDARD 2	2.00	1.1	0.042	0.043	0.042 T210
STANDARD 3	5.00	0.9	0.108	0.107	0.108 U210
STANDARD 4	10.00	0.6	0.209	0.208	0.210 V210
STANDARD 5	40.00	0.2	0.790	0.789	0.792 W210

fisher
Std made 11-6-01

VERIFIED
DATE

ICV/CCV = Z210

LdL = Q210



Hg 245.1 - 7470A
HM 11-8-01

VERIFIED
DATE 11-13-01

LCS = .20ml of 1000ppb Em N204 | 20ml T.V. 10ppb
Spk = .10ml " " " T.V. 5ppb

	~~5.00~~	~~5.45~~ void HM	0.7	0.117	0.117	0.118	
	5.00 ICV	5.14 103%	0.8	0.111	0.110	0.111	
	....ICB....	0.06	22.3	0.001	0.001	0.001	
	0.50 LdL	0.51 102%	1.8	0.010	0.010	0.011	
	MB1.1461-HAA..	0.15	4.1	0.003	0.003	0.003	
	LCS2.1461-HAA..	10.52 105%	0.4	0.219	0.219	0.220	
	MB1.1462-HAA..	0.09	52.2	0.002	0.003	0.001	
	LCS2.1462-HAA..	8.97 89.7%	0.9	0.189	0.187	0.190	
01	10.674.17A 1	1.39	1.7	0.029	0.029	0.029	
	10.674.18A 1	3.78	3.0	0.081	0.079	0.083	
	~~10.674.19 1~~	~~1.05~~ void HM	3.1	0.021	0.021	0.022	
	10.674.20A 1	1.36 X100	0.6	0.028	0.028	0.029	
	10.674.19A 1	7.81 X100	1.1	0.165	0.164	0.167	
	~~10.674.21 1~~	~~0.02~~ void HM	0.5	0.001	0.001	0.001	
	10.674.21A 1	1.16	0.4	0.024	0.024	0.024	
	5.00CCV	4.94 98.8%	0.8	0.106	0.106	0.107	
	....CCB....	0.06	11.9	0.001	0.001	0.001	
01	10.674.22A 1	4.29	0.5	0.092	0.092	0.092	
	10.674.23A 1	2.23	1.1	0.047	0.048	0.047	
	10.674.24A 1	2.37	0.8	0.050	0.050	0.051	
	10.674.25A 1	2.66	0.6	0.056	0.056	0.057	
	10.674.26A 1	1.57	1.6	0.033	0.033	0.033	
	10.674.27A 1	1.42	2.3	0.030	*0.029	0.030	
	10.674.28A 1	0.12	3.6	0.002	0.002	0.002	
	10.674.29A 1	0.86	1.5	0.018	0.017	0.018	
	10.674.30A 1	1.33	1.0	0.028	0.028	0.028	
	10.674.31A 1	1.88	1.6	0.040	0.039	0.040	
	5.00CCV	4.97 99.4%	0.4	0.107	0.107	0.107	1.86
	....CCB.....	0.13	5.6	0.003	0.003	0.003	0.15 RPD
01	10.674.31AD 1	1.84	2.2	0.039	0.038	0.039	
	10.674.31AS 1	6.19 -86.6%	1.7	0.132	0.131	0.134	
	11.088.1A 40	0.46	2.5	0.009	0.010	0.009	
	11.088.1AD 40	0.26	4.1	0.005	0.005	0.006	

(12)

11.088.1AS	40	4.90	5.02	0.5	4.56	0.105	0.105	0.106	
11.088.1AD	40	5.13	100%	0.5	APD	0.110	0.110	0.111	100%
11.112.1A	40	0.21		0.0		0.004	0.004	0.004	
11.146.1A	40	0.15		19.7		0.003	0.003	0.003	
11.153.1A	1	0.11		0.0		0.002	0.002	0.002	
5.00CCV		4.96	99.2%	1.5		0.107	0.106	0.108	
..CCB.....		0.13		0.0		0.003	0.003	0.003	
Calibration Blk.		0.08		0.0		0.002	0.002	0.002	

All samples prepped w/

- 5ml HNO_3 conc.
- 1.0ml H_2SO_4 conc.
- 3.0ml 5% $KMnO_4$
- 1.6ml 5% $K_2S_2O_8$
- 1.2ml 12% $NH_2OH \cdot HCL$ / 20ml

* See dilution sheet

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Varian 20
Hg-Cold Vapor

COPY

	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A James II

OPERATOR	
DATE	11.12.2001
BATCH NO.	281 1464
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

	PROGRAM 16	Hg	
0.000	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP
PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 384.7

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

14

	RE SCALE			OPTIMIZE SIGNAL	
BLANK	0.00		-0.000	-0.001	-0.000 C211
STANDARD 1	0.50	0.0	0.010	0.010	0.010 S210
STANDARD 2	2.00	0.6	0.038	0.038	0.038 T210
STANDARD 3	5.00	0.4	0.100	0.100	0.100 U210
STANDARD 4	10.00	0.0	0.196	0.197	0.196 V210
STANDARD 5	40.00	0.4	0.738	0.736	0.740 W210

Fisher

Std made 11-6-01

VERIFIED
DATE

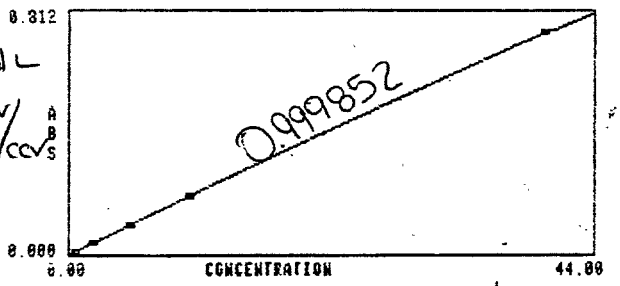
7470A
11-12-01 HM
Hg 245.1 7470

VERIFIED
DATE

Em

Q210 = LdL

B211 = ICV/CCVs



LCS = .20ml of 1000ppb Em N204 / 20ml = T.V. 10ppb

Spk = .10ml " " " = T.V. 5ppb

Soil LCS = Cert Value 3.94 ERA / Range 2.69 - 5.21 mg/kg

	5.00 ICV		4.9999	99.8%	0.4	0.100	0.099	0.100
	....ICB.....		0.05		56.9	0.001	0.001	0.001
	0.50 LdL		0.50	100%	5.8	0.010	0.009	0.010
MB	1.1464:HAA..		0.05		13.1	0.001	0.001	0.001
LCS	2.1464:HAA..		10.15	102%	1.1	0.199	0.198	0.201
01	11.180.1	1	0.15		9.4	0.003	0.003	0.003
	11.092.4A	1	0.20		9.7	0.004	0.004	0.004
	11.202.1A	1	0.05		28.3	0.001	0.001	0.001
	11.202.2A	1	0.03		60.9	0.001	0.000	0.001
	11.190.1A	40	0.04		7.4	0.001	0.001	0.001
	11.192.1A	10	0.02		57.5	0.000	0.000	0.000
	11.192.2A	10	0.01		99.9	0.000	-0.000	0.001
	11.192.2AD	10	0.01		99.9	0.000	0.000	0.000
	5.00 CCV		4.9999	99.8%	0.8	0.100	0.099	0.100
	....CCB....		0.03		0.0	0.001	0.001	0.001
01	11.192.2AS	10	5.34	>5.26	0.8	3.23 mg/kg 0.107	0.106	0.107
	11.192.2ADS	1	5.17	105%	0.4	0.103	0.103	0.103
	11.192.3A	10	0.07		35.7	0.001	0.002	0.001
	11.207.1A	10	0.04		16.3	0.001	0.001	0.001
	11.207.2A	10	0.02		73.3	0.000	0.001	0.000
	5.00 CCV		4.92	98.4%	1.4	0.098	0.097	0.099
	....CCB.....		0.10		6.9	0.002	0.002	0.002
MB	1.281:HMA....		0.03		0.0	0.001	0.001	0.001
Soil LCS	2.281:HMA	100	35.19	ERA 3.52	0.2	0.653	0.652	0.654
01	10.674.32A		1.53		1.5	0.029	0.029	0.030
	10.674.33A		7.35		1.2	0.146	0.145	0.147
	10.674.34A		3.54		0.8	0.069	0.069	0.069
	10.674.35A		2.43		0.5	0.047	0.047	0.046
	10.674.36A		1.83		2.0	0.035	0.034	0.035
	10.674.37A		3.01		1.3	0.058	0.058	0.059
	10.674.38A		3.12		0.6	0.060	0.060	0.061
	10.674.39A		4.36		0.8	0.086	0.086	0.087

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5.00 CCV	4.984	99.7%	0.7	0.099	0.099	0.100	
.....CCB.....	0.23		0.0	0.004	0.004	0.004	9.80 AS
01 10.674.39AD	5.23		0.5	0.104	0.104	0.105	18.1 RPD
10.674.39AS(005)	23.18	103%	1.0	0.440	0.437	0.443	
10.674.40A	6.15		1.0	0.122	0.121	0.123	
10.674.41A	8.04		1.1	0.159	0.158	0.160	
10.674.42A	39.11		0.6	0.722	0.719	0.726	
10.674.43A	4.14		0.6	0.082	0.081	0.082	
10.674.44A	4.70		1.4	0.094	0.093	0.094	
11.035.1A 100	2.42		0.0	0.046	0.046	0.046	
11.035.2A 100	5.32		0.5	0.106	0.106	0.107	
5.00 CCV	4.959	99.0%	0.7	0.099	0.098	0.099	
.....CCB.....	0.09		15.2	0.002	0.002	0.002	
Dilution H2O...	0.09		0.0	0.002	0.002	0.002	

→ P.D.S. 5ml ~~Sxdup~~ 5ml 40ppb (w210)

23.181 X 2

$= \frac{46.362 - \cancel{4.50}\ 527}{40} =$

103%

All Sx's prepped w/

- .5ml conc HNO_3
- 1.0ml conc $H_2S_2O_4$
- 3.0ml 5% $KMnO_4$
- 1.6ml 5% $K_2S_2O_8$
- 1.2ml 12% $NH_2OH \cdot HCL$

* See dilution Sheet attached!

HAM

11-12-01

(16)

ENVIRONMENTAL ENTERPRISES, INC.

(7)

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 0110676.

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	Digestion Batch #	ICV True	ICV Found	ICV % Rec	CCV1 True	CCV1 Found	CCV1 % Rec	CCV2 Found	CCV2 % Rec	CCV3 Found	CCV3 % Rec
11/1/01	HAJ	7470A	Hg	1457HAA	5	5.07	101	5	5.01	100	4.95	99		

Digestion Batch #	Sample Fractions Included
1457HAA	0110676-01 through 06

ICV = Initial Calibration Verification **ICV % Range =** +/-10%

CCV = Continue Calibration Verification **CCV % Range =** +/-20%

0110676 cal

ENVIRONMENTAL ENTERPRISES, INC.

(81)

Quality Assurance Report
Project: SCIE02

Analysis Date	Sample #	Digestion Batch #	D. L. ppb	Method Blank ppb	Sample Results ppb	Sample Dup ppb	Sample Ave. ppb	RPD	Dilution Factor	Spike Added ppb	Matrix Sp. Result ppb	Matrix Sp. Dup. Result ppb	Matrix Spike % Rec	Dup Spike % Rec	LCS Conc. ppb	LCS % Rec	LCS Acceptance % Limits
11/1/01	0110676-02	1457HAA	0.5	<0.5	7.98	8.24	8.11(1)	3.21	100	10	17.96	NA	97.2(2)	NA	10	99.3	85 - 115

Method # SW 7470A Analyte: Hg Analyst: HAJ

Note:
(1) Dilution factors were applied to average reported sample results.
(2) Post Digestion Spikes (PDS) were performed on the diluted sample duplicate due to the high levels of mercury present in the sample.

NA - Not Available.

Digestion Batch #	Sample Fractions Included
1457HAA	0110676-01 through 06

RPD = Relative Percent Difference **RPD Control Limits =** 0-20%

LCS = Laboratory Control Sample **Spike Control Limits =** +/-25%

An Employee-Owned Company

method	Analyst	w.o
7470A	HM	10-676-

COPY

Sample Dilution Record

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
10-676-1A	1x	1,000x			
" 2A		100x			
" 2A		100x			
" 3A		10,000x			
" 4A		1,000,000x			
" 5A		1,000x			
" 6A	↓	100x			

(19)

Environmental Enterprises | Hg Aqueous Digestion Log | Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	ml/ml DILN	COMMENTS
01-1457-HAA	11-01-01	HM	BLK	Hg	20/20	
02-			LCS	Hg		
03-			0110-1084-5A	Hg		
04-			0110-1085-1A	Hg		
05-			~~0110-0991-36~~	Hg		~~0110-0991-36~~ 0110-0662-3E
06-			0110-1070-1A	Hg		
07-			" 2A	Hg		
08-			" 2AD	Hg		
09-			" 2AS	Hg		
10-			" 3A	Hg		
11-			" 4A	Hg		
12-			" 5A	Hg		
13-			" 6A	Hg		
14-				Hg		
15-				Hg		
16-				Hg		
17-				Hg		
18-				Hg		
19-				Hg		
20-				Hg		

BATCH QC DATA

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

5ml Dup
5ml 10ppb (K210)

Page _____

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Varian 20
Hg - Cold Vapor

COPY

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. James II

OPERATOR	
DATE	11.01.2001
BATCH NO	1457
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

	PROGRAM 16	Hg	
0.000	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP
PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 387.0

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

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RAW DATA

COPY

	FE SCALE			OPTIMIZE STANDARDS SIGNAL		
BLANK	0.00		-0.000	-0.000	-0.000	A210
STANDARD 1	0.50	8.5	0.010	0.011	0.010	G210
STANDARD 2	2.00	1.6	0.042	0.042	0.042	H210
STANDARD 2	5.00	0.8	0.098	0.098	0.099	I210
STANDARD 3	5.00	0.4	0.100	0.100	0.100	J210
STANDARD 4	10.00	0.6	0.212	0.211	0.213	K210
STANDARD 5	40.00	0.2	0.796	0.794	0.797	L210

Fisher

Std's made 10/30/01

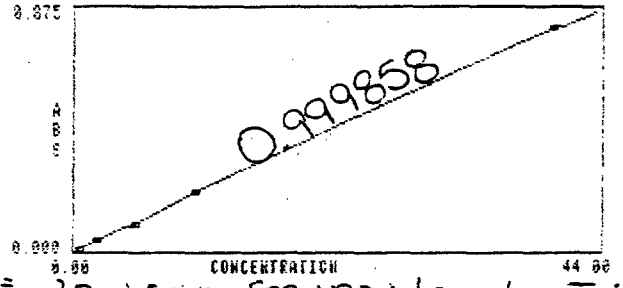
EM

made 11-1-01

ICV/CCV = L210

LdL = E210

made 10/30/01



Hg 245.1

7470A

HAM 11-1-01

11-9-01

LCS = .20ml Spike EM N204 / 20ml T.V 10ppb

SpK = .10ml " " " T.V. 5ppb

		void HM	1.1	0.017	0.013	0.013	
	ICV	5.07 101%	1.2	0.101	0.100	0.102	
	ICB	0.04	37.7	0.001	0.001	0.001	
0.50	LdL	0.51 102%	2.5	0.010	0.010	0.011	
MB	HAA	0.02	0.0	0.000	0.000	0.000	
LCS	HAA	9.93 99.3%	0.6	0.211	0.210	0.212	
0'	10.694.5A 1	0.07	13.8	0.001	0.001	0.002	
	10.695.1A 1	1.68	0.7	0.027	0.026	0.026	
	10.692.1E 1	0.69	1.2	0.017	0.017	0.017	
	10.675.1A 1	2.32	0.4	0.046	0.045	0.046	
	10.675.1A void	0.92 (1,000x)	1.1 NIR	0.019	0.019	0.019	
	10.675.1A 1	7.35	0.9	0.185	0.184	0.186	
	AD 1	8.24	0.5	0.171	0.170	0.172	
	10.676.2APOS	8.98 97.2%	1.0	0.180	0.181	0.179	— 5ml of Dup 5ml of 10ppb (K210)
5.00	CCV	5.00 100%	0.2	0.100	0.100	0.100	
	CCB	-0.01	49.9	-0.000	-0.000	-0.000	
0'	10.676.3A 1	3.46	1.7	0.064	0.063	0.064	
	10.676.4 1	-0.04 void HM	3.0	-0.001	-0.001	-0.001	
	10.676.4A 1	2.25	1.3	0.048	0.047	0.047	
	10.676.5A 1	15.14	0.9	0.318	0.317	0.320	
	10.676.6A 1	5.07	1.6	0.101	0.100	0.102	
5.00	CCV	4.95 99.0%	1.2	0.099	0.099	0.100	
	CCB	-0.02	20.5	-0.000	-0.000	-0.000	
M209	Dilution H_2O	-0.06	17.5	-0.001	-0.001	-0.001	

$8.98 \times 2 = 17.96 - 8.24$

10 ppb

All Sx's prepped = .5ml conc HNO_3
1.0ml conc H_2SO_4
3.0ml 5% $KMnO_4$
1.6ml 5% $K_2S_2O_8$
1.2ml 12% NH_2OH HCL / 20ml

(see dilution sheet)

22

DSWI-018-001

Page 1 EEI REPORT Work Order # 01-09-416
Received: 09/19/01 10/12/01 11:52:13

REPORT TO: UC, ALTER FACILITY
DEPT. OF CIVIL & ENVIR. ENG.
CINCINNATI, OHIO 45221-0071

ATTEN: LINDA RIESER

CLIENT: SCIE02 SAMPLES: 41
COMPANY: SCIENCE APPLICATIONS INT'L
FACILITY:

WORK ID: 9/04 & 9/19/01 EPA HG (ALTER)
TAKEN: CUSTOMER
TRANS: DELIVERED
TYPE: LIQUID/SOLID/LEACHATE
P.O. #: 4400038593
INVOICE: under separate cover

PREPARED BY: Environmental Enterprises
10163 Cincinnati-Dayton Rd.
Cincinnati, Ohio 45241

CERTIFIED BY: Debbe Jones

ATTEN: Debbe Jones
PHONE: (513) 772-2818 CONTACT: JILL

Enclosed are the results of specified samples submitted for analysis. If you have any questions please use Order # for faster identification.
OHIO EPA CERTIFICATION: CHEMICAL #4095, MICROBIOLOGICAL #850

QA/QC ENCLOSURES.

SAMPLE IDENTIFICATION	TEST CODES and NAMES used on this workorder	
01 TCLP-BLANK	HG	Mercury (Cold vapor)
02 Vendor D B1 TCLP (1)		
03 Vendor D B1 TCLP (2)		
04 Vendor D B1 TCLP (3)		
05 Vendor D B1 TCLP (3D)		
06 Vendor D B2 TCLP (1)		
07 Vendor D B2 TCLP (2)		
08 Vendor D B2 TCLP (3)		
09 Vendor D B1 pH2B		
10 Vendor D B1 pH2		
11 Vendor D B1 pH2D		
12 Vendor D B1 pH4		
13 Vendor D B1 pH6		
14 Vendor D B1 pH8		
15 Vendor D B1 pH8D		
16 Vendor D B1 pH10		
17 Vendor D B1 pH12		
18 Vendor D B1 pH12D		
19 Vendor D B2 pH2B		
20 Vendor D B2 pH2		
21 Vendor D B2 pH2D		
22 Vendor D B2 pH4		
23 Vendor D B2 pH6		
24 Vendor D B2 pH8		
25 Vendor D B2 pH8D		
26 Vendor D B2 pH10		

Page 2 EEI REPORT Work Order # 01-09-416

Received: 09/19/01 10/12/01 11:52:13

SAMPLE IDENTIFICATION

27 Vendor D B2 pH12
28 Vendor D B2 pH12D
29 Vendor D RAW S1
30 Vendor D RAW S2
31 Vendor D RAW S3
32 Vendor D B1 S1
33 Vendor D B1 S2
34 Vendor D B1 S3
35 Vendor D B1 S4
36 Vendor D B1 S5
37 Vendor D B2 S1
38 Vendor D B2 S2
39 Vendor D B2 S3
40 Vendor D B2 S4
41 Vendor D B2 S5

Page 3 EKI REPORT Work Order # 01-09-416
Received: 09/19/01 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
HG mg/l	<0.0005	0.005	0.008	0.005	0.005

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)	Sample 10 (entered units)
HG mg/l	0.077	0.012	0.058	0.0005	0.127

TEST CODE default units	Sample 11 (entered units)	Sample 12 (entered units)	Sample 13 (entered units)	Sample 14 (entered units)	Sample 15 (entered units)
HG mg/l	0.078	2.63	0.240	0.060	0.059

TEST CODE default units	Sample 16 (entered units)	Sample 17 (entered units)	Sample 18 (entered units)	Sample 19 (entered units)	Sample 20 (entered units)
HG mg/l	2.17	0.016	0.011	<0.0005	0.257

TEST CODE default units	Sample 21 (entered units)	Sample 22 (entered units)	Sample 23 (entered units)	Sample 24 (entered units)	Sample 25 (entered units)
HG mg/l	0.130	4.35	0.289	0.072	0.066

TEST CODE default units	Sample 26 (entered units)	Sample 27 (entered units)	Sample 28 (entered units)	Sample 29 (entered units)	Sample 30 (entered units)
HG mg/l	0.020	0.025	0.019	3,380 mg/kg	3,830 mg/kg

TEST CODE default units	Sample 31 (entered units)	Sample 32 (entered units)	Sample 33 (entered units)	Sample 34 (entered units)	Sample 35 (entered units)
HG mg/l	3,910 mg/kg	1,210 mg/kg	1,530 mg/kg	1,280 mg/kg	1,630 mg/kg

TEST CODE default units	Sample 36 (entered units)	Sample 37 (entered units)	Sample 38 (entered units)	Sample 39 (entered units)	Sample 40 (entered units)
HG mg/l	1,860 mg/kg	1,230 mg/kg	1,160 mg/kg	1,700 mg/kg	1,400 mg/kg

Page 4 EKI REPORT Work Order # 01-09-416

Received: 09/19/01 Results By Test

TEST CODE default units	Sample 41 (entered units)
BG mg/l	1,400 mg/kg

OSWI-018-002

Page 1 EEI REPORT Work Order # 01-10-360

Received: 10/15/01 10/26/01 10:46:02

REPORT TO: UC, ALTER FACILITY
DEPT. OF CIVIL & ENVIR. ENG.
CINCINNATI, OHIO 45221-0071

PREPARED BY: Environmental Enterprises
10163 Cincinnati-Dayton Rd.
Cincinnati, Ohio 45241

CERTIFIED BY: Debbe Jones

ATTEN: LINDA RIESER

ATTEN: Debbe Jones
PHONE: (513) 772-2818
CONTACT: JILL

CLIENT: SCIE02 SAMPLES: 18
COMPANY: SCIENCE APPLICATIONS INT'L
FACILITY:

Enclosed are the results of specified samples submitted for analysis. If you have any questions please use Order # for faster identification.
OHIO EPA CERTIFICATION: CHEMICAL #4095, MICROBIOLOGICAL #850

WORK ID: 10/1 & 10/4/01 EPA HG (ALTER)
TAKEN: CUSTOMER
TRANS: DELIVERED
TYPE: LIQUID/SOLID/LEACHATE
P.O. #: 4400038593
INVOICE: under separate cover

QA/QC ENCLOSURE

SAMPLE IDENTIFICATION	TEST CODES and NAMES used on this workorder	
01 Vendor C B2 pH2	HG	Mercury (Cold vapor)
02 Vendor C B2 pH2D		
03 Vendor C B2 pH4		
04 Vendor C B2 pH6		
05 Vendor C B2 pH8		
06 Vendor C B2 pH8D		
07 Vendor C B2 pH10		
08 Vendor C B2 pH12		
09 Vendor C B2 pH12D		
10 Vendor C B2 pH2B		
11 Vendor C AM pH2		
12 Vendor C AM pH2D		
13 Vendor C B1 pH2		
14 Vendor C B1 pH2D		
15 SPSS pH9		
16 SPSS pH11		
17 SPSS pH11D		
18 pH2B		

Page 2 EEI REPORT Work Order # 01-10-360
Received: 10/15/01 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
HG mg/l	4.39	1.11	0.034	0.118	0.011

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)	Sample 10 (entered units)
HG mg/l	0.008	0.003	0.002	0.003	<0.0005

TEST CODE default units	Sample 11 (entered units)	Sample 12 (entered units)	Sample 13 (entered units)	Sample 14 (entered units)	Sample 15 (entered units)
HG mg/l	29.0	2,790	14.9	0.478	13.7

TEST CODE default units	Sample 16 (entered units)	Sample 17 (entered units)	Sample 18 (entered units)
HG mg/l	0.010	0.018	<0.0005

OSWI-018-005

ENVIRONMENTAL ENTERPRISES, INC.

QC REPORT
UNIVERSITY OF CINCINNATI
SCIE02

CASE NARRATIVE

PROJECT: Science Applications Int'L (SCIE02) (Work Order # 0109416-01 to 41 and 0110360-01 to 18)

METAL

Mercury analyses were performed in accordance with SW 846 Method 7470A and meet the required QC criteria.

Initial calibrations were performed within 0.9996 to 0.9999 Correlation Coefficient.

The daily calibration were verified by Initial Calibration Verification (ICV) standard and Continuing Calibration Verification (CCV) standard. ICV and all CCV recoveries were within the acceptable control limits.

All the laboratory control samples recoveries were within the acceptable control limits.

RPD calculated for all duplicate analyses were within the acceptable control limits.

All matrix spike samples recoveries were within the acceptable control limits.

For three analytical batches Post Digestion Spikes (PDS) were performed due to the high level of mercury present.

All method blanks were free of contamination.

Jyoti Desai 10/15/01

Jyoti Desai (Date)
QA Coordinator

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METAL

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Quality Assurance Report	2
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Mercury Analysis Data	23 – 25

ENVIRONMENTAL ENTERPRISES, INC.

(1)

Initial and Continuing Calibration Verification
Project SCIE02 Work Order # 0109416 01 through 0109416 41.

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	Digestion Batch #	ICV True	ICV Found	ICV % Rec	True	CCV1 Found	CCV1 % Rec	CCV2 Found	CCV2 % Rec	CCV3 Found	CCV3 % Rec	CCV4 Found	CCV4 % Rec	CCV5 Found	CCV5 % Rec	CCV6 Found	CCV6 % Rec
9/24/01	HAJ	7470A	Hg	1427HAA 1428HAA	5	5 05	101	5	5.22	104	5.28	106	5 29	106	5.2	104	5 26	105	5.27	105
9/26/01	HAJ	7470A	Hg	1431HAA	5	4.95	99	5	4.89	97 8	4.89	97.8	4 7	94						
10/2/01	HAJ	7470A	Hg	277HMA	5	5 24	105	5	5.16	103	5.22	104								

Digestion Batch #	Sample Fractions Included
1427HAA	0109415 01 through 0109416-16
1428HAA	0109416 17 through 0109416 18
1431HAA	0109415 19 through 0109416-28
277HMA	0109415 29 through 0109416 41

ICV = Initial Calibration Verification

CCV = Continue Calibration Verification

ICV % Range = +/-10%

CCV % Range = +/-20%

0109416-cal

An Employee-Owned Company

ENVIRONMENTAL ENTERPRISES, INC.

(2)

Quality Assurance Report
Project: SCIE02

Analysis Date	Sample #	Digestion Batch #	D. L. ppb	Method Blank ppb	Sample Results ppb	Sample Dup ppb	Sample Ave. ppb	RPD	Dilution Factor	Spike Added ppb	Matrix Sp. Result ppb	Matrix Sp. Dup. Result ppb	Matrix Spike % Rec	Dup Spike % Rec	LCS Conc. ppb	LCS % Rec	LCS Acceptance % Limits
9/24/01	0109416-15	1427HAA	0.5	<0.5	6.01	5.87	5.94(1)	2.36	10	40	46.84	NA	102(2)	NA	10	107	85 - 115
9/24/01	0109416-18	1428HAA	0.5	<0.5	10.79	11.04	10.92	2.29	1	5	15.79	NA	97.4	NA	10	103	85 - 115
9/26/01	0109416-28	1431HAA	0.5	<0.5	19.19	19.32	19.26	0.68	1	5	23.54	NA	85.6	NA	10	112	85 - 115
10/2/01	0109416-41	277HMA	0.5	<0.5	1.38	1.42	1.40(1)	2.86	1,000,000	40	41.72	NA	101(2)	NA	3940(3)	96.4	68 - 132

Method # SW 7470A Analyte: Hg Analyst: HAJ

Note:
(1) Dilution factors were applied to average reported sample results.
(2) Post Digestion Spikes (PDS) were performed on the diluted sample due to the high levels of mercury present in the sample.
(3) Soil LCS.
NA - Not Available.

Digestion Batch #	Sample Fractions Included
1427HAA	0109416-01 through 0109416-16
1428HAA	0109416-17 through 0109416-18
1431HAA	0109416-19 through 0109416-28
277HMA	0109416-29 through 0109416-41

RPD = Relative Percent Difference **RPD Control Limits =** 0-20%

LCS = Laboratory Control Sample **Spike Control Limits =** +/-25%

0109416-1427HAA,1428HAA,1431HAA,277HMA

RAW DATA

Sample Dilution Record

Date: 9-24-01 Analyst Int.: HM Analysis: 7470A Hg Method #

Sample #	Original	1st	2nd	3rd	4th	5th	Total Dilution Factor
9-4110-1A	1X						1X
2A							1X
3A							1X
4A							1X
5A							1X
6A		10X					10X
7A							1X
8A		10X					10X
9A							1X
10A		100X					100X
11A		10X					10X
12A		1000X					1000X
13A		100X					100X
14A		10X					10X
15A		10X					10X
15AD		10X					10X
16A		100X					100X
17A							1X
18A							1X
18AD							1X

Spike 1:1 w/40ppb (5x)

(3)

9,596.1A 100	1.54 10,000x	1.4	0.034	0.034	0.035 = 1,000,000 x
5.00 CCV	4.70 94.0%	1.4	0.109	0.108	0.110
.....CCB....	0.06	12.2	0.001	0.001	0.001
.Dilution. H2O	0.01	99.5	0.000	0.001	0.000

COPY

Sx prepped with

.5ml conc. HNO_3
1.0ml conc. H_2SO_4
3.0ml 5% $KMnO_4$
1.6ml 5% $K_2S_2O_8$
1.2ml 12% $NH_2OH \cdot HCL$

0109-416-19A = 1x
20A = 100x
21A = 100x
22A = 1,000x
23A = 100x
24A = 10x
25A = 10x
26A = 1x
27A = 1x
28A = 1x

(4)

COPY

0109-4116 — HAM | 10-2-01

	1st	2nd	Original
29A,	÷1000	÷10	(100x)
30A,	"	"	"
31A,	"	"	"
32A =	"	"	"
33A =	"	"	"
34A =	"	"	"
35A =	"	"	"
36A =	"	"	"
37A =	"	"	"
38A =	"	"	"
39A =	"	"	"
40A =	"	"	"
41A =	"	"	"
41AD =	"	"	"

total Dilution 1,000,000x

(5)

Environmental Enterprises — Hg Aqueous Digestion Log — Metals Department

COPY

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-1427-HAA	9-24-01	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg		
03-			0109-416-1A	Hg		
04-			" 2A	Hg		
05-			" 3A	Hg		
06-			" 4A	Hg		
07-			" 5A	Hg		
08-			" 6A	Hg		
09-			" 7A	Hg		
10-			" 8A	Hg		
11-			" 9A	Hg		
12-			" 10A	Hg		
13-			" 11A	Hg		
14-			" 12A	Hg		
15-			" 13A	Hg		
16-			" 14A	Hg		
17-			" 15A	Hg		
18-			" 15AD	Hg		
19-			" 15AS	Hg		
20-			" 16A	Hg		

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
Em (LCS)	N204	.20ml of 1000ppb / 20ml
Em (Spike)	N204	.10ml of 1000ppb / 20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx +sp	%rec
_____ (@10x)	100.1	58.7	59.4	2.36	5.00ug/L	23.42	102 %
	6.01	5.87	5.94			46.84	

5ml Sx
5ml of 40ppb

$\frac{46.84 - 5.94}{40} = 102$

DATE ANALYZED 9-24-01
SAMPLE NUMBER 9-416-15A

ANALYIST HM DEPT. SUPER _____ INORGANIC SUPER. _____

Page _____

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RAW DATA

Environmental Enterprises — Hg Aqueous Digestion Log — Metals Department

COPY

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-1428-HAA	9-24-01	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg		
03-			0109-496-17A	Hg		
04-			" 18A	Hg		
05-			" 18AD	Hg		
06-			" 18AS	Hg		
07-1428-HAA	9-24-01	HM	0109-431-1AD	Hg	20ml/20ml	
08-			" -1ADW0	Hg		
09-			" -1ADW5	Hg		
10-			" -1ADW09	Hg		
11-1428-HAA	9-24-01	HM	0109-378-1A	Hg	20/20	
12-			" 2A	Hg		
13-			0109-429-1A	Hg		
14-1428-HAA	9-24-01	HM	0109-504-1A	Hg	20/20	
15-			0109-498-1A	Hg	20/20	
16-			0109-511-1A	Hg	2/20	P.R
17-			" 2A	Hg	2/20	"
18-			0109-476-1A	Hg	~~20~~ HM 2ml/20ml	P.R.
19-			0109-502-1A	Hg	20/20	F.S.R
20-				Hg		

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
LCS (Em)	N204	• 20ml of 1000ppb/20ml
Spk (Em)	N204	• 10ml " " "

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx +sp	%rec
500 above)		11.04	10.97	2.29	5.00ug/L	15.79	97.4%

DATE ANALYZED 9-24-01
SAMPLE NUMBER 9-496-18A

ANALYIST HM DEPT. SUPER _____ INORGANIC SUPER._____

Page _____

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Environmental Enterprises — Hg Aqueous Digestion Log — Metals Department

COPY

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN (ml/ml)	COMMENTS
01-1431-HAA	9-26-01	HAA	BLK	Hg	20/20	
02-			LCS	Hg	20/20	
03-			0109-595-4A	Hg	2/20	
04-			" 1A	Hg		
05-			0109-593-1A	Hg	↓	Rerun
06-			0109-583-1A	Hg	20/20	
07-			0109-416-19A	Hg	20/20	
08-			" 20A	Hg		
09-			" 21A	Hg		
10-			" 22A	Hg		
11-			" 23A	Hg		
12-			" 24A	Hg		
13-			" 25A	Hg		
14-			" 26A	Hg		
15-			" 27A	Hg		
16-			" 28A	Hg		
17-			" 28AD	Hg		
18-	✓	✓	" 28AS	Hg	✓	
19-				Hg		
20-				Hg		

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
5m (LCS)	N204	.20ml of 1000ppb / 20ml
5m (SPK)	N204	.20ml of 1000ppb / 20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx +sp	%rec
5.49/e	19.19	19.32	19.26	0.67%	5.00ug/L	23.34	85.6%

DATE ANALYZED 9-26-01
SAMPLE NUMBER 0109-416-28A

ANALYIST HAA DEPT. SUPER _____ INORGANIC SUPER. _____

(8)

Page _____

Environmental Enterprises Hg Miscellaneous Metals Department

weighed 10/01/01
Analyzed 10/02/01

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-277-HMA	10-01-01	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg	.20g/20ml	ERA
03-			0109-416-39A	Hg		
04-			" 30A	Hg		
05-			" 31A	Hg		
06-			" 32A	Hg		
07-			" 33A	Hg		
08-			" 34A	Hg		
09-			" 35A	Hg		
10-			" 36A	Hg		
11-			" 37A	Hg		
12-			" 38A	Hg		
13-			" 39A	Hg		
14-			" 40A	Hg		
15-			" 41A	Hg		
16-			" 41AD	Hg		
17-			" 41AS	Hg		
18-				Hg		
19-				Hg		
20-				Hg		

BATCH QC DATA
SPIKE SOURCE
ERA (LCS)
EM (spk)

STD PREP #
050F
N204

SPIKE INFORMATION
.20g soil LCS/20ml
.10ml of 100ppb/20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	~~ug/L~~ mg/Kg run 1	~~ug/L~~ mg/Kg run 2	~~ug/L~~ mg/Kg mean	rpd	spike value	ug/L sx - sp	%rec
	1.38	1.42	1.40	2.86	5.00ug/L	20.86	101 %

PDS = 5ml of 40ppb
5ml of dup
20.86 X 2 = 41.72

$\frac{41.72 - 1.40}{40} = 101$ %

DATE ANALYZED 10-2-01
SAMPLE NUMBER ~~09-416~~-41A

ANALYIST HM DEPT. SUPER ____ INORGANIC SUPER. ____

Page ____

9

Varian 20
Hg-Cold Vapor

COPY

0.000	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

OPERATOR	Harold A. James II
DATE	09.24.2001
BATCH NO	1427 1428 485
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP
PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 384.7

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	3.00

RE SCALE

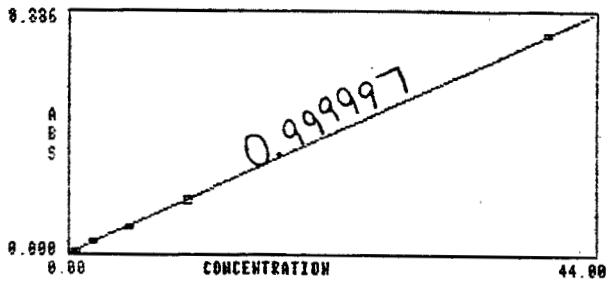
OPTIMIZE STANDARDS SIGNAL

BLANK	0.00		-0.000	-0.000	0.000
STANDARD 1	0.50	4.0	0.009	0.009	0.009
STANDARD 1	0.50	4.5	0.010	0.009	0.010
STANDARD 2	2.00	0.5	0.042	0.042	0.042
STANDARD 3	5.00	0.8	0.102	0.101	0.102
STANDARD 4	10.00	1.8	0.202	0.199	0.205
STANDARD 5	40.00	0.1	0.800	0.804	0.805

f. star
mod 9-18-01

10

Em
made 9-24-01
L207 = ICW/CCV
C207 = LdL
F206 = Dilution H2O



HA7 9-24-01
Sm3112 DW
COPY
V
I

9-24-01 Hg
HA7 245.1 - 7470 - TCLP's
V
I

LCS = .20ml of 1000ppb Em N204 / 20ml T.V. 10ppb
SpK = .10ml " " " " T.V. 5ppb

HA7 9-24-01
7470A - Hg Leachates for SCIEOZ
1A-18A
V 10-4-01
I

	5.00 ICV	5.05	101%	0.0	0.103	0.103	0.103
	....ICB....	0.03		88.8	0.000	0.001	0.000
	0.50 LdL	0.53	106%	1.0	0.010	0.010	0.010
	mg.1427:HAA..	-0.01		99.9	-0.000	0.000	-0.001
	LCS2.1427:HAA..	10.65	107%	1.1	0.215	0.213	0.217
	mg.1428:HAA..	0.06		25.1	0.001	0.001	0.001
	LCS2.1428:HAA..	10.31	103%	0.7	0.208	0.207	0.209
	mg1.405:TMA...	0.03		99.9	0.000	0.001	0.000
	LCS 2.405:TMA...	10.94	109%	0.9	0.221	0.220	0.222
01	09.431.1ADW 1	0.03		16.9	0.001	0.001	0.000
	09.431.1ADWD 1	-0.01	7.94 RPD	89.9	-0.000	0.000	-0.000
	09.431.1ADWS 1	5.89	>5.47	0.7	0.120	0.119	0.120
	09.431.1ADWDS 1	5.44		1.0	113% 0.111	0.110	0.111
	5.00 CCV	5.22	104%	0.9	0.106	0.106	0.107
	....CCB....	0.00		99.9	0.000	0.001	-0.000
01	09.378.1A 1	0.42		3.8	0.008	0.008	0.008
	09.378.2A 1	0.40		0.8	0.008	0.008	0.008
	09.429.1A 1	0.09		6.9	0.002	0.002	0.002
	09.504.1A 1	0.00		0.0	0.000	0.000	0.000
	09.498.1A 1	0.33		7.5	0.006	0.006	0.007
	09.511.1A 10	2.03		1.7	0.042	0.042	0.043
	09.511.2A 10	0.28		2.2	0.005	0.006	0.005
	09.476.1A 10	2.31		0.3	0.048	0.048	0.048
	09.502.1A 1	0.49		1.7	0.009	0.009	0.009
	09.367.1ATC 1	0.25		13.6	0.005	0.004	0.005
	5.00 CCV	5.28	106%	1.2	0.107	0.107	0.108
	....CCB.....	-0.01		47.1	-0.000	-0.000	-0.000
01	09.398.1ATC 1	-0.03		0.0	-0.000	-0.000	-0.001
	09.401.1ATC 1	-0.01	SX	99.9	-0.000	-0.001	0.000
	09.401.1ADTC 1	5.47	Spike	0.6	0.111	0.111	0.112
	09.401.1ASTC 1	0.02	dup	99.9	0.000	0.001	-0.000
	09.401.1ADSTC 1	4.90	D.Spike	2.0	0.100	0.098	0.101
	5.00 CCV	~~5.33~~	void	0.7	0.112	0.112	0.113
	5.00 CCV	5.29	106%	1.3	0.108	0.107	0.109
	....CCB....	0.04		30.4	0.001	0.001	0.001
01	09.416.1A 1	0.02		61.1	0.000	0.000	0.001
	09.416.2A 1	5.39		0.5	0.110	0.109	0.110
	09.416.3A 1	7.85		1.1	0.159	0.158	0.160
	09.416.4A 1	~~0.08~~	Void	21.5	0.002	0.001	0.002
	09.416.4A 1	4.76		1.1	0.097	0.096	0.098
	09.416.5A 1	4.73		0.4	0.096	0.096	0.097
	09.416.6A 1	7.68		0.9	0.156	0.155	0.157
	09.416.7A 1	11.92		1.0	0.241	0.239	0.242
	09.416.8A 1	5.79		0.6	0.118	0.117	0.118

104%
5.19 ~~96.4%~~ HM
11.0 % RPD

11

	09.416.9A	0.52		3.9	0.010	0.010	0.010
	09.416.10A	1.27		2.5	0.025	0.025	0.026
	5.00 CCV	5.20	104%	1.3	0.106	0.105	0.107
	.....CCB.....	0.08		9.8	0.002	0.002	0.002
01	09.416.11A 1	~~0.86~~ void		2.7	0.017	0.017	0.017
	09.416.11A	7.75		0.9	0.157	0.156	0.158
	09.416.12A	2.63		1.1	0.054	0.054	0.055
	09.416.13A	2.40		1.0	0.050	0.049	0.050
	09.416.14A ~~1~~	~~0.16~~ void		9.8	0.003	0.003	0.003
	09.416.14AD 1	6.03		1.2	0.123	0.122	0.124
	09.416.15A 1	6.01	avg 5.94	0.8	2.36%	0.122	0.121	0.123
	09.416.15AD 1	5.87	~~118%~~	0.8	RPD	0.119	0.119	0.120
	09.416.15AS 1	23.42	102%	1.0		0.472	0.469	0.476 — PDS 5ml sx 5ml of 40ppb (J207)
	09.416.16A 1	21.70		1.1		0.438	0.434	0.441
	09.416.17A 1	15.60		0.9		0.315	0.313	0.317
	5.00 CCV	5.26	105%	1.4		0.107	0.106	0.108

$$23.42 \times 2 = \frac{46.84 - 5.94}{40} = 102\%$$

SAMPLE	CONC		%RSD	MEAN ABS	READINGS	
....CCB.....	0.18		10.8	0.003	0.004	0.003
01 09.416.18A	10.79	avg 10.92	0.8	2.39	0.218	0.217	0.219
09.416.18AD	11.04		0.8	RPD	0.223	0.222	0.224
09.416.18AS 1	15.79	97.4%	1.0		0.319	0.317	0.321
5.00 CCV	5.27	105%	1.5		0.107	0.106	0.108
.....CCB.....	-1.29		99.9		-0.025	-0.080	0.003
.....CCB...	0.13		8.8		0.003	0.002	0.003
dilution H_2O..	0.13		15.3		0.003	0.002	0.003

See attached dilution sheet for W.O. 416-

All Samples prepped w/
- 5ml conc. HNO_3
- 1.0ml conc. H_2SO_4
- 3.0ml 5% $KMnO_4$
- 1.6ml 5% $K_2S_2O_8$
- 1.2ml 12% $NH_2OH \cdot HCL$

09-416-15A

PDS = 23.42 x 2 = 46.84

$$\frac{46.84 - 5.94}{40} \times 100 = 102\%$$

12

Varian 20
Hg-cold Vapor

COPY

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

II

Harold A. J

OPERATOR	
DATE	09.26.2001
BATCH NO.	1431 276
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP

PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 384 7

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0 5
AIR FLOW	0.00

13

RE SCALE

OPTIMIZE SIGNAL

FORWARDS

BLANK	0.00		-0.000	-0.001	-0.000	K207
STANDARD 1	0.50	0.0	0.010	0.010	0.010	Q207
STANDARD 2	2.00	0.4	0.046	0.046	0.046	R207
STANDARD 3	5.00	0.9	0.116	0.115	0.116	S207
STANDARD 4	10.00	0.5	0.230	0.229	0.231	T207
STANDARD 5	40.00	0.5	0.835	0.832	0.836	U207

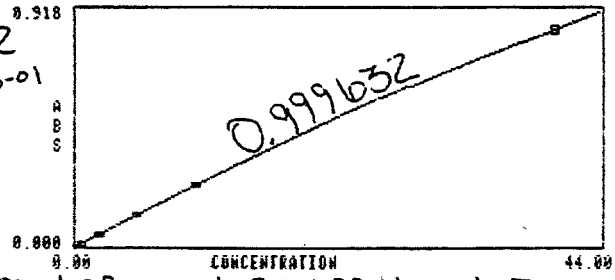
made 9-25-01 Fisher

COPY

EM

ICV/CCV = V202 made 9-26-01

LdL = 0207 made 9-25-01



9-26-01 HM
Hg 245.1
7470

LCS = .20ml of 1000ppb EM N204 (20ml) T.V. 10ppb

SpK = .10ml " " " T.V 5ppb Hg 7470A

10-4-01 gmc

5.00 ICV		4.95	99.0%	0.3	0.115	0.115	0.114
....ICB...		-0.02		73.0	-0.000	-0.001	-0.000
0.50 LdL		0.51	102%	12.1	0.011	0.010	0.012
MB 1.1431-HMA.		-0.03		66.7	-0.001	-0.000	-0.001
LCS 2.1431-HMA.		11.15	112%	0.8	0.256	0.257	0.254
MB 1.276-HMA.		0.06		0.0	0.001	0.001	0.001
LCS 2.276-HMA.		8.23	82.3%	0.3 oil	0.190	0.190	0.190
01 9.595.4A	10	0.34		1.2	0.007	0.007	0.007
9.595.1A	10	0.41		1.2	0.009	0.008	0.009
9.593.1A	10	0.79		0.0	0.017	0.017	0.017
9.583.1A	1	0.03		70.6	0.001	0.001	0.000
9.418.1A	100	0.03		26.8	0.001	0.000	0.001
9.418.1AD	100	-0.01		57.1	-0.000	-0.000	-0.000
5.00 CCV		4.89	97.8%	0.5	0.113	0.113	0.113
....CCB...		0.00		99.9	0.000	-0.000	0.000
01 9.418.1AS	100	~~5.17~~	void	0.3	0.073	0.073	0.074
9.418.1ASD	100	~~5.01~~	void	0.7	0.069	0.069	0.070
9.418.1APDS	100	4.86		0.4	0.113	0.112	0.113 - 5ml 3x 5ml 10ppb
9.416.19A ✓1		-0.00		99.9	-0.000	0.000	-0.000
9.416.20A	1	~~0.27~~	void	11.8	0.006	0.005	0.006
9.416.20A ✓1		2.57		0.4	0.059	0.060	0.059
9.416.21A ✓1		1.30		0.9	0.029	0.029	0.029
9.416.22A ✓1		4.35		0.8	0.101	0.100	0.101
9.416.23A ✓1		2.89		1.1	0.067	0.066	0.067
9.416.24A	1	~~0.07~~	void	28.5	0.001	0.002	0.001
9.416.24A ✓1		7.24		0.3	0.167	0.167	0.168
9.416.25A ✓1		6.58		0.8	0.152	0.151	0.153
5.00 CCV		4.89	97.8%	1.0	0.113	0.112	0.114
.....CCB....		0.00		99.9	0.000	0.000	-0.000
9.416.26A ✓1		20.35		1.0	0.457	0.453	0.460
9.416.27A	10	0.12	void	4.9	0.002	0.003	0.002
9.416.27A ✓1		24.95		1.0	0.552	0.548	0.556
9.418.28A	1	19.19	19.26	0.5	.675 0.432	0.431	0.433
9.416.28AD ✓1		19.32		0.0	RPD 0.435	0.435	0.435
9.416.28AS ✓1		23.54	85.6%	0.9	0.523	0.520	0.526

0109-4116 HM

14

9.596.1A 100	1.54	10,000x	1.4	0.034	0.034	0.035 = 1,000,000 x
5.00 CCV	4.70	94.0%	1.4	0.109	0.108	0.110
.....CCB....	0.06		12.2	0.001	0.001	0.001
.Dilution. H_2O	0.01		99.5	0.000	0.001	0.000

COPY

Sx prepped with

用 .5ml conc. HNO_3
1.0ml conc. H_2SO_4
3.0ml 5% $KMnO_4$
1.0ml 5% $K_2S_2O_8$
1.2ml 12% $NH_2OH \cdot HCL$

0109-416-19A = 1x
20A = 100x
21A = 100x
22A = 1,000x
23A = 100x
24A = 10x
25A = 10x
26A = 1x
27A = 1x
28A = 1x

15

COPY

```
                PROGRAM 16        Hg
                BLANK             REPLICATE   1    MANUAL
                ABSORBANCE        CONCENTRATION    BC ON
                INTEGRATION       3.0      (sec)   AIR ONLY
PRINTING
                          REPORT FORMAT

        OPERATOR
        DATE                      10.02.2001
        BATCH NO.                 277

        FORMAT                    SEQUENTIAL
        DATA PRINTED              EACH READING
        PRINT                     DURING RUN
        INSTRUMENT STATUS         NO
        CALIBRATION RESULTS       YES
        CALIBRATION GRAPH         YES
        SAMPLE LABELS             YES
        LINES PER REPORT PAGE     66

                                                  SAMPLE
                                                  LABELS

                PROGRAM 16        Hg
0.000           BLANK             REPLICATE   1    MANUAL
                ABSORBANCE        CONCENTRATION    BC ON
                INTEGRATION       3.0      (sec)   AIR ONLY
PRINTING
                          OPTIMIZATION

ALIGN D2 LAMP
ALIGN HC LAMP
PEAK WAVELENGTH

                PHOTOMULTIPLIER VOLTS     387.0

                PARAMETERS TO BE SET MANUALLY

                WAVELENGTH (nm)           253.7
                SLIT WIDTH (nm)           0.5
                AIR FLOW                  0.00
```

16

RAW DATA

	RE SCALE			SIGNAL		
BLANK	0.00		0.000	0.001	0.000	Z207
STANDARD 1	0.50	1.0	0.011	0.011	0.011	F208
STANDARD 2	2.00	0.2	0.047	0.046	0.047	G208
STANDARD 3	5.00	0.1	0.115	0.115	0.115	H208
STANDARD 4	10.00	0.1	0.233	0.233	0.233	I208
STANDARD 5	40.00	0.2	0.843	0.842	0.844	J208

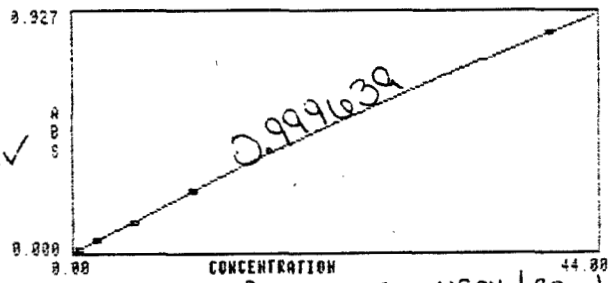
Standard made 10-2-01 Fisher

COPY

mgai 10-2-01 Em

D208 = LdL

E208 = ICV/CCV



Hg 7470A
HA 10-2-01

VERIFIED DATE 10-4-01

LCS = .20ml of 1000ppb Em N204 / 20ml T.V
SPK = .10ml " " " "
LCS = ERA 050F, 20g Soil LCS = Cert Val. = 3.94 Range = 2.64 - 5.21 mg/kg

	5.00 ICV	5.24	105%	0.8	0.121	0.120	0.121	
	....ICB....	0.05		39.6	0.001	0.001	0.001	
	0.50 LdL	0.54	108%	0.0	0.012	0.012	0.012	
mg	1.277 mg/kg....	0.01		99.9	0.000	0.001	-0.000	
LCS	2.277 mg/kg 100X	38.02	3.80 mg/kg	0.2	0.806	0.805	0.807	
0'	9.416.29A 100	✓3.38		1.2	0.076	0.078	0.075	
	9.416.30A 100	✓3.83		1.0	0.089	0.088	0.089	
	9.416.31A 100	✓3.91		1.3	0.090	0.090	0.091	
	9.416.32A 100	✓1.21		0.6	0.027	0.027	0.027	
	9.416.33A 100	✓1.53		0.0	0.035	0.035	0.035	
	9.416.34A 100	✓1.28		1.9	0.029	0.029	0.029	
	9.416.35A 100	✓1.63		1.2	0.037	0.037	0.036	
	5.00 CCV	5.16	103%	0.4	0.119	0.119	0.119	
	....CCB....	-0.02		22.7	-0.000	-0.001	-0.000	
5'	9.416.36A 100	✓1.86		0.9	0.043	0.043	0.043	
	9.416.37A 100	✓1.23		3.4	0.028	0.027	0.028	
	9.416.38A 100	✓1.16		1.2	0.026	0.026	0.026	
	9.416.39A 100	✓1.70		0.3	0.039	0.039	0.039	
	9.416.40A 100	✓1.40	2.80 mg/kg	0.3	0.032	0.032	0.032	
	9.416.41A 100	✓1.38	>1.40	0.8	0.031	0.031	0.031	
	9.416.41AD 100	✓1.42		0.0	0.032	0.032	0.032	
	9.416.41AD 100	20.86	(PDS)	0.6	101% 0.466	0.466	0.470	— 5.0ml of dup (1,001,000A) 5.0ml of 40ppm (J204)
	5.00 CCV	5.22	104%	0.8	0.120	0.119	0.121	
	.....CCB....	-0.02		92.7	-0.000	-0.000	-0.001	
Dilution H_2O	.....LDB.....	-0.06		15.8	-0.001	-0.001	-0.001	

9.416.41 PDS
20.86 ÷ 2 = 41.72
$\frac{41.72 - 1.40}{40} \times 100 = 101\%$

All prepped: .5ml conc. HNO_3
1.0ml conc. $H_2S_2O_4$
3.0ml 5% $KMnO_4$
1.0ml 5% $K_2S_2O_8$
1.2ml 12% $NH_2OH \cdot HCl$ / 20ml

* See dilution Sheet

17

ENVIRONMENTAL ENTERPRISES, INC.

(31)

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 0110360-01 through 0110360-18.

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	Digestion Batch #	ICV			CCV1			CCV2		CCV3	
					True	Found	% Rec	True	Found	% Rec	Found	% Rec	Found	% Rec
10/16/01	HAJ	7470A	Hg	1444HAA 1445HAA	5	5.19	104	5	4.88	97.6	5.01	100	4.98	99.6

Digestion Batch #	Sample Fractions Included
1444HAA	0110360-01 through 0110360-15
1445HAA	0110360 16 through 0110360-18

ICV = Initial Calibration Verification **ICV % Range =** +/-10%

CCV = Continue Calibration Verification **CCV % Range =** +/-20%

0110360-cal

ENVIRONMENTAL ENTERPRISES, INC.

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Quality Assurance Report
Project: SCIE02

Analysis Date	Sample #	Digestion Batch #	D. L. ppb	Method Blank ppb	Sample Results ppb	Sample Dup ppb	Sample Ave. ppb	RPD	Dilution Factor	Spike Added ppb	Matrix Sp. Result ppb	Matrix Sp. Dup. Result ppb	Matrix Spike % Rec	Dup Spike % Rec	LCS Conc. ppb	LCS %. Rec	LCS Acceptance % Limits
10/16/01	0110360-01	1444HAA	0.5	<0.5	4.26	4.51	4.39(1)	5.69	1,000	10	14.4	NA	100(2)	NA	10	106	85 - 115
10/16/01	0110360-16	1445HAA	0.5	<0.5	8.9	10.11	9.51	12.7	1	5	14.96	14.98	109	109	10	102	85 - 115

Method # SW 7470A Analyte: Hg Analyst: HAJ

Note:
(1) Dilution factors were applied to average reported sample results.
(2) Post Digestion Spikes (PDS) were performed on the diluted sample due to the high levels of mercury present in the sample.

NA - Not Available.

Digestion Batch #	Sample Fractions Included
1444HAA	0110360-01 through 0110360-15
1445HAA	0110360-16 through 0110360-18

RPD = Relative Percent Difference **RPD Control Limits =** 0-20%

LCS = Laboratory Control Sample **Spike Control Limits =** +/-25%

An Employee-Owned Company

COPY

Sx = 0110-300-1A
Sciro2
Project WA3-08

Sample Dilution Record Hg 7470A 10-16-01

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
10-300-1A	1x	1000x			1,000x
1AD		1000x			1,000x
2A		1000x			1,000x
3A		10x			10x
4A		100x			100x
5A		1x			1x
6A		1x			1x
7A		1x			1x
8A		1x			1x
9A		1x			1x
10A		1x			1x
11A		10,000x			10,000x
12A		1,000,000x			1,000,000x * ran 12A @ 10,000x as 11A ran over (Sx. Dup)
13A		1,000x			1,000x
14A		100x			100x
15A		10,000x			10,000x
16A		1x			1x
16AD	↓	1x			1x
17A	1x	1x			1x
18A	1x	1x			1x
2A =	re-checked 2x for Dup				
1APDS	5ml of 1000x & 2ml of 1000x				
11A =	re-checked				

1000x = .01ml/10ml
10,000x = .1ml/10ml x .1ml/10ml
1000,000x = .01/10 x .01/10ml

20

Environmental Enterprises — Hg Aqueous Digestion Log — Metals Department

COPY

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-HAN-HAA	10-16-01	HAN	BLK	Hg	20ml/60ml	
02-			LCS	Hg		
03-			0110-360-1A	Hg		
04-			" 1AD	Hg		
05-			" 1AS	Hg		
06-			" 1ADS	Hg		
07-			" 2A	Hg		
08-			" 3A	Hg		
09-			" 4A	Hg		
10-			" 5A	Hg		
11-			" 6A	Hg		
12-			" 7A	Hg		
13-			" 8A	Hg		
14-			" 9A	Hg		
15-			" 10A	Hg		
16-			" 11A	Hg		
17-			" 12A	Hg		
18-			" 13A	Hg		
19-			" 14A	Hg		
20-			" 15A	Hg		

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
Sm (SpK)	N204	.10ml of 100ppb/20ml
Sm (LCS)	N204	.20ml " " "

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx +sp	%rec
	4.26	4.51	4.39	5.69	5.00ug/L	7.20	98.8

5ml dup
5ml 10ppb

DATE ANALYZED 10-16-01
SAMPLE NUMBER 10-360-1A

ANALYIST HAN DEPT. SUPER _____ INORGANIC SUPER. _____

Page _____

21

Environmental Enterprises — Hg Aqueous Digestion Log — Metals Department

COPY

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-1445-HAA	10-16-01	HAM	BLK	Hg	20ml/20ml	
02-			LCS	Hg		
03-			0110-360-16A	Hg		
04-			" 16AD	Hg		
05-			" 16AS	Hg		
06-			" 16ADS	Hg		
07-			" 17A	Hg		
08-			" 18A	Hg		
09-			0110-346-40	Hg		
10-			" 20	Hg		
11-				Hg		
12-				Hg		
13-				Hg		
14-				Hg		
15-				Hg		
16-				Hg		
17-				Hg		
18-				Hg		
19-				Hg		
20-				Hg		

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
5m (LCS)	U204	.20ml of 1000ppb/20ml
5m (Spk)	N204	.10ml " "

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx +sp	%rec
	8.90	10.11	9.51	12.7	5.00ug/L	14.97	109 %

DATE ANALYZED 10-16-01
SAMPLE NUMBER 10-360-16A

ANALYIST HAM DEPT. SUPER _____ INORGANIC SUPER. _____

(22)

Page _____

Hg - Cold Vapor
Varian 40

COPY

	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold S. James II

OPERATOR	
DATE	10.16.2001
BATCH NO.	1444 1445
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

	PROGRAM 16	Hg		
0.000	BLANK	REPLICATE 1	MANUAL	
	ABSORBANCE	CONCENTRATION	BC ON	
	INTEGRATION	3.0 (sec)	AIR ONLY	

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP

PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 387 8

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

RE... OPTIMIZE STANDARDS

23

COPY

	SCALE			SIGNAL	
BLANK	0.00		0.000	0.000	0.000 G209
STANDARD 1	0.50	0.0	0.011	0.011	0.011 G209
STANDARD 2	2.00	1.0	0.044	0.045	0.044 H209
STANDARD 3	5.00	0.4	0.112	0.112	0.113 I209
STANDARD 4	10.00	0.5	0.226	0.225	0.227 J209
STANDARD 5	40.00	0.6	0.826	0.823	0.830 K209

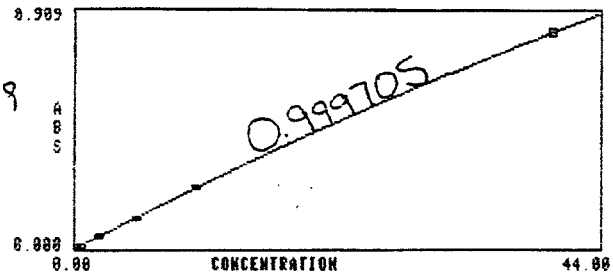
Fisher

Std - QC
made 10-16-01

Em

ICV/CCV = F209

LdL = E209



Hg 7470A
245.1
HM 10-16-01

LCS = .20ml of 1000ppb Em N204 | 20ml

SpK = .10ml of 1000ppb Em N204 | 20ml

	5.00 ICV	5.19 104%	0.2	0.117	0.117	0.117	
	.....ICB...	0.09	34.4	0.002	0.001	0.002	
	0.50 LDL	0.53 106%	3.3	0.012	0.012	0.011	
MB	1.1444 HAA..	0.05	0.0	0.001	0.001	0.001	
LCS	2.1444 HAA..	10.57 106%	0.2	0.238	0.239	0.238	
MB	1.1445 HAA..	0.11	0.0	0.002	0.002	0.002	
LCS	2.1445 HAA..	10.18 102%	0.8	0.230	0.228	0.231	
01	10.360.1A 1	4.26 >4.39	0.7	5.69 RPD 0.096	0.095	0.096	
	10.360.1AD 1	4.51	0.2	0.101	0.101	0.101	
	10.360.1APDS 1	7.20 98.8%	0.6	0.162	0.162	0.163	= 5ml std 10ppb 5ml dup
	10.360.2A 1	1.11	0.0	0.024	0.024	0.024	
	10.360.2A 1	0.91 (re-v)	0.8	0.020	0.020	0.020	
	5.00 CCV	4.88 97.6%	0.3	0.110	0.109	0.110	
	.....CCB....	0.04	67.4	0.001	0.001	0.000	
01	10.360.3A 1	3.40	1.1	0.076	0.075	0.076	
	10.360.4A 1	1.18	0.2	0.026	0.026	0.026	
	10.360.5A 1	10.62	0.7	0.239	0.238	0.241	
	10.360.6A 1	7.97	0.6	0.180	0.179	0.181	
	10.360.7A 1	3.37	1.0	0.075	0.075	0.076	
	10.360.8A 1	2.39	0.2	0.053	0.053	0.053	
	10.360.9A 1	2.64	9.8	0.059	0.055	0.063	
	~~10.360.10 1 0.25~~		3.5	0.006	0.005	0.006	
11A	10.360.11A 1	2.90	0.5	0.065	0.064	0.065	
	10.360.11A 1	2.97 (re-v)	0.2	0.066	0.066	0.066	
	~~10.360.12 1 0.34~~		0.0	0.007	0.007	0.007	
	10.360.12A 1	2.79	0.8	0.062	0.062	0.062	
	5.00 CCV	5.01 100%	0.8	0.113	0.112	0.113	
	.....CCB....	0.20	1.4	0.004	0.005	0.004	
	~~NO 360.13 1 OVER~~		1.0	1.956	1.942	1.970	
01	10.360.13A 1	14.87	0.9	0.331	0.329	0.333	
	10.360.14A 1	4.78	1.2	0.107	0.107	0.108	
	10.360.15A 1	1.37	1.8	0.030	0.030	0.031	
	10.360.16A 1	8.90 >9.51	1.0	12.7 RPD 0.201	0.200	0.202	
	10.360.16AD 1	10.11	0.1	0.228	0.228	0.229	

10-36-01 PDS

7.20 x 2 = 14.4

$\frac{14.4}{10} \times 100 = 144\%$

264

RAW DATA

10.360.16A DS		14.98	0.2	0.333	0.333	0.334
10.360.17A	1	17.65	0.9	0.389	0.387	0.392
10.360.18A	1	0.46	0.9	0.010	0.010	0.010
10.346.2D	1	0.18	18.2	0.004	0.004	0.003
10.346.4D	1	0.19	12.4	0.004	0.004	0.004
10.360.10A	1	0.17	0.0	0.004	0.004	0.004
5.00 CCV		4.98 99.6%	0.1	0.112	0.112	0.112
CCB		0.16	6.2	0.004	0.003	0.004
Dilution H_2O		0.14	20.2	0.003	0.004	0.003

COPY

All samples prepped w/

- 5ml conc HNO_3
- 1.0ml conc. H_2SO_4
- 3.0ml 5% $KMnO_4$
- 1.6ml 5% $K_2S_2O_8$
- 1.2ml 12% NH_2OH HCL

25

OSWI-014-①

Page 1 EEI REPORT Work Order # 01-08-371
Received: 08/15/01 08/31/01 17:17:39

REPORT TO: UC, ALTER FACILITY
DEPT. OF CIVIL & ENVIR. ENG.
CINCINNATI, OHIO 45221-0071

ATTEN: LINDA RIESER

CLIENT: SCIE02 SAMPLES: 51
COMPANY: SCIENCE APPLICATIONS INT'L
FACILITY:

WORK ID: 8/15/01 EPA MERCURY (ALTER)
TAKEN: CUSTOMER
TRANS: DELIVERED
TYPE: LEACHATES/SOLIDS
P.O. #: 4400038593
INV. #: 18862

PREPARED BY: Environmental Enterprises
10163 Cincinnati-Dayton Rd.
Cincinnati, Ohio 45241

ATTEN: Debbe Jones
PHONE: (513) 772-2818

CERTIFIED BY: Debbe Jones

CONTACT: JASON

Enclosed are the results of specified samples submitted for analysis. If you have any questions please use Order # for faster identification.
OHIO EPA CERTIFICATION: CHEMICAL #4095, MICROBIOLOGICAL #850

QA/QC ENCLOSURES.

Previously Reported on 08/31/01.

SAMPLE IDENTIFICATION	TEST CODES and NAMES used on this workorder	
01 Vendor C A1T(1) TCLP Leachate	HG	Mercury (Cold vapor)
02 Vendor C A1T(2) TCLP Leachate		
03 Vendor C A2T TCLP Leachate		
04 Vendor C A3T TCLP Leachate		
05 Vendor C B1T TCLP Leachate		
06 Vendor C B2T TCLP Leachate		
07 Vendor C B3T TCLP Leachate		
08 TCLP BLANK		
09 Vendor C A1-S1 Solid		
10 Vendor C A1-S2 Solid		
11 Vendor C A1-S3 Solid		
12 Vendor C A1-S4 Solid		
13 Vendor C A1-S5 Solid		
14 Vendor C B1-S1 Solid		
15 Vendor C B1-S2 Solid		
16 Vendor C B1-S3 Solid		
17 Vendor C B1-S4 Solid		
18 Vendor C B1-S5 Solid		
19 Vendor C B2-S1 Solid		
20 Vendor C B2-S2 Solid		
21 Vendor C B2-S3 Solid		
22 Vendor C B2-S4 Solid		
23 Vendor C B2-S5 Solid		
24 Vendor C B3-S1 Solid		
25 Vendor C B3-S2 Solid		
26 Vendor C B3-S3 Solid		

Page 2 EKI REPORT Work Order # 01-08-371

Received: 08/15/01 08/31/01 17:17:39

SAMPLE IDENTIFICATION

27 Vendor C B3-S4 Solid
28 Vendor C B3-S5 Solid
29 Vendor C AM1-pH2
30 Vendor C AM1-pH2D
31 Vendor C AM1-pH4
32 Vendor C AM1-pH6
33 Vendor C AM1-pH8
34 Vendor C AM1-pH8D
35 Vendor C AM1-pH10
36 Vendor C AM1-pH12
37 Vendor C AM1-pH12D
38 Vendor C AM1-pH2B
39 Vendor C B1-pH2
40 Vendor C B1-pH2D
41 Vendor C B1-pH4
42 Vendor C B1-pH6
43 Vendor C B1-pH8
44 Vendor C B1-pH10
45 Vendor C B1-pH12
46 Vendor C B1-pH12D
47 Vendor C B1-pH2B
48 Vendor C RAW 1 Solid
49 Vendor C RAW 2 Solid
50 Vendor C RAW 3 Solid
51 Vendor C B1-pH8D

Vendor C B3-S2 Solid

Page 3 KKI REPORT Work Order # 01-08-371

Received: 08/15/01 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
HG mg/l	0.013	0.013	0.015	0.015	0.010

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)	Sample 10 (entered units)
HG mg/l	0.009	0.008	0.0005	10,700 mg/kg	9,860 mg/kg

TEST CODE default units	Sample 11 (entered units)	Sample 12 (entered units)	Sample 13 (entered units)	Sample 14 (entered units)	Sample 15 (entered units)
HG mg/l	7,820 mg/kg	9,730 mg/kg	8,600 mg/kg	1,750 mg/kg	1,910 mg/kg

TEST CODE default units	Sample 16 (entered units)	Sample 17 (entered units)	Sample 18 (entered units)	Sample 19 (entered units)	Sample 20 (entered units)
HG mg/l	1,830 mg/kg	1,810 mg/kg	2,030 mg/kg	1,800 mg/kg	1,850 mg/kg

TEST CODE default units	Sample 21 (entered units)	Sample 22 (entered units)	Sample 23 (entered units)	Sample 24 (entered units)	Sample 25 (entered units)
HG mg/l	1,930 mg/kg	1,970 mg/kg	1,670 mg/kg	2,170 mg/kg	2,160 mg/kg

TEST CODE default units	Sample 26 (entered units)	Sample 27 (entered units)	Sample 28 (entered units)	Sample 29 (entered units)	Sample 30 (entered units)
HG mg/l	2,030 mg/kg	2,090 mg/kg	2,140 mg/kg	2,210	1,430

TEST CODE default units	Sample 31 (entered units)	Sample 32 (entered units)	Sample 33 (entered units)	Sample 34 (entered units)	Sample 35 (entered units)
HG mg/l	0.215	0.032	0.049	0.268	0.139

TEST CODE default units	Sample 36 (entered units)	Sample 37 (entered units)	Sample 38 (entered units)	Sample 39 (entered units)	Sample 40 (entered units)
HG mg/l	0.025	0.025	0.0007	0.356	13.9

Page 4 KEI REPORT Work Order # 01-08-371

Received: 08/15/01 Results By Test

TEST CODE default units	Sample 41 (entered units)	Sample 42 (entered units)	Sample 43 (entered units)	Sample 44 (entered units)	Sample 45 (entered units)
HG mg/l	0.008	0.044	0.039	0.011	0.035

TEST CODE default units	Sample 46 (entered units)	Sample 47 (entered units)	Sample 48 (entered units)	Sample 49 (entered units)	Sample 50 (entered units)
HG mg/l	0.034	<0.0005	5,790 mg/kg	5,340 mg/kg	4,720 mg/kg

TEST CODE default units	Sample 51 (entered units)
HG mg/l	0.021

OSWI-014-E

ENVIRONMENTAL ENTERPRISES, INC.

QC REPORT
UNIVERSITY OF CINCINNATI
SCIE02

TABLE OF CONTENTS

METAL

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Mercury Analysis Data..... 14 - 24

CASE NARRATIVE

PROJECT: Science Applications Int'L (SCIE02) (Work Order # 0108371-01 to 51)

METAL

Mercury analyses were performed in accordance with SW 846 Method 7470A and meet the required QC criteria.

Initial calibrations were performed within 0.9996 to 0.9998 Correlation Coefficient.

The daily calibration were verified by Initial Calibration Verification (ICV) standard and Continuing Calibration Verification (CCV) standard. ICV and all CCV recoveries were within the acceptable control limits.

Laboratory control samples recovery were within the acceptable control limits.

RPD calculated for duplicate analyses were within the acceptable control limits.

For all the analytical batches Post Digestion Spikes (PDS) were performed due to the high level of mercury present. except for sample 0108371-1. All the PDS recoveries were within the control limits.

Method blanks were free of contamination.

Jyoti Desai 9/6/01

Jyoti Desai (Date)
QA Coordinator

ENVIRONMENTAL ENTERPRISES, INC.

(1)

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 01-08-371-01A-08A and 31A-38A

Aqueous Batch 1403 HAA

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	ICV True	ICV Found	ICV % Rec	CCV1 True	CCV1 Found	CCV1 % Rec	CCV2 Found	CCV2 % Rec	CCV3 Found	CCV3 % Rec	CCV4 Found	CCV4 % Rec
8/17/01	HAJ	7470A	Hg	5	5.05	101	5	5 22	104	5.35	107	5.05	101	4.95	99

ICV = Initial Calibration Verification **ICV % Range =** +/-10%

CCV = Continue Calibration Verification **CCV % Range =** +/-20%

0108371-1403HAAcal

An Employee-Owned Company

ENVIRONMENTAL ENTERPRISES, INC.

(2)

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 01-08-371-29A-30A, 39A-47A, and 51A.

Aqueous Batch 1405-HAA.

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	ICV			CCV1			CCV2		CCV3	
				True	Found	% Rec	True	Found	% Rec	Found	% Rec	Found	% Rec
8/20/01	HAJ	7470A	Hg	5	4.86	97.2	5	5.08	102	5.05	101	4.91	98.2

ICV = Initial Calibration Verification **ICV % Range =** +/-10%

CCV = Continue Calibration Verification **CCV % Range =** +/-20%

0108371-1405HAAcal

ENVIRONMENTAL ENTERPRISES, INC.

(3)

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 01 08 371-09A 18A.

Miscellaneous Batch 273-HMA.

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	ICV			CCV1			CCV2		CCV3		CCV4		CCV5	
				True	Found	% Rec	True	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
8/23/01	HAJ	7470A	Hg	5	5.25	105	5	5.39	108	5.53	111	4.91	98.2	4.91	98.2	4.74	94.8

ICV = Initial Calibration Verification **ICV % Range =** +/-10%

CCV = Continue Calibration Verification **CCV % Range =** +/-20%

An Employee-Owned Company

ENVIRONMENTAL ENTERPRISES, INC.

(4)

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 01-08-371-19A-28A and 48A-50A.

Miscellaneous Batch 274-HMA.

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	ICV			CCV1			CCV2	
				True	Found	% Rec	True	Found	% Rec	Found	% Rec
8/28/01	HAJ	7470A	Hg	5	5.06	101	5	4.93	98.6	4.89	97.8

ICV = Initial Calibration Verification **ICV % Range =** +/-10%

CCV = Continue Calibration Verification **CCV % Range =** +/-20%

0108371-274HMAcal

ENVIRONMENTAL ENTERPRISES, INC.

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Quality Assurance Report
Project: SCIE02

Analysis Date	Sample #	D. L. ppb	Method Blank ppb	Sample Results ppb	Sample Dup ppb	Sample Ave. ppb	RPD	Dilution Factor	Spike Added ppb	Matrix Sp. Result ppb	Matrix Sp. Dup. Result ppb	Matrix Spike % Rec	Dup Spike % Rec	LCS Conc. ppb	LCS % Rec	LCS Acceptance % Limits
8/17/01	0108371-1	0.5	<0.5	12.8	12.9	12.85	1	1	5	17.05	NA	84	NA	10	101	85 - 115
8/20/01	0108371-29	0.5	<0.5	2.34	2.08	2.21(1)	12	1,000,000	10	12.22	NA	100 (2)	NA	10	99.5	85 - 115
8/23/01	0108371-18	0.5	<0.5	3.83	4.26	4.05 (1)	11	500,000	10	13.74	NA	97 (2)	NA	3940(3)	94	68 - 132
8/28/01	0108371-24	0.5	<0.5	2.09	2.24	2.17 (1)	7	1,000,000	10	11.94	NA	98 (2)	NA	3940(3)	90	68 - 132

Method # SW 7470A Analyte: Hg Analyst: HAJ

Note:
(1) Dilution factor were applied to average reported sample results.
(2) A Post Digestion Spike (PDS) were performed on the diluted sample due to the high levels of mercury present in the sample.
(3) Soil LCS.
NA - Not Available.

RPD = Relative Percent Difference RPD Control Limits = 0-20%

LCS = Laboratory Control Sample Spike Control Limits = +/-25%

An Employee-Owned Company

Sample Dilution Record

Date: 8-17-01 Analyst Int.: HAM Analysis: Hg Method # 7470A

Sample #	Original	1st	2nd	3rd	4th	5th	Total Dilution Factor
D108-371-1A	1x	–	–				1x
1AD	1x	–	–				1x
2A	1x	–	–				1x
3A	1x	–	–				1x
4A	1x	–	–				1x
5A	1x	–	–				1x
6A	1x	–	–				1x
7A	1x	–	–				1x
8A	1x	–	–				1x (BLK) resetting
31A	1x	100x					100x
32A	1x	10x					10x
33A	1x	10x					10x
34A	1x	10x					10x
35A	1x	10x					10x
36A	1x	10x					10x + 1x
37A	1x	–	–				1x
38A	1x						1x (BLK)
36A	1x	1x					Recheck on Dilution

(6)

Sample Dilution Record

Date: 8-20-01 Analyst Int.: HM Analysis: Hg Method # 7470A

Sample #	Original	1st	2nd	3rd	4th	5th	Total Dilution Factor
8-571-8A	1X	—	—				
28A	1X	1000X	1000X				1 million X
29AD	1X	1000X	1000X				1 million X
30A	1X	1000X	1000X				1 million X
39A	1X	100X	—				100X
40A	1X	1000X	—				1000X
41A	1X	—	—				1X
42A	1X	—	—	over curve			1X
42A	1X	10X					10X
43A	1X	10X					10X
44A	1X	10X		void			10X
44A	1X	—					1X
45A	1X	10X					10X
46A	1X	10X					10X
47A	1X	—					1X
51A	1X	10X					10X
(re-check) 34A	1X	100X					

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Sample Dilution Record

Date: 8-23-01 Analyst Int.: HAY Analysis: Hg Method # 7470A

Sample #	Original	1st	2nd	3rd	4th	5th	Total Dilution Factor
8-371-9A	100X	500X	10X				500,000X
8-371-10A	100X	500X	10X				
8-371-11A	100X	500X	10X				
8-371-12A	100X	500X	10X				
8-371-13A	100X	500X	10X				
8-371-14A	100X	500X	10X				
8-371-15A	100X	500X	10X				
8-371-16A	100X	500X	10X				
8-371-17A	100X	500X	10X				
8-371-18A	100X	500X	10X				
8-371-18AD	100X	500X	10X				

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Sample Dilution Record

Date: 8/28/01 Analyst Int.: HAJ Analysis: Hg Method # 7470A

Sample #	Original	1st	2nd	3rd	4th	5th	Total Dilution Factor
LCS	100X	10X					1,000
B-371-19A	100X	1000X	10X				1,000,000
20A	100X	1000X	10X				
21A	100X	1000X	10X				
22A	100X	1000X	10X				
23A	100X	1000X	10X				
24A	100X	1000X	10X				
24AD	100X	1000X	10X				
25A	100X	1000X	10X				
26A	100X	1000X	10X				
27A	100X	1000X	10X				
28A	100X	1000X	10X				
48A	100X	1000X	10X				
49A	100X	1000X	10X				
50A	100X	1000X	10X				

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Environmental Enterprises | Hg Aqueous Digestion Log | Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-1403-HAA	8-17-01	HM	BLK	Hg	20ml/20ml	
02-			LCS			
03-			0108-371-1A			
04-			0108-371-1AD			
05-			0108-371-1AS			
06-			0108-371-2A			
07-			0108-371-3A			
08-			0108-371-4A			
09-			0108-371-5A			
10-			0108-371-10A			
11-			0108-371-7A			
12-			0108-371-8A			
13-			0108-371-31A			
14-			0108-371-32A			
15-			0108-371-33A			
16-			0108-371-34A			
17-			0108-371-35A			
18-			0108-371-36A			
19-			0108-371-37A			
20-			0108-371-38A			

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
Em (LCS)	P197	20ml of 100ppb/20ml
Em (Spk)	P197	10ml of 1000ppb/20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx + sp	%rec
	12.79	12.90	12.85	0.8530	5.00ug/L	17.25	5.40

RPD's = 5 ml Sx
2 ml dup
5 ml 1000ppb (HZ84)

DATE ANALYZED 8 17 01
SAMPLE NUMBER 0108-371-1A

ANALYIST HM DEPT. SUPER _____ INORGANIC SUPER. _____

Page _____

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Environmental Enterprises — Hg Aqueous Digestion Log — Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01- 1405-HAA	8-20-01	HAA	BLK	Hg	20ml/20ml	
02-			LCS			
03-			0108-371-28A			(RBS50-)
04-			0108-371-29A			
05-			0108-371-29AD			
06-			0108-371-29AS			
07-			0108-371-30A			
08-			0108-371-39A			
09-			0108-371-40A			
10-			0108-371-41A			
11-			0108-371-42A			
12-			0108-371-43A			
13-			0108-371-44A			
14-			0108-371-45A			
15-			0108-371-46A			
16-			0108-371-47A			
17-			0108-371-51A			
18-						
19-						
20-						

BATCH QC DATA
SPIKE SOURCE
8m (LCS)
8m (SPK)

STD PREP #
P197
D197

SPIKE INFORMATION
20ml of spike / 20ml
10ml " "

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	run 1 (ng/L ~~ug/L~~)	run 2 (ng/L ~~ug/L~~)	mean (ng/L ~~ug/L~~)	rpd	spike value	sx + sp (ng/L ~~ug/L~~)	%rec
	2310.	2080.	2210.	11.8	5.00ug/L	6.11	1. 100 1.
	2.34	2.08	2.21				

P.D.S
5.0ml of Dup (1 ml ...)
5.0ml of 10 ppb (W20...)
12.22 − 2.21 = 100 %

DATE ANALYZED 8-20-01
SAMPLE NUMBER 0108-371-51A

ANALYIST _____ DEPT. SUPER _____ INORGANIC SUPER. 10

Page _____

(11)

Environmental Enterprises

Hg Miscellaneous

Metals Department

8-22-01 weighed up

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-273HMA	8-23-01	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg	.20g/20ml	
03-			0108-371-9A	Hg		
04-			" -10A	Hg		
05-			" -11A	Hg		
06-			" -12A	Hg		
07-			" -13A	Hg		
08-			" -14A	Hg		
09-			" -15A	Hg		
10-			" -16A	Hg		
11-			" -17A	Hg		
12-			" -18A	Hg		
13-			" -18AD	Hg		
14-			" -18AS	Hg		
15-				Hg		
16-				Hg		
17-				Hg		
18-				Hg		
19-				Hg		
20-				Hg		

BATCH QC DATA

SPIKE SOURCE: Em-Sox, LCS-ERA

STD PREP #: N204, 050F

SPIKE INFORMATION: .10ml spike /20ml; .20g soil /20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	run 1 (mg/L ~~ug/L~~)	run 2 (mg/L ~~ug/L~~)	mean (mg/L ~~ug/L~~)	rpd	spike value	sx +sd (ug/L)	%rec
	1915.	2130.	2025.	10.60	5.00ug/L	6.87	~~99.0%~~ HM 76.9
	3.83	4.26	4.05				

pds

DATE ANALYZED 8-23-01

SAMPLE NUMBER 8-371-18A

5.0ml Sx (500,000x) ~~1,000,000x~~

5.0ml 10ppb (W204)

13.74 - 4.05

ANALYIST HM

DEPT. SUPER ____

INORGANIC SUPER. ____

10 =

76.9

(.12)

Page ____

Environmental Enterprises

Hg Miscellaneous

Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-274-HMA	8-28-01	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg	.20g/20ml	
03-			8-371-19A	Hg		
04-			" 20A	Hg		
05-			" 21A	Hg		
06-			" 22A	Hg		
07-			" 23A	Hg		
08-			" 24A	Hg		
09-			" 24AD	Hg		
10-			" 24AS	Hg		
11-			" 25A	Hg		
12-			" 26A	Hg		
13-			" 27A	Hg		
14-			" 28A	Hg		
15-			" 48A	Hg		
16-			" 49A	Hg		
17-			" 50A	Hg		
18-				Hg		
19-				Hg		
20-				Hg		

BATCH QC DATA

SPIKE SOURCE: LCS- ERA; Spike- Em

STD PREP #: 050F; N20H

SPIKE INFORMATION: .20g soil LCS /20ml; 10ml spike 100ppb/20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	~~ug/L~~ mg/Kg run 1	~~ug/L~~ mg/Kg run 2	~~ug/L~~ mg/Kg mean	rpd	spike value	ug/L sx + sp	%rec
PDS	2,090.	2,240.	2,170.	6.91	5.00ug/L	5.97	97.8%

5ml Sx (1,000,000x)
5ml of 100ppb (m205)

DATE ANALYZED 8-28-01

SAMPLE NUMBER 8-371-24A

ANALYIST HM DEPT. SUPER _____ INORGANIC SUPER. _____

Page _____

13

Varian 20
Hg - Cold Vapor

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. James II

OPERATOR	
DATE	08.17.2001
BATCH NO.	1403 1404
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

	PROGRAM 16	Hg	
0.000	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP [redacted]

ALIGN HC LAMP [redacted]
PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 354.0

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

(14)

RAW DATA

	SCALE		SIGNAL		[redacted]
BLANK	0.00		0.000	0.000	0.000
BLANK	0.00		-0.001	-0.001	-0.000 J204
STANDARD 1	0.50	1.1	0.010	0.009	0.010 E204
STANDARD 2	2.00	0.9	0.040	0.041	0.040 F204
STANDARD 3	5.00	0.9	0.100	0.099	0.100 G204
STANDARD 4	10.00	0.8	0.200	0.199	0.201 H204
STANDARD 5	40.00	0.9	0.748	0.743	0.753 I204

std's made 8/14/01

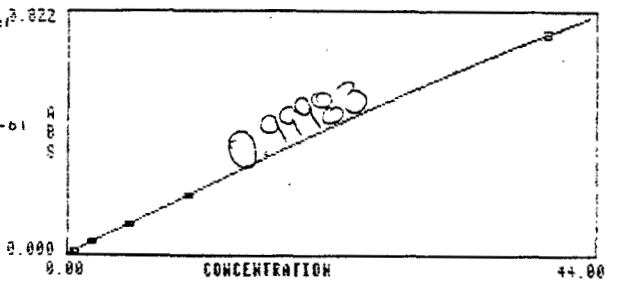
fisher

Em

I-V/CCV = M204

LdL = C204 made 8-4-01

made 8-17-01 3.822



HM 8-17-01
Hg 7470A
245.1

VERIFIED
DATE

LCS: .20ml of 1000ppb Em P197 | 20ml TV 10ppb
SPK: .10ml " " " T.V. 5ppb

5.00 ICV		5.05 101%	0.6	0.101	0.101	0.101	
ICB		0.07	23.8	0.001	0.001	0.001	
0.50 LdL		0.51 102%	3.1	0.010	0.010	0.009	
1.1403:HAA		0.02	55.3	0.000	0.001	0.000	
2.1403:HAA		10.12 101%	0.8	0.201	0.201	0.203	
1.1404:HAA		0.13	13.8	0.003	0.003	0.002	
2.1404:HAA		9.73 97.3%	0.8	0.194	0.193	0.195	
~~8.371.1~~	1	~~0.11~~ 10.0	24.1	0.002	0.003	0.002	
8.371.1A	1	12.79 >12.9%	1.3	0.255	0.253	0.258	0.05 RPD
8.371.1AD	1	12.90	1.2	0.257	0.255	0.260	
8.371.1AS	1	17.05 84.0%	0.6	0.339	0.337	0.340	
8.371.1APDS	1	11.86 109%	1.0	0.237	0.235	0.238	2.5ml 1ss 3.5ml dup 5.0ml 10ppb (HNO3)
8.371.2A	1	13.33	1.1	0.266	0.264	0.268	
8.371.3A	1	15.19	0.4	0.302	0.302	0.302	
5.00 CCV		5.22 104%	0.5	0.104	0.104	0.104	
CCB		0.10	8.5	0.002	0.002	0.002	
8.371.4A		15.36	1.2	0.306	0.311	0.300	
8.371.6A	1	10.16	1.2	0.203	0.201	0.205	
8.371.6A	1	9.48	0.8	0.189	0.188	0.190	
8.371.7A	1	7.69	0.5	0.154	0.153	0.154	
~~8.371.8A~~	1	~~0.89~~ void	1.9	0.017	0.017	0.017	
8.371.31A	1	2.15	1.5	0.043	0.043	0.044	
~~8.371.32A~~	1	~~0.58~~ void	0.8	0.011	0.011	0.011	
8.371.32A	1	3.23	1.2	0.063	0.064	0.063	
8.371.33A	1	4.94	0.7	0.099	0.098	0.099	
8.371.34A	1	26.75	1.4	0.521	0.516	0.527	
5.00 CCV		5.35 107%	0.4	0.107	0.107	0.107	
CCB		0.20	6.9	0.004	0.004	0.004	
8.371.8B		0.50 (resetting)	0.6	0.010	0.010	0.010	
8.371.33A	1	13.85	1.6	0.276	0.273	0.279	
8.371.36A	1	2.51 10X	1.7	0.051	0.050	0.051	
8.371.36A	1	25.08 1X	1.2	0.491	0.487	0.495	
8.371.37A	1	24.87	1.6	0.487	0.482	0.493	

15

~~8.371.38A 1 0.82~~		5.1	0.016	0.016	0.015
8.371.38A	1	0.66	1.5	0.013	0.012	0.013
5.00CCV		5.05 101%	1.5	0.101	0.100	0.102
.....CCB.....		0.06	13.4	0.001	0.001	0.001
8.332.1A	1	0.14	18.4	0.003	0.003	0.002
8.332.2A	1	0.00	99.9	0.000	-0.000	0.000
8.332.2AD	1	-0.01	99.9	-0.000	-0.000	-0.000
8.332.2AS	1	5.13	1.6	0.102	0.101	0.104
8.332.2ADS	1	5.31 >5.22 104%	1.2	0.106	0.105	0.107
8.332.3A	1	0.20	4.3	0.004	0.004	0.004
8.416.1A	10	0.03	20.5	0.001	0.001	0.001
8.416.2A	10	0.50	5.9	0.010	0.009	0.010
5.00CCV		4.95 99.0%	1.2	0.099	0.098	0.100
.....CCB.....		0.01	99.9	0.000	0.000	-0.000

All samples prepped w/

.5ml conc. HNO_3
1.0ml conc H_2SO_4
3.0ml 5% $KMnO_4$
1.6ml 5% $K_2S_2O_8$
1.2ml 12% $NH_2OH \cdot HCL$ /20ml's

16

Varian 20
Hg-Cold Vapor

0.129	PROGRAM 16	Hg	
	SAMPLE 23	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

OPERATOR	Harold S. Jones II
DATE	08.29.2001
BATCH NO.	1405 1406
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000	PROGRAM 16	Hg	
	SAMPLE 23	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP

PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS	387.8

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

17

	RE SCALE			OPTIMIZE SIGNAL	STANDARDS
BLANK	0.00		0.001	0.000	0.001 Y204
STANDARD 1	0.50	2.5	0.012	0.012	0.013 T204
STANDARD 2	2.00	0.0	0.050	0.050	0.050 W204
STANDARD 3	5.00	0.7	0.127	0.127	0.128 V204
STANDARD 4	10.00	0.5	0.250	0.249	0.251 W204
STANDARD 5	40.00	0.4	0.910	0.907	0.913 X204

made 8-20-01

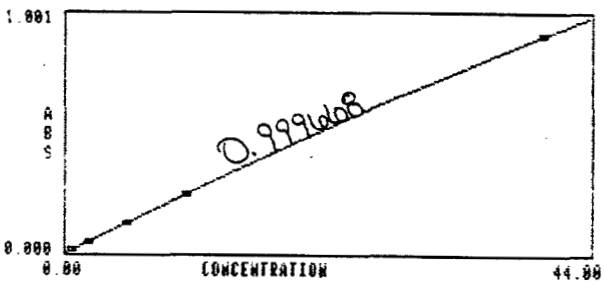
Fisher

Em

ICV/CCV = S204

LdL = R204

Xlution H_2O Z204



8-20-01

Hg 245.1

7470A

LCS = .20ml of 1000ppb Em P197 / 20ml T.V. 10ppb

SpK = .10ml " " " T.V. 5ppb

5.00 ICV		4.86	97.2%	1.2	0.124	0.123	0.125	
.... ICB...		0.04		57.8	0.001	0.001	0.001	
0.50 LdL		0.50	100%	5.1	0.012	0.013	0.012	
MB 1.1405-HAA..		0.43		2.7	0.011	0.011	0.010	
~~MBCS~~ 1.1406-HAA..		0.02		0.0	0.000	0.000	0.000	
~~LCMB~~ 2.1405-HAA..		9.95	99.5%	4.5	0.249	0.257	0.241	
LCS 2.1406-HAA.		10.14	101%	0.7	0.254	0.252	0.255	
✓ 8.418.1A	1	0.05		59.0	0.001	0.001	0.002	
8.418.1AD	1	0.10		15.8	0.002	0.003	0.002	
8.418.1AS	1	4.87	>4.90	0.6	1.22	0.124	0.123	0.124
8.418.1ADS	1	4.93	98.0%	0.8	RPD	0.125	0.126	0.125
✓ 8.434.1A	1	0.48		0.0		0.012	0.012	0.012
✓ 8.427.1	1	1.29		1.4		0.032	0.032	0.032
5.00 CCV		5.08	102%	0.8		0.129	0.129	0.130
.... CCB....		0.09		16.6		0.002	0.002	0.003
8.371.8A	1	0.53		7.0		0.013	0.014	0.012
8.371.29A	1	2.34	>2.21	1.0	11.8	0.059	0.058	0.059
8.371.29AD	1	2.08		0.6	RPD	0.052	0.052	0.052
8.371.29ADS	1	6.11	~~HA-C~~ HA1 101%	0.8		0.155	0.154	0.156
8.371.30A	1	1.43		0.2		0.036	0.036	0.036
8.371.39A	1	3.56		0.5		0.090	0.090	0.091
8.371.40A	1	13.94		0.7		0.345	0.343	0.346
8.371.41A	1	8.16		0.5		0.205	0.205	0.206
5.00 CCV		5.05	101%	0.4		0.129	0.129	0.128
.... CCB....		0.04		57.8		0.001	0.001	0.001
8.371.42A	1	41.71	(Above Curve)	0.6		0.944	0.940	0.948
8.371.42A	1	4.41		0.0		0.112	0.112	0.112
8.371.43A	1	3.91		0.8		0.099	0.099	0.100
~~8.371.44~~	~~1~~	~~1.32~~	void HM	1.7		0.033	0.033	0.034
8.371.44A	1	10.84		0.6		0.271	0.270	0.272
8.371.45A	1	3.53		0.1		0.089	0.089	0.089
8.371.46A	1	3.36		1.0		0.085	0.084	0.086

- 5.0ml of dup (1 million x)
5.0ml of 10ppb (W204)

6.11 X2 = 12.22

18

RAW DATA

8.371.47A	1	0.07	9.8	0.002	0.002	0.002
8.371.51A	1	2.06	0.2	0.052	0.052	0.051
8.371.39A	1	3.60(re-check)	1.1	0.091	0.090	0.092
5.00 CCV		4.9198.2%	0.5	0.125	0.125	0.125
CCB		0.04	99.9	0.001	0.000	0.002
2204 Dilution H_2O		0.01	99.9	0.000	0.000	0.000

All prepped with

.5ml HNO_3
1.0ml H_2SO_4
3.0ml 5% $KMnO_4$
1.6ml 5% $K_2S_2O_8$
1.2ml 12% $NH_2OH \cdot HCL$ / 20ml

* For dilutions see attached page

HM
8-20-01

(19)

Varian 20
Hg - cold vapor

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

OPERATOR	Harold A. Jones II
DATE	08.23.2001
BATCH NO.	1409 273
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP

PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 378.4

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

20

RAW DATA

	KE SCALE			OPTIMIZE SIGNAL	
BLANK	0.00		0.001	0.001	0.001 Z204
STANDARD 1	0.50	3.5	0.011	0.011	0.012 Z204
STANDARD 2	2.00	0.2	0.045	0.045	0.045 Z204
STANDARD 3	5.00	0.1	0.117	0.117	0.117 Z204
STANDARD 4	10.00	0.3	0.235	0.234	0.235 Z204
STANDARD 5	40.00	0.8	0.881	0.876	0.886 Z204

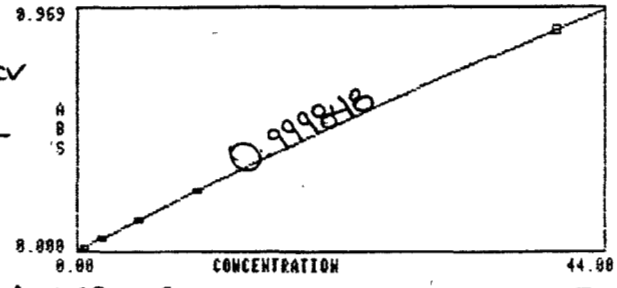
Fisher made 8-20-01

Em

C205 = ICV/CCV

R204 = LdL

Z204 = Dilution H_2O



8-23-01 HM
Hg 245.1
7470A

Aq LCS = .20ml of 1000ppb Em N204 /20ml T.V. 10ppb

SpK = .10ml " " " T.V. 5ppb

Soil LCS = ERA 050F .20g /20ml - T.V. 3.94mg/kg Range 2.69-5.21 mg/kg

~~5.00~~		~~5.28~~ void	1.0	0.123	0.122	0.124	
5.00		5.25 105%	0.8	0.123	0.122	0.123	
.....		0.03	24.9	0.001	0.001	0.001	
0.50		0.53 106%	5.0	0.012	0.011	0.012	
mb	1.1409:HAA..	0.04	0.0	0.001	0.001	0.001	
LCS	2.1409:HAA..	10.40 104	0.1	0.244	0.244	0.244	
mb	1.273:HMA..	~~0.54~~ void	1.2	0.012	0.012	0.012	
mbs	1.273:HMA...	0.45	1.8	0.010	0.010	0.010	
LCS	2.273:HMA	100 36.99 .2g/kom	0.3	0.820	0.818	0.822	= 3.70mg/kg
8.531.1A		1 0.03	43.9	0.001	0.001	0.000	
8.531.1AD		1 0.04	26.6	0.001	0.001	0.001	
8.531.1AS		1 5.14	1.0	0.120	0.119	0.121	
8.531.1ADS		1 5.20	1.2	0.121	0.120	0.122	
8.531.2A		1 0.06	4.3	0.001	0.001	0.001	
8.514.1A		1 -0.01	28.3	-0.000	-0.000	-0.000	
5.00 CCV		5.39 109	0.6	0.126	0.125	0.126	
.....CCB.....		-0.01	99.9	-0.000	-0.001	-0.000	
8.548.1A		10 0.08	4.9	0.002	0.002	0.002	
8.548.2A		10 0.34	1.8	0.008	0.008	0.007	
8.547.1A		10 5.13	1.3	0.120	0.119	0.121	
8.547.2A		10 7.92	0.8	0.185	0.184	0.186	
5.00 CCV		5.53 110%	0.7	0.129	0.128	0.130	
.....CCB.....		-0.01	73.0	-0.000	-0.000	-0.000	
RESLOPE		3 5.00	0.9	0.131	0.130	0.132	
5.00 CCV		4.91 98.2%	0.5	0.128	0.128	0.129	
.....CCB.....		0.01	0.0	0.000	0.000	0.000	
8.371.9A		100 21.38	0.6	0.546	0.543	0.548	
8.371.10A		100 19.72	0.4	0.505	0.504	0.507	
8.371.11A		100 15.63	0.5	0.405	0.403	0.406	
8.371.12A		100 19.45	0.8	0.499	0.496	0.502	
8.371.13A		100 17.20	0.7	0.444	0.441	0.446	
8.371.14A		100 3.51	0.6	0.090	0.090	0.091	
8.371.15A		100 3.81	1.3	0.098	0.098	0.099	
8.371.16A		100 3.65	[illegible]	[illegible]	0.097	0.098	

21

8.531.2A	1	0.06	4.3	0.001	0.001	0.001	
8.514.1A	1	0.01	28.3	-0.000	-0.000	-0.000	
5.00 ccv		5.39	0.6	0.126	0.125	0.128	
....ccb.....		-0.01	99.9	-0.000	-0.001	-0.000	
8.548.1A	10	0.08	4.9	0.002	0.002	0.002	
8.548.2A	10	0.34	1.8	0.008	0.008	0.007	
8.547.1A	10	5.13	1.3	0.120	0.119	0.121	
8.547.2A	10	7.92	0.8	0.185	0.184	0.186	
5.00 ccv		5.53 110%	0.7	0.129	0.128	0.130	
....ccb.....		-0.01	73.0	-0.000	-0.000	-0.000	
RESLOPE	3	5.00	0.9	0.131	0.130	0.132	
5.00 ccv		4.91 98.2%	0.5	0.128	0.128	0.129	
....ccb.....		0.01	0.0	0.000	0.000	0.000	
8.371.9A	100	21.38	0.6	0.546	0.543	0.548	
8.371.10A	100	19.72	0.4	0.505	0.504	0.507	
8.371.11A	100	15.63	0.5	0.405	0.403	0.406	
8.371.12A	100	19.45	0.8	0.499	0.496	0.502	
8.371.13A	100	17.20	0.7	0.444	0.441	0.446	
8.371.14A	100	3.51	0.6	0.090	0.090	0.091	
8.371.15A	100	3.81	1.3	0.098	0.098	0.099	
8.371.16A	100	3.65	0.9	0.094	0.093	0.095	
8.371.17A	100	3.61	0.1	0.093	0.093	0.093	
5.00 ccv		4.91 98.2%	0.6	0.128	0.128	0.129	
....ccb.....		0.04	9.5	0.001	0.001	0.001	
8.371.18A	100	3.83 >4.05	0.9 10.6 RPD	0.099	0.098	0.100	
8.371.18AD	100	4.26	0.0	0.111	0.111	0.111	
8.371.18AS	100	3.88-void	0.4	0.100	0.100	0.101	
8.371.18AMS	500	6.87-POS	0.6 99.0%	0.180	0.179	0.181	5.0ml (500,000%) Sx
5.00 ccv		4.74	3.2	0.124	0.121	0.127	5.0ml 10ppb (W204) (ave)
....ccb.....		0.05	0.0	0.001	0.001	0.001	

$\frac{13.74 - 4.05}{10} = 96.9$

All sx's prepped w/

- 5ml conc HNO_3
- 1.0ml conc. H_2SO_4
- 3.0ml 5% $KMnO_4$
- 1.6ml 5% $K_2S_2O_8$
- 1.2ml 12% $NH_2OH \cdot HCL$

For dilutions see attached sheet

HM
8-23-01

22

Varian 20
Hg-Cold Vapor

0.043	PROGRAM 16	Hg	
	SAMPLE 1	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. James II

OPERATOR	
DATE	08.28.2001
BATCH NO.	274
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000	PROGRAM 16	Hg	
	SAMPLE 1	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP

PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 378.4

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

23

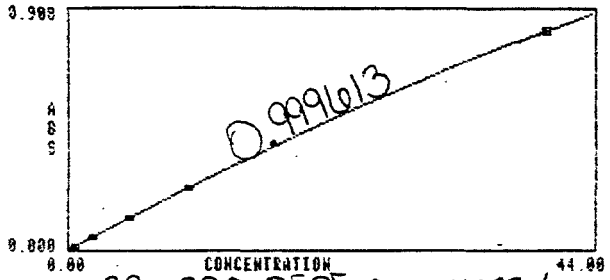
	RE SCALE			OPTIMIZE SIGNAL [redacted]	
BLANK	0.00		-0.000	-0.001	-0.000 D205 cal blk
STANDARD 1	0.50	4.1	0.010	0.010	0.010 J205
STANDARD 2	2.00	0.9	0.045	0.045	0.045 K205
STANDARD 3	5.00	0.2	0.115	0.115	0.116 L205
STANDARD 4	10.00	0.3	0.228	0.228	0.229 M205
STANDARD 5	40.00	0.6	0.826	0.822	0.824 N205

Fisher made 8-27-01

Em

ICV/CCV = 0205

LdL = 4205



Hg 7470A

HM 8-28-01

VERIFIED

DATE

LCS = ERA 050F .20g soil LCS / 20ml Tval = 3.94 mg/kg

SpK = PDS Range = 2.64-5.21 mg/kg

5.00 ICV	5.06	101%	0.4	0.117	0.117	0.117	
.... ICB...	0.05		21.9	0.001	0.001	0.001	
0.50 LdL	0.51	102%	0.0	0.010	0.010	0.010	
1.274 HMA..	-0.03		81.3	-0.001	-0.001	-0.000	
1.274 HMA..	3.54	1000X	0.9	0.081	0.080	0.081	3.54 mg/kg
8.371.19A100	1.80		1.4	0.040	0.039	0.040	
8.371.20A100	1.85		0.0	0.041	0.041	0.041	
8.371.21A100	1.93		0.9	0.043	0.043	0.044	
8.371.22A100	1.97		0.3	0.044	0.044	0.044	
8.371.23A100	1.67		1.8	0.037	0.036	0.037	
8.371.24A100	2.09	>2.17	0.9 6.91 RPD	0.047	0.047	0.048	
8.371.24A100	2.24		0.7	0.051	0.050	0.051	
8.371.24A100	5.97	PDS 97.8%	0.8	0.138	0.137	0.138	
5.00 CCV	4.93	98.6%	0.5	0.114	0.113	0.114	
.... CCB.....	-0.08		0.0	-0.002	-0.002	-0.002	
8.371.25A100	2.16		0.0	0.049	0.049	0.049	
8.371.26A100	2.03		0.5	0.046	0.046	0.046	
8.371.27A100	2.09		0.7	0.047	0.047	0.047	
8.371.28A100	2.14		0.7	0.048	0.048	0.049	
8.371.48A100	5.79		0.8	0.133	0.133	0.134	
8.371.49A100	5.34		0.6	0.123	0.123	0.124	
8.371.50A100	4.72		0.3	0.109	0.108	0.109	
5.00 CCV	4.89	97.8%	0.5	0.113	0.112	0.113	
.... CCB.....	-0.09		11.0	-0.002	-0.002	-0.002	
Z204 Dilution H2O..	-0.09		8.6	-0.002	-0.002	-0.002	

(m205)

5.0ml spike 10ppb
5.0ml (1,000,000x) Sx

$\frac{5.97 \times 2 = 11.94 - 2.17}{10} =$ 97.7

* See attached for dilutions

All Sx's prepped w/ .5ml conc HNO_3 1.6ml $K_2S_2O_8$
1.0ml conc H_2SO_4 1.2ml $NH_2OH \cdot HCL$
3.0ml 5% $KMnO_4$

24

OSWI-013-0

Page 1 EEI REPORT Work Order # 01-07-213
Received: 07/10/01 07/20/01 10:37:38

REPORT TO: UC, ALTER FACILITY
DEPT. OF CIVIL & ENVIR. ENG.
CINCINNATI, OHIO 45221-0071

ATTEN: LINDA RIESER

CLIENT: SCIE02 SAMPLES: 36
COMPANY: SCIENCE APPLICATIONS INT'L
FACILITY:

WORK ID: 6/20/01-7/10/01 MERCURY
TAKEN: CUSTOMER
TRANS: DELIVERED
TYPE: LEACHATES/SOLIDS
P.O. #: 4400038593
INVOICE: under separate cover

PREPARED BY: Environmental Enterprises
10163 Cincinnati-Dayton Rd.
Cincinnati, Ohio 45241

CERTIFIED BY: Jason M. Kylemes

ATTEN: Debbe Jones
PHONE: (513) 772-2818 CONTACT: JASON

Enclosed are the results of specified samples submitted for analysis. If you have any questions please use Order # for faster identification.
OHIO EPA CERTIFICATION: CHEMICAL #4095, MICROBIOLOGICAL #850

QA/QC ENCLOSURES.

	SAMPLE IDENTIFICATION	TEST CODES and NAMES used on this workorder	
01	P1 SPSS PELLETS (SOLID)	HG	Mercury (Cold vapor)
02	P-2 SPSS PELLETS (SOLID)		
03	P-3 SPSS PELLETS (SOLID)		
04	P-4 SPSS PELLETS (SOLID)		
05	P-5 SPSS PELLETS (SOLID)		
06	C-1 SPSS CRUSHED (SOLID)		
07	C-2 SPSS CRUSHED (SOLID)		
08	C-3 SPSS CRUSHED (SOLID)		
09	C-4 SPSS CRUSHED (SOLID)		
10	C-5 SPSS CRUSHED (SOLID)		
11	SPSS-P-pH2 (LEACHATE)		
12	SPSS-P-pH2D (LEACHATE)		
13	SPSS-P-pH4 (LEACHATE)		
14	SPSS-P-pH6 (LEACHATE)		
15	SPSS-P-pH8 (LEACHATE)		
16	SPSS-P-pH8D (LEACHATE)		
17	SPSS-P-pH10 (LEACHATE)		
18	SPSS-P-pH12 (LEACHATE)		
19	SPSS-P-pH12D (LEACHATE)		
20	SPSS-P-pH2B (LEACHATE)		
21	SPSS-P1T (TCLP LEACHATE)		
22	SPSS-P2T (TCLP LEACHATE)		
23	SPSS-P3T (TCLP LEACHATE)		
24	SPSS-pH2 (LEACHATE		
25	SPSS-pH2D		
26	SPSS-pH4 (LEACHATE)		

Page 2 EKI REPORT Work Order # 01-07-213
Received: 07/10/01 07/20/01 10:37:38

	SAMPLE IDENTIFICATION
27	SPSS-pH6
28	SPSS-pH8 (LEACHATE)
29	SPSS-pH8D (LEACHATE)
30	SPSS-pH10 (LEACHATE)
31	SPSS-pH12 (LEACHATE)
32	SPSS-pH12D (LEACHATE)
33	SPSS-pH2B (LEACHATE)
34	SPSS-C1T (TCLP LEACHATE)
35	SPSS-C2T (TCLP LEACHATE)
36	SPSS-C3T (TCLP LEACHATE)

Page 3 EEI REPORT Work Order # 01-07-213
Received: 07/10/01 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
HG mg/l	7,930 mg/kg	10,800 mg/kg	9,310 mg/kg	16,400 mg/kg	13,400 mg/kg

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)	Sample 10 (entered units)
HG mg/l	15,700 mg/kg	9,710 mg/kg	5,240 mg/kg	12,700 mg/kg	8,660 mg/kg

TEST CODE default units	Sample 11 (entered units)	Sample 12 (entered units)	Sample 13 (entered units)	Sample 14 (entered units)	Sample 15 (entered units)
HG mg/l	0.005	0.014	0.984	0.084	44.9

TEST CODE default units	Sample 16 (entered units)	Sample 17 (entered units)	Sample 18 (entered units)	Sample 19 (entered units)	Sample 20 (entered units)
HG mg/l	24.3	0.074	127	155	<0.0005

TEST CODE default units	Sample 21 (entered units)	Sample 22 (entered units)	Sample 23 (entered units)	Sample 24 (entered units)	Sample 25 (entered units)
HG mg/l	0.058	1.13	0.024	0.007	0.013

TEST CODE default units	Sample 26 (entered units)	Sample 27 (entered units)	Sample 28 (entered units)	Sample 29 (entered units)	Sample 30 (entered units)
HG mg/l	0.062	16.7	30.8	53.5	0.084

TEST CODE default units	Sample 31 (entered units)	Sample 32 (entered units)	Sample 33 (entered units)	Sample 34 (entered units)	Sample 35 (entered units)
HG mg/l	74.6	23.5	<0.0005	0.144	0.049

TEST CODE default units	Sample 36 (entered units)
HG mg/l	0.202

OSWI-013-E

ENVIRONMENTAL ENTERPRISES, INC.

QC REPORT
UNIVERSITY OF CINCINNATI

CASE NARRATIVE

PROJECT: Science Applications Int'L (SCIE02) (Work Order # 0107213-01 to 36)

METAL

Mercury analyses were performed in accordance with SW 846 Method 7470A and meet the required QC criteria.

Initial calibrations were performed within 0.9996 to 0.9998 Correlation Coefficient.

The daily calibration were verified by Initial Calibration Verification (ICV) standard and Continuing Calibration Verification (CCV) standard. ICV and all CCV recoveries were within the acceptable control limits.

Laboratory control samples recovery were within the acceptable control limits.

RPD calculated for duplicate analyses were within the acceptable control limits.

Sample # 0107213-10 was analyzed in triplicate due to the solid sample matrix. Duplicate sample result was lower than other two, it may be due to the sample matrix, and it did not used to report.

For all the analytical batches Post Digestion Spikes (PDS) were performed due to the high level of mercury present, except for sample 0107213-33. Matrix spike and matrix spike duplicate were performed for sample 0107213-33. One of the matrix spike recovery was out of range, PDS was performed and it's within range. Corrective action was not required.

Method blanks were free of contamination.

Jyoti Desai 8/02/01

Jyoti Desai (Date)
QA Coordinator

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METAL

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Quality Assurance Report..... 5

Sample Dilution Record..... 6 - 9

Sample Digestion Log..... 10 - 13

Mercury Analysis Data..... 14 - 24

ENVIRONMENTAL ENTERPRISES, INC.

(1)

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 01-0-213-01A-10A.

Miscellaneous Batch 265-HMA.

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	ICV			CCV1			CCV2		CCV3		CCV4	
				True	Found	% Rec	True	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
7/12/01	HAJ	7470A	Hg	5	4.99	99.8	5	4.67	93.4	4.94	98.8	4.94	97.6	4.88	97.6

ICV = Initial Calibration Verification

CCV = Continue Calibration Verification

ICV % Range = +/-10%

CCV % Range = +/-20%

0107213-265HMAcal

An Employee-Owned Company

ENVIRONMENTAL ENTERPRISES, INC.

(2)

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 01-0-213-11A-20A.

Aqueous Batch 1377-HAA.

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	ICV True	ICV Found	ICV % Rec	CCV1 True	CCV1 Found	CCV1 % Rec	CCV2 Found	CCV2 % Rec	CCV3 Found	CCV3 % Rec
7/16/01	HAJ	7470A	Hg	5	4.87	97.4	5	4.7	94	4.62	92.4		

ICV = Initial Calibration Verification **ICV % Range =** +/-10%

CCV = Continue Calibration Verification **CCV % Range =** +/-20%

0107213-1377HAAcal

ENVIRONMENTAL ENTERPRISES, INC.

(3)

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 01-0-213-21A-30A.

Aqueous Batch 1378-HAA.

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	ICV True	ICV Found	ICV % Rec	CCV1 True	CCV1 Found	CCV1 % Rec	CCV2 Found	CCV2 % Rec	CCV3 Found	CCV3 % Rec
7/17/01	HAJ	7470A	Hg	5	4.9	98	5	4.92	98.4	5.14	103	5.45	109

ICV = Initial Calibration Verification — ICV % Range = +/-10%

CCV = Continue Calibration Verification — CCV % Range = +/-20%

An Employee-Owned Company

ENVIRONMENTAL ENTERPRISES, INC.

(6)

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 01-0-213-31A-36A.

Aqueous Batch 1380-HAA.

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	ICV			CCV1			CCV2		CCV3	
				True	Found	% Rec	True	Found	% Rec	Found	% Rec	Found	% Rec
7/19/01	HAJ	7470A	Hg	5	5.19	104	5	4.98	99.6	4.99	99.8	4.98	99.6

ICV = Initial Calibration Verification — ICV % Range = +/-10%

CCV = Continue Calibration Verification — CCV % Range = +/-20%

0107213-1380HAAcal

(5)

ENVIRONMENTAL ENTERPRISES, INC.

Quality Assurance Report (Metals)
Project:SCIE02

Analysis Date	Sample #	D. L. ppb	Method Blank ppb	Sample Results ppb	Sample Dup ppb	Sample Trip. ppb	Sample Ave. ppb	Dilution Factor	Spike Added ppb	Matrix Sp. Result ppb	Matrix Sp. Dup. Result ppb	Matrix Spike % Rec	Dup Spike % Rec	RPD	LCS Conc. ppb	LCS % Rec	LCS Acceptance % Limits
7/12/01	0107213-10	0.5	<0.5	9.07	6.14*	9.85	9.46(1)	((2))	10	21.4	NA	115 (3)	------	8	3940(5)	85	68 - 132
7/16/01	0107213-13	0.5	<0.5	9.7	9.98	NA	9.84 (1)	100	10	19.2	NA	93.6 (3)	------	3	10	94	85 - 115
7/17/01	0107213-21	0.5	<0.5	5.93	5.66	NA	5.8 (1)	10	40	48.4	NA	107 (3)	------	5	10	95	85 - 115
7/19/01	0107213-33	0.5	<0.5	<0.5	<0.5	NA	<0.5	1	5	6.83	6.15	137 (4)	123	10	10	102	85 - 115

Method # SW 7470A Analyte - Hg Analyst - HAJ

* Duplicate sample result was not used for report.
(1) Dilution factor were applied to average reported sample results.
((2)) See attached sample dilution record.
(3) A post Digestion Spike (PDS) were performed on the diluted sample due to the high levels of mercury present in the sample.
(4) Matrix spike recovery was out of range, PDS was performed with 97% recovery.
(5) Soil LCS.
NA = Not Available

RPD = Relative Percent Difference RPD Control Limits: 0-20% Matrix Spike Control Limits: +/- 25%

LCS = Laboratory Control Sample

An Employee-Owned Company

Sample Dilution Record

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
0107213-01	0.212g/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	94.3	1000	10		943,000
0107213-02	0.229g/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	87.3	1000	10		873,000
0107213-03	0.201g/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	99.5	1000	10		995,000
0107213-04	0.215g/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	93	1000	10		930,000
0107213-05	0.2g/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	100	1000	10		1,000,000
0107213-06	0.2g/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	100	1000	10		1,000,000
0107213-07	0.207g/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	96.6	1000	10		966,000
0107213-08	0.221g/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	90.5	1000	10		905,000
0107213-09	0.219g/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	91.3	1000	10		913,000
0107213-10	0.219g/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	91.3	1000	10		913,000
0107213-10D	0.239g/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	83.7	1000	10		837,000
0107213-10T	0.218g/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	91.7	1000	10		917,000

6

Sample Dilution Record

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
0107213-11	20 ml/20 ml				
	1				1
0107213-12	20 ml/20 ml				
	1				1
0107213-13	20 ml/20 ml	0.1 ml/10 ml			
	1	100			100
0107213-13D	20 ml/20 ml	0.1 ml/10 ml			
	1	100			100
0107213-14	20 ml/20 ml	1 ml/10 ml			
	1	10			10
0107213-15	20 ml/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	1	1000	10		10,000
0107213-16	20 ml/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	1	1000	10		10,000
0107213-17	20 ml/20 ml	1 ml/10 ml			
	1	10			10
0107213-18	2 ml/20 ml	0.01 ml/10 ml			
	10	1000			10,000
0107213-19	2 ml/20 ml	0.01 ml/10 ml			
	10	1000			10,000
0107213-20	20 ml/20 ml				
	1				1

(7)

Sample Dilution Record

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
0107213-21	20 ml/20 ml	1 ml/10 ml			
	1	10			10
0107213-21D	20 ml/20 ml	1 ml/10 ml			
	1	10			10
0107213-22	20 ml/20 ml	0.01 ml/10 ml			
	1	1000			1,000
0107213-23	20 ml/20 ml				
	1				1
0107213-24	20 ml/20 ml				
	1				1
0107213-25	20 ml/20 ml	1 ml/10 ml			
	1	10			10
0107213-26	20 ml/20 ml	1 ml/10 ml			
	1	10			10
0107213-27	20 ml/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	1	1000	10		10,000
0107213-28	20 ml/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	1	1000	10		10,000
0107213-29	20 ml/20 ml	0.01 ml/10 ml	1 ml/10 ml		
	1	1000	10		10,000
0107213-30	20 ml/20 ml	1 ml/10 ml			
	1	10			10

8

Sample Dilution Record

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
0107213-31	2 ml/20 ml	0.01 ml/10 ml			
	10	1000			10,000
0107213-32	2 ml/20 ml	0.01 ml/10 ml			
	10	1000			10,000
0107213-33	20 ml/20 ml				
	1				1
0107213-33D	20 ml/20 ml				
	1				1
0107213-33S	20 ml/20 ml				
	1				1
0107213-33DS	20 ml/20 ml				
	1				1
0107213-34	20 ml/20 ml	0.1 ml/10 ml			
	1	100			100
0107213-35	20 ml/20 ml	2 ml/10 ml			
	1	5			5
0107213-36	20 ml/20 ml	1 ml/10 ml			
	1	10			10

9

As-is

Environmental Enterprises — Hg Miscellaneous — Metals Department

7-11-01 (Pre-weighed)

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-2605-HMA	7-12-01	HAM	BLK	Hg	20ml/60ml	
02-			LCS	Hg	.20g/20	
03-			0107-213-1A	Hg	.212g/20	
04-			" 2A	Hg	.224g/20	
05-			" 3A	Hg	.204g/20	
06-			" 4A	Hg	.215g/20	
07-			" 5A	Hg	.200g/20	
08-			" 6A	Hg	.200g/20	
09-			" 7A	Hg	.207g/20	
10-			" 8A	Hg	.221g/20	
11-			" 9A	Hg	.219g/20	
12-			" 10AI	Hg	.219g/20	
13-			" 10AD	Hg	.239g/20	
14-			" 10AS	Hg	.205g/20	
15- 2605-HMA	7-12-01	HAM	" 10AT	Hg	.218g/20	
16-				Hg		
17-				Hg		
18-				Hg		
19-				Hg		
20-				Hg		

* Sample crushed before weighing up. HAM 7-12-01

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
ERA-LCS	050AE	.20 g soil LCS (20ml)
EM-Spk	P197	.10ml of 100ppb (20ml)

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	~~mg~~ ug/L run 1	~~mg~~ ug/L run 2	~~mg~~ ug/L mean	rpd	spike value	ug/L sx ± sp	%rec
	8280.	9030.	8650.	8.67	5.00ug/L	10.69	115%
	9.07	9.85					

PDS - 5ml of (dilution) Trip x2
5ml of 10ppb (I201)

21.4 − 9.85 / 10 = 115%

DATE ANALYZED 7-12-0
SAMPLE NUMBER 7-213-10A

ANALYIST HAM DEPT. SUPER ____ INORGANIC SUPER. ____

Page ____

(10)

RAW DATA

Environmental Enterprises | Hg Aqueous Digestion Log | Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-1377-HGA	7-16-01	HM	BLK	Hg	20ml/20ml	
02-			LCS		20ml/20ml	
03-			0107-213-11A		20ml/20ml	
04-			0107-213-12A			
05-			0107-213-13A			
06-			0107-213-13AD			
07-			0107-213-13AS			
08-			0107-213-14A			
09-			0107-213-15A			
10-			0107-213-16A			
11-			0107-213-17A			
12-			0107-213-18A			Reset @ 2ml/20ml
13-			0107-213-19A			Reset @ 2ml/20ml
14-			0107-213-20A			~~Cleared when hammer~~ was added HM 7-16-01
15-						
16-						
17-						
18-						
19-						
20-						

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
Em (LCS)	P197	20ml of 100ppb / 20ml
Em (Spk)	P197	10ml " " "

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx + sp	%rec
	970.	998.	984.	2.85	5.00ug/L	9.59 x2 = 19.2	93.4%
	9.70	9.98	9.84				

pds = 2.5ml sx (100x)
2.5ml dup (100x)
5.0ml 10ppb

$\frac{19.2 - 9.84}{10} = 93.6\%$

DATE ANALYZED 7-16-01
SAMPLE NUMBER 7-213-13A

ANALYIST HM DEPT. SUPER ____ INORGANIC SUPER. ____

(11)

Page ____

...nmental Enterprises | Hg Aqueous Digestion Log | Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01- 1378-HAA	7-17-01	HA	BLK	Hg	20ml/20ml	
02-			LCS			
03-			0107-213-21A			Scico 2
04-			21AD			
05-			21AS			
06-			22A			
07-			23A			
08-			24A			
09-			25A			
10-			26A			
11-			27A			
12-			28A			
13-			29A			
14-			30A			
15-			0107-311-5A		2ml/20ml	QCB
16-			0107-313-1A		2ml/20ml	Hilton • 5-1/20
17- 1378-HAA	7-17-01	HA	0107-382-1A	Hg	2/20	P.R.
18-						
19-						
20-						

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
Sm (Spk)	P197	•10ml of 100ppb /20ml
Sm (LCS)	P197	•20ml of 100ppb /20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx + sp	%rec
	59.3 (5.93)	56.60 (5.660)	58.0 (5.80)	4.660	5.00ug/L	24.21 P.O.S. =	~~180~~ = 107% 5ml Sx (10x) 5ml of 40ppb

5.80÷2=2.90

DATE ANALYZED 7-17-01
SAMPLE NUMBER 7-213-21A

24.21
−2.90
21.31

21.31÷20 = 107%

ANALYIST HA DEPT. SUPER ____ INORGANIC SUPER. ____

Page ____

12

Environmental Enterprises | Hg Aqueous Digestion Log | Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-1380-HAA	7-19-01	HAA	BLK	Hg	20ml/20ml	
02-			LCS		20ml/20ml	
03-			0107-213-31A		20ml/20ml	Reset 2/20 cleared when 5% KMnO4 added
04-			" 32A			Reset 2/20
05-			" 33A			
06-			" 33ADup			
07-			" 33ADS			
08-			" 34A			
09-			" 35A			
10-			" 36A			
11-			" 15A			re-check
12-			" 16A			
13-			0107-435-1A			
14-						
15-						
16-						
17-						
18-						
19-						
20-						

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
7Em (LCS)	P197	.20ml of spike / 20ml
7Em (Spk)	P197	.10ml of spike / 20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

Spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx +sp	%rec
	<.5	<.5	<.5	0	5.00ug/L	6.49	130 %

pds done
2.5ml sx
2.5ml dup
5.0ml 10 ppb
4.87 = 97.4 %

DATE ANALYZED 7-19-01
SAMPLE NUMBER 7-213-33A

ANALYST HAA DEPT. SUPER _____ INORGANIC SUPER. _____

Page _____

13

Varian 20
Hg - cold Vapor

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. James II

OPERATOR	
DATE	07 19.2001
BATCH NO.	1380
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP
PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 394.0

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

(14)

RE OPTIMIZE STANDARDS

Varian 20
Hg Cold Vapor

7/12/01

```
PROGRAM 16        Hg
BLANK             REPLICATE   1    MANUAL
ABSORBANCE        CONCENTRATION    BC ON
INTEGRATION       3.0      (sec)   AIR ONLY
PRINTING
                  REPORT FORMAT

OPERATOR                  Harold A. James II
DATE                      07.12.2001
BATCH NO.                 1374 390 265

FORMAT                    SEQUENTIAL
DATA PRINTED              EACH READING
PRINT                     DURING RUN
INSTRUMENT STATUS         NO
CALIBRATION RESULTS       YES
CALIBRATION GRAPH         YES
SAMPLE LABELS             YES
LINES PER REPORT PAGE     66

                                       SAMPLE
                                       LABELS

PROGRAM 16        Hg
0.000  BLANK      REPLICATE   1    MANUAL
ABSORBANCE        CONCENTRATION    BC ON
INTEGRATION       3.0      (sec)   AIR ONLY
PRINTING
                  OPTIMIZATION

ALIGN D2 LAMP
ALIGN HC LAMP
PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS     394.0

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)           253.7
SLIT WIDTH (nm)           0.5
AIR FLOW                  0.00

RE                        OPTIMIZE STANDARDS
```

(15)

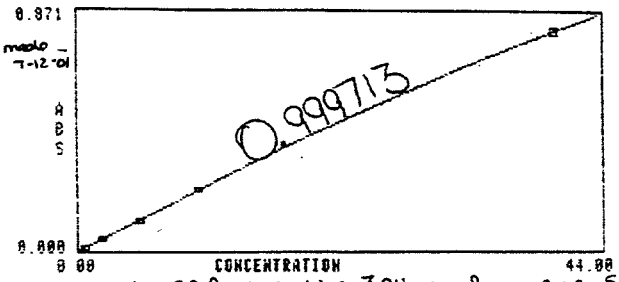
	SCALE			SIGNAL	
BLANK	0.00		-0.002	-0.002	-0.002
BLANK	0.00		0.001	0.000	0.001 M201
STANDARD 1	0.50	2.8	0.010	0.010	0.010 F201
STANDARD 2	2.00	0.9	0.043	0.043	0.043 G201
STANDARD 3	5.00	0.8	0.109	0.108	0.109 H201
STANDARD 4	10.00	0.7	0.216	0.215	0.217 I201
STANDARD 5	40.00	1.2	0.791	0.784	0.798 J201

Fisher std made 7-9-01

EM

ICV/CCV = N201 made 7-12-01

LdL = D201



Hg 245.1

7470 = misc TCLP

7-12-01 HAJ

LCS Soil = ERA Cert Value 3.94 mg/kg, Range 2.69 - 5.21 mg/kg

Aq LCS = .20ml of 1000ppb EM P197 / 20ml T.V. 10ppb

Spike S = .10ml " " " T.V. 5ppb

VERIFIED DATE 7-19-01

5.00 ICV	4.99 99.8%	0.1	0.109	0.109	0.109	
....ICB....	0.02	99.9	0.000	0.001	0.000	
0.50 LdL	0.51 102%	0.0	0.010	0.010	0.010	
mb1.1374:HAA..	0.05	26.9	0.001	0.001	0.001	
lcs2.1374:HAA..	9.51 95.1%	0.8	0.205	0.204	0.207	
mb1.390:TMA...	-0.01	99.9	-0.000	0.000	-0.001	
lcs2.390:TMA..	9.20 92.0%	0.7	0.199	0.198	0.200	
07.235.1A 1	0.11	2.7	0.002	0.002	0.002	
7.235.1AD 1	0.03	87.8	0.001	0.000	0.001	
7.235.1AS 1	4.83	0.3	0.105	0.105	0.105	
7.235.1ADS 1	5.59	104% 1.1	0.122	0.121	0.123	
7.236.1A 40	0.09	14.6 RPD 3.8	0.002	0.002	0.002	
7.271.1A P.R.10	0.37	2.2	0.007	0.007	0.007	
5.00 CCV	4.67 93.4%	0.8	0.101	0.101	0.102	
.....CCB.....	0.07	20.1	0.001	0.002	0.001	
07.027.1ATC 10	6.50	1.0	0.141	0.140	0.142	
7.125.1ATC 1	0.10	13.6	0.002	0.002	0.002	
7.125.1ATCBlk	0.00	99.9	0.000	0.000	-0.000	
7.125.1ATCSpk	1.66 (void)	0.3	0.035	0.035	0.035	
7.125.1ATCPDS1	4.82 96.4%	1.1	0.105	0.104	0.106	– 2.5ml sx 2.5ml dup 5.0ml 10ppb
mb1.265:HMA...	0.31	3.8	0.006	0.006	0.006	
lcs2.265:HMA 97.1%	34.51 = 3.35 mg/kg	0.8	0.676	0.692	0.700	
5.00 CCV	4.94 98.8%	1.2	0.107	0.107	0.108	
...LDL....	0.50 100%	2.1	0.010	0.010	0.010	
...CCB.....	-0.14	20.5	-0.003	-0.002	-0.003	
07.213.1A 94.3%	8.41	1.5	0.182	0.180	0.184	
7.213.2A 87.3%	12.35	1.0	0.265	0.263	0.267	
7.213.3A 99.5%	9.36	0.6	0.202	0.201	0.204	
7.213.4A 93.0%	17.64	1.4	0.374	0.370	0.378	
7.213.5A 100%	13.42	1.3	0.288	0.285	0.290	
7.213.6A 100%	15.73	1.2	0.335	0.332	0.338	
7.213.7A 96.6%	10.05	1.0	0.217	0.215	0.218	

(16)

10A

RAW DATA

7.213.8n	90.5%	5.79	1.3	0.126	0.125	0.127	
7.213.9A	91.3%	13.86	1.6	0.297	0.293	0.300	
5.00 CCV		4.94	97.6%	1.1	0.107	0.107	0.108
.....CCB.....		-0.02	99.9	-0.000	0.001	-0.002	
7.213.10n	91.3%	9.07	0.8	0.196	0.195	0.197	
7.213.10A	83.6%	6.14 (void)	1	0.133	0.133	0.135	
7.213.10	19E	9.85	1.1	0.212	0.211	0.214	
7.213.10PDS		10.69	115%	0.8	0.230	0.232	
5.00 CCV		4.88		1.7	0.106	0.105	0.107
.....CCB.....		-0.10		5.2	-0.002	-0.002	-0.002
Dilution H2O.BLK		-0.14		0.0	-0.003	-0.003	-0.003

10A
Sx = 828. > 865.5
Tri p = 903.
Avg = 865. × 10000 ÷ 1000
RPD = 8.67%

← PDS = 5ml of (dilution) Trip
5ml of 10ppb
I201

10A = 8660. mg/kg

PDS ilu
21.4 − 9.85 / 10 = 115 %

original dilution factor
(See page Attached - dilution breakdown)

All samples prepped with

- 5ml HNO_3 conc.
- 1.0ml H_2SO_4 conc.
- 3.0ml 5% $KMnO_4$
- 1.6ml 5% $K_2S_2O_8$
- 1.2ml 12% $NH_2OH \cdot HCL$ / 20ml

HA 7-12-01

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Varian 20
Hg Cold Vapor

7/16/01

	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. James II

OPERATOR	
DATE	07.16.2001
BATCH NO	1777 266
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN DC LAMP [redacted]

ALIGN HC LAMP [redacted]
PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 394.0

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.0A

	RE SCALE			OPTIMIZE SIGNAL	STANDARDS [redacted]
BLANK	0.00		0.001	0.002	0.000
BLANK	0.00		0.001	0.000	0.001Z201
~~STANDARD 1~~	~~0.50~~	~~1.0~~	~~0.012~~	~~0.012~~	void
STANDARD 1	0.50	1.0	0.012	0.012	0.012U201
STANDARD 2	2.00	0.8	0.049	0.049	0.049V201
STANDARD 3	5.00	[illegible]	[illegible]	[illegible]	[illegible]201

(18)

Fisher

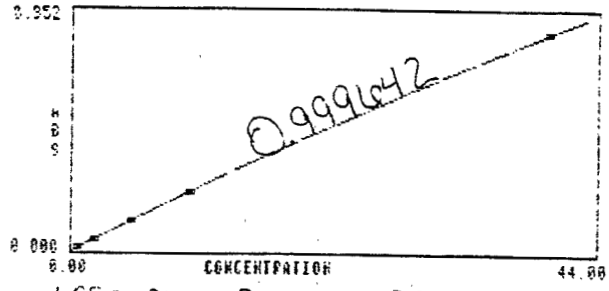
STANDARD 5	40.00	0.2	0.865	0.864	0.86	Y201

Std made 7-16-01

EM

ICV/CCV = T201

LDL = S201



HAM 7-16-01
Hg 7470 - misc
245.1

VERIFIED
DATE

LCS = .20ml of 100ppb PIST EM / 20ml T.V. 10ppb
SPK = .10ml of 100ppb PIST EM / 20ml T.V. 5ppb

7.00 ICV		4.87 97.4%	0.6	0.118	0.118	0.119	
ICB		-0.02	99.9	-0.000	-0.001	-0.000	
0.50 LDL		0.47 94.0%	3.9	0.012	0.011	0.012	
MB 1.1377 HAM		0.29	0.0	0.007	0.007	0.007	
LS 2.1377 HAM		9.37 93.7%	0.7	0.225	0.224	0.226	
MB 1.266 HMA		0.07	21.5	0.002	0.002	0.001	
LS 2.266 HMA		9.16 91.6%	0.4	0.220	0.219	0.221	
01 7.213.11A	1✓	5.42	0.9	0.131	0.131	0.132	
7.213.12A	1✓	13.71	0.6	0.325	0.323	0.326	
7.213.13A	1✓	9.70 ~100x	0.6	0.233	0.231	0.234	
7.213.13AD	1✓	9.98 ~100x	0.7	0.239	0.238	0.240	
7.213.13ADS	1	9.59 93.4%	1.1	0.230	0.228	0.232	— PDS - 2.5ml sx (100x)
~~7.213.14A~~	~~1~~	~~[illegible]~~ ~~~100x~~	void	HM	0.023	0.023	0.023	2.5ml dup (100x)
7.213.14A✓	1	8.35 ~10x	0.9		0.201	0.200	0.202	5.0ml of 10ppb
8.00 CCV		4.70	0.9		0.114	0.113	0.115	
CCB		0.03	72.7		0.001	0.001	0.000	
01 7.213.15A	1✓	4.49 10,000x	0.7		0.109	0.108	0.109	
7.213.16A	1✓	2.43 10,000x	0.4		0.059	0.059	0.059	
~~7.213.17A~~	~~1~~	~~[illegible]~~ void	HM	0.0	0.001	0.001	0.001	
7.213.17A	1✓	7.42 10x	1.2		0.179	0.177	0.181	
7.213.18A	10✓	12.74 10,000x	1.0		0.302	0.300	0.305	
7.213.19A	10✓	15.51 10,000x	1.1		0.365	0.362	0.368	
7.213.20A	1✓	0.18	8.5		0.004	0.005	0.004	
7.250.1A	100	0.02	31.8		0.000	0.000	0.001	
7.250.1AD	100	0.01	99.9		0.000	0.001	-0.000	
~~7.250.1AS~~	~~100~~	~~[illegible]~~ void	HM	1.0	0.080	0.079	0.080	
7.250.1ADS	100	4.60	1.6		0.112	0.110	0.113	
5.00 CCV		4.62	0.5		0.112	0.112	0.113	
CCB		0.05	0.0		0.001	0.001	0.001	
~~5.00~~ dilution H_2O		-0.01	99.9		-0.000	-0.000	-0.000	

PDS - 2.5ml sx (100x)
2.5ml dup (100x)
5.0ml of 10ppb

PDS % R.E.C.
9.59 x 2 = 19.2

$\frac{19.2 - 9.84}{10} = 93.6\%$

All samples prepped w/ .5ml conc. HNO_3
1.0ml conc. H_2SO_4
3.0ml 5% $KMnO_4$
1.6ml 5% $K_2S_2O_8$

(19)

Varian 20
Hg - Cold Vapor

7/17/01

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. James II

OPERATOR	
DATE	07 17 2001
BATCH NO.	1378 136
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP
PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 394.0

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

20

RE OPTIMIZE STANDARDS

RAW DATA

BLANK	0.00		-0.000	-0.000	-0.000 Z201
STANDARD 1	0.50	1.9	0.011	0.011	0.011 u201
STANDARD 2	2.00	2.5	0.043	0.043	0.044 v201
STANDARD 3	5.00	0.6	0.111	0.110	0.111 w201
STANDARD 4	10.00	0.6	0.218	0.217	0.219 x201
STANDARD 5	40.00	1.0	0.791	0.786	0.797 Y201

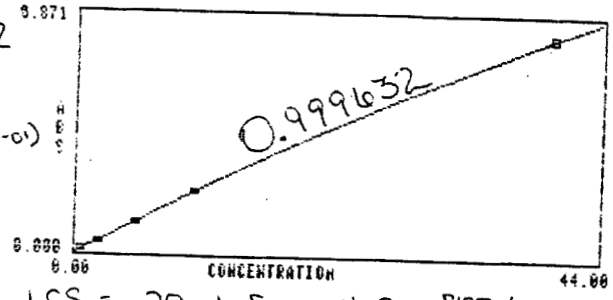
Fisher

Std's made 7-10-01

EM

ICV/CCV = B202 (made 7-17-01)

LdL = S201 (made 7-10-01)



Hg 245.1 w/w + 7470 - TCLP

HM 7-17-01

LCS = .20ml of 1000ppb Em P197 / 20ml T.V. 10ppb

Spks = .10ml " " T.V. 5ppb

VERIFIED DATE

PROGRAM 16 HG
SAMPLE 1 REPLICATE 1 MANUAL
ABSORBANCE CONCENTRATION BC ON
INTEGRATION 3.0 (sec) AIR ONLY

PRINTING

SAMPLE LABELS

1.	5.00		2.			3	0.50	
4.	1 1378.		5.	2.1378		6	1.136	
7.	2.136		8.	7 213.21	1	9.	7.212.21	1
10	7.213.21	10X	11.	7.213.22	1000	12.	7.213.23	1X
13.	7.213.24	1X	14.	5.00		15.		
16	7.213.25	10X	17.	7.213.26	10X	18.	7.213.27	100X
19	7.212.28	10X	20	7.213.29	100X	21.	7.213.30	10X
22.	5.00		23			24.	07.311.5	10
25.	7.313.1	40	26	07.382.1	10	27.	07.384.1	1
28	07.385.1	1	29.	07.385.1	1	30	07.385.1	1
31.	07.385.1	1	32.	5.00		33.		
34.	5.00		35.			36		
37			38.			39.		
40.			41.			42.		

MORE LABELS INCREMENT LABELS OPTIMIZATION

5.00 ICV	4.90	0.9	0.108	0.108	0.109	
ICB	0.03	11.5	0.001	0.001	0.001	
0.50 LdL	0.50	3.0	0.011	0.011	0.011	
MB 1.1378 HAA	0.03	76.0	0.001	0.001	0.000	
LCS 1.1378 HAA	9.49	1.0	0.208	0.206	0.209	
MB 1.136 TAA	0.14	18.3	0.003	0.004	0.003	
LCS 1.136 TAA	9.73	1.1	0.215	0.211	0.214	
7.213.21A 1	5.93 ÷10X	1.3	0.131	0.129	0.13	
7.213.21AD 1	5.66 ÷10X	1.2	0.125	0.124	0.126	
7.213.21APDS1	24.21	1.7	0.506	0.505	0.506	
7.213.22A 1	1.15 ÷1000X	1.2	0.025	0.024	0.025	
7.213.23A 1	1.21 1X	1.1	0.502	0.502	0.502	

AVG 5.86 4.66

PDS

48.4 − 5.8 / 40 = 107 −1.

21

P.D.S. — 5ml of 10x sample — 5ml of 40ppb (4x20.)

	7.213.24A	1	6.58 1X	1.2	0.145	0.144	0.146	
	5.00 CCV		4.92	0.3	0.109	0.108	0.109	
	CCB		0.06	57.2	0.001	0.002	0.001	
	7.213.25A	1	~~1.76~~ void	0.3	0.038	0.038	0.038	
	7.213.26A	1	~~2.42~~ void	3.9	0.046	0.045	0.047	
Void	7.213.27A	1	~~2.27~~ void	6.4 HAM 7-17-01	0.060	0.063	0.057	
	7.213.28A	1	~~2.18~~ void	4.8	0.092	0.095	0.089	SnCL 25%
HAM	7.213.29A	1	~~7.58~~ void	6.7	0.167	0.174	0.159	hose pulled out
	7.213.30A	1	~~2.59~~ void	9.9	0.006	0.007	0.006	(Still absorbed due
	7.213.30A	1	~~1.09~~ void	2.3	0.043	0.042	0.044	to high value)
	5.00 CCV		5.14 98.4%	0.8	0.114	0.113	0.114	
	CCB		0.08	24.6	0.002	0.002	0.001	
01	7.213.30A	1	8.39 • 10X	0.9	0.184	0.183	0.185	
	7.213.29A	1	5.35 • 10,000X	0.9	0.118	0.118	0.119	
	7.213.28A	1	3.08 • 10,000X	1.6	0.067	0.066	0.068	
	7.213.27D	1	1.67 • 10,000X	2.1	0.036	0.036	0.037	
	7.213.26A	1	6.21 • 10X	1.4	0.137	0.136	0.138	
	7.213.25A	1	1.32 • 10X	1.2	0.029	0.028	0.029	
	07.311.5A	10	0.28	5.4	0.006	0.006	0.006	
	7.313.1A	40	0.06	9.0	0.001	0.001	0.001	
	07.382.1A	10	9.09	1.4	0.199	0.197	0.201	
	07.304.1A	1	1.35	1.9	0.029	0.030	0.029	
	5.00 CCV		5.45	1.1	0.120	0.119	0.121	
	CCB		0.16	0.0	0.003	0.003	0.004	
01	07.305.1ATC	1	0.14	5.2	0.003	0.003	0.003	
	07.305.1ATCD	1	0.19	5.1	0.004	0.004	0.004	
	07.305.1ATCS	1	4.50 > 4.59	1.4	0.099	0.098	0.100	
	07.305.1ATCD	1	4.67 91.7% 3.70	1.1	0.103	0.103	0.103	
	07.273.1ATC	40	-0.02	99.9	-0.000	0.000	-0.001	
	07.273.1ATC	40	-0.04 40X	60.5	-0.001	-0.001	-0.001	
	07.273.1ATC	40	0.25 T.V. 20.0	9.4	0.005	0.006	0.005	
	07.273.1ATC	40	0.13 (400X)	16.5	0.003	0.002	0.003	
	07.273.1ATC	40	0.17 (400X)	4.9	0.004	0.004	0.004	
	07.273.1ATC	40	9.63 > 7.4	0.7 48.2%	0.210	0.209	0.211	— 5ml of 400X Sx
	07.273.1ATC	40	10.24 > 7.9 →	1.3 51.2%	0.223	0.221	0.226	5ml of 4000
	5.00 CCV		4.83 96.6%	1.7	0.107	0.105	0.108	(Supression from
	CCB		0.21	13.8	0.005	0.005	0.004	Sx)

original dilution Factors

All Sx's prepped w/

- 5ml conc. HNO_3
- 1.0ml conc. H_2SO_4
- 3.0ml 5% $KMnO_4$
- 1.6ml 5% $K_2S_2O_8$
- 1.2ml 12% $NH_2OH.HCL$

/20ml

* Additional Dilutions

10x = 1ml/10ml

1000x = .01ml/10ml

10,000x = .01ml/10ml

1ml/10ml

HAM 7-17-01

22

RAW DATA

	SCALE			SIGNAL [redacted]	
BLANK	0.00		0.001	0.001	0.001 Z201
STANDARD 1	0.50	4.2	0.011	0.011	0.011 U201
STANDARD 2	2.00	1.3	0.044	0.044	0.044 V201
STANDARD 3	5.00	1.0	0.110	0.109	0.111 W201
STANDARD 4	10.00	0.8	0.222	0.220	0.223 X201
STANDARD 5	40.00	0.5	0.820	0.817	0.826 Y201

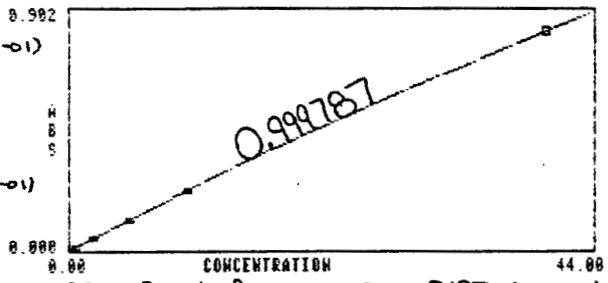
Fisher Std made 7-16-01

Em

(made 7-19-01)

ICV/CCV = D202

LdL = S201 (made 7-16-01)



7470A

Hg ~~245.1~~ HM

HM 7-19-01

VERIFIED
DATE

LCS - .20ml of 1000ppb Em P197 / 20ml T.V. 10ppb

Spk - .10ml " " " T.V. 5ppb

	5.00 ICV		5.19 104%	0.6	0.114	0.114	0.115
	..... ICB		0.22	1.3	0.005	0.005	0.005
	0.50 LdL		0.61 122%	2.1	0.013	0.014	0.013
MB	1.1380:HAA		0.20	4.1	0.004	0.004	0.005
	~~2.1380:HAA~~		~~12.17~~ void	0.7	0.268	0.267	0.270
LCS	2.1380:HAA		10.15 102%	1.1	0.225	0.223	0.227
01	07.435.1A	1	0.36	3.3	0.008	0.008	0.008
	7.213.31A	10	7.46 ~1,000	1.0	0.165	0.163	0.166
	7.213.32A	10	2.35 ~1,000	2.3	0.052	0.051	0.053
	7.213.33A	1	0.12	18.8	0.003	0.002	0.003
	7.213.33AD	1	0.11	35.3	0.002	0.002	0.003
	7.213.33S	1	6.83 >6.49	0.1	0.151	0.151	0.150
	7.213.33DS	1	6.15 130%	1.4	0.136	0.134	0.137
	5.00 CCV		4.98 99.6%	0.8	0.110	0.109	0.110
	..... CCB		0.15	15.7	0.003	0.004	0.003
01	7.213.34A	1	0.25 1,000%	4.9	0.005	0.005	0.006
	7.213.34A	1	1.44 100%	0.0	0.032	0.032	0.032
	~~7.213.35~~	~~1~~	~~OVER~~ void	0.5%	0.950	0.947	0.954
	~~7.213.35~~	~~1~~	~~0.03~~ void	19.1	0	0.001	0.001
	7.213.35A	1	9.86 5%	0.7	0.218	0.217	0.220
	7.213.36A	1	20.19 10%	0.8	0.436	0.433	0.438
	7.213.15A	1	5.46 10,000%	0.3	0.120	0.120	0.120
	7.213.16A	1	2.73 10,000%	1.9	0.060	0.059	0.061
	5.00 CCV		4.99 99.8%	0.7	0.110	0.109	0.110
	..... CCB		0.00	0.0	0.000	0.000	0.000
	Dilution. H_2O.		0.03	22.2	0.001	0.001	0.000
01	7.213.33APDS	1	4.87 97.4%	1.1	0.107	0.106	0.108
	5.00 CCV		4.98 99.6%	0.5	0.110	0.109	0.110
	..... CCB		0.06	67.6	0.001	0.002	0.001

-25ml Sx
2.5ml dup
5.0ml of 10ppb (X201)

23

All sx's prepped with

.5ml HNO_3 conc.
1.0ml H_2SO_4 conc.
3.0ml $KMnO_4$ 5%.
1.6ml $K_2S_2O_8$ 5%.
1.2ml $NH_2OH \cdot HCL$ 12%. /20ml

1,000x = .01ml/10ml
100x = .10ml/10ml
10x = 1.0ml/10ml
5x = 2ml/10ml

31A = total Dilution 10,000x
32A = " 10,000x
33A = " 1x
34A = " 100x
35A = " 5x
36A = " 10x

7-19-01

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DSWI-011-①

Page 1 EEI REPORT Work Order # 01-05-904
Received: 05/29/01 06/07/01 16:24:58

REPORT UC, ALTER FACILITY
TO DEPT. OF CIVIL & ENVIR. ENG.
CINCINNATI, OHIO 45221-0071

PREPARED Environmental Enterprises
BY 10163 Cincinnati-Dayton Rd.
Cincinnati, Ohio 45241

Debbe Jones
CERTIFIED BY

ATTEN LINDA RIESER

ATTEN Debbe Jones
PHONE (513) 772-2818 CONTACT JASON

CLIENT SCIE02 SAMPLES 10
COMPANY SCIENCE APPLICATIONS INT'L
FACILITY

Enclosed are the results of specified samples submitted for analysis. If you have any questions please use Order # for faster identification.
OHIO EPA CERTIFICATION: CHEMICAL #4095, MICROBIOLOGICAL #850

WORK ID 5/29/01 TCLP LEACHATE WA3-08
TAKEN CUSTOMER
TRANS DELIVERED
TYPE LEACHATE
P.O. # 4400038593
INVOICE under separate cover

QA/QC ENCLOSURES.

SAMPLE IDENTIFICATION		TEST CODES and NAMES used on this workorder	
01	PH 2-U	HG	Mercury (Cold vapor)
02	PH 2D-U		
03	PH 2B-U		
04	PH 4-U		
05	PH 6-U		
06	PH 8-U		
07	PH 8D-U		
08	PH 10-U		
09	PH 12-U		
10	PH 12D-U		

Constant pH leaching test
[illegible]

Page 2 EEI REPORT Work Order # 01-05-904

Received: 05/29/01 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
HG mg/l	126	125	0.052	25.7	23.5

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)	Sample 10 (entered units)
HG mg/l	22.0	19.0	6.66	27.3	40.6

DSW1-011-2

ENVIRONMENTAL ENTERPRISES, INC.

QC REPORT
UNIVERSITY OF CINCINNATI

CASE NARRATIVE

PROJECT: Science Applications Int,L (WA3-08) (Work Order # 0105904-01 to 10)

METAL

Mercury analyses were performed in accordance with SW 846 Method 7470A and meet the required QC criteria.

Initial calibrations were performed within 0.9999 Correlation Coefficient.

The daily calibration were verified by Initial Calibration Verification (ICV) standard and Continuing Calibration Verification (CCV) standard. ICV and all CCV recoveries were within the acceptable control limits.

Laboratory control samples recovery were within the acceptable control limits.

RPD calculated for duplicate analyses were within the acceptable control limits.

A Post Digestion Spike was performed due to the high level of mercury present.

Method blanks was free of contamination.

Jyoti Desai 6/4/01

Jyoti Desai (Date)
QA Coordinator

TABLE OF CONTENTS

METAL

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Initial and Continuing Calibration Verification Recovery Data	1
Quality Assurance Report	2
Sample Dilution Record	3
Sample Digestion Log	4
Mercury Analysis Data	5 - 6

ENVIRONMENTAL ENTERPRISES, INC.

Initial and Continuing Calibration Verification

Project:Science Applications Int,L (WA3-08)

Concentration Units: ppb

Date	Analyst	Method #	Analyte	ICV			CCV1			CCV2		CCV3	
				True	Found	% Rec	True	Found	% Rec	Found	% Rec	Found	% Rec
5/31/01	HAJ	7470A	Hg	5	4.95	99	5	4.85	97	4.83	97	4.87	97

ICV = Initial Calibration Verification ICV % Range - 10%

CCV = Continue Calibration Verification CCV % Range - 20%

Work Order # - 0105904-01 to 10

ENVIRONMENTAL ENTERPRISES, INC.

(2)

Quality Assurance Report
Project: Science Applications Int,L (WA3-08)

Analytes	Analyst	D. L. ppb	Batch Blank ppb	Sample #	Sample Results ppb	Duplicate Sx-Result ppb	Average ppb	RPD	Spike Added ppb	Matrix Sp. Result ppb	Matrix Spike % Rec.	LCS Conc. ppb	LCS % Rec.	LCS Acceptance % Limits
Mercury	HAJ	0.5	<0.5	0105904-08A	6.60	6.71	6.66 (2)	1.6	10	16.5	98 (1)	10	104	85 - 115

Analysis Date - 5/31/01

Work Order # 0105904-01 to 10

Method # 7470A

RPD Range = 0-20 %

Matrix Spike Recovery Range - +/- 25%

NOTE: LCS - Laboratory Control Sample

RPD = Relative Percent Difference

D. L. = Detection Limits

(1) = A post digestion spike was performed due to the high level of mercury present in sample.

(2) = 1000 x dilution factor aplied to reported sample results.

An Employee-Owned Company

Sample Dilution Record

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
0105904-01A	2 ml/20 ml	0.1 ml/10 ml	0.1 ml/10 ml		
	10	100	100		100,000
0105904-02A	2 ml/20 ml	0.1 ml/10 ml	0.1 ml/10 ml		
	10	100	100		100,000
0105904-03A	20 ml/20 ml	1 ml/10 ml			
	1	10			10
0105904-04A	2 ml/20 ml	0.1 ml/10 ml			
	10	100			1,000
0105904-05A	2 ml/20 ml	0.1 ml/10 ml			
	10	100			1,000
0105904-06A	2 ml/20 ml	0.1 ml/10 ml			
	10	100			1,000
0105904-07A	2 ml/20 ml	0.1 ml/10 ml			
0105904-08A	2 ml/20 ml	0.1 ml/10 ml			
	10	100			1,000
0105904-09A	2 ml/20 ml	0.1 ml/10 ml			
	10	100			1,000
0105904-10A	2 ml/20 ml	0.1 ml/10 ml			
	10	100			1,000

3

RAW DATA

COPY

Environmental Enterprises — Hg Aqueous Digestion Log — Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN (ml/ml)	COMMENTS
01-1340-HAA	5-31-01	HM	BLK	Hg	20/20	
02-			LCS		20/20	
03-			0105-9660-1A		2/20	
04-			" 2A		2/20	
05-			0105-964-1A		20/20	
06-			0105-904-1A		2/20	
07-			" 2A		2/20	
08-			" 3A		20/20	
09-			" 4A		2/20	
10-			" 5A			
11-			" 6A			
12-			" 7A			
13-			" 8A			
14-			" 8AD			
15-			" 8AS			
16-			" 8ADS			
17-			" 9A			
18-			" 10A			
19-						
20-						

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
Sm (LCS)	P197	.20ml spike / 20ml
Sm (SDK)	P197	.10ml spike / 20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx +sp	%rec
	6600.	6710.	6,660.	1.65	5.00ug/L	8.24	98.2 %

P.D.S. 2.5ml Sx (1000x)
2.5ml dup (1000x)
5.0ml 10ppb (C198)

DATE ANALYZED 5-31-01
SAMPLE NUMBER 5-904-8A

ANALYIST HM DEPT. SUPER ____ INORGANIC SUPER. ____

Page ____

(4)

Varian 20
Hg - Cold Vapor

QAQC
Copy

COPY

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. Jones II

OPERATOR	
DATE	05.31.2001
BATCH NO.	1340
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP

PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 394.0

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

5

RAW DATA

COPY

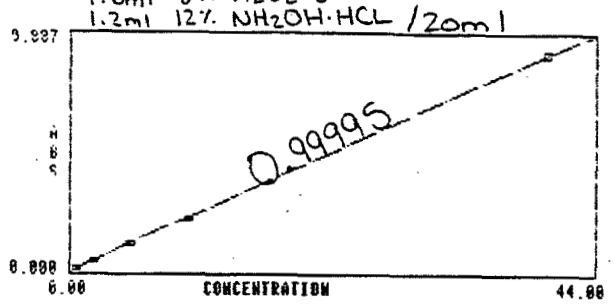
	RE SCALE			OPTIMIZED SIGNAL [redacted]		
BLANK	0.00		0.001	0.000	0.001	T197 Cal. Blank
STANDARD 1	0.50	1.5	0.012	0.012	0.012	Z197
STANDARD 2	2.00	0.2	0.043	0.043	0.043	A198
STANDARD 3	5.00	0.1	0.110	0.110	0.110	B198
STANDARD 4	10.00	0.6	0.203	0.202	0.204	C198
STANDARD 5	40.00	0.7	0.807	0.802	0.811	D198

Fisher made 5-25-01

All samples prepped w/ .5ml conc HNO_3
1.0ml conc H_2SO_4
3.0ml 5% $KMnO_4$
1.6ml 5% $K_2S_2O_8$
1.2ml 12% $NH_2OH \cdot HCL$ /20ml

EM
(made 5-31-01)
ICV/CCV = G198

LdL = X197
(made 5-25-01)



Hg 245.1/7470A
HAM 5-31-01

6-1-01

Fisher LCS = .20ml of 1000ppb P197 EM /20ml T.V. 10ppb
Spike = .10ml " " T.V. 5ppb

* 1000X = 2ml/20ml = 10X; .10ml/10ml = 1,000X
* 100,000X = 2ml/20 = 10X; .10ml/10ml = 1,000X; .10ml/10ml = 100,000
* 10X = 20ml/20ml = 1X; 1ml/10ml

	5.00 ICV		4.95	99.0%	0.8	0.109	0.108	0.110	
	....ICB.....		0.06		8.1	0.001	0.001	0.001	
	0.50 LdL		0.45	90.0%	3.1	0.011	0.010	0.011	
MB	1.1340: HAB..		0.03		74.8	0.001	0.000	0.001	
LCS	2.1340: HAB..		10.42	104%	0.5	0.212	0.211	0.212	
01	05.966.1A	10	0.11	P.R.	4.2	0.003	0.003	0.002	
	05.966.2A	10	0.11	P.R.	4.1	0.003	0.003	0.002	
	05.964.1A	1	0.70		0.4	0.016	0.016	0.016	
	5.00 CCV		4.85	97.0%	0.9	0.107	0.106	0.108	
	....CCB.....		0.03		37.7	0.001	0.001	0.001	
01	05.904.1A	10	1.26	10,000	0.7	0.028	0.028	0.028	Total Dilution 100,000X
	05.904.2A	10	1.25	10,000	1.5	0.028	0.028	0.029	" "
	05.904.3A	1	5.20	10%	1.2	0.114	0.114	0.115	
	05.904.4A	10	0.27	Void	12.2	0.006	0.007	0.006	
	05.904.4A	10	25.71	100%	0.7	0.520	0.518	0.523	Total Dilution 1000X
	05.904.5A	10	23.49	100%	0.4	0.475	0.474	0.477	" "
	05.904.6A	10	21.98	100%	0.6	0.445	0.443	0.447	" "
	05.904.7A	10	19.01	100X	1.0	0.385	0.382	0.388	" "
	05.904.8A	10	6.60	100X	1.1	>6.66 Avg 0.143	1.65 RPD 0.142	0.144	" "
	05.904.8AD	10	6.71	100X	0.9	0.145	0.145	0.146	" "
	05.904.8AS	10	8.24	PDS X2	0.6	98.2% 0.174	0.173	0.175	→ 2.5 sx (100X)
	5.00 CCV		4.83	96.6%	1.2	0.106	0.106	0.107	2.5 dup (100X)
	....CCB.....		0.03		37.1	0.001	0.001	0.001	5.0ml of 10ppb (C198)
01	05.904.8A	10	27.25	100X	0.5	0.551	0.549	0.553	Total Dilution 1000X
	05.904.10A	10	40.57	100X	0.7	0.818	0.814	0.822	" "
	05.904.9A	10	26.96	100X	1.1	(re-checks) 0.545	0.541	0.549	" "
	05.904.10A	10	41.58	100X	0.9	(re-checks) 0.838	0.833	0.843	" "
	5.00 CCV		4.87	97.4%	0.9	0.107	0.107	0.108	
	....CCB.....		0.08		10.4	0.002	0.002	0.002	
	Dilution H_2O		0.04		6.6	0.001	0.001	0.001	

digested Dilution

Additional Dilutions

6

Page 1 EKI REPORT Work Order # 01-03-491 OSWI-005-(1)
Received: 03/20/01 03/28/01 12:09:45

REPORT TO: UC, ALTER FACILITY
DEPT. OF CIVIL & ENVIR. ENG.
CINCINNATI, OHIO 45221-0071

ATTEN: LINDA RIESER

CLIENT: SCIE02 SAMPLES: 9
COMPANY: SCIENCE APPLICATIONS INT'L
FACILITY:

WORK ID: 3/20/01 TCLP LEACHATE/SLUDGE
TAKEN: CUSTOMER
TRANS: DELIVERED
TYPE: LEACHATE/SLUDGE
P.O. #: 4400038593
INVOICE: under separate cover

PREPARED BY: Environmental Enterprises
10163 Cincinnati-Dayton Rd.
Cincinnati, Ohio 45241

CERTIFIED BY: Debbie Jones

ATTEN: Debbe Jones
PHONE: (513) 772-2818 CONTACT: JASON

Enclosed are the results of specified samples submitted for analysis. If you have any questions please use Order # for faster identification.
OHIO EPA CERTIFICATION: CHEMICAL #4095, MICROBIOLOGICAL #850

QA/QC ENCLOSURES.

SAMPLE IDENTIFICATION		TEST CODES and NAMES used on this workorder	
01	TCLP1	HG	Mercury (Cold vapor)
02	TCLP2		
03	TCLP3		
04	TCLP3D		
05	S1		
06	S2		
07	S3		
08	S4		
09	S5		

TCLP of Untreated Surrogate

Total Hg of Untreated Surrogate

Page 2 EEI REPORT Work Order # D1-03-491
Received: 03/20/01 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
HG mg/l	113	107	111	109	4,660 mg/kg

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)
HG mg/l	3,250 mg/kg	3,640 mg/kg	4,090 mg/kg	4,230 mg/kg

OSWI-005-②

ENVIRONMENTAL ENTERPRISES, INC.

UNIVERSITY OF CINCINNATI
QC REPORT

CASE NARRATIVE

PROJECT: University of Cincinnati (Work Order # 0103491-01 to 09)

METAL

Mercury analyses were performed in accordance with SW 846 Method 7470A and meet the required QC criteria.

Initial calibrations were performed within 0.9997 Correlation Coefficient.

The daily calibration were verified by Initial Calibration Verification (ICV) standard and Continuing Calibration Verification (CCV) standard. ICV and all CCV recoveries were within the acceptable control limits.

Laboratory control samples recovery were within the acceptable control limits.

RPD calculated for duplicate analyses were within the acceptable control limits.

Post Digestion Spikes were performed due to the high level of mercury present.

Method blanks were free of contamination.

Jyoti Desai 3/28/01

Jyoti Desai. (Date)
QA Coordinator

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METAL

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ENVIRONMENTAL ENTERPRISES, INC.

(1)

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 01-03-491-01A-09A.

Aqueous Batch 1289-HAA.

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	ICV			CCV1			CCV2		CCV3	
				True	Found	% Rec	True	Found	% Rec	Found	% Rec	Found	% Rec
3/26/01	MJW	7470A	Hg	5	4.94	98.8	5	5.02	100	4.98	99.6	5.05	101

ICV = Initial Calibration Verification

ICV % Range = +/-10%

CCV = Continue Calibration Verification

CCV % Range = +/-20%

0103491-1289HAAcal

An Employee-Owned Company

ENVIRONMENTAL ENTERPRISES, INC.

(2)

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 01-03-491-05A-09A.

Miscellaneous Batch 250-HMA.

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	ICV			CCV1			CCV2	
				True	Found	% Rec	True	Found	% Rec	Found	% Rec
3/27/01	HAJ	7470A	Hg	5	5.2	104	5	5.06	101.2	5	100

ICV = Initial Calibration Verification **ICV % Range =** +/-10%

CCV = Continue Calibration Verification **CCV % Range =** +/-20%

0103491-250HMAcal

ENVIRONMENTAL ENTERPRISES, INC.

(3)

Quality Assurance Report
Project: SCIE02 Work Order # 01-03-491 Fractions 01A-04A

Date Analyzed	Analyst	Method #	Analytes	Sample #	Method Blank ppb	Sample Results ppm	Sample Dup ppm	RPD	Spike % Rec	LCS Conc. ppb	LCS % Rec	LCS Acceptance % Limits
3/26/01	MJW	7470A	Hg	01-03-491-01A	<0.5	112.8	112.6	0.18	106(*1)	10	95.5	85-115

RPD = Relative Percent Difference **RPD Control Limits =** +/-25%

LCS = Laboratory Control Sample **Spike Control Limits =** +/-25%

(*1) Due to the high levels of mercury present, a Post Digestion Spike was performed on an equal mixture of diluted sample and duplicate digestates.

An Employee-Owned Company

ENVIRONMENTAL ENTERPRISES, INC.

(4)

Quality Assurance Report
Project: SCIE02 Work Order # 01-03-491 Fractions 05A-09A.

Miscellaneous Digestion Batch 250-HMA.

Date Analyzed	Analyst	Method #	Analytes	Sample #	Method Blank ppb	Sample Results ppm	Sample Dup ppm	Sample Triplicate ppm	Sample Average ppm	RPD	Spike % Rec	LCS Conc. ppm	LCS % Rec	LCS Acceptance % Limits
3/27/01	HAJ	7470A	Hg	01-03-491-05A	<0.5	5,270	4,270	4,450	4,660	21.5	104(*1)	2.48	88.3	68.1-132

RPD = Relative Percent Difference **RPD Control Limits =** +/-25%

LCS = Laboratory Control Sample **Spike Control Limits =** +/-25%

(*1) Due to the high levels of mercury present, a Post Digestion Spike was performed on an equal mixture of diluted sample and duplicate digestates.

0103491-250HMA

RAW DATA

COPY
For QA/QC Report

Environmental Enterprises — Hg Aqueous Digestion Log — Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN ml/ml	COMMENTS
01-1289-HAA	3-26-01	HM	BLK	Hg	20/20	
02-			LCS		20/20	
03-			0103-595-1A		20/20	
04-			1AD		20/20	
05-			1AS		20/20	
06-			1ADS		20/20	
07-			0103-578-1A		2/20	QCB
08- 1289-HAA	3-26-01	HM	0103-537-19A	Hg	20/20	
09-			0103-491-1A	Hg	20/20	SCIF OQ
10-			1AD			
11-			1AS			
12-			1ADS			
13-			2A			
14-			3A			
15-			4A			
16-1289-HAA	3-26-01	HM	0103-1009-1A	Hg	2/20	EEJ01 Rinsh
17-						
18-						
19-						
20-						

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
5m (LCS)	Q191	.20ml of 100ppb / 20ml
5m (Spk)	Q191	.10ml of 100ppb / 20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx +sp	%rec
	<0.5	<0.5	<0.5	0	5.00ug/L	4.285	85.7%

ms 4.22 → 4.285
msD 4.35
3.03% RPD

DATE ANALYZED 3-26-01
SAMPLE NUMBER 0103-595-1A

ANALYIST [signature] DEPT. SUPER _____ INORGANIC SUPER. _____

Page _____

(5)

Environmental Enterprises

Hg Miscellaneous

AS-75

Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-250·HMA	3/27/01	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg	.20g/20ml	
03-			0103-491-5A	Hg	.20g/20ml	
04-			5AD	Hg		
05-			5AS	Hg		
06-			5ADS	Hg		
07-			6A	Hg		
08-			7A	Hg		
09-			8A	Hg		
10-			9A	Hg		
11-250·HMA	3/27/01	HM	0103-491-5AT	Hg	.20g/20ml	(Triplicate)
12-				Hg		
13-				Hg		
14-				Hg		
15-				Hg		
16-				Hg		
17-				Hg		
18-				Hg		
19-				Hg		
20-				Hg		

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
Em (SPKS)	Q191	.10ml of 1000ppm/20ml
SRA (LCS)	Q47J	.20g of soil LCS/20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx + sp	%rec
	5,270,000.	4,270,000.	4,660,000.		5.00ug/L		104 %

Trip 4,450,000.

pdS - took 5ml of Trip (1million x)
5ml of 10ppb

7.42 ppb
- 2.23 (1/2 of trip)
5.19

DATE ANALYZED 3·27·01
SAMPLE NUMBER 3·491·5A

ANALYIST HM DEPT. SUPER ____ INORGANIC SUPER. ____

Page ____

(6)

Varian 20
Cold Vapor

COPY
FOR QA/QC REPORT

	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

OPERATOR	Mary Jo WELTZER
DATE	03.26.2001
BATCH NO.	1289-HAM 1290-HAM
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

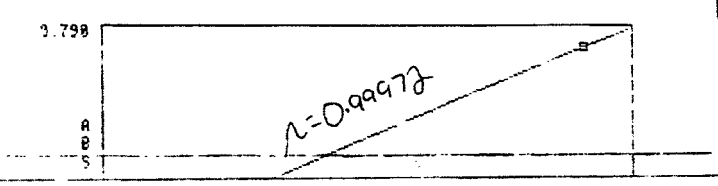
H193	BLANK	0.00		-0.001	-0.001	-0.001
C193	STANDARD 1	0.50	0.8	0.007	0.009	0.010
D193	STANDARD 2	2.00	1.0	0.040	0.040	0.040
E193	STANDARD 3	5.00	0.8	0.099	0.099	0.100
F193	STANDARD 4	10.00	1.1	0.195	0.194	0.190
G193	STANDARD 5	40.00	1.2	0.718	0.712	0.724

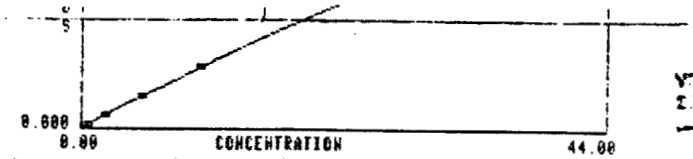
Fisher STD's made 3-23-01

ICV/CCV 5.00 ppb Em I193 made 3-26-01
LOL 0.5 ppb Em A193 made 3-23-01

7

Hg 245.1 (WW)
SM 3112 (D.W)
7470 (MISC TCLP)
3-26-01 MJW





3-26-01 mgN

3-27-01

LCS = 0.2ml 1000ppb Em Q191 | 20ml ASTM II TV 10.0ppb
SpK : 0.10ml 1000ppb Em Q191 | 20ml SX TV 5.0ppb

COPY

5.00	4.94 98.8%	0.8	0.098	0.098	0.099	
.BLANK.....	0.04 <	87.5	0.001	0.001	0.000	
0.50	0.53 106%	1.8	0.010	0.010	0.010	
1.1289:HAA..	-0.01	45.3	-0.000	-0.000	-0.000	
2.1289:HAA..	9.55 95.5%	0.8	0.187	0.185	0.188	
1.1290:HAA..	0.06	18.8	0.001	0.001	0.001	
2.1290:HAA..	0.02	26.3	0.000	0.000	0.000	
03.612.1ADW 1	0.07 ✓	66.1	0.001	0.001	0.001	
03.612.1ADW 1	0.07 ✓	29.0	0.001	0.001	0.001	
03.612.1ASPK 1	0.06 ✓	12.7	0.001	0.001	0.001	
03.612.1ARS 1	5.23 ✓	1.3	0.104	0.103	0.105	- P.S done as follows
03.612.2ADW 1	6.90 ✓	0.9	0.136	0.135	0.137	Took 5mls of SX and
5.00	5.02 100%	0.9	0.100	0.099	0.100	5ml of 10ppb F193
.BLANK.....	0.05	8.7	0.001	0.001	0.001	for TV of 5ppb then
03.612.3ADW 1	11.31 ✓	1.2	0.219	0.217	0.221	Analyzed
03.609.1A 10	0.21 ✓	4.5	0.004	0.004	0.004	
03.595.1A 1	0.08	34.3	0.002	0.002	0.001	
03.595.1ADup 1	0.05	10.7	0.001	0.001	0.001	
03.595.1A MS 1	4.22 84.4%	1.5 3.03%	0.084	0.083	0.085	785.7% Rec. average
03.595.1AMSD 1	4.35 87.0%	0.9 RPD	0.087	0.086	0.087	
03.578.1A 10	0.47	5.7	0.009	0.009	0.008	
03.537.19A 1	0.27	7.8	0.005	0.005	0.005	
5.00	4.98 99.6%	1.0	0.099	0.098	0.100	
.BLANK.....	0.16 <	13.3	0.003	0.003	0.003	
03.491.1A 1	11.28 >11.27	1.4 0.18%	0.219	0.217	0.221	These samples were
03.491.1Adup 1	11.26	1.0 RPD	0.219	0.217	0.220	diluted 10,000x
03.491.1APS 1	10.91 106% Rec	1.2	0.212	0.210	0.214	before Analyzing
03.491.2A 1	10.66	1.2	0.207	0.206	0.209	
03.491.3A 1	11.14	1.0	0.216	0.215	0.218	
03.491.4A 1	10.94	0.9	0.213	0.211	0.214	
5.00	5.05 101%	1.4	0.100	0.099	0.101	
BLANK.....	0.19 <	11.7	0.004	0.004	0.003	

ALL SX prepped with
0.5ml conc HNO_3
1.0ml conc H_2SO_4
3.0ml 5% $KMnO_4$
1.6ml 5% $K_2S_2O_8$
1.2ml 12% $NH_2OH \cdot HCL$ | 20ml

P.S for 03-491-1A done as follows
Sample was diluted to 10,000x using 0.05mls of SX And 0.05mls of dup
Then 5mls of 10,000x diluted Sample And 5mls of 10ppb F193 were mixed for A True Spike value of 5ppb

Dilution done as follows
0.10ml of SX diluted to 10mls using Hg dilution H_2O (W192) for 100x dilution.
Then 0.10ml of 100x dilution sample was diluted to 10mls Also using Hg dilution H_2O (W192) for total of 10,000x dilution

(8)

COPY
FOR QA/QC REPORT

Hg - Varian 20
Cold Vapor

QC
Copy

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 sec	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. Jones II

OPERATOR	
DATE	03.27.2001
BATCH NO	1231 250
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP [redacted]

ALIGN HC LAMP [redacted]
PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS [illegible]

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	1.5
AIR FLOW	[illegible]

(9)

	RE SCALE		OPTIMIZE STANDARDS SIGNAL		
BLANK	0.00		0.001	0.001	0.001 ~~0.002~~ 1ml K193
STANDARD 1	0.50	2.4	0.010	0.010	0.010 C193
STANDARD 2	2.00	1.0	0.043	0.042	0.043 D193
STANDARD 3	5.00	1.3	0.105	0.104	0.106 E193
STANDARD 4	10.00	1.1	0.209	0.207	0.210 F193
STANDARD 5	40.00	0.9	0.766	0.762	0.771 G193

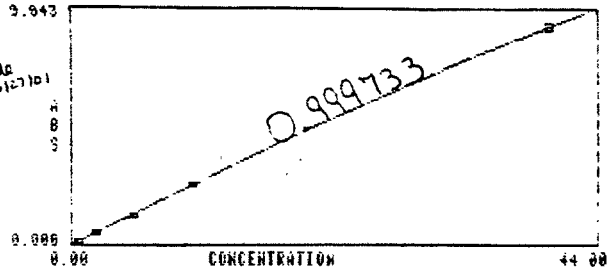
Fisher made 3/23/01

COPY FOR QA/QC PURPOSES

EM

ICV/CCV = J193 made 3/27/01

LdL = A193 made 3/23/01



Hg 245.1

+

7470 - misc

HAM 3/27/01

3-28-01

LCS Soil = .20g of ERA 047J soil / 20ml

Aq LCS = .20ml of 1000 ppb Em G191 / 20ml = T.V. 10ppb

SpA = .10ml " " " = T.V. 5ppb

	5.00 ICV	5.20 104%	0.6	0.109	0.109	0.110	
	....ICB.....	0.05	55.3	0.001	0.001	0.002	
	0.50 LdL	0.54 108%	2.9	0.011	0.011	0.011	
mb	1.1291-HAA...	0.05	19.2	0.001	0.001	0.002	
LCS	1.129-HAA...	0.44 94.4%	0.7	0.197	0.196	0.198	
mb	1.250-HMA...	0.17	8.9	0.003	0.004	0.006	
LCS	1.250-HMA 10x	21.87 = 2.19 mg/kg	1.3	0.444	0.443	0.445	= Cert value 2.48 mg/kg
✓ OI	03.620.1A 1	0.18	18.1	0.004	0.004	0.005	Range allowed
✓	03.620.1A 1	0.05	0.0	0.001	0.001	0.001	1.69 mg/kg - 3.27 mg/kg
	03.620.1AD 1	0.02 3 SREPD	13.6	0.000	0.001	0.000	
	03.620.1ADpE	5.12 > 5.03 101%	1.3	0.108	0.107	0.109	
	03.620.1ASD1	4.94	1.0	0.104	0.106	0.103	
✓	03.611.1A 10	0.11	39.0	0.002	0.002	0.003	
✓	03.608.2A 10	0.74	1.2	0.015	0.015	0.015	
	5.00 CCV	5.06 101%	0.8	0.106	0.106	0.107	
	.....CCB.....	0.08	34.4	0.002	0.002	0.002	
OI	03.491.5A 100	3.[illegible] = 1 mlx	0.9	0.111	0.112	0.112	= Avg of all 3 = 4.66
	03.491.5AD 100	[illegible] = 1 mlx	0.6	0.090	0.090	0.091	
	~~03.491.5A 100~~	[illegible] 0.1 ml	0.9	0.774	0.769	0.779	
	03.491.5AT 100	4.45 = 1 mlx	1.0	0.094	0.092	0.[illegible]	
	03.491.5APDS 100	7.42 104%	0.7	0.156	0.155	0.156	= 5ml of 1 million x (Trip)
	03.491.6A 100	3.25 = 1 mlx	0.6	0.069	0.069	0.070	5ml of 10ppb (F193)
	03.491.6A 100	3.20 0.1 ml check	0.1	0.069	0.069	0.069	
	03.491.7A 100	3.[illegible] = 1 mlx	1.4	0.07[illegible]	0.07[illegible]	0.[illegible]	
	03.491.8A 100	4.09 = 1 mlx	1.1	0.08[illegible]	0.086	0.087	
	03.491.9A 100	4.2[illegible] = 1 mlx	0.5	0.090	0.089	0.091	
	5.00 CCV	5.00 100%	0.8	0.105	0.105	0.106	
	....ICB.....	0.10	20.7	0.002	0.002	0.002	
	Hg dilution H2O wt2	0.04	53.4	0.001	0.001	0.001	

(10)

All sample prepared w/ .5ml HNO_3 1.8ml $NH_2OH \cdot HCL$ 12%
1.0ml H_2SO_4
3.0ml 5% $KMnO_4$
1.6ml 5% $K_2S_2O_8$

3-491-5A-4A diluted as followed, original dilution
.20g / 20ml = 100 x
100 x = .01ml / 10ml = 100,000.
100,000 x = 1ml / 10ml = 1 million

RAW DATA

OSWI-021-①

Page 1 EEI REPORT Work Order # 01-12-039
Received: 12/04/01 12/20/01 14:50:50

REPORT UC, ALTER FACILITY
TO DEPT. OF CIVIL & ENVIR. ENG.
CINCINNATI, OHIO 45221-0071

ATTEN LINDA RIESER

CLIENT SCIE02 SAMPLES 43
COMPANY SCIENCE APPLICATIONS INT'L
FACILITY

WORK ID 11/28-12/04/01 EPA HG (ALTER)
TAKEN CUSTOMER
TRANS DELIVERED
TYPE LEACHATE/SOLID
P.O. # 4400038593
INVOICE under separate cover

PREPARED BY Environmental Enterprises
10163 Cincinnati-Dayton Rd.
Cincinnati, Ohio 45241

CERTIFIED BY Debbe Jones

ATTEN Debbe Jones
PHONE (513) 772-2818 CONTACT BRENDA

Enclosed are the results of specified samples submitted for analysis. If you have any questions please use Order # for faster identification.
OHIO EPA CERTIFICATION: CHEMICAL #4095, MICROBIOLOGICAL #850

QA/QC ENCLOSURES.

SAMPLE IDENTIFICATION	TEST CODES and NAMES used on this workorder	
01	HG	Mercury (Cold vapor)
02		
03		
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26		

Page 2 EEI REPORT Work Order # 01-12-039
Received: 12/04/01 12/20/01 14:50:50

SAMPLE IDENTIFICATION

27 Vendor B m-3T TCLP Leachate
28 TCLP-blank TCLP LEACHATE
29 Vendor B m-S1 Solid
30 Vendor B m-S2 Solid
31 Vendor B m-S3 Solid
32 Vendor B m-S4 Solid
33 Vendor B m-S5 Solid
34 Vendor B ea-S1 Solid
35 Vendor B ea-S2 Solid
36 Vendor B ea-S3 Solid
37 Vendor B ea-S4 Solid
38 Vendor B ea-S5 Solid
39 Vendor B eb-S1 Solid
40 Vendor B eb-S2 Solid
41 Vendor B eb-S3 Solid
42 Vendor B eb-S4 Solid
43 Vendor B eb-S5 Solid

Page 3 EEI REPORT Work Order # 01-12-039
Received: 12/04/01 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
HG mg/l	<0.0005	0.00105	0.00156	0.00186	0.00484

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)	Sample 10 (entered units)
HG mg/l	0.0110	0.00832	0.0118	0.143	0.0672

TEST CODE default units	Sample 11 (entered units)	Sample 12 (entered units)	Sample 13 (entered units)	Sample 14 (entered units)	Sample 15 (entered units)
HG mg/l	<0.0005	46.6	44.0	0.126	0.606

TEST CODE default units	Sample 16 (entered units)	Sample 17 (entered units)	Sample 18 (entered units)	Sample 19 (entered units)	Sample 20 (entered units)
HG mg/l	0.344	0.460	0.0634	0.0646	0.0509

TEST CODE default units	Sample 21 (entered units)	Sample 22 (entered units)	Sample 23 (entered units)	Sample 24 (entered units)	Sample 25 (entered units)
HG mg/l	0.00588	0.00611	0.00284	0.00613	0.140

TEST CODE default units	Sample 26 (entered units)	Sample 27 (entered units)	Sample 28 (entered units)	Sample 29 (entered units)	Sample 30 (entered units)
HG mg/l	0.165	0.161	<0.0005	4,350 mg/kg	4,610 mg/kg

TEST CODE default units	Sample 31 (entered units)	Sample 32 (entered units)	Sample 33 (entered units)	Sample 34 (entered units)	Sample 35 (entered units)
HG mg/l	4,470 mg/kg	4,310 mg/kg	3,940 mg/kg	158,000 mg/kg	285,000 mg/kg

TEST CODE default units	Sample 36 (entered units)	Sample 37 (entered units)	Sample 38 (entered units)	Sample 39 (entered units)	Sample 40 (entered units)
HG mg/l	148,000 mg/kg	60,500 mg/kg	121,000 mg/kg	5,420 mg/kg	4,930 mg/kg

Page 4 EEI REPORT Work Order # 01-12-039
Received: 12/04/01 Results By Test

TEST CODE default units	Sample 41 (entered units)	Sample 42 (entered units)	Sample 43 (entered units)
HG mg/l	2,600 mg/kg	3,690 mg/kg	6,230 mg/kg

OSWI-021-E

ENVIRONMENTAL ENTERPRISES, INC.

QC REPORT
UNIVERSITY OF CINCINNATI
SCIE02

CASE NARRATIVE

PROJECT: Science Applications Int'L (SCIE02) (Work Order # 0112039-01 to 43)

METAL

Mercury analyses were performed in accordance with SW 846 Method 7470A and meet the required QC criteria.

Initial calibrations were performed within 0.9998 Correlation Coefficient.

The daily calibration were verified by Initial Calibration Verification (ICV) standard and Continuing Calibration Verification (CCV) standard. ICV and all CCV recoveries were within the acceptable control limits.

All the laboratory control samples recoveries were within the acceptable control limits.

RPD calculated for all duplicate analyses were within the acceptable control limits.

Matrix spike matrix spike duplicate samples recoveries were within the acceptable control limits.

For two analytical batches Post Digestion Spikes (PDS) were performed due to the high level of mercury present.

All method blanks were free of contamination.

Jyoti Desai 12/20/01

Jyoti Desai (Date)
QA Coordinator

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METAL

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ENVIRONMENTAL ENTERPRISES, INC.

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 0112039-01 through 0112039-43

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	Digestion Batch #	ICV True	ICV Found	ICV % Rec	CCV1 True	CCV1 Found	CCV1 % Rec	CCV2 Found	CCV2 % Rec	CCV3 Found	CCV3 % Rec	CCV4 Found	CCV4 % Rec
12/11/01	HAJ	7470A	Hg	1481HAA 1482HAA	5	4.85	97	5	4.93	98.6	4.96	99.2	4.88	97.6	4.95	99
12/19/01	HAJ	7470A	Hg	284HMA	5	5	100	5	5.15	103	5.2	104	5.19	104		

Digestion Batch #	Sample Fractions Included
1481HAA	0112C39-01 through 0112039-15
1482HAA	0112C39-16 through 0112039-28
284HMA	0112C39-29 thought 0112039-43

ICV = Initial Calibration Verification — **ICV % Range =** +/-10%

CCV = Continue Calibration Verification — **CCV % Range =** +/-20%

0112039 cal

ENTERPRISES, INC.

(2)

Quality Assurance Report
Project: SCIE02

Analysis Date	Sample #	Digestion Batch #	D. L. ppb	Method Blank ppb	Sample Results ppb	Sample Dup ppb	Sample Ave. ppb	RPD	Dilution Factor	Spike Added ppb	Matrix Sp. Result ppb	Matrix Sp. Dup. Result ppb	Matrix Spike % Rec	Dup Spike % Rec	LCS Conc. ppb	LCS % Rec	LCS Acceptance % Limits
12/11/01	0112039-04	1481HAA	0.5	<0.5	2.01	1.71	1.86	16.1	1	5	7.28	7.16	108	106	10	97.3	85 - 115
12/11/01	0112039-18	1482HAA	0.5	<0.5	6.27	6.4	6.34(1)	2.05	10	40	46.42	NA	100(2)	NA	10	89.3	85 - 115
12/19/01	0112039-29	284HMA	0.5	<0.5	4.45	4.25	4.35(1)	4.6	1,000,000	40	46.8	NA	106(2)	NA	3940(3)	107	68-132

Method # SW 7470A Analyte: Hg Analyst: HAJ

Note:
(1) Dilution factors were applied to average reported sample results.
(2) Post Digestion Spikes (PDS) were performed on the diluted sample due to the high levels of mercury present in the sample.
(3) Soil LCS.
NA - Not Available.

Digestion Batch #	Sample Fractions Included
1481HAA	0112039-01 through 0112039-15
1482HAA	0112039-16 through 0112039-28
284HMA	0112039-29 through 0112039-43

RPD = Relative Percent Difference RPD Control Limits = 0-20%

LCS = Laboratory Control Sample Spike Control Limits = +/-25%

An Employee-Owned Company

Hg HAD 12-11-01 7470A

Sample Dilution Record

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
1A	1x	–			
2A	1	–			
3A	1	–			
4A	1	–			
4AD	1	–			
4AS	1	–			
4ADS	1	–			
5A	1	–			
[illegible]	1	–			
[illegible]		–			
8A	1	–			
9A		100x			
10A	1	[illegible]			
11A	1	–			
12A	1	10,000x			
13A	1	10,000x			
[illegible]		50x			
15A	1	[illegible]			
[illegible]	1	[illegible]			
[illegible]		100x			
18A		10x			
19A		[illegible]			
[illegible]	↓				
[illegible]	10x	–			
22A	10x	–			
23A	1x	–			
23AA		–			
23B		–			
24A	↓	–			
25A	1x	100x			
26A	1x	100x			
27A	1x	100x			
28A	1x	–			

(3)

RAW DATA

Environmental Enterprises | Hg Aqueous Digestion Log | Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-HIBI-HIBA	12-11-01	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg		
03-			DUP-CON-1A	Hg		
04-			" 2A	Hg		
05-			" 3A	Hg		
06-			" 4A	Hg		
07-			" 4AD	Hg		
08-			" 4AS	Hg		
09-			" 4AM	Hg		
10-			" 5A	Hg		
11-			" 6A	Hg		
12-			" 7A	Hg		
13-			" 8A	Hg		
14-			" 9A	Hg		
15-			" 10A	Hg		
16-			" 1A	Hg		
17-			" 2A	Hg		
18-			" 3A	Hg		
19-			" 4A	Hg		
20-			" 5A	Hg		

BATCH QC DATA
SPIKE SOURCE
5m (CDK)
5m (LCS)

STD PREP #
DA1
DA1

SPIKE INFORMATION
5ml of Spike 1 20ml
5ml " "

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx +sp	%rec
	2.01	1.71	1.86	16.1 RPD	5.00ug/L	[illegible]	[illegible] %

DATE ANALYZED 12-11-01
SAMPLE NUMBER 12-001-4A

ANALYIST HM DEPT. SUPER _____ INORGANIC SUPER. _____

Page _____

(4)

Environmental Enterprises | Hg Aqueous Digestion Log | Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-				Hg		
02-				Hg		
03-				Hg		
04-				Hg		
05-				Hg		
06-				Hg		
07-				Hg		
08-				Hg		
09-				Hg		
10-				Hg		
11-				Hg		
12-				Hg		
13-				Hg		
14-				Hg		
15-				Hg		
16-				Hg		
17-				Hg		
18-				Hg		
19-				Hg		
20-				Hg		

BATCH QC DATA SPIKE SOURCE	STD PREP #	SPIKE INFORMATION

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx + sp	%rec
					5.00ug/L		

DATE ANALYZED
SAMPLE NUMBER

ANALYIST DEPT. SUPER INORGANIC SUPER.

Page

Varian 20
Hg - Cold Vapor

COPY

	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. James II

OPERATOR	
DATE	12 11.2001
BATCH NO	1481 1482
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

	PROGRAM 16	Hg	
0.000	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP [redacted]

ALIGN HC LAMP [redacted]
PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 387.0

PARAMETERS TO BE SET MANUALLY.

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

(6)

SE SCALE — DEFINICE STANDARDS SIGNAL [redacted]

0.000

PROGRAM 16 Hg
BLANK REPLICATE 1 MANUAL
ABSORBANCE CONCENTRATION BC ON

BLANK	0.00		-0.000	-0.001	-0.000 S212
STANDARD 1	0.50	2.1	0.010	0.010	0.010 Y212
STANDARD 2	2.00	0.3	0.045	0.045	0.045 Z212
STANDARD 3	5.00	0.3	0.106	0.106	0.106 A213
STANDARD 4	10.00	0.2	0.217	0.216	0.217 B213
STANDARD 5	40.00	0.2	0.807	0.806	0.808 C213

Fisher

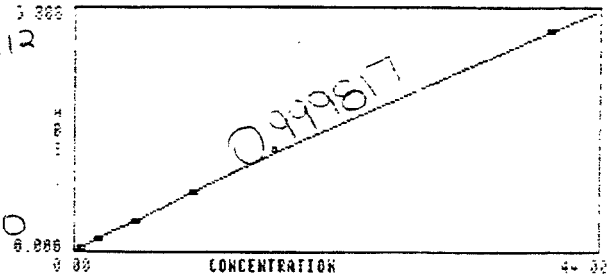
Std's made 12-3-01

EM

ICV/CCV = W212

LdL = F213

Dilution H_2O = X210



Hg 245.1 + 7470A HAM 12-11-01

LCS - .2ml of 1000ppb EM /20ml T = 10ppb

SpK - .1ml " " TV = 5ppb

VERIFIED 12-20-01 (9M)

	0.00 ICV	-0.8547.0	1.2	-.163	0.171	-0.000
	[illegible]	0.01	99.9	0.000	0.000	-0.000
	0.50 ICV	0.5[illegible]	0.0	0.011	0.01	0.011
mb	1.13617 HAM	-0.01	81.8	-0.000	-0.000	-0.000
	1.1481 HAM	0.0973	0.3	0.1[illegible]	0.11	0.11
mb	1.1481 HAM	0.00	43.0	0.001	0.00	0.000
	1.1482 HAM	0.9789	0.5	0.193	0.192	0.193
	12.039.1A	0.04	0.0	0.001	0.001	0.001
	12.039.2A	1.00	0.9	0.022	0.022	0.022
	12.039.3A	1.56	0.0	0.034	0.034	0.034
	12.039.4A	2.1	0.5	0.045	0.045	0.045
	12.039.4AD	1.71	0.2	0.038	0.038	0.038
	12.039.4AS	7.12	0.4	0.156	0.156	0.156
	5.00 CCV	4.73	0.3	0.104	0.104	0.104
	[illegible]	0.00	0.0	0.000	0.000	0.000
cl	12.039.4AD	7.22	1.1	0.153	0.152	0.154
	12.039.5A	6.84	0.0	0.153	0.152	0.153
	12.039.6A	11.00	0.2	0.238	0.238	0.238
	12.039.7A	8.02	0.0	0.179	0.179	0.179
	12.039.8A	11.76	0.3	0.254	0.253	0.254
	12.039.9A	1.47	0.1	0.031	0.031	0.031
	12.039.10A	[illegible]	0.0	0.015	0.015	0.015
	12.039.10A	6.72	0.3	0.143	0.14	0.143
	12.039.11A	-0.07	99.9	-0.001	-0.000	-0.001
	12.039.12A	[illegible]	99.9	0.000	-0.000	0.000
	12.039.12A	4.66	0.5	0.099	0.099	0.100
	12.039.13A	4.47	0.5	0.094	0.094	[illegible]

(7)

RAW DATA

	5.00 CCV	4.969 99.2%	0.2	0.105	0.105	0.105	
	.....CCB.....	0.01	0.0	0.000	0.000	0.000	
01	12.039.14A 1 ✓	1.26	0.0	0.027	0.027	0.027	
	12.039.15A 1 ✓	6.06	0.8	0.129	0.128	0.129	
	12.039.16A 1 ✓	3.44	0.7	0.075	0.075	0.075	
	12.039.17A 1 ✓	4.60	1.0	0.098	0.097	0.099	
	12.039.18A 1	6.27 > 6.34 ✓	0.7	0.133	0.133	0.134	
	12.039.18ADI	6.40	0.3	0.136	0.136	0.136	
	12.039.18A PDS	23.21 - PDS 100%	0.8	0.487	0.484	0.490	- PDS 5ml 5x 5ml 40(x4)
	12.039.19A 10	~~0.17~~ 0.01 ppm	21.4	0.003	0.003	0.002	
	12.039.19A 10 ✓	6.46	0.3	0.138	0.137	0.138	
✓	12.039.20A 10 ✓	5.09	0.5	0.108	0.107	0.108	
	5.00 CCV	4.889 97.6%	0.1	0.103	0.103	0.103	
	.....CCB.....	-0.01	78.4	-0.000	-0.000	-0.000	
01	12.039.21A 1 ✓	5.88	1.0	0.125	0.124	0.126	
	12.039.22A 1 ✓	6.11	0.5	0.130	0.129	0.130	
	12.039.23A 1 ✓	2.84	0.5	0.063	0.063	0.062	
	12.039.24A 1 ✓	6.13	0.6	0.130	0.130	0.131	
	12.039.25A 1 ✓	1.40	1.2	0.030	0.030	0.030	
	12.039.26A 1 ✓	1.65	0.7	0.036	0.036	0.036	
	12.039.27A 1 ✓	1.61	0.8	0.035	0.035	0.035	
	12.039.28A 1 ✓	-0.01	84.8	-0.000	0.000	-0.001	
✓	12.177.1A 10	1.86	1.7	0.040	0.039	0.040	
	5.00 CCV	4.944 98.9%	0.2	0.105	0.104	0.106	
	.....CCB.....	-0.01	55.0	-0.000	-0.000	-0.000	
	Diluted H_2O ...	-0.03	39.0	-0.001	-0.001	-0.000	
	x 2L						

23.21 X2 = 46.42

$\frac{46.42 - 6.34}{40}$ = 100%

All Sx's prepared with /

5ml conc. HNO_3
10ml conc. H_2SO_4
3.0ml 5% $KMnO_4$
1.0ml 5% $K_2S_2O_8$
1.0ml 12% $NH_2OH \cdot HCl$ / 20ml

* See dilution Sheet

8

HM

Sample Dilution Record 12-19-01 Ws 7470A

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
DIR - D39-29A	100x	1000	10		
-29AD		1000	10		
-29AS		PDS	5ml5x/5ml 40ml		
-30A		1000	10		
-31A		1000	10		
-32A		1000	10		
-33A		1000	10		
-34A		1000	1000		
-35A		1000	1000		
-36A		1000	1000		
-37A		1000	100		
-38A		1000	100		
-39A		1000	10		
-40A		1000	10		
-41A		1000	10		
-42A		1000	10		
-43A	↓	1000	10		
LCS -	100x	10			

9

Environmental Enterprises — Hg Miscellaneous — Metals Department

prepped = weighed out 12-14-01
Analyzed = ~~12-18-01~~ 12-19-01 cooked = 12/18/01

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-284HMA	12-18-01	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg	20g/20ml	ERA OSOF
03-			012-039-29A	Hg	.20g/20ml	
04-			" 29AD	Hg		
05-			" 29AS	Hg		
06-			" 30A	Hg		
07-			" 31A	Hg		
08-			" 32A	Hg		
09-			" 33A	Hg		
10-			" 34A	Hg		
11-			" 35A	Hg		
12-			" 36A	Hg		
13-			" 37A	Hg		
14-			" 38A	Hg		
15-			" 39A	Hg		
16-			" 40A	Hg		
17-			41A	Hg		
18-			" 42A	Hg		
19-			" 43A	Hg		
20-			012-235-1A	Hg		
21-284-HMA	12- -01	HM	012-271-1A	Hg	.20g/20ml	

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
Em (Sok)	D211	.10ml of 100ppb/20ml
Em (LCS)	OSOF	.20ml of 100ppb/20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx + sp	%rec
	4.45	4.25	4.35	4.60	5.00ug/L	23.40	106%

P.D.S. 5ml sx
5ml 40ppb

DATE ANALYZED 12-19-01
SAMPLE NUMBER 12-039-29A

23.40 x 2 = 46.80 − 4.35 / .40 x100 106

ANALYIST HM DEPT. SUPER ____ INORGANIC SUPER. ____

(10)

Page ____

Varian 20
Hg - Cold Vapor

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

OPERATOR	Harold A. James II
DATE	12.19.2001
BATCH NO.	284
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP

PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 387.8

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

(11)

RAW DATA

	SCALE		SIGNAL [redacted]		
BLANK	0.00		-0.001	-0.002	-0.001
BLANK	0.00		-0.000	0.000	-0.000 P213
STANDARD 1	0.50	2.3	0.010	0.010	0.010 K213
STANDARD 2	2.00	0.0	0.039	0.039	0.039 L213
STANDARD 3	5.00	0.9	0.103	0.103	0.104 M213
STANDARD 4	10.00	0.2	0.209	0.209	0.210 N213
STANDARD 5	40.00	0.3	0.771	0.769	0.773 O213

Fisher

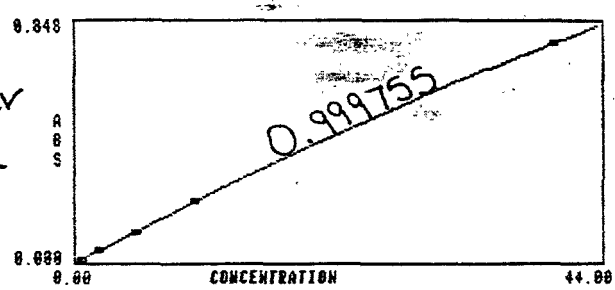
COPY

Std's made 12/12/01

EM

U213 = ICV/CCV

I213 = LdL



Hg 7470A

HM 12-19-01

12-039-69A 43A

VERIFIED
DATE 12-20-01
(SM)

LCS = ERA Soil 050F .20g/20ml Cert Value 3.94 mg/kg Range 2.69-5.21 mg/kg

* Spk = DDS = 5ml Sx, 5ml of 40ppb

Hg 7470 (12-271-1A 12-235-1A)
HM 12-19-01
VERIFIED
DATE

	5.00 ICV	5.00 100%	0.8	0.103	0.103	0.104
	....ICB....	0.07	30.9	0.001	0.002	0.001
	0.50 LdL	0.61 122%	0.0	0.012	0.012	0.012
mB	1.284 NMA...	0.32	5.8	0.006	0.007	0.006
	~~2.284....100~~	~~OVER~~ void	1.3	0.910	0.919	0.902
LCS	2.284 HMA 100	4.21 → 10x	0.1	0.086	0.086	0.086 = 4.21 mg/kg
01	12.039.29A	4.45 > 4.35	1.14 bD RPD	0.091	0.090	0.092
	12.039.29A	4.25	1.0	0.087	0.086	0.087
*	12.039.29A PDS	23.40 106%	0.9	0.472	0.469	0.475
	12.039.30A	4.61	0.4	0.095	0.094	0.095
	12.039.31A	4.47	0.6	0.091	0.091	0.092
	12.039.32A	4.31	0.6	0.088	0.088	0.088
	12.039.33A	3.94	0.9	0.080	0.079	0.080
	5.00 CCV	5.15 103%	0.4	0.106	0.106	0.107
	....CCB.....	0.10	2.9	0.002	0.002	0.002
01	12.039.34A	1.58	0.5	0.031	0.031	0.031
	12.039.35A	2.85	1.3	0.057	0.056	0.057
	12.039.36A	1.48	0.6	0.029	0.029	0.029
	12.039.37A	6.05	0.8	0.125	0.125	0.126
	12.039.38A	12.11	0.7	0.252	0.251	0.253
	12.039.39A	5.42	1.0	0.112	0.111	0.113
	12.039.40A	4.93	0.7	0.102	0.101	0.102
	12.039.41A	2.60	1.3	0.052	0.051	0.052
	12.039.42A	3.69	0.7	0.075	0.074	0.075
	12.039.43A	6.23	0.5	0.129	0.129	0.130
	5.00 CCV	5.20 104%	0.8	0.107	0.107	0.106
	....CCB.....	0.07	16.6	0.001	0.002	0.001
01	12.235.1A 100X	4.48	0.7	0.092	0.091	0.092
	12.271.1A 100X	1.05	3.8	0.021	0.022	0.020
	12.271.1A (re-ext)	0.9 U1B	2.8	0.018	0.018	0.019
	5.00 CCV	5.19 104%	0.5	0.107	0.107	0.107
	....CCB....	0.08	21.7	0.002	0.002	0.001
Q213	Dilution H_2O.	0.06	11.7	0.001	0.001	0.001

23.40 x2 = 46.80

46.80 − 4.35 / 40 x100 = 106 %

* See dilution Sheet attached

All Sx's prepped w/

- 5ml conc. HNO_3
- 1.0ml " H_2SO_4
- 3.0ml 5% $KMnO_4$
- 1.6ml 5% $K_2S_2O_8$
- 1.2ml 12% $NH_2OH \cdot HCl$

/20ml

(12)

OSWI-002-①

Page 1 EEI REPORT Work Order # 01-01-549

Received: 01/24/01 01/30/01 09:30:59

REPORT TO: UC, ALTER FACILITY
DEPT. OF CIVIL & ENVIR. ENG.
CINCINNATI, OHIO 45221-0071

ATTEN: LINDA RIESER

CLIENT: SCIE02 SAMPLES: 9

COMPANY: SCIENCE APPLICATIONS INT'L

FACILITY:

WORK ID: 1/23/01 TCLP LEACHATE/SLUDGE

TAKEN: CUSTOMER

TRANS: DELIVERED

TYPE: LEACHATE/SLUDGE

P.O. #: CONTRACT 68-W-95-005, WA 2-15

INVOICE: under separate cover

PREPARED BY: Environmental Enterprises
10163 Cincinnati-Dayton Rd.
Cincinnati, Ohio 45241

CERTIFIED BY: Debbe Jones

ATTEN: Debbe Jones

PHONE: (513) 772-2818 CONTACT: DEBBE

Enclosed are the results of specified samples submitted for analysis. If you have any questions please use Order # for faster identification.

OHIO EPA CERTIFICATION: CHEMICAL #4095, MICROBIOLOGICAL #850

QA/QC ENCLOSURES.

SAMPLE IDENTIFICATION	
01	TCLP 1
02	TCLP 2
03	TCLP 3
04	TCLP 3-D
05	S1
06	S2
07	S3
08	S4
09	S5

TEST CODES and NAMES used on this workorder	
HG	Mercury (Cold vapor)

Page 2 EEI REPORT Work Order # 01-01-549

Received: 01/24/01 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
HG mg/l	166	149	152	143	3,340 mg/kg

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)
HG mg/l	3,960 mg/kg	2,780 mg/kg	3,580 mg/kg	3,100 mg/kg

OSWI-002-②

ENVIRONMENTAL ENTERPRISES, INC.

UNIVERSITY OF CINCINNATI
QC REPORT

CASE NARRATIVE

PROJECT: University of Cincinnati (Work Order # 0101549-01 to 09)

METAL

Mercury analyses were performed in accordance with SW 846 Method 7470A and meet the required QC criteria.

Initial calibration was performed within 0.9998 Correlation Coefficient.

The daily calibration were verified by Initial Calibration Verification (ICV) standard and Continuing Calibration Verification (CCV) standard. ICV and all CCV recoveries were within the acceptable control limits.

Laboratory control sample recovery were within the acceptable control limits.

RPD calculated for duplicate analyses were within the acceptable control limits.

Matrix spikes recovery were within the acceptable control limits. Post Digestion Spikes were performed due to the high level of mercury present.

Method blanks were free of contamination.

Jyoti Desai 01/31/01

Jyoti Desai (Date)
QA Coordinator

TABLE OF CONTENTS

METAL

	PAGE #
Initial and Continuing Calibration Verification Recovery Data	1
Quality Assurance Report	2 - 3
Sample Digestion Log	4 - 5
Mercury Analysis Data	6 - 8

ENVIRONMENTAL ENTERPRISES, INC.

1

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 01-01-549-01A- 9A.

Aqueous Batch 1246-HAA.

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	ICV True	ICV Found	ICV % Rec	CCV1 True	CCV1 Found	CCV1 % Rec	CCV2 Found	CCV2 % Rec	CCV3 Found	CCV3 % Rec	CCV4 Found	CCV4 % Rec	CCV5 Found	CCV5 % Rec
1/29/01	HAJ	7470A	Hg	5	5.05	101	5	5.15	103	5.17	103	5.29	106	5.46	109	5.42	108

ICV = Initial Calibration Verification — ICV % Range = +/-10%

CCV = Continue Calibration Verification — CCV % Range = +/-20%

0101549-1246HAAcal

An Employee-Owned Company

ENVIRONMENTAL ENTERPRISES, INC.

2

Quality Assurance Report
Project: SCIE02 Work Order # 01-01-549 Fractions 01A-04A

Aqueous Digestion Batch 1246-HAA.

Date Analyzed	Analyst	Method #	Analytes	Sample #	Method Blank ppb	Sample Results ppm	Sample Dup ppm	RPD	Spike % Rec	LCS Conc. ppb	LCS % Rec	LCS Acceptance % Limits
1/29/01	HAJ	7470A	Hg	01-01-549-01A	<0.5	171	160	6.63	106(*1)	10	110	85-115

RPD = Relative Percent Difference **RPD Control Limits =** +/-25%

LCS = Laboratory Control Sample **Spike Control Limits =** +/-25%

(*1) Due to the high levels of mercury present, a Post Digestion Spike was performed on an equal mixture of diluted sample and duplicate digestates.

0101549-1246HAA

ENVIRONMENTAL ENTERPRISES, INC.

(3)

Quality Assurance Report
Project: SCIE02 Work Order # 01-01-549 Fractions 05A-09A.

Miscellaneous Digestion Batch 241-HMA.

Date Analyzed	Analyst	Method #	Analytes	Sample #	Method Blank ppb	Sample Results ppm	Sample Dup ppm	RPD	Spike % Rec	LCS Conc. ppm	LCS % Rec	LCS Acceptance % Limits
1/29/01	HAJ	7470A	Hg	01-01-549-05A	<0.5	3,040	3,640	18	106(*1)	2.48	105	68.1-132

RPD = Relative Percent Difference **RPD Control Limits =** +/-25%

LCS = Laboratory Control Sample **Spike Control Limits =** +/-25%

(*1) Due to the high levels of mercury present, a Post Digestion Spike was performed on an equal mixture of diluted sample and duplicate digestates.

An Employee-Owned Company

Environmental Enterprises

Hg Miscellaneous

Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-011-HMA	1/29/01	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg	.203/20	EKA 0475
03-			0101-549-5A	Hg		
04-			5Ad	Hg		
05-			5AS	Hg		
06-			5AD	Hg		
07-			6A	Hg		
08-			7A	Hg		
09-			8A	Hg		
10-			9A	Hg		
11-011-HMA	1/29/01	HM	0101-553-1A	Hg	.249/20ml	Reruns
12-			1AD	Hg		Sample
13-			1AT	Hg		Rush
14-				Hg		Trip not need
15-				Hg		Sx-dup matched
16-				Hg		HM
17-				Hg		1/29/01
18-				Hg		
19-				Hg		
20-				Hg		

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
EM (SPK)	F184	.10ml SPK/20ml
EPA (LCS)	0475	.20ml of Std/LCS/20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx + sp	%rec
	3,040,000	3,640,000	3,340,000	18.0	5.00ug/L	6.99	106%

P.D.S.
- 5ml Sx (100,000 ug/L)
- 5ml dup (100,000 ug/L) / 10ml

DATE ANALYZED 1/29/01
SAMPLE NUMBER 0101-549-5A

5ml (1,000,000 ug/L)
5ml (10ppb)

ANALYIST HM DEPT. SUPER ____ INORGANIC SUPER. ____

Page ____

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Environmental Enterprises | Hg Aqueous Digestion Log | Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01-2448-HAA	1/29/01	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg	20ml/20ml	
03-			QW3-7000L 5x	Hg	.100ml/20ml	Duly [illegible] from vial
04-			dup	Hg	.100ml/20ml	
05-			5x	Hg	.100ml/20ml	
06-			1.5x	Hg	.100ml/20ml	
07-			5x	Hg	.20ml/20ml	
08-			0101-544-1C	Hg	20ml/20ml	GC Blind 14.08ug/L
09-			[illegible]	Hg		14.24ug/L
10-			-1C DUP	Hg		19.94ug/L
11-			-1C DS	Hg		19.54ug/L
12-			0101-549-1A	Hg	20ml/20ml	
13-			1A DUP	Hg		
14-			1A 5x	Hg		
15-			1A 1.5x	Hg		
16-			2A	Hg	20ml/20ml	
17-			3A	Hg		
18-			4A	Hg		
19-			0101-552-1A DUP	Hg	20ml/20ml	
20-			-2A DUP	Hg	20ml/20ml	

additionals 1.5x 2.35ppm 2.85ppb

4.51 ppb

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
5m (LCS)	F184	.20ml of 1000ppb / 20ml
5m (5x)	F184	.10ml "

Acceptance Criteria:
Duplicates (-/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx+sp	%rec
	171,000	100,000	100,000	6.63	5.00ug/L P.D.S.	6.14	102%

.05ml 5x
.05ml dup of 1000x / 10ml
5ml of (100,000x)
5ml of (10ppb)

DATE ANALYZED 1-29-01
SAMPLE NUMBER 0101-549-1A

ANALYIST HM DEPT. SUPER ____ INORGANIC SUPER. ____

Page ____

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Varian 20
Hg Cold Vapor

PROGRAM 16	Hg	
BLANK	REPLICATE 1	MANUAL
ABSORBANCE	CONCENTRATION	BC ON
INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. James II

OPERATOR	
DATE	01 29.2001
BATCH NO.	1246 348 241 121
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP

PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 400.3

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

(6)

RAW DATA

	RE SCALE			OPTIMIZE SIGNAL	STANDARDS
BLANK	0.00		0.000	0.000	0.000
STANDARD 1	0.50	8.6	0.010	0.010	0.009S 188
STANDARD 2	2.00	1.6	0.041	0.040	0.041F 188
STANDARD 3	5.00	0.9	0.101	0.100	0.101W 188
STANDARD 4	10.00	0.5	0.200	0.199	0.201V 188
STANDARD 5	40.00	0.6	0.745	.742	0.748W 188

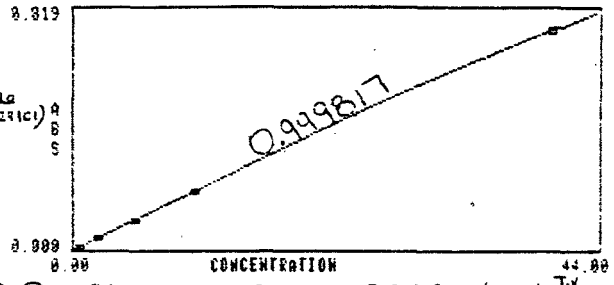
Fisher

Std made 1/26/01

Em

ICV/CCV = X188 (made 1/29/01)

LDL = Q188



HAJ 1/29/01

Hg 245.1

7470 = TCLP misc

Hg SM3112 - D.W.

* Aq. LCS = .20ml of 1000ppb F184 Em/20ml T.V. 10ppb

SpK = .10ml of 1000ppb F184 Em/20ml T.V. 5 ppb

	5.00 ICV	5.05	101%	1.1	0.101	0.101	0.102
	....ICB.....	0.05		59.5	0.001	0.001	0.001
	0.50 LDL	0.4998	0.0%	2.9	0.010	0.010	0.009
mb	01.1246-HAA..	0.01		29.6	0.000	0.000	0.000
* vs	2.1246-HAA..	11.00	110%	0.8	0.220	0.219	0.221
mb	1.241-HMA....	0.47		1.8	0.009	0.009	0.009
Soil LCS	2.241-HMA.100	26.11		0.5	0.507	0.509	0.505
QWS	.70-5....200	2.35	+10%	1.9	0.048	0.047	0.048
QWS	.70-5....200	2.83	+10%	0.7	0.057	0.057	0.057
QWS	.70-5.PAS.200	6.76	104%	1.1	0.136	0.135	0.137
QWS	.706-5...2000	4.51		0.0	0.091	0.091	0.091
	5.00 CCV	5.15	103%	0.6	0.104	0.103	0.104
	.....CCB.....	-0.05		35.1	-0.001	-0.001	-0.001
CI	01.544.1CDW 1	14.08		0.8	0.280	0.279	0.282
	01.544.1CDWP1	14.24		0.7	0.283	0.282	0.285
	01.544.1CDWS 1	19.94		0.4	0.393	0.392	0.394
	01.544.1CDWSP1	19.54		0.4	0.385	0.384	0.386
	01.552.1ADW 1	0.84		1.6	0.016	0.017	0.016
	01.552.2ADW 1	-0.02		99.9	-0.000	-0.001	0.000
	5.00 CCV	5.17	103%	1.2	0.104	0.103	0.105
	.....CCB.....	-0.09		37.1	-0.002	-0.001	-0.002
void	~~01.549.1 1~~	~~-0.02~~	void	99.9	-0.000	-0.000	-0.001
CI	01.549.1A 1	1.71	100,000+	1.9	0.034	0.034	0.035
	01.549.1AD 1	1.60	100,000+	0.9	0.032	0.032	0.032
	01.549.1ADPDS 1	6.14	100%	0.8	0.123	0.123	0.124
	01.549.2A 1	1.49	100,000+	2.3	0.030	0.029	0.030
	01.549.3A 1	1.52	100,000+	0.9	0.030	0.031	0.030
	01.549.4A 1	1.43	100,000+	0.8	0.028	0.028	0.029
	01.549.5A100	3.04	1 million+	1.4	0.061	0.061	0.062
	01.549.5AD100	3.64	1 million+	0.9	0.073	0.073	0.074
	01.549.5ADPDS100	6.99	100%	0.9	0.140	0.141	0.139
void	~~5.00~~	~~1.17~~	void	6.1	0.023	0.024	0.022

Cert. Value = 2.46 mg/L

Range 1.64 mg/L - 3.27 mg/L

2.61 mg/L Okay

105%

Range = 68.1 - 132%

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	.....CB.....	-0.05		46.9	-0.001	-0.001	-0.001	
recheck	01.549.5A 100	1.38	1 million	1.7	(total) 0.027	0.027	0.028	Rechecked on #5 NIR
	5.00 CCV	5.29	106%	0.1	0.106	0.106	0.106	
	.....CB.....	-0.10		13.0	-0.002	-0.002	-0.002	
	01.549.6A 100	3.96	1 million	1.8	0.080	0.079	0.081	
	01.549.7A 100	2.78		1.2	0.056	0.056	0.057	
	01.549.8A 100	3.58		2.5	0.072	0.071	0.073	
	01.549.9A 100	3.10		0.5	0.063	0.062	0.063	
	01.553.1A 100	3.91	10,000x	0.4	total 0.079	0.079	0.079	
	01.553.1A 100	4.52	10,000x	0.7	0.091	0.091	0.092	14.5 ppm
	5.00 CCV	5.46	109%	0.1	0.110	0.110	0.110	
	....CB..	0.03		34.5	0.001	0.000	0.001	
MB	1.348.121.. tmA/TAA	0.01		99.9	-0.000	-0.001	0.000	
LCS *	2.348.121.. tmA/TAA	11.16	112%	0.7	0.223	0.222	0.224	
	01.411.1ATC 1	0.07		0.0	0.001	0.001	0.001	
	01.411.1ATCD 1	0.08	112%	13.5	0.001	0.001	0.002	
	01.411.1ATCS 1	5.54	5.61	0.8	0.111	0.111	0.112	
	01.411.1ATCDS 1	5.67	2.32 RPD	0.4	0.114	0.114	0.114	
	01.512.1ATC 1	10.83		0.7	0.217	0.216	0.218	
	01.512.1ATC 1	9.79	um-cooked	1.4	0.196	0.194	0.198	- undigested scan NIR
	5.00 CCV	5.42	108%	0.6	0.109	0.108	0.109	
	.....CB...	-0.01		99.9	-0.000	0.000	-0.000	

original dilution

All samples prepared w/
.5ml conc HNO_3
1.0ml conc H_2SO_4
3.0ml 5% $KMnO_4$
1.6ml 5% $K_2S_2O_8$
1.2ml 12% $NH_2OH\ HCL$ /20ml

01-549-1A, 2A, 3A, 4A

Started @ 20ml/20ml = 1x
diluted = .01ml/10ml
x = 1000x
diluted = .1ml/10ml
x = 100,000x total dilution

01-549-5A, 6A, 7A, 8A, 9A

Started @ .20g/20ml = 100x
Diluted = .01ml/10ml
x = 100,000x
diluted = 1ml/10ml
x = 1,000,000x total dilution

01-553-1A

Started @ .20g/20ml = 100x
diluted .10ml/10ml
x = 10,000x

Reported
4.22 x 10,000
42,200 ug/L
42.2 mg/L

8

OSWI-002-(3)

ENVIRONMENTAL ENTERPRISES, INC.
ANALYTICAL SERVICES DIVISION - LABORATORY
10163 Cincinnati-Dayton Road
Cincinnati, Ohio 45241

February 5, 2001

Linda Rieser
Academic Director
ALTER Facility
Civil and Environmental Engineering
University of Cincinnati
(513) 556-2060 Office
(513) 556-3148 Fax

Dear Linda:

This letter is in response to your voice mail left for Debbe Jones on Monday, February 05, 2001. In an effort to attempt to achieve better surrogate sludge recoveries, we will be conducting a few comparison studies on the samples submitted for analysis on 01/24/01 (EEI Work Order # 01-01-519).
149

As we have discussed in the past, working with many of the samples that you submit can be somewhat of a challenge merely due to the high levels of mercury present relative to the 0.5ppb to 40.0 ppb linear range of our instrumentation. Many of the analyses require 100,000 to 1,000,000 times dilutions in order to fall within the instrument capabilities. Each and every dilution made introduces possible decreases in precision and accuracy. Additionally, in order to prevent possible carry over or cross contamination with other samples analyzed in our laboratory (i.e. drinking waters), these dilutions, as well as the digestions of your samples are performed using disposable materials (i.e. digestion cups, ependorf pipetters, and centrifuge tubes). These materials may not meet the same level of accuracy as with the use of Class A glass materials. These may be contributing factors to the apparent low recoveries on your samples.

EPA SW846 methods suggest using 0.2g aliquots of solid/sludge samples for mercury digestion. Needless to say, 0.2g is a very small amount and raises questions of the ability to digest and analyze a truly representative sample. This may be a contributing factor to the apparent low recoveries on your samples.

As you are aware, in recent years we have switched our mercury digestions from BOD bottles to an Environmental Express HotBlock digestion system. This switch allowed us to utilize disposable digestion vessels to avoid contaminations and to reduce our amount of reagents used and waste produced to 1/5th of the original amounts. While we did reduce the amount of aqueous sample proportionally (from 100mL to 20mL), we have continued to use 0.2g of solid/sludge sample while reducing the amount of reagents. We felt that attempts to use 0.04g of sample would make it even more difficult to digest and analyze a truly representative sample. So a question might be "Are we using too much sample or not enough reagent?" This may be a contributing factor to the apparent low recoveries on your samples.

Phone (513) 772-2818 or (800) 722-2818
Fax (513) 782-8970

Supporting data show that we continue to achieve acceptable recoveries on our purchased soil Laboratory Control Sample (LCS), suggesting that sufficient reagents are present for 0.2g of solid/sludge samples. I acknowledge that there are various forms of mercury that may not be present in the purchased soil LCS that we analyze. Perhaps the forms of mercury present in your samples are not accurately represented by the soil LCS we are using. This may be a contributing factor to the apparent low recoveries on your samples.

The following steps will be performed in an attempt to isolate potential sources for low surrogate sludge sample recoveries.

1). In order to validate our dilution techniques, a 1000ppm standard (the highest standard purchased by our laboratory) will be diluted and analyzed in the same manner as the samples.

2). In order to validate that we are not using too much sample or too little reagent, the solid/sludge samples will be re-digested in triplicate using 0.2g, 0.1g, and 0.05g, while each digestion will receive the same amount of reagents.

Unfortunately, I have no suggestions as to how we can validate that our digestions are adequate for the particular forms of mercury present in your samples.

Please let me know if you have any suggestions or additional questions.

Thank you,

Jason M. Lykins
Assistant Laboratory Manger / Metals Department Supervisor
Environmental Enterprises, Incorporated
Analytical Services Division – Laboratory

Page 1
Received: 01/24/01

EEI REPORT Work Order # 01-01-549
01/30/01 09:30:59

REPORT TO: HQ, ALTER FACILITY
DEPT. OF CIVIL & ENVIR. ENG.
CINCINNATI, OHIO 45221-0071

ATTEN: LINDA RIEGER

CLIENT: SCI002 SAMPLES: 9
COMPANY: SCIENCE APPLICATIONS INT'L
FACILITY:

WORK ID: 1/23/01 TCLP LEACHATE/SLUDGE
TAKEN: CUSTOMER
TRANS: DELIVERED
TYPE: LEACHATE/SLUDGE
P.O. #: CONTRACT 68-W-98-008 WA 2-15
INVOICE: under separate cover

PREPARED BY: Environmental Enterprises
10163 Cincinnati-Dayton Rd.
Cincinnati, Ohio 45241

ATTEN: Debbie Jones
PHONE: (513) 772-2818

CERTIFIED BY: Debbie Jones

CONTACT: DEBBI

Enclosed are the results of specified samples submitted for analysis. If you have any questions please use Order # for faster identification.

OHIO EPA CERTIFICATION: CHEMICAL #4095, MICROBIOLOGICAL #45[illegible]

QA/QC ENCLOSURES.

SAMPLE IDENTIFICATION

01 TCLP 1
02 TCLP 2
03 TCLP 3
04 TCLP 1-D
05 S1
06 S2
07 S3
08 S4
09 S5

TEST CODES and NAMES used on this workorder

HG Mercury (Cold vapor)

01/30/2001 09:49 5127826970 EEI LABORATORY PAGE 02/03

Page 2 EEI REPORT Work Order # 01-01-549
Received: 01/24/01 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
HG mg/l	166	149	162	141	3,340 mg/kg

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)
HG mg/l	3,960 mg/kg	2,780 mg/kg	3,580 mg/kg	3,100 mg/kg

- Inorganic Solids -

DSWI-022-①

Page 1 EEI REPORT Work Order # 01-12-515
Received: 12/26/01 01/09/02 13:20:02

REPORT TO: UC, ALTER FACILITY
DEPT. OF CIVIL & ENVIR. ENG.
CINCINNATI, OHIO 45221-0071

ATTEN: LINDA RIESER

CLIENT: SCIE02 SAMPLES: 33
COMPANY: SCIENCE APPLICATIONS INT'L
FACILITY:

WORK ID: 12/19-12/24/01 EPA HG (ALTER)
TAKEN: CUSTOMER
TRANS: DELIVERED
TYPE: LEACHATE/SOLID
P.O. #: 4400038593
INVOICE: under separate cover

PREPARED BY: Environmental Enterprises
10163 Cincinnati-Dayton Rd.
Cincinnati, Ohio 45241

CERTIFIED BY: Debbe Jones

ATTEN: Debbe Jones
PHONE: (513) 772-2818 CONTACT: JASON

Enclosed are the results of specified samples submitted for analysis. If you have any questions please use Order # for faster identification.
OHIO EPA CERTIFICATION: CHEMICAL #4095, MICROBIOLOGICAL #850

QA/QC ENCLOSURES.

SAMPLE IDENTIFICATION	TEST CODES and NAMES used on this workorder	
01 Vendor B mb-pH2 Leachate	HG	Mercury (Cold vapor)
02 Vendor B mb-pH2D Leachate		
03 Vendor B mb-pH4 Leachate		
04 Vendor B mb-pH6		
05 Vendor B mb-pH8 leachate		
06 Vendor B mb-pH8D Leachate		
07 Vendor B mb-pH10 Leachate		
08 Vendor B mb-pH12		
09 Vendor B mb-pH12D Leachate		
10 Vendor B mb-pH12D Leachate		
11 Vendor B mb-pH2B Leachate		
12 HgSe pH7 Leachate		
13 HgSe pH10 Leachate		
14 HgSe Cl pH7 Leachate		
15 HgSe pH10B CONST. pH BLK		
16 Vendor B Soil S1 Solid		
17 Vendor B Soil S2 Solid		
18 Vendor B Soil S3 Solid		
19 Vendor B Soil S4 Solid		
20 Vendor B Soil S5 Solid		
21 Vendor B RAW S1 Solid		
22 Vendor B RAW S2 Solid		
23 Vendor B RAW S3 Solid		
24 Vendor B MB S1 Solid		
25 Vendor B MB S2 Solid		
26 Vendor B MB S3 Solid		

Page 2 ERI REPORT Work Order # 01-12-515
Received: 12/26/01 01/09/02 13:20:02

SAMPLE IDENTIFICATION

27 Vendor B MB S4 Solid
28 Vendor B MB S5 Solid
29 Vendor B MB 1T TCLP Leachate
30 Vendor B MB 2T TCLP Leachate
31 Vendor B MB 3T TCLP Leachate
32 Vendor B MB 3TD TCLP Leachate
33 TCLP Blank

RAW DATA

Page 3 REI REPORT Work Order # 01-12 515
Received: 12/26/01 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
HG mg/l	1.92	0.617	0.137	0.102	0.0873

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)	Sample 10 (entered units)
HG mg/l	0.0753	0.0577	0.00885	0.00609	<0.0005

TEST CODE default units	Sample 11 (entered units)	Sample 12 (entered units)	Sample 13 (entered units)	Sample 14 (entered units)	Sample 15 (entered units)
HG mg/l	0.00656	0.0216	0.0278	0.108	<0.0005

TEST CODE default units	Sample 16 (entered units)	Sample 17 (entered units)	Sample 18 (entered units)	Sample 19 (entered units)	Sample 20 (entered units)
HG mg/l	2.730 mg/kg	2,480 mg/kg	3,930 mg/kg	3,500 mg/kg	3,390 mg/kg

TEST CODE default units	Sample 21 (entered units)	Sample 22 (entered units)	Sample 23 (entered units)	Sample 24 (entered units)	Sample 25 (entered units)
HG mg/l	6,170 mg/kg	6,930 mg/kg	6,040 mg/kg	2,530 mg/kg	2,690 mg/kg

TEST CODE default units	Sample 26 (entered units)	Sample 27 (entered units)	Sample 28 (entered units)	Sample 29 (entered units)	Sample 30 (entered units)
HG mg/l	2,690 mg/kg	2,590 mg/kg	2,720 mg/kg	0.266	0.150

TEST CODE default units	Sample 31 (entered units)	Sample 32 (entered units)	Sample 33 (entered units)
HG mg/l	0.112	0.107	<0.0005

OSWT-022-31

ENVIRONMENTAL ENTERPRISES, INC.

QC REPORT
UNIVERSITY OF CINCINNATI
SCIE02

CASE NARRATIVE

PROJECT: Science Applications Int'L (SCIE02) (Work Order # 0112515-01 to 33)

METAL

Mercury analyses were performed in accordance with SW 846 Method 7470A and meet the required QC criteria.

Initial calibrations were performed within 0.9995 to 0.9998 Correlation Coefficient.

The daily calibration were verified by Initial Calibration Verification (ICV) standard and Continuing Calibration Verification (CCV) standard. ICV and all CCV recoveries were within the acceptable control limits.

All the laboratory control samples recoveries were within the acceptable control limits.

RPD calculated for all duplicate analyses were within the acceptable control limits.

Post Digestion Spikes (PDS) were performed due to the high level of mercury present in the samples. All PDS recoveries were within the acceptable control limits.

All method blanks were free of contamination.

Jyoti Desai 01/10/02

Jyoti Desai (Date)
QA Coordinator

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METAL

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Work Order # 0112515-16 to 28	
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Mercury Analysis Data	11 – 13

ENVIRONMENTAL ENTERPRISES, INC.

1

Initial and Continuing Calibration Verification
Project : SCIE02 Work Order # 0112515-01 through 0112515-33

Concentration Units: ppb (ug/L)

Date	Analyst	Method #	Analyte	Digestion Batch #	ICV True	ICV Found	ICV % Rec	CCV1 True	CCV1 Found	CCV1 % Rec	CCV2 Found	CCV2 % Rec	CCV3 Found	CCV3 % Rec	CCV4 Found	CCV4 % Rec
1/3/02	HAJ	7470A	Hg	1496HAA 1497HAA	5	4.89	97.8	5	4.85	97	4.71	94.2	4.81	96.2		
1/8/02	HAJ	7470A	Hg	285HMA	5	5.22	104	5	5.09	102	5.19	104	4.93	98.6		

Digestion Batch #	Sample Fractions Included
1496HAA	0112515-01 through 0112515-15
1497HAA	0112515-29 through 0112515-33
285HMA	0112515-16 thought 0112515-28

ICV = Initial Calibration Verification

CCV = Continue Calibration Verification

ICV % Range = +/-10%

CCV % Range = +/-20%

0112515-cel

An Employee-Owned Company

ENVIRONMENTAL ENTERPRISES, INC.

(2)

Quality Assurance Report
Project: SCIE02

Analysis Date	Sample #	Digestion Batch #	D. L. ppb	Method Blank ppb	Sample Results ppb	Sample Dup ppb	Sample Ave. ppb	RPD	Dilution Factor	Spike Added ppb	Matrix Sp. Result ppb	Matrix Sp. Dup. Result ppb	Matrix Spike % Rec	Dup Spike % Rec	LCS Conc. ppb	LCS % Rec	LCS Acceptance % Limits
1/3/02	0112515-01	1496HAA	0.5	<0.5	1.9	1.93	1.92(1)	1.56	1000	40	42.58	NA	102(2)	NA	10	96.6	85 - 115
1/3/02	0112515-30	1497HAA	0.5	<0.5	1.5	1.5	1.50(1)	0	100	40	41.8	NA	101(2)	NA	10	98.9	85 - 115
1/8/02	0112515-19	285HMA	0.5	<0.5	35.44	34.51	34.98(1)	2.66	100,000	40	72.1	NA	94(2)	NA	3940(3)	95.2	68-132

Method # SW 7470A Analyte: Hg Analyst: HAJ

Note:
(1) Dilution factors were applied to average reported sample results.
(2) Post Digestion Spikes (PDS) were performed on the diluted sample due to the high levels of mercury present in the sample.
(3) Soil LCS.
NA - Not Available.

Digestion Batch #	Sample Fractions Included
1496HAA	0112515-01 through 0112515-15
1497HAA	0112515-29 through 0112515-33
285HMA	0112515-16 thought 0112515-28

RPD = Relative Percent Difference **RPD Control Limits =** 0 - 20%

LCS = Laboratory Control Sample **Spike Control Limits =** +/-25%

0112515-1496HAA,1497HAA,285HMA.xls

RAW DATA

Environmental Enterprises | Hg Aqueous Digestion Log | Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN (ml/ml)	COMMENTS
01-1490-HAA	01-03-02	HAA	BLK	Hg	20/20	
02-			LCS	Hg	20/20	
03-			0112-515-1A	Hg	20/20	
04-			1AD	Hg		
05-			1AS	Hg		
06-			2A	Hg		
07-			3A	Hg		
08-			4A	Hg		
09-			5A	Hg		
10-			6A	Hg		
11-			7A	Hg		
12-			8A	Hg		
13-			9A	Hg		
14-			10A	Hg		
15-			11A	Hg		
16-			12A	Hg		
17-			13A	Hg		
18-			14A	Hg		
19-			15A	Hg		
20-			28A	Hg		0112-515-28A

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
Em (LCS)	D211	.20ml of 1000ppb /20ml
Em (SpK)	D211	.10ml " " "

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

Spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx + sp	%rec
	1.90	1.93	1.92	1.56%	5.00ug/L	21.29	102%

PDS = 5ml SX
5ml SpK (40ppb)

DATE ANALYZED 1-3-01
SAMPLE NUMBER 12-515-1A

$\frac{21.29 \times 2 = 42.58 - 1.92}{40} \times 100 = 102\%$

ANALYIST HAA DEPT. SUPER ____ INORGANIC SUPER. ____

Page ____

3

Environmental Enterprises — Hg Aqueous Digestion Log — Metals Department

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN (ml/ml)	COMMENTS
01-1497-HAA	01-03-02	HAJ	BLK	Hg	20/20	
02-			LCS	Hg	20/20	
03-			0112-515-30A	Hg		
04-			" -30AD	Hg		
05-			" -30AS	Hg		
06-			" -31A	Hg		
07-			" -32A	Hg		
08-			" -33A	Hg		
09-				Hg		
10-				Hg		
11-				Hg		
12-				Hg		
13-				Hg		
14-				Hg		
15-				Hg		
16-				Hg		
17-				Hg		
18-				Hg		
19-				Hg		
20-				Hg		

BATCH QC DATA

SPIKE SOURCE	STD PREP #	SPIKE INFORMATION
Em (LCS)	D211	.20ml of 1000ppb/20ml
Em (Spk)	D211	.10ml " "

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx +sp	%rec
	1.50	1.50	1.50	0	5.00ug/L	20.90	101%

PDS 5ml SX
5ml Spk (40ppb)

DATE ANALYZED 1-3-01
SAMPLE NUMBER 0112-515-30A

20.90x2 = 41.8 − 1.50 / 40 x100 = 101.%

ANALYIST HAJ DEPT. SUPER ____ INORGANIC SUPER. ____

Page ____

4

COPY

Sample Dilution Record

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
OU2-515-1A	1x	1000x			1000x
" 1AD		1000x			1000x
" 2A		100x			100x
" 3A		100x			100x
" 4A		100x			100x
" 5A		10x			10x
" 6A		10x			10x
" 7A		10x			10x
" 8A		1x			1x
" 9A		1x			1x
" 10A		1x			1x
" 11A		1x			1x
" 12A		1x			1x
" 13A		1x			1x
" 14A		100x			100x
" 15A		1x			1x
" 24A		100x			100x
" 30A		100x			100x
" 30AD		100x			100x
" 31A		100x			100x
" 32A		100x			100x
33A	✓	1x			1x
8A - 30A					
10X =	5ml 5x / 5ml of 40mb				

1000X = .01ml/10ml

100X = .10ml/10ml

10X = 1ml/10ml

5

Varian 20
Hg - Cold Vapor

COPY

	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. James II

OPERATOR	
DATE	01.03.2002
BATCH NO.	1496 1497
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

0.000	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP
PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 384.0

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

RE SCALE | OPTIMIZE SIGNAL | STANDARDS

BLANK	0.00		0.001	0.001	0.001
BLANK	0.00		-0.001	-0.000	-0.001 Z214
STANDARD 1	0.50	4.4	0.011	0.011	0.011 Q214
STANDARD 2	2.00	0.2	0.042	0.042	0.042 R214
STANDARD 3	5.00	0.5	0.107	0.107	0.106 S214
STANDARD 4	10.00	0.1	0.215	0.215	0.216 T214
STANDARD 5	40.00	0.6	0.771	0.767	0.774 U214

fisher stds made

(6)

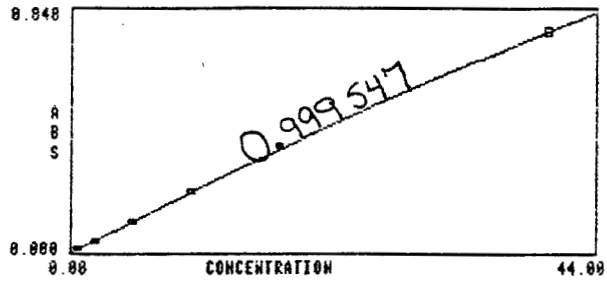
12-29-01

COPY

Em

LdL = 0214

ICV/CCV = X214
⇓
made 1-3-02



HAM 1-3-02
Hg 7470A

VERIFIED 1-7-02
DATE

LCS = .20ml of 1000ppb Em DQ11 /2ml T.V = 100ppb
SPK (PDS) = .10ml " " "
↳ 5ml sx / 5ml of 40 ppb

	5.00 ICV		4.89	97.8%	0.0	0.104	0.104	0.104
	ICB		0.06		42.6	0.001	0.001	0.002
	0.50 LdL		0.50	100%	1.6	0.011	0.011	0.011
mb	1.1496:HAA		-0.01		99.9	-0.000	0.000	-0.001
LCS	2.1496:HAA		9.66	96.6%	0.1	0.208	0.208	0.208
mb	1.1497:HAA		0.02		92.8	0.001	0.001	0.000
LCS	2.1497:HAA		9.89	98.9%	0.1	0.213	0.213	0.213
01	12.515.1A	1✓	1.90	>1.92	1.0	1.56% PPD 0.040	0.040	0.040
	12.515.1AD	1✓	1.93		1.8	0.041	0.041	0.040
	12.515.1ADPDS	1✓	21.29	102%	0.6	0.439	0.437	0.441
	12.515.2A	✓	6.17		0.7	0.132	0.131	0.133
	12.515.3A	✓	1.37		0.3	0.029	0.029	0.029
	12.515.4A	✓ 1	1.02		2.4	0.022	0.022	0.022
	5.00 CCV		4.85	97.0%	0.3	0.104	0.103	0.104
	CCB		0.02		73.0	0.001	0.001	0.000
01	12.515.5A	✓ 1	8.73		0.9	0.188	0.186	0.189
01	12.515.6A	✓ 1	7.53		0.3	0.162	0.161	0.162
	~~12.515.7~~	~~1~~	~~OVER~~		0.4	1.150	1.146	1.153
void HAM	~~12.515.7~~	~~1~~	~~-0.05~~	Flushed	18.9	-0.001	-0.001	-0.001
	~~12.515.7~~	~~1~~	~~0.11~~		4.5	0.002	0.002	0.002
01	12.515.7A	✓ 1	5.77		0.7	0.123	0.123	0.124
	12.515.8A	✓ 1	8.85		0.5	0.190	0.190	0.191
	12.515.9A	✓ 1	6.07		0.3	0.130	0.130	0.130
	12.515.10A	✓ 1	-0.02		99.9	-0.000	-0.001	-0.000
	12.515.11A	✓ 1	6.56		0.5	0.140	0.140	0.141
	12.515.12A	✓ 1	21.61		0.5	0.445	0.444	0.447
	12.515.13A	1	27.84		0.5	0.561	0.559	0.562
void HAM	~~12.515.14~~	~~1~~	~~OVER~~		0.1	1.649	1.651	1.647
	~~12.515.14~~	~~1~~	~~-0.00~~	Flushed	99.9	-0.000	0.000	-0.000
01	12.515.14A	✓ 1	1.08		0.0	0.023	0.023	0.023
	5.00 CCV		4.71	94.2%	0.5	0.100	0.100	0.101
	CCB		-0.01		0.0	-0.000	-0.000	-0.000
01	12.515.15A	✓ 1	-0.02		99.9	-0.001	-0.001	-0.000
	12.515.29A	✓ 1	2.66		1.7	0.056	0.055	0.057
	12.515.30A	✓ 1	1.50	>1.50	2.4 RPD	0.032	0.031	0.032
	12.515.30AD	✓ 1	1.50		2.3 0	0.032	0.031	0.032
	12.515.30ADPDS	✓	20.90	101%	0.6	0.432	0.430	0.434
	12.515.31A	✓ 1	1.12		2.6	0.024	0.024	0.024
	12.515.32A	✓ 1	1.07		1.5	0.023	0.023	0.023
	12.515.33A	✓ 1	-0.01		99.9	-0.000	0.000	-0.001
	5.00 CCV		4.81	96.2%	0.4	0.103	0.102	0.103
	CCB		0.02		99.9	0.000	0.001	0.000
	Dilution H2O		-0.03	Y214	70.6	-0.001	-0.001	-0.000

21.29 x 2 = 42.58

$\frac{42.58 - 1.92}{40}$ x100 = 102%

20.90 x 2 = 41.8

$\frac{41.8 - 1.50}{40}$ x100 = 101%

7

All samples prepped:

.5ml conc. HNO_3
1.0ml conc. H_2SO_4
3.0ml 5% $KMnO_4$
1.6ml 5% $K_2S_2O_8$
1.2ml 12% $NH_2OH \cdot HCL$ / 20ml

COPY

✱ - See dilution sheet Attached

HM
1-3-01

(8)

RAW DATA

Environmental Enterprises

Hg Miscellaneous

COPY

Metals Department

1-7-01 weighed out

BATCH #	DATE	INIT	SAMPLE #	PARAM	DILN	COMMENTS
01 285-HMA	1-8-01 Analyzed	HM	BLK	Hg	20ml/20ml	
02-			LCS	Hg	20g/20	050F ERA
03-			C112-515-16A	Hg		
04-			" 17A	Hg		
05-			" 18A	Hg		
06-			" 19A	Hg		
07-			" 19AD	Hg		
08-			" 19AS	Hg		
09-			" 20A	Hg		
10-			" 21A	Hg		
11-			" 22A	Hg		
12-			" 23A	Hg		
13-			" 24A	Hg		
14-			" 25A	Hg		
15-			" 26A	Hg		
16-			" 27A	Hg		
17-			" 28A	Hg		
18-			C2C1-073-1A	Hg		
19-				Hg		
20-				Hg		

BATCH QC DATA

SPIKE SOURCE: Em (SpK), ERA (LCS)

STD PREP #: D211, 050F

SPIKE INFORMATION: 10ml of 1000ppb / 20ml; 2g soil LCS / 20ml

Acceptance Criteria:
Duplicates (+/-) 25%
%Spike Recovery MEAN RECOVERY (+/-)3*SD

spike added	ug/L run 1	ug/L run 2	ug/L mean	rpd	spike value	ug/L sx + sp	%rec
	35.44	34.51	34.98	2.66	5.00ug/L	PDS 34.95	94.0%
						5ml dup	
						5ml 40ppb (J215)	

DATE ANALYZED 1-8-01

SAMPLE NUMBER 12-515-19A

$\frac{36.0542 = 72.1 - 34.51}{40} \times 100 = 94.1$

ANALYIST HM

DEPT. SUPER ____

INORGANIC SUPER. ____

Page ____

(9)

Sample Dilution Record 7470A Hg HAM 1-8-02 COPY

Sample #	Original	1st	2nd	3rd	Total Dilution Factor
0112-515-16A	100x	1000			100,000x
17A		1000			100,000x
18A		1000			100,000x
19A		1000			100,000x
19AD		1000			100,000x
20A		1000			100,000x
21A		2000x			200,000x
22A		2000x			200,000x
23A		2000x			200,000x
24A		1000x			100,000x
25A		1000x			100,000x
26A		1000x			100,000x
27A		1000x			100,000x
28A		1000x			100,000x
19A DDS =	5ml dup. 5ml 40ppb				

Sx's set-up .20g/20ml

1000x = .01 ml/10ml

2000x = .005ml/10ml

10

Varian 20
Hg - Cold Vapor

	PROGRAM 16	Hg	
	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

REPORT FORMAT

Harold A. James II

OPERATOR	
DATE	01.08.2002
BATCH NO.	1500 285
FORMAT	SEQUENTIAL
DATA PRINTED	EACH READING
PRINT	DURING RUN
INSTRUMENT STATUS	NO
CALIBRATION RESULTS	YES
CALIBRATION GRAPH	YES
SAMPLE LABELS	YES
LINES PER REPORT PAGE	66

SAMPLE LABELS

	PROGRAM 16	Hg	
0.000	BLANK	REPLICATE 1	MANUAL
	ABSORBANCE	CONCENTRATION	BC ON
	INTEGRATION	3.0 (sec)	AIR ONLY

PRINTING

OPTIMIZATION

ALIGN D2 LAMP

ALIGN HC LAMP

PEAK WAVELENGTH

PHOTOMULTIPLIER VOLTS 474.1

PARAMETERS TO BE SET MANUALLY

WAVELENGTH (nm)	253.7
SLIT WIDTH (nm)	0.5
AIR FLOW	0.00

11

	RE SCALE			OPTIMIZE SIGNAL	
BLANK	0.00		-0.000	-0.001	0.000 Z214
STANDARD 1	0.50	2.7	0.010	0.010	0.009 F215
STANDARD 2	2.00	0.2	0.041	0.041	0.041 G215
STANDARD 3	5.00	0.4	0.107	0.107	0.107 H215
STANDARD 4	10.00	0.2	0.215	0.215	0.216 I215
STANDARD 5	40.00	0.3	0.794	0.792	0.796 J215

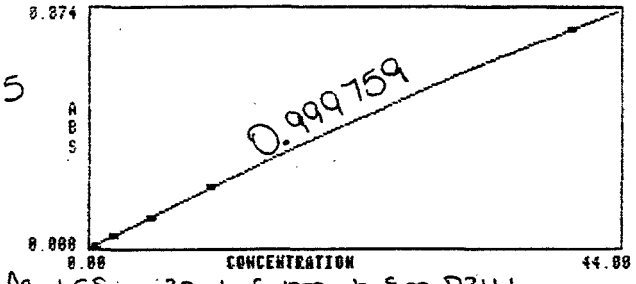
Fisher

Std's made 1-7-01

Em

ICV/CCV = K215

LdL = D215



VERIFIED DATE 1-9-02

HM 1-8-02

7470 - misc

7470A -

245.1 - w/w

Δq LCS = .20ml of 1000ppb Em D211/20ml T.V. 10ppb

	~~5.00~~		~~5.36~~ void HM	0.1	0.115	0.115	0.115	
	5.00 ICV		5.22 104%	0.4	0.112	0.111	0.112	
	.... ICB		0.01	70.7	0.000	0.000	0.000	
	0.50 LdL		0.51 102%	4.4	0.010	0.010	0.010	
mb	1.1500 HMA..		-0.05	55.3	-0.001	-0.001	-0.001	
LCS	2.1500 HMA..		9.99 99.8%	0.1	0.215	0.215	0.215	
mb	1.285 HMA..		0.00	99.9	0.000	-0.000	0.000	
LCS	2.285 HMA 100X		37.51 = 3.75 mg/kg	0.5	0.750	0.747	0.752	- ERA LCS soil 050F
02	1.100.1A	10	0.46	0.7	0.009	0.009	0.009	cert v. 3.94 mg/kg
↓	1.100.2A	10	1.13	2.3	0.022	0.022	0.023	Range
	5.00 CCV		5.09 102%	0.4	0.109	0.109	0.109	2.69 mg/kg - 5.21 mg/kg
	.... CCB		0.07	20.8	0.001	0.002	0.001	
01	12.515.16A ✓		27.31	0.7	0.561	0.558	0.564	
	12.515.17A ✓		24.83	0.6	0.513	0.511	0.516	
	12.515.18A ✓		39.28	0.5	0.781	0.779	0.784	
	12.515.19A ✓		35.44 > 34.98	0.6 2.00 RPD	0.712	0.709	0.715	
	12.515.19AD ✓		34.51	0.5	0.695	0.693	0.698	
	12.515.19A ✓		~~37.04~~ void HM	0.4	0.556	0.554	0.557	
	12.515.19APDS ✓		36.05 94.0%	0.6	0.723	0.720	0.726	36.05 X 2 = 72.1
	12.515.20A ✓		33.90	0.6	0.684	0.681	0.687	
	12.515.21A ✓		30.83	0.7	0.627	0.624	0.630	72.1 − 34.~~98~~ 51 / 40 × 100 =
	12.515.22A		~~0.03~~ void HM	0.0	0.001	0.001	0.001	
↓	12.515.22A ✓		34.63	0.7	0.697	0.694	0.701	94.1%
	5.00 CCV		5.19 104%	0.2	0.111	0.111	0.111	
	CCB		0.09	0.0	0.002	0.002	0.002	
01	12.515.23A ✓		30.20	0.5	0.615	0.613	0.618	
	12.515.24A ✓		25.34	0.2	0.523	0.522	0.524	
	12.515.25A ✓		26.91	0.6	0.553	0.551	0.556	
	12.515.26A ✓		26.89	0.5	0.553	0.551	0.555	
	12.515.27A ✓		25.92	0.4	0.534	0.533	0.536	
↓	12.515.28A ✓		27.16	0.4	0.558	0.556	0.559	
02	01.073.1A	100	2.65	0.7	0.055	0.055	0.055	
	5.00 CCV		4.93 98.6%	0.2	0.105	0.105	0.106	

(12)

All samples prepped w/

- 5ml conc. HNO_3
- 1.0ml conc. H_2SO_4
- 3.0ml 5% $KMnO_4$
- 1.6ml 5% $K_2S_2O_8$
- 1.2ml 12% $NH_2OH \cdot HCL$ / 20ml

* See attached dilution sheet

1000 X = .01 ml / 10ml
2000 X = .005ml / 10ml

* PDS = 5ml ~~5X~~ dup
5ml 40ppb (J215)

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OSWI-003-C

ENVIRONMENTAL ENTERPRISES, INC.
ANALYTICAL SERVICES DIVISION - LABORATORY
10163 Cincinnati-Dayton Road
Cincinnati, Ohio 45241

February 14, 2001

Linda Rieser
Academic Director
ALTER Facility
Civil and Environmental Engineering
University of Cincinnati
(513) 556-2060 Office
(513) 556-3148 Fax

Dear Linda:

This letter addresses the findings of the investigation into the apparent low surrogate sludge sample recoveries associated with the samples submitted for analysis on 01/24/01 (EEI Work Order # 01-01-519).

As discussed in a previous correspondence, the following steps were performed in an attempt to isolate potential sources for low surrogate sludge sample recoveries. Our findings have been summarized in Table 1.

1). In order to validate our dilution techniques, a 1000ppm standard (the highest standard purchased by our laboratory) was diluted and analyzed in the same manner as the samples.

2). In order to validate that we are not using too much sample or too little reagent, the solid/sludge samples were re-digested in triplicate using 0.2g, 0.1g, and 0.05g, while each digestion received the same amount of reagents.

Additionally, the following steps were also performed:

3). Additional post-digestion dilutions were performed using only ASTM II water.

4). Additional post-digestion dilutions were performed using ASTM II water + 4% HNO_3.

5). Additional post-digestion dilutions were performed using a solution containing ALL of the digestion reagents.

Steps 3-5 show a progression towards matching the post-digestion diluted samples to the calibration standards.

While no true statistical calculations or evaluations were conducted, the following generalizations seem apparent:

1). Analysis of the 1000ppm Reference Standard suggest an increase in recovery when dilutions were prepared using ASTM II water + HNO_3 or a solution containing ALL of the digestion reagents. Our dilution techniques appear to be acceptable. Table 2 summarizes how the dilutions were prepared.

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Fax (513) 782-8970

2). Comparisons between the 0.2g, 0.1g, and 0.05g sample digestions show inconsistent results. I would tend to attribute these inconsistencies merely to the difficulty in obtaining a representative sample using such small aliquots. Since I cannot conclude that we "are using too much sample or not enough reagent," I am inclined to continue our mercury digestions using 0.2g aliquots of solid/sludge samples digested in 20mLs of ASTM II water (with additional required digestion reagents added).

3). We have consistently demonstrated that there is an increase in recoveries when post-digestion dilutions were prepared using a solution containing ALL of the digestion reagents. Therefore, all future post-digestion dilutions will be prepared in this manner.

Conclusion

Unless instructed otherwise, our dilution techniques as well as the sample size used for the digestions will remain unchanged. All future post-digestion dilutions will be prepared using a dilution solution that contains ALL of the digestion reagents in a ratio equivalent to those in the digested samples and the calibration standards.

Please let us know if you have any further questions, suggestions, or requests.

Thank you,

Jason M. Lykins
Assistant Laboratory Manger / Metals Department Supervisor
Environmental Enterprises, Incorporated
Analytical Services Division – Laboratory

Date Analyzed	Digestion	Total Dilution	Post-digestion dilution prepared with ASTM II Water only	Post-digestion dilution prepared with ASTM II Water + 4% HNO3	Post-digestion dilution prepared with a Solution Containing All of the Digestion Reagents	01-01-549-05A	01-01-549-05A Dup	01-01-549-06A	01-01-549-07A	01-01-549-08A	01-01-549-09A	Fisher 1000PPM Reference Standard
1/29/01	0.2g/20mL	1,000,000	X			3,040	3,640	3,960	2,780	3,580	3,100	
2/6/01	(*1) 0.2g/20mL	1,000,000	X			3,110		3,930	3,580	3,410	3,900	
2/6/01	(*2) 0.1g/20mL	2,000,000	X			3,080		2,980	3,060	3,780	3,200	
2/6/01	(*3) 0.05g/20mL	400,000	X			3,296		4,732	3,480	3,560	4,064	
2/6/01	(*1) 0.2g/20mL	1,000,000		X		3,630						
2/6/01	(*2) 0.1g/20mL	2,000,000		X		3,580						
2/6/01	(*3) 0.05g/20mL	400,000		X		3,440						
2/7/01	(*1) 0.2g/20mL	1,000,000			X	3,740		5,110	4,030	3,980	4,410	
2/7/01	(*2) 0.1g/20mL	2,000,000			X	4,100		4,200	3,580	4,720	3,740	
2/7/01	(*3) 0.05g/20mL	400,000			X	3,628		6,012	3,644	3,920	4,316	
2/6/01	not digested	1,000,000	X									830
2/6/01	not digested	100,000	X									745
2/6/01	not digested	100,000		X								990
2/7/01	not digested	100,000			X							1,093

(*1) The same digested sample was used for each comparison dilution.
(*2) The same digested sample was used for each comparison dilution.
(*3) The same digested sample was used for each comparison dilution.

Table 1

Prep. Procedure	This Dilution	Total Dilution
0.2g/20mL	100X	
0.01mL of 100X / 10mL	1000X	100,000X
1mL of 100,000X / 10mL	10X	1,000,000X
0.2g/20mL	100X	
0.1mL of 100X / 10mL	10,000X	1,000,000X
0.1g/20mL	200X	
0.1mL of 200X / 10mL	10,000X	2,000,000X
0.05g/20mL	400X	
0.01mL of 400X / 10mL	1000X	400,000X

Table 2

.02/14/2001 13:54 5137820978 EEI LABORATORY PAGE 01/05

OSWI-003-E

ENVIRONMENTAL ENTERPRISES, INC.

ANALYTICAL SERVICES DIVISION - LABORATORY
10163 Cincinnati-Dayton Road
Cincinnati, Ohio 45241

FACSIMILE TRANSMITTAL SHEET

TO: Linda Rieser	FROM: Jason M. Lykins
COMPANY: ALTER Facility – UC	DATE: 02/14/2001
FAX NUMBER: (513) 556-3148	TOTAL NO. OF PAGES INCLUDING COVER: 5
RE: Findings of low recovery investigation	

☐ URGENT ☑ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

Linda,

The following Microsoft Word document has also been e-mailed to : lrieser@uceng.uc.edu

Thanks,

Jason

Phone (513) 772-2818 or (800) 722-2818
Fax (513) 782-8970

Raw Data

Date Analyzed	Digestion	Total Dilution	Post-digestion dilution prepared with ASTM II Water only	Post-digestion dilution prepared with ASTM II Water + 4% HNO3	Post-digestion dilution prepared with a Solution Containing All of the Digestion Reagents	01-01-549-05A	01-01-549-05A Dup	01-01-549-06A	01-01-549-07A	01-01-549-08A	01-01-549-09A	Fisher 1000PPM Reference Standard
1/29/01	0.2g/20mL	1,000,000	X			3,040	3,640	3,960	2,780	3,580	3,100	
2/6/01	(*1) 0.2g/20mL	1,000,000	X			3,110		3,930	3,580	3,410	3,900	
2/6/01	(*2) 0.1g/20mL	2,000,000	X			3,080		2,980	3,060	3,760	3,200	
2/6/01	(*3) 0.05g/20mL	400,000	X			3,296		4,732	3,480	3,560	4,064	
2/6/01	(*1) 0.2g/20mL	1,000,000		X		3,630						
2/6/01	(*2) 0.1g/20mL	2,000,000		X		3,580						
2/6/01	(*3) 0.05g/20mL	400,000		X		3,440						
2/7/01	(*1) 0.2g/20mL	1,000,000			X	3,740		5,110	4,030	3,980	4,410	
2/7/01	(*2) 0.1g/20mL	2,000,000			X	4,100		4,200	3,580	4,720	3,740	
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2/6/01	not digested	1,000,000	X									830
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Table 1

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0.2g/20mL	100X	
0.1mL of 100X / 10mL	10,000X	1,000,000X
0.1g/20mL	200X	
0.1mL of 200X / 10mL	10,000X	2,000,000X
0.05g/20mL	400X	
0.01mL of 400X / 10mL	1000X	400,000X

Table 2