FRONTIER
ANALYTICAL LABORATORY

July 30, 2003

Mr. Bruce Lewis
ERM West
620 Bercut Dr.
Sacramento, CA 95814

Dear Mr. Lewis,

Enclosed are the results for Frontier Analytical Laboratory project **2143.** This corresponds to your project number **1099**. The two soil samples received on 7/16/03 were extracted and analyzed by EPA Method 8290 for tetra through octa chlorinated dibenzo dioxins and furans. ERM West requested our standard turnaround time of fourteen (14) days for project **2143**. Frontier Analytical Laboratory successfully fulfilled this request.

The following report consists of an Analytical Data section, a Sample Receipt section, a Laboratory Raw Data section, and an Instrument Raw Data section. The Analytical Data section contains the project-sample tracking log, a qualifier reference guide, ML/MDL reference form and the analytical results. The Sample Receipt section contains your original chain of custody, the sample login form and a sample photo. The Laboratory Raw Data section contains all of the bench paperwork; project request sheet, percent solids determination sheet, extraction bench sheet, and the cleanup bench sheet. The Instrument Raw Data section contains two subsections; Initial Calibration Results and the Continuing Calibration Results. The Initial Calibration Results consists of all quantitation results, run logs, resolution checks, and chromatograms for the calibration curve. The Continuing Calibration Results consists of all the quantitation results, run logs, resolution checks, and chromatograms for every beginning and ending calibration standards. We have also included a compact disk (CD) that contains all of the above information in PDF.

Thank you for choosing Frontier Analytical Laboratory for your analytical needs. If you have any questions regarding this project, please feel free to contact me at (916) 934-0900.

Sincerely,

Bradley B. Silverbush
Director of Operations

FRONTIER ANALYTICAL LABORATORY
5172 Hillsdale Circle • El Dorado Hills, CA 95762
Tel (916) 934-0900 • Fax (916) 934-0999
dioxin@frontieranalytical.com

Frontier Analytical Laboratory

Sample Tracking Log

FAL Project ID: **2143**

Received on: **07/16/2003** Project Due: **07/31/2003** Storage: **R1**

FAL Sample ID	Dup	Client Project ID	Client Sample ID	Requested Method	Matrix	Sampling Date	Sampling Time	Hold Time Due Date
2143-001-SA	0	1099	C4-SN501	EPA 8290 D/F	Soil	07/16/2003	06:50 am	08/15/2003
2143-002-SA	0	1099	C4-SN502	EPA 8290 D/F	Soil	07/16/2003	07:10 am	08/15/2003

FRONTIER
ANALYTICAL LABORATORY

Qualifier Reference Guide

A	Isotopic Labeled Standard outside QC range but signal to noise ratio is >10:1
B	Analyte is present in Method Blank
C	Chemical Interference
D	Presence of Diphenyl Ethers
E	Analyte concentration is above calibration range
F	Analyte confirmation on secondary column
J‡	Analyte concentration is below calibration range
M	Maximum possible concentration
NP	Not Provided
S	Sample acceptance criteria not met
X	Matrix interferences
*	Result taken from dilution or reinjection
-	Analyte Not Detected

‡ "J" values are equivalent to DNQ (detected but not qualified) for California Toxics Rule (CTR)/National Pollutant Discharge Elimination System (NPDES) samples

EPA Method 1613/8290 Solid MDL
(Sox/SDS Extraction)

FRONTIER ANALYTICAL LABORATORY

Analyte	ML	MDL
2,3,7,8-TCDD	0.500	0.132
1,2,3,7,8-PeCDD	2.50	0.223
1,2,3,4,7,8-HxCDD	2.50	0.346
1,2,3,6,7,8-HxCDD	2.50	0.381
1,2,3,7,8,9-HxCDD	2.50	0.343
1,2,3,4,6,7,8-HpCDD	2.50	0.318
OCDD	5.00	1.20
2,3,7,8-TCDF	0.500	0.100
1,2,3,7,8-PeCDF	2.50	0.232
2,3,4,7,8-PeCDF	2.50	0.217
1,2,3,4,7,8-HxCDF	2.50	0.114
1,2,3,6,7,8-HxCDF	2.50	0.106
1,2,3,7,8,9-HxCDF	2.50	0.117
2,3,4,6,7,8-HxCDF	2.50	0.147
1,2,3,4,6,7,8-HpCDF	2.50	0.140
1,2,3,4,7,8,9-HpCDF	2.50	0.155
OCDF	5.00	0.498

Project **1370**, Extracted 11/04/02; analyzed 11/08/02. Based on 10g sample, pg/g.

EPA Method 8290
PCDD/F

FRONTIER ANALYTICAL LABORATORY

FAL ID: 2143-001-MB | Date Extracted: 7/22/03 | ICal: PCDDFAL1-6-13 | Acquired: 24-JUL-03
Client ID: Method Blank | Date Received: NA | GC Column: db5
Matrix: Soil | Amount: 10.00 g | Units: pg/g | WHO TEQ: 0.000342
Batch No.: 0056 | % Solids: NA

Compound	Conc	DL	Qual	WHO Tox	Compound	Conc	DL	Qual	#Hom
2,3,7,8-TCDD	-	0.174		-					
1,2,3,7,8-PeCDD	-	0.439		-					
1,2,3,4,7,8-HxCDD	-	0.502		-					
1,2,3,6,7,8-HxCDD	-	0.549		-	Total Tetra-Dioxins	-	0.174		0
1,2,3,7,8,9-HxCDD	-	0.476		-	Total Penta-Dioxins	-	0.439		0
1,2,3,4,6,7,8-HpCDD	-	1.10		-	Total Hexa-Dioxins	-	0.749		0
OCDD	3.42	-	J	0.000342	Total Hepta-Dioxins	-	1.10		0
2,3,7,8-TCDF	-	0.107		-					
1,2,3,7,8-PeCDF	-	0.323		-					
2,3,4,7,8-PeCDF	-	0.319		-					
1,2,3,4,7,8-HxCDF	-	0.110		-					
1,2,3,6,7,8-HxCDF	-	0.144		-					
2,3,4,6,7,8-HxCDF	-	0.169		-					
1,2,3,7,8,9-HxCDF	-	0.219		-	Total Tetra-Furans	-	0.107		0
1,2,3,4,6,7,8-HpCDF	-	0.255		-	Total Penta-Furans	-	0.324		0
1,2,3,4,7,8,9-HpCDF	-	0.300		-	Total Hexa-Furans	-	0.219		0
OCDF	-	0.538		-	Total Hepta-Furans	-	0.300		0

Internal Standards	% Rec	QC Limits	Qual
13C-2,3,7,8-TCDD	84.7	40.0 - 135	
13C-1,2,3,7,8-PeCDD	81.0	40.0 - 135	
13C-1,2,3,4,7,8-HxCDD	92.2	40.0 - 135	
13C-1,2,3,6,7,8-HxCDD	86.4	40.0 - 135	
13C-1,2,3,4,6,7,8-HpCDD	99.2	40.0 - 135	
13C-OCDD	109	40.0 - 135	
13C-2,3,7,8-TCDF	90.0	40.0 - 135	
13C-1,2,3,7,8-PeCDF	83.6	40.0 - 135	
13C-2,3,4,7,8-PeCDF	81.9	40.0 - 135	
13C-1,2,3,4,7,8-HxCDF	91.7	40.0 - 135	
13C-1,2,3,6,7,8-HxCDF	80.3	40.0 - 135	
13C-2,3,4,6,7,8-HxCDF	83.5	40.0 - 135	
13C-1,2,3,7,8,9-HxCDF	84.9	40.0 - 135	
13C-1,2,3,4,6,7,8-HpCDF	95.8	40.0 - 135	
13C-1,2,3,4,7,8,9-HpCDF	110	40.0 - 135	
13C-OCDF	107	40.0 - 135	

Cleanup Surrogate		
37Cl-2,3,7,8-TCDD	78.7	40.0 - 135

Analyst: [signature] Date: 7/30/03

Reviewed by: [signature] Date: 7/30/03

EPA Method 8290
PCDD/F

FRONTIER ANALYTICAL LABORATORY

FAL ID: 2143-001-OPR | Date Extracted: 7/22/03 | ICal: PCDDFAL1-6-13 | Acquired: 24-JUL-03
Client ID: OPR | Date Received: NA | GC Column: db5
Matrix: Soil | Amount: 10.00 g | Units: ng/mL | WHO TEQ: NA
Batch No.: 0056

Compound	Conc	QC Limits
2,3,7,8-TCDD	8.91	7.00 - 13.0
1,2,3,7,8-PeCDD	48.6	35.0 - 65.0
1,2,3,4,7,8-HxCDD	50.2	35.0 - 65.0
1,2,3,6,7,8-HxCDD	48.1	35.0 - 65.0
1,2,3,7,8,9-HxCDD	46.9	35.0 - 65.0
1,2,3,4,6,7,8-HpCDD	49.3	35.0 - 65.0
OCDD	102	70.0 - 130
2,3,7,8-TCDF	7.82	7.00 - 13.0
1,2,3,7,8-PeCDF	48.9	35.0 - 65.0
2,3,4,7,8-PeCDF	49.5	35.0 - 65.0
1,2,3,4,7,8-HxCDF	48.9	35.0 - 65.0
1,2,3,6,7,8-HxCDF	50.8	35.0 - 65.0
2,3,4,6,7,8-HxCDF	50.4	35.0 - 65.0
1,2,3,7,8,9-HxCDF	50.7	35.0 - 65.0
1,2,3,4,6,7,8-HpCDF	50.2	35.0 - 65.0
1,2,3,4,7,8,9-HpCDF	51.2	35.0 - 65.0
OCDF	102	70.0 - 130

Internal Standards	% Rec	QC Limits
13C-2,3,7,8-TCDD	66.8	40.0 - 135
13C-1,2,3,7,8-PeCDD	59.6	40.0 - 135
13C-1,2,3,4,7,8-HxCDD	76.6	40.0 - 135
13C-1,2,3,6,7,8-HxCDD	74.5	40.0 - 135
13C-1,2,3,4,6,7,8-HpCDD	83.6	40.0 - 135
13C-OCDD	94.2	40.0 - 135
13C-2,3,7,8-TCDF	66.4	40.0 - 135
13C-1,2,3,7,8-PeCDF	67.8	40.0 - 135
13C-2,3,4,7,8-PeCDF	65.2	40.0 - 135
13C-1,2,3,4,7,8-HxCDF	78.9	40.0 - 135
13C-1,2,3,6,7,8-HxCDF	76.6	40.0 - 135
13C-2,3,4,6,7,8-HxCDF	76.9	40.0 - 135
13C-1,2,3,7,8,9-HxCDF	79.8	40.0 - 135
13C-1,2,3,4,6,7,8-HpCDF	89.2	40.0 - 135
13C-1,2,3,4,7,8,9-HpCDF	95.6	40.0 - 135
13C-OCDF	90.4	40.0 - 135

Cleanup Surrogate		
37Cl-2,3,7,8-TCDD	63.7	40.0 - 135

Analyst: [signature] Date: 7/30/03

Reviewed by: [signature] Date: 7/30/03

EPA Method 8290
PCDD/F

FRONTIER ANALYTICAL LABORATORY

FAL ID: 2143-001-SA | Date Extracted: 7/22/03 | ICal: PCDDFAL1-6-13 | Acquired: 24-JUL-03
Client ID: C4-SN501 | Date Received: 7/16/03 | GC Column: DB5
Matrix: Soil | Amount: 10.08 g | Units: pg/g | WHO TEQ: 0.967
Batch No.: 0056 | % Solids: 99.6

Compound	Conc	DL	Qual	WHO Tox	Compound	Conc	DL	Qual	#Hom
2,3,7,8-TCDD	-	0.182		-					
1,2,3,7,8-PeCDD	-	0.654		-					
1,2,3,4,7,8-HxCDD	0.602	-	J	0.0602					
1,2,3,6,7,8-HxCDD	1.71	-	J	0.171	Total Tetra-Dioxins	-	0.314		0
1,2,3,7,8,9-HxCDD	1.07	-	J	0.107	Total Penta-Dioxins	-	0.772		0
1,2,3,4,6,7,8-HpCDD	29.5	-		0.295	Total Hexa-Dioxins	12.8	-		6
OCDD	201	-	B	0.0201	Total Hepta-Dioxins	56.1	-		2
2,3,7,8-TCDF	-	0.215		-					
1,2,3,7,8-PeCDF	-	0.304		-					
2,3,4,7,8-PeCDF	-	0.485		-					
1,2,3,4,7,8-HxCDF	0.467	-	J	0.0467					
1,2,3,6,7,8-HxCDF	0.674	-	J	0.0674					
2,3,4,6,7,8-HxCDF	1.11	-	J	0.111					
1,2,3,7,8,9-HxCDF	-	0.181		-	Total Tetra-Furans	7.93	-		10
1,2,3,4,6,7,8-HpCDF	8.55	-		0.0855	Total Penta-Furans	20.0	-		6
1,2,3,4,7,8,9-HpCDF	-	0.384		-	Total Hexa-Furans	15.5	-		6
OCDF	24.0	-		0.00240	Total Hepta-Furans	21.1	-		2

Internal Standards	% Rec	QC Limits	Qual
13C-2,3,7,8-TCDD	94.1	40.0 - 135	
13C-1,2,3,7,8-PeCDD	85.1	40.0 - 135	
13C-1,2,3,4,7,8-HxCDD	98.1	40.0 - 135	
13C-1,2,3,6,7,8-HxCDD	98.0	40.0 - 135	
13C-1,2,3,4,6,7,8-HpCDD	113	40.0 - 135	
13C-OCDD	109	40.0 - 135	
13C-2,3,7,8-TCDF	92.4	40.0 - 135	
13C-1,2,3,7,8-PeCDF	89.6	40.0 - 135	
13C-2,3,4,7,8-PeCDF	84.7	40.0 - 135	
13C-1,2,3,4,7,8-HxCDF	96.3	40.0 - 135	
13C-1,2,3,6,7,8-HxCDF	91.7	40.0 - 135	
13C-2,3,4,6,7,8-HxCDF	94.1	40.0 - 135	
13C-1,2,3,7,8,9-HxCDF	95.5	40.0 - 135	
13C-1,2,3,4,6,7,8-HpCDF	99.2	40.0 - 135	
13C-1,2,3,4,7,8,9-HpCDF	115	40.0 - 135	
13C-OCDF	104	40.0 - 135	

Cleanup Surrogate			
37Cl-2,3,7,8-TCDD	90.5	40.0 - 135	

Analyst: _____
Date: 7/30/03

Reviewed by: _____
Date: 7/30/03

EPA Method 8290
PCDD/F

FRONTIER ANALYTICAL LABORATORY

FAL ID: 2143-002-SA | Date Extracted: 7/22/03 | ICal: PCDDFAL1-6-13 | Acquired: 24-JUL-03
Client ID: C4-SN502 | Date Received: 7/16/03 | GC Column: DB5
Matrix: Soil | Amount: 10.11 g | Units: pg/g | WHO TEQ: 7.29
Batch No.: 0056 | % Solids: 99.2

Compound	Conc	DL	Qual	WHO Tox	Compound	Conc	DL	Qual	#Hom
2,3,7,8-TCDD	-	0.350		-					
1,2,3,7,8-PeCDD	1.02	-	J	1.02					
1,2,3,4,7,8-HxCDD	1.22	-	J	0.122					
1,2,3,6,7,8-HxCDD	2.72	-		0.272	Total Tetra-Dioxins	4.44	-		4
1,2,3,7,8,9-HxCDD	1.99	-	J	0.199	Total Penta-Dioxins	13.4	-		8
1,2,3,4,6,7,8-HpCDD	46.6	-		0.466	Total Hexa-Dioxins	28.6	-		7
OCDD	175	-	B	0.0175	Total Hepta-Dioxins	83.9	-		2
2,3,7,8-TCDF	2.30	-	F	0.230					
1,2,3,7,8-PeCDF	3.59	-		0.180					
2,3,4,7,8-PeCDF	4.67	-		2.33					
1,2,3,4,7,8-HxCDF	5.12	-		0.512					
1,2,3,6,7,8-HxCDF	5.66	-		0.566					
2,3,4,6,7,8-HxCDF	6.47	-		0.647					
1,2,3,7,8,9-HxCDF	2.18	-	J	0.218	Total Tetra-Furans	55.7	-		17
1,2,3,4,6,7,8-HpCDF	42.1	-		0.421	Total Penta-Furans	59.3	-		11
1,2,3,4,7,8,9-HpCDF	7.56	-		0.0756	Total Hexa-Furans	58.1	-		13
OCDF	103	-		0.0103	Total Hepta-Furans	70.7	-		4

Internal Standards	% Rec	QC Limits	Qual
13C-2,3,7,8-TCDD	97.1	40.0 - 135	
13C-1,2,3,7,8-PeCDD	86.9	40.0 - 135	
13C-1,2,3,4,7,8-HxCDD	92.3	40.0 - 135	
13C-1,2,3,6,7,8-HxCDD	94.7	40.0 - 135	
13C-1,2,3,4,6,7,8-HpCDD	99.6	40.0 - 135	
13C-OCDD	106	40.0 - 135	
13C-2,3,7,8-TCDF	96.3	40.0 - 135	
13C-1,2,3,7,8-PeCDF	92.7	40.0 - 135	
13C-2,3,4,7,8-PeCDF	88.5	40.0 - 135	
13C-1,2,3,4,7,8-HxCDF	90.4	40.0 - 135	
13C-1,2,3,6,7,8-HxCDF	90.9	40.0 - 135	
13C-2,3,4,6,7,8-HxCDF	88.1	40.0 - 135	
13C-1,2,3,7,8,9-HxCDF	91.6	40.0 - 135	
13C-1,2,3,4,6,7,8-HpCDF	89.6	40.0 - 135	
13C-1,2,3,4,7,8,9-HpCDF	106	40.0 - 135	
13C-OCDF	97.1	40.0 - 135	

Cleanup Surrogate			
37Cl-2,3,7,8-TCDD	94.5	40.0 - 135	

F = DB225 Confirmation

Acquired: 25-JUL-03

Analyst: _____
Date: 7/30/03

Reviewed by: _____
Date: 7/30/03

GENCORP AEROJET

Chain of Custody Record

KD2 2143 0

№ 1099

E.T.R. NO:	WORK ORDER NO:
SOURCE SITE NO:	AUGER HOLE NO:
SAMPLERS (SIGNATURE) [signature]	

14-DAY TAT
Method 8290
per phone conv.
w/ Bruce Lewis.
K-2
7-17-03

REQUESTED SAMPLE ANALYSES

COC SAMPLE ID	FIELD SAMPLE NO.	DEPTH (FT.)	DATE MM/DD/YY	TIME	TYPE OF CONTAINER	# OF SAMPLE CONTAINERS	SOIL TYPE (USCS CODE)	VOLATILE ORGANICS EPA 8240	BNA's EPA 8270	METALS EPA 6010	PERCHLORATE EDL-SW-006	DIOXINS	FURANS	~~Tiltedd CCR~~ DSB			LABORATORY QA/QC	REMARKS
1099 A	C4-SNS01	0.5	7/16/03	0650	2x3" BRASS	1						X	X					
1099 B	C4-SNS02	0.5	7/16/03	0710	"	1						X	X					
1099 C	~~A20-BML01~~	~~2~~	~~7/16/03~~	~~1020~~	"	~~3~~				X				X	DSB			
1099 D	~~A20-BML02~~	~~2~~	~~7/16/03~~	~~1100~~	"	~~3~~				X				X	DSB			
1099 E	~~A20-BML04~~	~~2~~	~~7/16/03~~	~~1130~~	"	~~3~~				X				X	DSB			
1099 F	~~A20-BML03~~	~~2~~	~~7/16/03~~	~~1200~~	"	~~3~~				X				X	DSB			
1099 G			/ /															
1099 H			/ /															
1099 I			/ /															
1099 J			/ /															
1099 K			/ /															
1099 L			/ /															
1099 M			/ /															
1099 N			/ /															
1099 O			/ /															
1099 P			/ /															
1099 Q			/ /															
TOTALS												2	2					

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	TOTAL NO. OF SAMPLE CONTAINERS:
[signature]	7/16/03 1440		2
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	METHOD OF SHIPMENT: HAND
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY LABORATORY BY: (SIGNATURE) Kathleen Zipp 7/16/03 2:43	LABORATORY DELIVERED TO: FRONTIER ANALYTICAL

COMMENTS:

ORIGINAL – ENVIRONMENTAL OPERATIONS: *WHITE* 2ND COPY – LABORATORY: *YELLOW* 3RD COPY – SAMPLER: *PINK*

7.67.35 v. 4

Frontier Analytical Laboratory

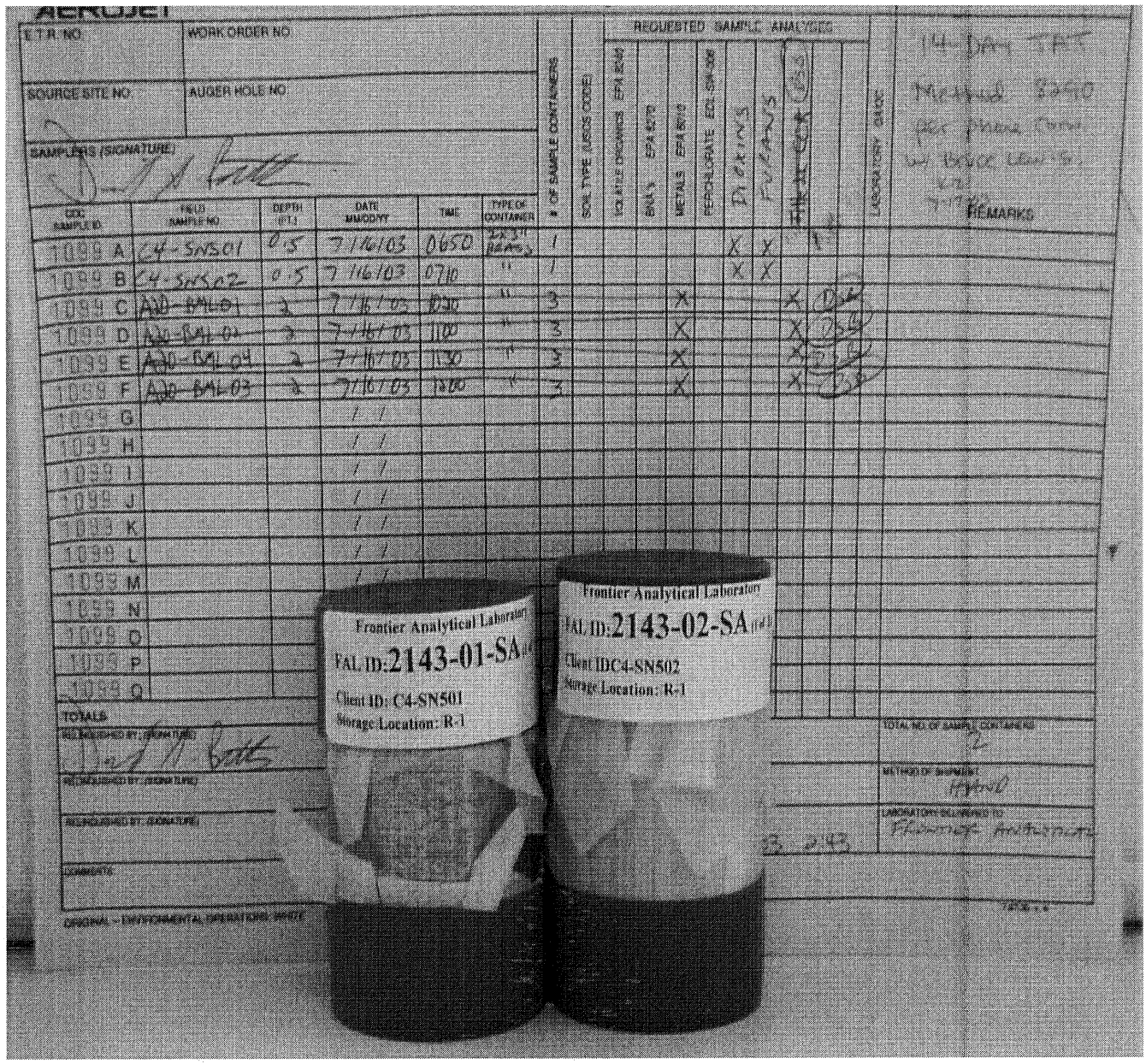
Sample Login Form

FAL Project ID: **2143**

Client:	ERM West
Client Project ID:	1099
Date Received:	07/16/2003
Time Received:	02:43 pm
Received By:	KZ
# of Samples Received:	2
Duplicates:	0
Storage Location:	R1

Method of Delivery:	Other
Tracking Number:	Hand Delivered
Shipping Container Received Intact	Yes
Custody seals(s) present?	No
Custody seals(s) intact?	No
Sample Arrival Temperature (C)	0
Cooling Method	Blue Ice
Chain Of Custody Present?	Yes
Return Shipping Container To Client	Yes
Test for residual Chlorine	No
Thiosulfate Added	No
Earliest Sample Hold Time Expiration	08/15/2003
Adequate Sample Volume	Yes

Anomalies or additional comments:


AEROJET
E.T.R. NO.
WORK ORDER NO.
SOURCE SITE NO.
AUGER HOLE NO.
SAMPLERS (SIGNATURE)
REQUESTED SAMPLE ANALYSIS
REMARKS
TOTALS
Frontier Analytical Laboratory
FAL ID: 2143-01-SA
Client ID: C4-SN501
Storage Location: R-1
Frontier Analytical Laboratory
FAL ID: 2143-02-SA
Client ID: C4-SN502
Storage Location: R-1