4017

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403
Phone: (303) 278-4455 • FAX: (303) 278-7012

RECEIVED FEB 1998

John Miglio
LOS ALAMOS NATIONAL LABORATORY
SMO, TA-3, Bldg. 271, MS H865
LOS ALAMOS, NEW MEXICO 87545

January 29, 1998

FIELD COPY

Lab. No. 275297st

SIX FOLD DISSOLVED ORGANIC CARBON
FRACTIONATION RESULTS

Report Sent To: Roland D. Fizell
Approved By:
Date Sent: 2/4/98

Sample	STANDARD MIX		
Conductivity (microsiemens/cm2)	18		
pH	7.3		
Dissolved organic carbon (MG/L)	6.5		
Hydrophobics Total (MG/L)	3.3	(51)	
bases	0.0	(--)	
acids	3.0	(46)	Benzoic Acid 95% recovery
neutrals	0.3	(5)	
'drophilics 'otal (MG/L)	3.2	(49)	
ases	0.2	(3)	
:ids	2.9	(45)	Acetic Acid 91% recovery
utrals	0.1	(2)	

The numbers in parentheses are the percent of the total .C. in that fraction.

6981

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403
Phone: (303) 278-4455 • FAX: (303) 278-7012

John Miglio
LOS ALAMOS NATIONAL LABORATORY
SMO, TA-3, Bldg. 271, MS H865
LOS ALAMOS, NEW MEXICO 87545

January 29, 1998

Lab. No. 27529701

SIX FOLD DISSOLVED ORGANIC CARBON
FRACTIONATION RESULTS

Sample	04LA-97-0628-01	
Conductivity (microsiemens/cm2)	89	
pH	6.8	
Dissolved organic carbon (MG/L)	5.6	
Hydrophobics		
Total (MG/L)	3.4	(60)
bases	0.1	(2)
acids	1.4	(25)
neutrals	1.9	(34)
Hydrophilics		
Total (MG/L)	2.3	(41)
bases	0.2	(4)
acids	1.3	(23)
neutrals	0.7	(12)

The numbers in parentheses are the percent of the total .O.C. in that fraction.

Sample was diluted 1:3 before fractionation analysis. sults reported are based on the diluted sample.

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403
Phone: (303) 278-4455 • FAX: (303) 278-7012

John Miglio
LOS ALAMOS NATIONAL LABORATORY
SMO, TA-3, Bldg. 271, MS H865
LOS ALAMOS, NEW MEXICO 87545

January 29, 1998

Lab. No. 2752971D

SIX FOLD DISSOLVED ORGANIC CARBON
FRACTIONATION RESULTS

Sample	04LA-97-0628-01	
Conductivity (microsiemens/cm2)	89	
pH	6.7	
Dissolved organic carbon (MG/L)	5.9	
Hydrophobics Total (MG/L)	3.5	(60)
bases	0.1	(2)
acids	1.6	(27)
neutrals	1.8	(31)
ydrophilics Total (MG/L)	2.4	(41)
bases	0.2	(3)
icids	1.3	(22)
eutrals	0.9	(15)

The numbers in parentheses are the percent of the total
).C. in that fraction.

Sample was diluted 1:3 before fractionation analysis.
ılts reported are based on the diluted sample.

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403

ANALYSIS: SIX FOLD DOC FRACTIONATION	HUFFMAN LAB NO: DI
PROCEDURE: USGS/WRI 79-4	pH: 5.00 METER: Orion 611
CUSTOMER:	CONDUCTIVITY: 0.46 µMHOS
CUSTOMER'S SAMPLE NO:	METER: Fisher 09-326-2
SAMPLE DILUTION:	SCREEN DOC:

SAMPLE	DOC	AVERAGE	DILUTION FACTOR (ROUND TO NEAREST 0.1)	DETERMINED MG/L C	BLANK MG/L C	RESULT MG/L C
A. INITIAL	0.22	.22				
	0.23					
B. HCL	0.40	[illegible]	V3/V1			
X2 0.30	[illegible]					
C. NAOH		2.[illegible]	V4/V1			
X10 0.44	2.[illegible]					
X4 0.68	[illegible]					
D. XAD	0.30	[illegible]	V2/V1			
X2 0.25	[illegible]					
E. CATION	0.32	.32	V2/V1			
X2 0.24	[illegible]					
F. ANION	0.38	[illegible]	V2/V1			
X2 0.30	.46					

VOLUME FRACTIONATED	V1	160	DILUTED TO VOLUME	V2	180
VOLUME HCL	V3	25	VOLUME NAOH	V1	25

COLUMN BLANKS:	XAD	0.30 MG/L C	CATION	0.31 MG/L C	ANION	0.30 MG/L C

CALCULATED RESULTS

TOTAL HYDROPHOBICS	A-D		TOTAL HYDROPHILICS	D	
BASES	B		BASES	D-E	
ACIDS	C		ACIDS	E-F	
NEUTRALS	A-D-B-C		NEUTRALS	F	

COMMENTS: [illegible]

ANALYST Dominic Chavez	DATE 1-28-97	REVIEWED EH	DATE 1-27-98

9/22/92

(1)

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403

ANALYSIS: SIX FOLD DOC FRACTIONATION	HUFFMAN LAB NO: STd
PROCEDURE: USGS/WRI 79-4	pH: 7.34 METER: Orion 611
CUSTOMER:	CONDUCTIVITY: 18.13 µMHOS
CUSTOMER'S SAMPLE NO:	METER: Fisher 09-326-2
SAMPLE DILUTION:	SCREEN DOC:

SAMPLE	DOC	AVERAGE	DILUTION FACTOR (ROUND TO NEAREST 0.1)	DETERMINED MG/L C	BLANK MG/L C	RESULT MG/L C
A. INITIAL	6.47					
	6.50					
B. HCL	0.51		V3/V1			
x2 0.33	.52					
C. NAOH			V4/V1			
x10 2.47	[illegible]	[illegible]				
x4 5.92	[illegible]					
D. XAD	3.09	[illegible]	V2/V1			
x2 1.59	[illegible]					
E. CATION	2.91	[illegible]	V2/V1			
x2 1.53	[illegible]					
F. ANION	0.32	[illegible]	V2/V1			
x2 0.21	[illegible]					

VOLUME FRACTIONATED	V1	173	DILUTED TO VOLUME	V2	194
VOLUME HCL	V3	26	VOLUME NAOH	V1	25

COLUMN BLANKS:	XAD	0.24	MG/L C	CATION	0.44 MG/L C	ANION	0.25 MG/L C

CALCULATED RESULTS

TOTAL HYDROPHOBICS	A-D		TOTAL HYDROPHILICS	D	
BASES	B		BASES	D-E	
ACIDS	C		ACIDS	E-F	
NEUTRALS	A-D-B-C		NEUTRALS	F	

COMMENTS: STd

	WT	mg/L
Benzoic	4.603	3.17
	7.913	3.17
	~~18.206~~	~~3.08~~
		~~9.42~~

6.34 mg/L

did not use
BC 1-28-98

ANALYST Bonnie Christy	DATE 1-28-98	REVIEWED EH	DATE 1-27-98

9/22/92

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403

ANALYSIS: SIX FOLD DOC FRACTIONATION	HUFFMAN LAB NO: 7752-01
PROCEDURE: USGS/WRI 79-4	pH: 6.84 METER: Orion 111
CUSTOMER: Los Alamos	CONDUCTIVITY: 89.3 µMHOS
CUSTOMER'S SAMPLE NO: 041A-97-0628-01	METER: Fisher 09-326-2
SAMPLE DILUTION: x3	SCREEN DOC: 20

SAMPLE	DOC	AVERAGE	DILUTION FACTOR (ROUND TO NEAREST 0.1)	DETERMINED MG/L C	BLANK MG/L C	RESULT MG/L C
A. INITIAL	5.61	[illegible]				
	5.67					
B. HCL	0.73	[illegible]	V3/V1			
x2 0.43	[illegible]					
C. NAOH			V4/V1			
x10 1.45	13.1	[illegible]				
x4 2.97	[illegible]					
D. XAD	2.28	2.29	V2/V1			
x2 1.23	2.46					
E. CATION	2.09	[illegible]	V2/V1			
x2 1.13	[illegible]					
F. ANION	0.90	[illegible]	V2/V1			
x2 0.51	[illegible]					

VOLUME FRACTIONATED	V1	162	DILUTED TO VOLUME	V2	182
VOLUME HCL	V3	25	VOLUME NACH	V1	25

COLUMN BLANKS:	XAD	0.29	MG/L C	CATION	0.32 MG/L C	ANION	0.30 MG/L C

CALCULATED RESULTS

TOTAL HYDROPHOBICS	A-D		TOTAL HYDROPHILICS	D	
BASES	B		BASES	D-E	
ACIDS	C		ACIDS	E-F	
NEUTRALS	A-D-B-C		NEUTRALS	F	

COMMENTS:

ANALYST Donna Christy	DATE 1-28-98	REVIEWED [illegible]	DATE 1-29-98

9/22/92

(3)

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403

ANALYSIS: SIX FOLD DOC FRACTIONATION	HUFFMAN LAB NO: 2752-01 Pup
PROCEDURE: USGS/WRI 79-4	pH: 6.79 METER: Orion 611
CUSTOMER: Los Alamos	CONDUCTIVITY: 89.5 µMHOS
CUSTOMER'S SAMPLE NO: 04LA-97-0628-01	METER: Fisher 09-326-2
SAMPLE DILUTION: X3	SCREEN DOC: 20

SAMPLE	DOC	AVERAGE	DILUTION FACTOR (ROUND TO NEAREST 0.1)	DETERMINED MG/L C	BLANK MG/L C	RESULT MG/L C
A. INITIAL	5.85	5.87				
	5.88					
B. HCL	0.71	[illegible]	V3/V1			
X2 0.41	[illegible]					
C. NAOH		[illegible]	V4/V1			
X10 1.43	[illegible]					
X4 3.37	[illegible]					
D. XAD	2.36	2.3[illegible]	V2/V1			
X2 1.13	[illegible]					
E. CATION	2.18	2.15	V2/V1			
X2 1.17	[illegible]					
F. ANION	1.06	1.[illegible]	V2/V1			
X2 0.72	[illegible]					

VOLUME FRACTIONATED	V1	162	DILUTED TO VOLUME	V2	182
VOLUME HCL	V3	25	VOLUME NAOH	V1	25

COLUMN BLANKS:	XAD	0.28 MG/L C	CATION	0.42 MG/L C	ANION	0.35 MG/L C

CALCULATED RESULTS

TOTAL HYDROPHOBICS	A-D		TOTAL HYDROPHILICS	D	
BASES	B		BASES	D-E	
ACIDS	C		ACIDS	E-F	
NEUTRALS	A-D-B-C		NEUTRALS	F	

COMMENTS:

ANALYST Bonnie Christy	DATE 1-28-98	REVIEWED [illegible]	DATE 1-29-98

9/22/92

(4)

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403

.5 mg/L STd pH 49 [illegible] 1-28-98
1.0 mg/L STd 99 [illegible] 1-28-98

Analysis:	TOTAL ORGANIC CARBON (TOC)
Method:	☐ SM 5310 ☐ EPA SW-846 9060
Detection Limit:	0.05 mg C/L
Analyzer:	OI Model 700 TOC Analyzer

5 mg/L Std: BN= 99	~~10~~ mg/L Std: 9 BN= 461	100 mg/L stock Solution BN= 99
☑ KHP ☐ Benzoic Acid ☐ _____	☐ KHP ☑ Benzoic Acid ☐ _____	☑ KHP ☑ Benzoic Acid ☑ DW 461
prep date 1-28-98	prep date 1-28-98	prep date 1-16-98

	Sample #	Dilution	Loop Size	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
13	5ppm KHP					3rd 543.016		
14	5ppm KHP					556.940		
15	5ppm KHP					556.471		
16	5ppm KHP				5.02123	-.17 Bl = 4.85	ICS	97.0%
17	9ppm Benzoic				8.93874	-.17 Bl = 8.77	LCS	97.4%
18	9 ppm Benzoic				9.20392	-.17 Bl = 9.03		100.3%
19	DI				0.24533			
20	DI				0.20282			
21	1ppm KHP				1.15269	-.17 Bl = 0.98	CCS	98.0%
22	1ppm KHP				1.13863	-.17 Bl = 0.97	CCS	97.0%
23	.5 ppm KHP				0.72674	-.17 Bl = 0.56	CCS	112.0%
24	.5 ppm KHP				0.64004	-.17 Bl = 0.47	CCS	0.94%
25	DI				0.16514			
26	DI				0.15814			
27	DI In				0.22151			
28	DI In				0.22917			
29	STd In				6.47309			
30	STd In				6.56276		imp	± .23% of mean
31	2752-01 In				5.61050			
32	2752-01 In				5.66516			
33	2752-01P In				5.55252			
34	2752-01D In				5.87667			
35	5ppm				5.1927	-.17 Bl = 5.02	CCS	100.4%
36	DI				0.24218			

Analyst	Date	Reviewed	Date	Page
B Ebrecht	1-28-98	ZH	1-29-98	1 of 4

rev. 0.0 10/6/95

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403

.5 mg/L Std: 0N99 Prep 1-28-98
1.0 mg/L STd: 0N99 prep 1-28-98

Analysis:	TOTAL ORGANIC CARBON (TOC)
Method:	☐ SM 5310 ☐ EPA SW-846 9060
Detection Limit:	0.05 mg C/L
Analyzer:	OI Model 700 TOC Analyzer

5 mg/L Std: BN= 99	10 mg/L Std: 9 BN= 461	100 mg/L stock Solution BN= 99
☐ KHP ☐ Benzoic Acid ☐ _____	☐ KHP ☑ Benzoic Acid ☐ _____	☐ KHP ☐ Benzoic Acid ☐ 61 461
prep date 1-28-98	prep date 1-28-98	prep date 1-16-98

	Sample #	Dilution	Loop Size	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
37	An Bl 1				0.30222			
38	An Bl 2				0.28050			
39	An Bl 3				0.29551			
40	An Bl 4				0.34734			
41	Cat Bl 1				0.31245			
42	Cat Bl 2				0.43870			
43	Cat Bl 3				0.32189			
44	Cat Bl 4				0.42293			
45	KHP .5 ppm				0.68801	-.17Bl = 0.52	CCS	104.0%
46	DI				0.18499			
47	XaD Bl 1				0.30141			
48	XaD Bl 2				0.23870			
49	XaD Bl 3				0.28746			
50	XaD Bl 4				0.28371			
51	KHP .5 ppm				0.63079	-.17Bl = 0.46	CCS	92.0%
52	DI				0.14929			
53	DI H_2SO_4	x 2			0.29873			
54	DI H_2SO_4				0.40694			
55	STd H_2SO_4	x 2			0.33468			
56	STd H_2SO_4				0.50879			
57	H_2SO_4 2752-01	x 2			0.42790			
58	H_2SO_4 2752-01				0.73116			
59	H_2SO_4 2752-01 Dup	x 2			0.40501			
60	H_2SO_4 2752-01 2 up				0.70998		Dup	± 7.7%

Analyst	Date	Reviewed	Date	Page
D Coburn	1-28-98	EC	1-29-98	2 of 4

rev. 0.0 10/6/95

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403

.5 mg/L STD: 0499 prep 1-16-98
1.0 mg/L STD: 0499 prep 1-16-98

Analysis:	TOTAL ORGANIC CARBON (TOC)
Method:	☐ SM 5310 ☐ EPA SW-846 9060
Detection Limit:	0.05 mg C/L
Analyzer:	OI Model 700 TOC Analyzer

5 mg/L Std: BN= 99	10 mg/L Std: 9 BN= 961	100 mg/L stock Solution BN= 99
☐ KHP ☐ Benzoic Acid ☐ _____	☐ KHP ☐ Benzoic Acid ☐ _____	☐ KHP ☐ Benzoic Acid ☐ BN= 461
prep date 1-16-98	prep date 1-16-98	prep date 1-16-98

	Sample #	Dilution	Loop Size	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
61	STd I KHP 5 ppm	BC 1-28-98			6.49991	STd I		
62	STd VI I DI	BC 1-28-98			6.48882	STd I		
63	5 ppm KHP				5.19827	-.17 Pl = 5.02	CCS	100.4%
64	DI				0.20071			
65	DI An	x2			0.30457			
66	DI An				0.37868			
67	STd An	x2			0.20729			
68	STd An				0.31703			
69	2752-01 An	x2			0.51076			
70	2752-01 An				0.90088		Dup	± 6.7% of mean
71	2752-01 An Dup	x2			0.72438			
72	2752-01 An Dup				1.06258			
73	1 ppm KHP				1.07991	-.17 Pl = 0.92	CCS	92.0%
74	DI				0.16072			
75	DI Cat	x2			0.24241			
76	DI Cat				0.32351			
77	STd Cat	x2			1.53374			
78	STd Cat				2.91477			
79	2752-01 Cat	x2			1.12524			
80	2752-01 Cat				2.08894			
81	2752-01 Cat Dup	x2			1.16871	± 2.34		
82	2752-01 Cat Dup				2.16917		Dup	± 3.9% of mean
83	5 ppm				4.97926	-.17 Pl = 4.81	CCS	96.2%
84	DI				0.08439			

Analyst	Date	Reviewed	Date	Page
B Pirnity	1-28-98	GH	1-29-98	3 of 4

rev. 0.0 10/6/95

HUFFMAN

LABORATORIES, INC.

Quality Analytical Services Since 1936

4630 Indiana Street • Golden, CO 80403

.5 mg/L Std BN99 prep 1-28-98

1.0 mg/L Std BN99 prep 1-28-98

Analysis:	**TOTAL ORGANIC CARBON (TOC)**
Method:	☐ SM 5310 ☐ EPA SW-846 9060
Detection Limit:	0.05 mg C/L
Analyzer:	OI Model 700 TOC Analyzer

5 mg/L Std: BN= 99	~~10~~ mg/L Std: 9 BN= 461	100 mg/L stock Solution BN= 99
☐ ~~KHP~~ ☐ Benzoic Acid ☐ _____	☐ KHP ☐ ~~Benzoic Acid~~ ☐ _____	☐ ~~KHP~~ ☐ ~~Benzoic Acid~~ ☐ BN=461
prep date 1-28-98	prep date 1-28-98	prep date 1-16-98

	Sample #	Dilution	Loop Size	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
85	DI XaD	x2			5.25117			
86	DI XaD				6.30416			
87	STd XaD	x2			1.59153			
88	STd XaD				3.68664			
89	XaD 2752-01	x2			1.22840			
90	XaD 2752-01				2.27612			
91	2752-01D XaD ~~2752~~ OC 128	x2			1.13289			
92	XaD 2752-01D				2.35590		2nd	± 2.2% of mean
93	KHP 5ppm				4.89169	-.17 BR = 4.72	CCS	94.4%
94	DI				0.18237			
95	DI NaOH	x10			0.44480			
96	DI NaOH	x4			0.68392			
97	STd NaOH	x10			2.46504			
98	STd NaOH	x4			5.92394			
99	2752-01 NaOH	x10			1.44911			
100	2752-01 NaOH	x4			2.96754		dup	± 1.2% of mean
101	NaOH 2752-01 Dup	x10			1.42755			
102	NaOH 2752-01 Dup	x4			3.36636			
103	5ppm				5.05002	-.17 BR = 4.88	CCS	97.6%
104	5ppm				5.09602	-.17 BR = 4.93	CCS	98.6%
105	DI				0.13840			
106	DI				0.15422			
107	thru blanks							
108								

Analyst	Date	Reviewed	Date	Page
B Clinesty	1-28-98	EH	1-29-98	4 of 4

rev. 0.0 10/6/95

1-28-98

SPL# 00001	01:18:20	TIC =	33.0054 mV	1.52814 ug C	0.30562 ppm
SPL# 00001	01:23:20	TOC =	48.9717 mV	2.26738 ug C	0.45347 ppm
SPL# 00002	01:26:25	TIC =	0.54791 mV	0.02536 ug C	0.00507 ppm
SPL# 00002	01:31:25	TOC =	46.9415 mV	2.17338 ug C	0.43467 ppm
SPL# 00003	01:34:30	TIC =	0.62813 mV	0.02908 ug C	0.00581 ppm
SPL# 00003	01:39:30	TOC =	34.9913 mV	1.62008 ug C	0.32401 ppm
SPL# 00004	01:42:35	TIC =	0.76185 mV	0.03527 ug C	0.00705 ppm
SPL# 00004	01:47:35	TOC =	25.3779 mV	1.17499 ug C	0.23499 ppm
SPL# 00005	01:50:40	TIC =	0.92237 mV	0.04270 ug C	0.00854 ppm
SPL# 00005	01:55:40	TOC =	15.6155 mV	0.72299 ug C	0.14459 ppm
SPL# 00006	01:58:45	TIC =	0.60139 mV	0.02784 ug C	0.00556 ppm
SPL# 00006	02:03:45	TOC =	9.81573 mV	0.45446 ug C	0.09089 ppm
SPL# 00007	02:06:50	TIC =	0.54791 mV	0.02536 ug C	0.00507 ppm
SPL# 00007	02:11:50	TOC =	5.99888 mV	0.27774 ug C	0.05554 ppm
SPL# 00008	02:14:55	TIC =	0.60139 mV	0.02784 ug C	0.00556 ppm
SPL# 00008	02:19:55	TOC =	4.19913 mV	0.19441 ug C	0.03888 ppm
SPL# 00009	02:23:00	TIC =	0.57465 mV	0.02660 ug C	0.00532 ppm
SPL# 00009	02:28:00	TOC =	4.14387 mV	0.19186 ug C	0.03837 ppm
SPL# 00010	02:31:05	TIC =	1.27038 mV	0.05881 ug C	0.01176 ppm
SPL# 00010	02:36:05	TOC =	2.70939 mV	0.12544 ug C	0.02508 ppm
SPL# 00011	02:39:10	TIC =	0.41425 mV	0.01918 ug C	0.00383 ppm
SPL# 00011	02:44:10	TOC =	1.80142 mV	0.08340 ug C	0.01668 ppm
SPL# 00012	02:47:15	TIC =	0.46771 mV	0.02165 ug C	0.00433 ppm
SPL# 00012	02:52:15	TOC =	2.62677 mV	0.12161 ug C	0.02432 ppm
SPL# 00013	02:55:20	TIC =	13.4616 mV	0.62326 ug C	0.12465 ppm
SPL# 00013	03:00:20	TOC =	543.016 mV	25.1415 ug C	

SPL# 00014	03:03:25		TIC =	12.9389 mV	0.59906 ug C	0.11981 ppm
SPL# 00014	03:08:25		TOC =	556.940 mV	25.7861 ug C	5.15723 ppm
SPL# 00015	03:11:30		TIC =	12.5816 mV	0.58252 ug C	0.11650 ppm
SPL# 00015	03:16:30		TOC =	556.471 mV	25.7644 ug C	5.15288 ppm
SPL# 00016	03:49:23		TIC =	15.7798 mV	0.72155 ug C	0.14431 ppm
SPL# 00016	03:54:23		TOC =	549.054 mV	25.1061 ug C	5.02123 ppm
SPL# 00017	03:57:28		TIC =	15.9735 mV	0.73040 ug C	0.14608 ppm
SPL# 00017	04:02:28	N.L.	TOC =	977.420 mV	44.6937 ug C	8.93874 ppm
SPL# 00018	04:05:33		TIC =	16.6938 mV	0.76334 ug C	0.15266 ppm
SPL# 00018	04:10:33	N.L.	TOC =	1006.42 mV	46.0196 ug C	9.20392 ppm
SPL# 00019	04:13:38		TIC =	13.3240 mV	0.60925 ug C	0.12185 ppm
SPL# 00019	04:18:38		TOC =	26.8265 mV	1.22667 ug C	0.24533 ppm
SPL# 00020	04:21:43		TIC =	11.9776 mV	0.54768 ug C	0.10953 ppm
SPL# 00020	04:26:43		TOC =	22.1778 mV	1.01411 ug C	0.20282 ppm
SPL# 00021	04:29:48		TIC =	12.4168 mV	0.56777 ug C	0.11355 ppm
SPL# 00021	04:34:48		TOC =	126.043 mV	5.76344 ug C	1.15269 ppm
SPL# 00022	04:37:53		TIC =	12.1148 mV	0.55396 ug C	0.11079 ppm
SPL# 00022	04:42:53		TOC =	124.505 mV	5.69314 ug C	1.13863 ppm
SPL# 00023	04:45:58		TIC =	16.0289 mV	0.73294 ug C	0.14658 ppm
SPL# 00023	04:50:58		TOC =	79.4666 mV	3.63371 ug C	0.72674 ppm
SPL# 00024	04:54:03		TIC =	12.2520 mV	0.56023 ug C	0.11204 ppm
SPL# 00024	04:59:03		TOC =	69.9866 mV	3.20022 ug C	0.64004 ppm
SPL# 00025	05:02:08		TIC =	15.2820 mV	0.69878 ug C	0.13975 ppm
SPL# 00025	05:07:08		TOC =	18.0584 mV	0.82574 ug C	0.16514 ppm
SPL# 00026	05:10:13		TIC =	19.1959 mV	0.87775 ug C	0.17555 ppm
SPL# 00026	05:15:13		TOC =	17.3469 mV	0.79320 ug C	0.15864 ppm

[illegible]	05:18:18	TIC =	21.7679 mV	0.99536 ug C	0.19907 ppm
SPL# 00027	05:23:18	TOC =	24.2222 mV	1.10759 ug C	0.22151 ppm
SPL# 00028	05:26:23	TIC =	20.5081 mV	0.93775 ug C	0.18755 ppm
S[illegible]# 00028	05:31:23	TOC =	25.0598 mV	1.14589 ug C	0.22917 ppm
SPL# 00029	05:34:28	TIC =	33.4652 mV	1.53024 ug C	0.30604 ppm
SPL# 00029	05:39:28	TOC =	707.810 mV	32.3655 ug C	6.47309 ppm
SPL# 00030	05:42:33	TIC =	36.8410 mV	1.68460 ug C	0.33692 ppm
SPL# 00030	05:47:33	TOC =	711.054 mV	32.5138 ug C	6.50276 ppm
SPL# 00031	05:50:38	TIC =	833.575 mV	38.1162 ug C	7.62324 ppm
SPL# 00031	05:55:38	TOC =	613.489 mV	28.0525 ug C	5.61050 ppm
SPL# 00032	05:58:43	TIC =	830.784 mV	37.9886 ug C	7.59772 ppm
SPL# 00032	06:03:43	TOC =	619.466 mV	28.3258 ug C	5.66516 ppm
SPL# 00033	06:06:48	TIC =	856.084 mV	39.1455 ug C	7.82909 ppm
S[illegible]# 00033	06:11:48	TOC =	639.953 mV	29.2626 ug C	5.85252 ppm
SPL# 00034	06:14:53	TIC =	852.962 mV	39.0027 ug C	7.80054 ppm
SPL# 00034	06:19:53	TOC =	642.593 mV	29.3833 ug C	5.87667 ppm
SPL# 00035	06:22:58	TIC =	18.7501 mV	0.85737 ug C	0.17147 ppm
SPL# 00035	06:27:58	TOC =	567.538 mV	25.9514 ug C	5.19027 ppm
[illegible]PL# 00036	06:31:03	TIC =	12.8839 mV	0.58913 ug C	0.11782 ppm
[illegible]PL# 00036	06:36:03	TOC =	26.5364 mV	1.21341 ug C	0.24268 ppm
[illegible]L# 00037	06:39:08	TIC =	21.5998 mV	0.98767 ug C	0.19753 ppm
[illegible]L# 00037	06:44:08	TOC =	33.0473 mV	1.51113 ug C	0.30222 ppm
[illegible]# 00038	06:47:13	TIC =	19.5306 mV	0.89305 ug C	0.17861 ppm
[illegible]# 00038	06:52:13	TOC =	30.6721 mV	1.40252 ug C	0.28050 ppm
[illegible]# 00039	06:55:18	TIC =	24.8058 mV	1.13427 ug C	0.22685 ppm
[illegible]# 00039	07:00:18	TOC =	32.3129 mV	1.47755 ug C	0.29551 ppm

SPL# 00040	07:08:23	TOC =	37.9813 mV	1.73674 ug C	0.34734 ppm
SPL# 00041	07:11:28	TIC =	27.6365 mV	1.26371 ug C	0.25274 ppm
SPL# 00041	07:16:28	TOC =	34.1656 mV	1.56226 ug C	0.31245 ppm
SPL# 00042	07:19:33	TIC =	25.2858 mV	1.15622 ug C	0.23124 ppm
SPL# 00042	07:24:33	TOC =	47.9707 mV	2.19352 ug C	0.43870 ppm
SPL# 00043	07:27:38	TIC =	30.7132 mV	1.40440 ug C	0.28088 ppm
SPL# 00043	07:32:38	TOC =	35.1979 mV	1.60947 ug C	0.32189 ppm
SPL# 00044	07:35:43	TIC =	29.8566 mV	1.36523 ug C	0.27304 ppm
SPL# 00044	07:40:43	TOC =	46.2465 mV	2.11467 ug C	0.42293 ppm
SPL# 00045	07:43:48	TIC =	19.7817 mV	0.90454 ug C	0.18090 ppm
SPL# 00045	07:48:48	TOC =	75.2323 mV	3.44009 ug C	0.68801 ppm
SPL# 00046	07:51:53	TIC =	15.4479 mV	0.70637 ug C	0.14127 ppm
SPL# 00046	07:56:53	TOC =	20.2280 mV	0.92495 ug C	0.18499 ppm
SPL# 00047	07:59:58	TIC =	32.0012 mV	1.46329 ug C	0.29265 ppm
SPL# 00047	08:04:58	TOC =	32.9591 mV	1.50709 ug C	0.30141 ppm
SPL# 00048	08:08:03	TIC =	39.0759 mV	1.78679 ug C	0.35735 ppm
SPL# 00048	08:13:03	TOC =	26.1017 mV	1.19353 ug C	0.23870 ppm
PL# 00049	08:16:08	TIC =	36.9279 mV	1.68857 ug C	0.33771 ppm
PL# 00049	08:21:08	TOC =	31.4332 mV	1.43732 ug C	0.28746 ppm
L# 00050	08:24:13	TIC =	33.6377 mV	1.53812 ug C	0.30762 ppm
L# 00050	08:29:13	TOC =	31.0232 mV	1.41857 ug C	0.28371 ppm
# 00051	08:32:18	TIC =	21.2636 mV	0.97230 ug C	0.19446 ppm
# 00051	08:37:18	TOC =	68.9752 mV	3.15397 ug C	0.63079 ppm
# 00052	08:40:23	TIC =	18.8337 mV	0.86119 ug C	0.17223 ppm
# 00052	08:45:23	TOC =	16.3243 mV	0.74644 ug C	0.14929 ppm
00053	08:48:28	TIC =	46.0798 mV	2.10705 ug C	

[illegible]	08:53:28	TOC =	32.6653 mV	1.49366 ug C	0.29875 ppm
SPL# 00054	08:56:33	TIC =	25.2858 mV	1.15622 ug C	0.23124 ppm
SPL# 00054	09:01:33	TOC =	44.4981 mV	2.03473 ug C	0.40694 ppm
SPL# 00055	09:04:38	TIC =	24.3827 mV	1.11493 ug C	0.22298 ppm
SPL# 00055	09:09:38	TOC =	36.5876 mV	1.67301 ug C	0.33460 ppm
SPL# 00056	09:12:43	TIC =	23.0875 mV	1.05570 ug C	0.21114 ppm
SPL# 00056	09:17:43	TOC =	55.6349 mV	2.54397 ug C	0.50879 ppm
SPL# 00057	09:20:48	TIC =	24.0726 mV	1.10075 ug C	0.22015 ppm
SPL# 00057	09:25:48	TOC =	46.7903 mV	2.13954 ug C	0.42790 ppm
SPL# 00058	09:28:53	TIC =	23.7628 mV	1.08658 ug C	0.21731 ppm
SPL# 00058	09:33:53	TOC =	79.9499 mV	3.65581 ug C	0.73116 ppm
SPL# 00059	09:36:58	TIC =	20.4801 mV	0.93647 ug C	0.18729 ppm
SPL# 00059	09:41:58	TOC =	44.2875 mV	2.02510 ug C	0.40501 ppm
SPL# 00060	09:45:03	TIC =	22.3571 mV	1.02230 ug C	0.20446 ppm
SPL# 00060	09:50:03	TOC =	77.6341 mV	3.54991 ug C	0.70998 ppm
SPL# 00061	09:53:08	TIC =	19.5306 mV	0.89305 ug C	0.17861 ppm
SPL# 00061	09:58:08	TOC =	710.524 mV	32.4895 ug C	6.49791 ppm
SPL# 00062	10:01:13	TIC =	18.3604 mV	0.83954 ug C	0.16791 ppm
SPL# 00062	10:06:13	TOC =	709.530 mV	32.4441 ug C	6.48882 ppm
SPL# 00063	10:09:18	TIC =	32.9767 mV	1.50790 ug C	0.30158 ppm
PL# 00063	10:14:18	TOC =	567.538 mV	25.9514 ug C	5.19027 ppm
PL# 00064	10:17:23	TIC =	16.5275 mV	0.75573 ug C	0.15114 ppm
L# 00064	10:22:23	TOC =	21.9480 mV	1.00360 ug C	0.20071 ppm
# 00065	10:25:28	TIC =	50.5875 mV	2.31317 ug C	0.46263 ppm
# 00065	10:30:28	TOC =	33.2825 mV	1.52188 ug C	0.30437 ppm
# 00066	10:33:33	TIC =	57.3371 mV	2.62181 ug C	0.52436 ppm

SPL# 00067	10:41:38	TIC =	30.7132 mV	1.40440 ug C	0.28088 ppm
SPL# 00067	10:46:38	TOC =	22.6665 mV	1.03645 ug C	0.20729 ppm
S# 00068	10:49:43	TIC =	35.2222 mV	1.61058 ug C	0.32211 ppm
SPL# 00068	10:54:43	TOC =	34.6667 mV	1.58518 ug C	0.31703 ppm
SPL# 00069	10:57:48	TIC =	45.5193 mV	2.08142 ug C	0.41628 ppm
SPL# 00069	11:02:48	TOC =	55.8503 mV	2.55382 ug C	0.51076 ppm
SPL# 00070	11:05:53	TIC =	81.8731 mV	3.74374 ug C	0.74874 ppm
SPL# 00070	11:10:53	TOC =	98.5083 mV	4.50441 ug C	0.90088 ppm
SPL# 00071	11:13:58	TIC =	40.7078 mV	1.86141 ug C	0.37228 ppm
SPL# 00071	11:18:58	TOC =	79.2090 mV	3.62193 ug C	0.72438 ppm
SPL# 00072	11:22:03	TIC =	67.4971 mV	3.08638 ug C	0.61727 ppm
SPL# 00072	11:27:03	TOC =	116.190 mV	5.31291 ug C	1.06258 ppm
S# 00073	11:30:08	TIC =	18.8615 mV	0.86246 ug C	0.17249 ppm
SPL# 00073	11:35:08	TOC =	118.085 mV	5.39957 ug C	1.07991 ppm
SPL# 00074	11:38:13	TIC =	14.8400 mV	0.67857 ug C	0.13571 ppm
SPL# 00074	11:43:13	TOC =	17.5745 mV	0.80361 ug C	0.16072 ppm
SPL# 00075	11:46:18	TIC =	25.9926 mV	1.18854 ug C	0.23770 ppm
SPL# 00075	11:51:18	TOC =	26.5074 mV	1.21208 ug C	0.24241 ppm
SPL# 00076	11:54:23	TIC =	22.8626 mV	1.04542 ug C	0.20908 ppm
PL# 00076	11:59:23	TOC =	35.3751 mV	1.61757 ug C	0.32351 ppm
PL# 00077	12:02:28	TIC =	23.5939 mV	1.07886 ug C	0.21577 ppm
PL# 00077	12:07:28	TOC =	167.709 mV	7.66868 ug C	1.53374 ppm
# 00078	12:10:33	TIC =	25.1728 mV	1.15106 ug C	0.23021 ppm
L# 00078	12:15:33	TOC =	318.720 mV	14.5738 ug C	2.91477 ppm
# 00079	12:18:38	TIC =	46.1684 mV	2.11110 ug C	0.42222 ppm
# 00079	12:23:38	TOC =	123.041 mV	5.62621 ug C	

SPL# 00080	12:26:43	TIC =	67.9904 mV	3.10894 ug C	0.62178 ppm
SPL# 00080	12:31:43	TOC =	228.418 mV	10.4447 ug C	2.08894 ppm
SPL# 00081	12:34:48	TIC =	35.1934 mV	1.60926 ug C	0.32185 ppm
SPL# 00081	12:39:48	TOC =	127.794 mV	5.84355 ug C	1.16871 ppm
SPL# 00082	12:42:53	TIC =	51.3329 mV	2.34726 ug C	0.46945 ppm
SPL# 00082	12:47:53	TOC =	237.191 mV	10.8458 ug C	2.16917 ppm
SPL# 00083	12:50:58	TIC =	26.7005 mV	1.22091 ug C	0.24418 ppm
SPL# 00083	12:55:58	TOC =	544.465 mV	24.8963 ug C	4.97926 ppm
SPL# 00084	12:59:03	TIC =	17.0544 mV	0.77983 ug C	0.15596 ppm
SPL# 00084	13:04:03	TOC =	9.22859 mV	0.42198 ug C	0.08439 ppm
SPL# 00085	13:07:08	TIC =	20.4242 mV	0.93392 ug C	0.18678 ppm
SPL# 00085	13:12:08	TOC =	27.4653 mV	1.25588 ug C	0.25117 ppm
SPL# 00086	13:15:13	TIC =	23.0875 mV	1.05570 ug C	0.21114 ppm
SPL# 00086	13:20:13	TOC =	33.2531 mV	1.52054 ug C	0.30410 ppm
SPL# 00087	13:23:18	TIC =	22.6098 mV	1.03386 ug C	0.20677 ppm
SPL# 00087	13:28:18	TOC =	174.029 mV	7.95767 ug C	1.59153 ppm
SPL# 00088	13:31:23	TIC =	23.7346 mV	1.08529 ug C	0.21705 ppm
SPL# 00088	13:36:23	TOC =	337.513 mV	15.4332 ug C	3.08664 ppm
SPL# 00089	13:39:28	TIC =	47.7357 mV	2.18277 ug C	0.43655 ppm
SPL# 00089	13:44:28	TOC =	134.322 mV	6.14202 ug C	1.22840 ppm
SPL# 00090	13:47:33	TIC =	80.4490 mV	3.67863 ug C	0.73572 ppm
SPL# 00090	13:52:33	TOC =	248.886 mV	11.3806 ug C	2.27612 ppm
SPL# 00091	13:55:38	TIC =	41.6721 mV	1.90551 ug C	0.38110 ppm
SPL# 00091	14:00:38	TOC =	123.877 mV	5.66444 ug C	1.13289 ppm
SPL# 00092	14:03:43	TIC =	64.8842 mV	2.96691 ug C	0.59338 ppm
SPL# 00092	14:08:43	TOC =	257.610 mV	11.7795 ug C	2.35590 ppm

[illegible]	14:11:48	TIC =	23.7065 mV	1.06401 ug C	[illegible] ppm
SPL# 00093	14:16:48	TOC =	534.824 mV	24.4555 ug C	4.89109 ppm
SPL# 00094	14:19:53	TIC =	19.6980 mV	0.90071 ug C	0.18014 ppm
[illegible]# 00094	14:24:53	TOC =	19.9420 mV	0.91187 ug C	0.18237 ppm
SPL# 00095	14:27:58	TIC =	7.20189 mV	0.32931 ug C	0.06586 ppm
SPL# 00095	14:32:58	TOC =	48.6378 mV	2.22402 ug C	0.44480 ppm
SPL# 00096	14:36:03	TIC =	7.82663 mV	0.35788 ug C	0.07157 ppm
SPL# 00096	14:41:03	TOC =	74.7852 mV	3.41964 ug C	0.68392 ppm
SPL# 00097	14:44:08	TIC =	8.99699 mV	0.41139 ug C	0.08227 ppm
SPL# 00097	14:49:08	TOC =	269.544 mV	12.3252 ug C	2.46504 ppm
SPL# 00098	14:52:13	TIC =	8.15293 mV	0.37280 ug C	0.07456 ppm
SPL# 00098	14:57:13	TOC =	647.762 mV	29.6197 ug C	5.92394 ppm
SPL# 00099	15:00:18	TIC =	8.45225 mV	0.38648 ug C	0.07729 ppm
[illegible]L# 00099	15:05:18	TOC =	158.455 mV	7.24553 ug C	1.44911 ppm
SPL# 00100	15:08:23	TIC =	8.39782 mV	0.38400 ug C	0.07680 ppm
SPL# 00100	15:13:23	TOC =	324.490 mV	14.8377 ug C	2.96754 ppm
SPL# 00101	15:16:28	TIC =	10.3071 mV	0.47130 ug C	0.09426 ppm
SPL# 00101	15:21:28	TOC =	156.098 mV	7.13776 ug C	1.42755 ppm
SPL# 00102	15:24:33	TIC =	8.47948 mV	0.38773 ug C	0.07754 ppm
SPL# 00102	15:29:33	TOC =	368.099 mV	16.8318 ug C	3.36636 ppm
SPL# 00103	15:32:38	TIC =	23.4813 mV	1.07371 ug C	0.21474 ppm
SPL# 00103	15:37:38	TOC =	552.202 mV	25.2501 ug C	5.05002 ppm
PL# 00104	15:40:43	TIC =	22.6098 mV	1.03386 ug C	0.20677 ppm
PL# 00104	15:45:43	TOC =	557.233 mV	25.4801 ug C	5.09602 ppm
L# 00105	15:48:48	TIC =	15.7521 mV	0.72028 ug C	0.14405 ppm
L# 00105	15:53:48	TOC =	15.1341 mV	0.69202 ug C	0.13840 ppm

SPL# 00106	16:01:53	TOC =	16.8638 mV	0.77111 ug C	0.15422 ppm
SPL# 00107	16:04:58	TIC =	20.5360 mV	0.93903 ug C	0.18780 ppm
SPL# 00107	16:09:58	TOC =	-0.17326 mV	-0.00792 ug C	-0.00158 ppm
SPL# 00108	16:13:03	TIC =	21.1796 mV	0.96846 ug C	0.19369 ppm
SPL# 00108	16:18:03	TOC =	0.81298 mV	0.03717 ug C	0.00743 ppm
SPL# 00109	16:21:08	TIC =	21.0396 mV	0.96206 ug C	0.19241 ppm
SPL# 00109	16:26:08	TOC =	0.59363 mV	0.02714 ug C	0.00542 ppm
SPL# 00110	16:29:13	TIC =	20.6759 mV	0.94542 ug C	0.18908 ppm
SPL# 00110	16:34:13	TOC =	0.81298 mV	0.03717 ug C	0.00743 ppm
SPL# 00111	16:37:18	TIC =	23.0875 mV	1.05570 ug C	0.21114 ppm
SPL# 00111	16:42:18	TOC =	-0.69291 mV	-0.03168 ug C	-0.00633 ppm
SPL# 00112	16:45:23	TIC =	21.0956 mV	0.96462 ug C	0.19292 ppm
SPL# 00112	16:50:23	TOC =	1.16967 mV	0.05348 ug C	0.01069 ppm
SPL# 00113	16:53:28	TIC =	21.2636 mV	0.97230 ug C	0.19446 ppm
SPL# 00113	16:58:28	TOC =	0.92270 mV	0.04219 ug C	0.00843 ppm
SPL# 00114	17:01:33	TIC =	20.3963 mV	0.93264 ug C	0.18652 ppm
SPL# 00114	17:06:33	TOC =	1.44423 mV	0.06603 ug C	0.01320 ppm
SPL# 00115	17:09:38	TIC =	20.3963 mV	0.93264 ug C	0.18652 ppm
SPL# 00115	17:14:38	TOC =	0.29219 mV	0.01336 ug C	0.00267 ppm
PL# 00116	17:17:43	TIC =	20.3404 mV	0.93008 ug C	0.18601 ppm
PL# 00116	17:22:43	TOC =	0.56622 mV	0.02589 ug C	0.00517 ppm
L# 00117	17:25:48	TIC =	20.6759 mV	0.94542 ug C	0.18908 ppm
L# 00117	17:30:48	TOC =	1.05989 mV	0.04846 ug C	0.00969 ppm
L# 00118	17:33:53	TIC =	21.4877 mV	0.98254 ug C	0.19651 ppm
# 00118	17:38:53	TOC =	0.40178 mV	0.01837 ug C	0.00367 ppm
# 00119	17:41:58	TIC =	21.5437 mV	0.98511 ug C	

Monday, December 22, 1997

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 4017RC

REQUEST NUMBER: 4017R
ANALYSIS TYPE: OTHER

ATTN: Sue Zeller
HUFFMAN LABORATORIES
4630 INDIANA
GOLDEN, CO 80430

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-97-0628	01	1 L amber glass	HUMACID

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 4017R **Page 1**

Relinquished By:		Date	Time	Received By:		Date	Time
John Kemp	John Kemp	12/22/97	7:00	Mary Dunlap		12/23/97	11:00
PRINTED NAME	SIGNATURE			PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE			PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE			PRINTED NAME	SIGNATURE		

Received for DISPOSAL By:		Date	Time
PRINTED NAME	SIGNATURE		

Remarks:

DATA ENTERED

Tuesday, December 23, 1997

010798 RT

REQUEST NUMBER: 4018R
ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

AMENDED

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

These samples are on:

SHIP DATE: 12/22/97
REPORT DUE: 1/22/98
TURN AROUND REQ'D: 30 days

LANL Request Number: 4018R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; AMENDED: ADDITIONAL ANALYSIS ADDED U BY KPA. JV 12/23/97

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
METTAL	+ U	04LA-97-0627	14	W	12/20/97	
TCN		04LA-97-0628	04	W	12/20/97	
ANWQ		04LA-97-0628	06	W	12/20/97	
CL(-1)		04LA-97-0628	06	W	12/20/97	
PO4(-3)		04LA-97-0628	06	W	12/20/97	
SIO2DISS		04LA-97-0628	06	W	12/20/97	
METTAL	+ U	04LA-97-0628	08	W	12/20/97	
NO3-N		04LA-97-0628	11	W	12/20/97	

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-8M

Request Number: 4018R

Date File Saved: 01/20/98

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0627	97-12-242-01
04LA-97-0628	97-12-242-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Total Uranium by KPA

No problems were observed in the preparation and analysis of the samples listed above, except as narrated below. All method required quality control parameters were met.

Samples under Request Number 4018R (Work Order 97-12-242) were received on 12/23/97 and scheduled for KPA analysis. The KPA analysis was completed on 01/20/98.

Method required dilutions may have been performed to address matrix interferences. Where dilutions are required, the submitted sample result, uncertainty and reporting limit reflect the dilution performed. Results above the PAI reporting limit are reported without qualification. Results which fall between the PAI reporting limit and the KPA instrument detection limit are flagged "J" and are qualifed as estimated results due to additional uncertainty in the measurement at this concentration. Results less than the method detection limit are flagged "U" and are qualified as "below detection limit."

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

B. Pirasteh 1/20/98

Bahman Pirasteh
Radiochemistry Instrumentation

Radi Cavin

Radiochemistry Final Review

1/20/98
Date

Don Gipple
Laboratory Manager

Date

Paragon Analytics, Inc.

TOTAL RECOVERABLE METALS CASE NARRATIVE

Los Alamos National Laboratory SMO

4018R

Order Number - 9712242

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Inorganic Qualifiers
Section 4: Sample Results
Section 5: Summary Report Forms
Section 6: Supporting Raw Data

Appendix A: Digestion Bench Sheets

Section 1: Case Narrative

1.1 This report consists of 2 water samples.

Due to limitation of the reporting software:

a) Some mercury values appear as 0.0. When this occurs the actual value is hand entered.

b) For Mercury, the ICB is also used as the preparation blank, therefore the run chronology will show the same time for both.

c) Trace ICP elements which are calibrated daily with a multipoint calibration do not appear on the run log. The calibration standards can be located at the beginning of each raw data package for this instrument.

1.2 The samples were received cool and intact on 12/23/97. The client had not designated a sample for quality control. The lab designated PAI sample ID 9712242-1 as the quality control sample for this Order Number.

1.3 The samples had been correctly preserved for the requested analyses.

1.4 The samples were prepared for analysis based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0..

1.5 The samples were analyzed and reported based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0.

1.6 All standards and solutions are NIST traceable and were used within their recommended shelf life.

1.7 The samples were prepared and analyzed within the established hold times.

All in house quality control procedures were followed, as described below.

1.8 General quality control procedures.

- A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in each digestion batch. There were not more than 20 samples in each digestion batch.
- The preparation (method) blank results associated with each batch were below the practical quantitation limits for the requested analytes.
- The laboratory control sample associated with each batch was within acceptance limits. This indicates complete digestion according to the method.
- All initial and continuing calibration blanks associated with this batch were below the practical quantitation limits for the requested analytes.
- All initial and continuing calibration verifications associated with each batch were within acceptance criteria for the requested analytes. This indicates a valid calibration and stable instrument conditions.
- The interference check samples, and high standard readbacks associated with Method 6010A analyses were within acceptance criteria.

1.9 Matrix specific quality control procedures.

- A matrix spike was digested and analyzed with each batch. All acceptance criteria for accuracy were met with the following exceptions.

Analyte	Sample ID
Aluminum	9712242-1MS
Iron	9712242-1MS

The affected sample results are flagged for aluminum.

The concentration of iron in the native sample was greater than 4 times the concentration of matrix spike added during the digestion. When sample concentration is that much greater than the spike added, spike recoveries may not be accurate. The Laboratory Control Sample indicates that the digestion and analysis were in control.

- A sample duplicate was digested and analyzed with each batch. All acceptance criteria for precision and accuracy were met.

- A serial dilution was analyzed with each ICP batch. All acceptance criteria were met with the following exceptions.

Analyte	Sample ID
Copper	9712242-1L
Lead	9712242-1L

Associated sample results for these elements have been flagged in the report.

Copper and lead results in the diluted sample did not agree within 10% with the undiluted sample results. Results for these elements are flagged with an "E" indicating a potential matrix effect. The concentrations of copper in the diluted and undiluted samples were below the CRDL. These relatively low concentrations may have contributed to the greater than 10% difference between the two sets of results.

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

Darryl Patrick — 1/20/98

Darryl Patrick
Senior Inorganic Chemist

Date

SW — 1/20/98

Reviewer's Initials

Date

CERTIFICATION

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

Paragon Analytics, Inc.

INORGANICS CASE NARRATIVE

Los Alamos National Laboratory SMO

4018R

Order Number - 9712242

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Sample Results
Section 4: QC and Summary Report Forms
Section 5: Supporting Raw Data/Benchsheets

Section 1: Case Narrative

1. This report consists of data for 1 water sample analyzed for bromide, chloride, fluoride, nitrate, sulfate, orthophosphate, and total cyanide.
2. The sample was received cool and intact on 12/23/97.
3. The sample had been correctly preserved for the requested analyses.
4. The sample was analyzed using procedures based on the following methods from the USEPA:

Analyte	Method
Bromide	300.0
Chloride	300.0
Fluoride	300.0
Nitrate	300.0
Sulfate	300.0
Orthophosphate	300.0
Total Cyanide	9010

5. All standards and solutions were used within their recommended shelf life.

6. Nitrate, orthophosphate, and total cyanide were prepared and analyzed outside of the established hold times. All other analyses were prepared and analyzed within the established hold times.
7. Sample results which are below the reporting limit are reported as "ND" on the enclosed report.

All in house quality control procedures were followed, as described below.

8. General quality control procedures.
   - A method blank, a laboratory control sample (LCS), a matrix spike (MS) and a matrix spike duplicate (MSD) or a matrix duplicate were prepared and analyzed for each analysis batch.
   - The matrix duplicate recovery for total cyanide was within acceptance limits.
   - The laboratory control sample (LCS) results were within acceptance limits for all analyses.
   - The MS/MSD results were within acceptance limits for all analytes.

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

Jm — 1-13-98
Reporter's Initials — Date

BS — 1-28-98
Reviewer's Initials — Date

CERTIFICATION

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple — Date
Laboratory Manager

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: 4018R LAB NAME Paragon LAB CODE_____

NAME OF CCS CHECKER_____ COMPANY_____

NAME OF VALIDATOR R. Sherman COMPANY LATA

CCS DATE_____ VALIDATION DATE 2/5/98 EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- x INORGANICS
- x RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	_____

Are all samples assigned to the SDG present? ¨ YES ¨ NO
Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

Uranium analyzed by KPA and validated using RAD baseline criteria.

Signature/1st validation [signature] 2/5/98
Signature/2nd validation _____
Qualifiers entered _____ Date_____

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgement based on data use . It usually has an "M"with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analyltes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likley because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

5 Sample result < EQL and < 5X (10X as above) the concentration of the analyte in the blank, which indicates the detected result was indistinguishable from blank contamination and the detected result was changed to non-detected at the EQL.

5a Sample result > EQL and > 5X (10X as above) the concentration of the analyte in the blank, which indicates the reported result is not likely to be related to the contamination in the associated blank.

6 Recovery of surrogates or analyte in the LCS > upper limit, which indicates a potential high bias in the results and a potential for false positive results.

6a Recovery of surrogates or analyte in the LCS < lower limit, which indicates a potential low bias in the results.

6d Result is a non-detect and the recovery of surrogates or the analyte in the LCS is < the lower limit, which indicates a potential for false negative results.

7 % RSD or %D exceeds specification - apply to a positive resultresult, which indicates potential quantitation problems in the analyses and the potential for false positive results.

8 % RSD or %D exceeds the specification - apply to a non-detect, which indicates potential quantitation problems in the analyses and the potential false negative results.

9. Holding time is exceeded. An evaluation of the data of interest with respect to holding time exceedance impact (technically) is recommended. Factors to consider include sample preservation, sample storage practices, use of the data, levels of contamination found in the sample, and the physical, chemical, and biological stability of the target analytes in the sample matrix.

10. Duplicate RPD > advisory 20% limit.

INORGANICS (I)

3 Spike recovery > upper limit (125%) and the results > the EDL.

3a Spike recovery < lower limit (75%) and the results are > the EDL.

3d Spike recovery < 30 % and results < EDL.

3e Spike recovery 30-74% and sample results < EDL.

4 Using the worse case blank, the sample results > the EDL but < 5X the concentration of the related analyte in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

7 ICS recovery > 120% and results > EDL.

7a ICS recovery 50-79% .

7b ICS recovery < 50% and result < EDL.

8a For ICV and CCV, recovery is lower than specification

8b For ICV and CCV, recovery is higher than specification

8c For ICV and CCV, results are positive, but < MDL and recovery is lower than the specification.

8d For ICV and CCV, recovery is extremely low and detection may be impaired.

8e For ICV and CCV, recovery is abnormally high - apply to results > MDL.

9 Holding time for Hg has been exceeded. Positive results may be biased low and non-detects may potential be false negatives.

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1c Carrier recovery 10-40% and result > EQL.

1d Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

INORGANICS

Calibration Present? x yes no **Initial calibration verification** Present? x yes no **Continuing calibration verification** Present? x yes no	NA OK OK	Obtain from lab. Q=A Obtain form lab. Q=A	
Blanks (Applies to each) Present? x yes no **Initial & continuing calibration blanks** Analyze at each wavelength Beginning and end of each run ICB and CCB analyzed at a frequency of 10% or 2 hours If blank results > EDL reanalyze previous 10 samples **Preparation blank** One per batch ≤ EDL, or if concentration of analyte < 10X EDL, repeat all samples in batch. *Be, Cr, Co, and Tl detected in blanks and samples.* *Al, Sb, Ba, Ca, Cd, Fe, Mg, and K detected in calibration blanks*	 U	 Obtain from lab. Q=A Use "worse" case blank. Sample results > EDL but < 5 X amount found in the blank should be qualified as U.	 I4

RJS
2/5/98

ICP Interference check sample Present? x yes no Solution contains Ag, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, V, & Zn Analyze at beginning of each run Each wavelength used for samples ICS results must be ± 20%of true value	OK	Obtain from lab. Q=A If the ICS recovery is >120% and the results are >EDL, qualify data as J+ If recovery is 50-79%, qualify data as J- If ICS recovery is < 50% and results are < EDL, qualify results as R, PM	 I7 I7a I7b
Spike sample analysis Present? x yes no One per run, per matrix, concentration, SDG % recovery: 75-125% (unless conc. > 4X spike conc.)	OK	Obtain from lab. Q=A If spike recovery > 125% and results < EDL, OK If spike recovery < 75% and results are >EDL, qualify results as J- if same matrix, P if not. If spike recovery > 125% and results are >EDL, qualify data as J+ if same matrix, P if not. If spike recovery 30-74% and sample results < EDL, qualify as UJ if same matrix, P if not. If spike recovery results < 30% and results < EDL, qualify as R, PM.	 I3a I3 I3e I3d

RDS
2/5/98

Duplicate **Present? x yes no** **One per batch of sample of like matrix for each SDG** **RPD : ≤ 20% (advisory)** **If either the sample or duplicate value is less than 5 X EDL, there is a control limit of ± EDL**	**OK**	**Obtain from lab. Q=A** **Q=P because of nature of LANL samples.**	
Laboratory Control Sample (LCS) **Aqueous LCS per batch/SDG** **% recovery : 80-120% (except Ag & Sb)**	**OK**	**If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 80% and J+ for > 120%**	**I6a** **I6**
Holding time **Analyze water samples for Hg within 28 days of sample collection** **Analyze water samples for CN within 14 days of sample collection**	**OK**	**Compare analysis date with date of sample collection on the Analysis Request.** **Q=PM**	

AJS
2/5/98

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-97-0628

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

Matrix (soil/water): WATER Lab Sample ID: 9712242-2

Level (low/med): LOW__ Date Received: 12/23/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	309		N	P_	
7440-36-0	Antimony_	3.4	U		P_	
7440-38-2	Arsenic__	2.8	U		P_	
7440-39-3	Barium___	62.3	B		P_	
7440-41-7	Beryllium	0.08	B		P_	U, E4
7440-43-9	Cadmium__	0.20	U		P_	
7440-70-2	Calcium__	23500			P_	
7440-47-3	Chromium_	1.2	B		P_	U, E4
7440-48-4	Cobalt___	1.6	B		P_	U, E4
7440-50-8	Copper___	3.2	B	E	P_	
7439-89-6	Iron_____	237			P_	
7439-92-1	Lead_____	1.3	U	E	P_	
7439-95-4	Magnesium	2150	B		P_	
7439-96-5	Manganese	516			P_	
7439-97-6	Mercury__	0.04	U		AV	
7439-98-7	Molybdenu	29.9			P_	
7440-02-0	Nickel___	7.8	B		P_	
7440-09-7	Potassium	3350	B		P_	
7782-49-2	Selenium_	2.6	U		P_	
7440-22-4	Silver___	0.70	U		P_	
7440-23-5	Sodium___	28500			P_	
7440-28-0	Thallium_	7.2	B		P_	U, E4
7440-61-1	Uranium__	64.0	U		P_	
7440-62-2	Vanadium_	0.50	U		P_	
7440-66-6_	Zinc_____	1.2	B		P_	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: N/A___

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN ILM03.0

00001

1/5/98

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-97-0627

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

Matrix (soil/water): WATER Lab Sample ID: 9712242-1

Level (low/med): LOW__ Date Received: 12/23/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	7860		N	P	
7440-36-0	Antimony_	3.4	U		P	
7440-38-2	Arsenic__	4.7	B		P	
7440-39-3	Barium___	175	B		P	
7440-41-7	Beryllium	0.46	B		P	U, I4
7440-43-9	Cadmium__	0.20	U		P	
7440-70-2	Calcium__	30000			P	
7440-47-3	Chromium_	75.0			P	
7440-48-4	Cobalt___	10.1	B		P	
7440-50-8	Copper___	23.1	B	E	P	
7439-89-6	Iron_____	36600			P	
7439-92-1	Lead_____	77.6		E	P	
7439-95-4	Magnesium	4370	B		P	
7439-96-5	Manganese	1040			P	
7439-97-6	Mercury__	0.04	U		AV	
7439-98-7	Molybdenu	35.9			P	
7440-02-0	Nickel___	44.2			P	
7440-09-7	Potassium	4290	B		P	
7782-49-2	Selenium_	3.4	B		P	
7440-22-4	Silver___	0.70	U		P	
7440-23-5	Sodium___	29200			P	
7440-28-0	Thallium_	11.3			P	U, I4
7440-61-1	Uranium__	64.0	U		P	
7440-62-2	Vanadium_	11.8	B		P	
7440-66-6_	Zinc_____	83.4			P	

Color Before: BROWN____ Clarity Before: CLOUDY Texture: N/A___

Color After: LT_BROWN_ Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

ILM03.0

00012

AJS 2/15/98

148419

Total CN in Water Calculations and Quality Control Results

Date analyzed: 01/06/98
Time analyzed: 1400

std (ug/L)	Abs (578nm)	calc soln conc (ug/L)
0	0.000	-1.3
10	0.024	10.8
50	0.100	49.4
100	0.197	98.6
200	0.403	203.2
300	0.598	302.2
400	0.785	397.1

Regression Output:

Constant		-1.3488
Std Err of Y Est		2.3727
R Squared		0.9998
No. of Observations		7
Degrees of Freedom		5
X Coefficient(s)	507.5660	
Std Err of Coef.	3.1953	

ID:	sample aliq (mL)	trap vol (mL)	aliq for color dev (mL)	Abs (578nm)	calc soln conc (ug/L)	sample conc mg/L	Rep Limit mg/L	ICV/CCV recovery %
ICV			10	0.195	97.6			98
ICB			10	0.004	0.7			
M Blank	50	50	10	0.008	2.7	0.00	0.01	
LCS	50	50	10	0.387	195.1	0.195	0.01	
9712242-2	50	50	10	0.004	0.7	0.001	0.01	
9712242-2 dup	50	50	10	0.008	2.7	0.003	0.01	
9712242-2 MS	50	50	10	0.201	100.7	0.101	0.01	
9712242-2 MSD	50	50	10	0.199	99.7	0.10	0.01	
9712252-1	50	50	10	0.006	1.7	0.00	0.01	
9712265-2	50	50	10	0.006	1.7	0.00	0.01	
CCV			10	0.199	99.7			100
CCB			10	0.003	0.2			

Total CN in Water Quality Control Results

Date analyzed: 01/06/98

BLANK SUMMARY

ID	blank CN conc (mg/L)	accept. limit (mg/L)
M Blank	0.003	< 0.01

LCS SUMMARY

ID	true CN conc (mg/L)	CN conc found (mg/L)	recovery %	recovery accept. limit
LCS	0.200	0.195	98	85-115%

MATRIX SPIKE SUMMARY

ID	spike added CN conc (mg/L)	sample CN conc (mg/L)	CN conc found in spkd sample (mg/L)	recovery %	recovery accept. limit	RPD %	RPD accept. limit
9712242-2 MS	0.100	ND	0.101	101	63-126%		
9712242-2 MSD	0.100	ND	0.100	100	63-126%	1	0-30%

DUPLICATE SUMMARY

ID	sample alk conc (mg/L)	duplic alk conc (mg/L)	RPD %	accept. limits
9712242-2 duo	ND	ND	NA	0-30%

ND = Not Detected
NA = Not Applicable

DM
1-7-98

000024

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	-38.6	B	7.5	B	-25.2	B	18.4	B	-37.790	B	P
Antimony	4.2	B	5.3	B	6.5	B	5.0	B	3.400	U	P
Arsenic	2.8	U	2.8	U	2.8	U	2.8	U	2.800	U	P
Barium	0.1	U	0.2	B	0.1	B	0.1	B	0.060	U	P
Beryllium	0.5	B	0.6	B	0.7	B	1.0	B	0.400	B	P
Cadmium	-0.6	B	-0.5	B	-0.6	B	0.2	B	0.200	U	P
Calcium	22.9	B	68.6	B	28.3	B	56.7	B	29.120	B	P
Chromium	1.6	B	1.7	B	1.7	B	1.1	B	1.340	B	P
Cobalt	0.4	U	0.4	U	0.4	U	0.4	U	0.440	B	P
Copper	-0.6	B	0.4	U	-0.6	B	-0.9	B	0.400	U	P
Iron	7.0	U	25.6	B	8.2	B	14.1	B	7.000	U	P
Lead	-1.3	B	1.3	U	1.3	U	1.3	U	1.300	U	P
Magnesium	-42.9	B	8.9	B	-34.4	B	3.7	U	-36.550	B	P
Manganese	-0.3	B	-0.2	B	-0.2	B	-0.2	B	-0.370	B	P
Mercury	0.04	U	0.04	U	0.04	U			0.040	U	AV
Molybdenu	4.2	U	4.2	U	4.2	U			4.200	U	P
Nickel	0.4	U	0.4	U	0.4	U	0.4	U	0.400	U	P
Potassium	-59.8	B	-70.4	B	58.8	B	141.6	B	49.500	B	P
Selenium	2.6	U	2.6	U	2.6	U	2.6	U	-2.830	B	P
Silver	0.7	U	0.7	U	0.7	U	0.7	U	0.700	U	P
Sodium	-37.4	B	-46.4	B	-36.0	B	-48.1	B	3.600	U	P
Thallium	3.5	B	6.1	B	7.8	B	3.8	B	5.960	B	P
Uranium	64.0	U	64.0	U	64.0	U	64.0	U	-97.610	B	P
Vanadium	-0.7	B	0.5	U	0.5	U	0.5	U	0.500	U	P
Zinc	-2.6	B	-3.0	B	-3.0	B	0.4	U	-0.450	B	P

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

04LA-97-0627

Lab Name: PARAGON_ANALYTICS_____ Contract:_____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

Matrix: __WATER_____ Level (low/med): _LOW____

% Solids for Sample: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum	75-125	11064.6500		7864.1800		2000.00	160.0	N	P
Antimony	75-125	455.1600		3.4000	U	500.00	91.0		P
Arsenic	75-125	2108.9700		4.7100	B	2000.00	105.2		P
Barium	75-125	2189.3200		174.8900	B	2000.00	100.7		P
Beryllium	75-125	52.9600		0.4600	B	50.00	105.0		P
Cadmium	75-125	47.4900		0.2000	U	50.00	95.0		P
Calcium									NR
Chromium	75-125	259.5700		74.9700		200.00	92.3		P
Cobalt	75-125	501.8000		10.1100	B	500.00	98.3		P
Copper	75-125	287.4100		23.1400	B	250.00	105.7		P
Iron		37224.7200		36632.1400		1000.00	59.3		P
Lead	75-125	578.6600		77.5700		500.00	100.2		P
Magnesium									NR
Manganese	75-125	1514.3700		1044.6700		500.00	93.9		P
Mercury	75-125	1.0100		0.0400	U	1.00	101.0		AV
Molybdenu	75-125	987.8000		35.8700		1000.00	95.2		P
Nickel	75-125	536.7300		44.2000		500.00	98.5		P
Potassium									NR
Selenium	75-125	2210.4600		3.4000	B	2000.00	110.4		P
Silver	75-125	49.4800		0.7000	U	50.00	99.0		P
Sodium									NR
Thallium	75-125	2039.4000		11.3100		2000.00	101.4		P
Uranium	75-125	11513.9700		64.0000	U	10000.00	115.1		P
Vanadium	75-125	502.6700		11.7800	B	500.00	98.2		P
Zinc	75-125	559.4500		83.4300		500.00	95.2		P

Comments:

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

04LA-97-0627

Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

Matrix (soil/water): WATER Level (low/med): _LOW__

% Solids for Sample: __0.0 % Solids for Duplicate: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum_		7864.1800		7612.0700		3.3		P
Antimony_		3.4000	U	3.4000	U			P
Arsenic__		4.7100	B	3.1700	B	39.1		P
Barium___		174.8900	B	174.6700	B	0.1		P
Beryllium		0.4600	B	0.5300	B	14.1		P
Cadmium__		0.2000	U	0.2000	U			P
Calcium__		29974.7000		29968.2800		0.0		P
Chromium_		74.9700		75.5200		0.7		P
Cobalt___		10.1100	B	10.3400	B	2.2		P
Copper___		23.1400	B	22.7600	B	1.7		P
Iron____		36632.1400		36695.0900		0.2		P
Lead____		77.5700		77.8000		0.3		P
Magnesium		4370.6900	B	4309.4900	B	1.4		P
Manganese		1044.6700		1044.2400		0.0		P
Mercury__		0.0400	U	0.0400	U			AV
Molybdenu	10.0	35.8700		34.8200		3.0		P
Nickel___	40.0	44.2000		44.6500		1.0		P
Potassium		4289.1000	B	4302.4800	B	0.3		P
Selenium_		3.4000	B	2.6000	U	200.0		P
Silver___		0.7000	U	0.7000	U			P
Sodium___		29175.1300		29128.7200		0.2		P
Thallium_	10.0	11.3100		8.4000	B	29.5		P
Uranium__		64.0000	U	89.9200	B	200.0		P
Vanadium_		11.7800	B	11.7200	B	0.5		P
Zinc____	20.0	83.4300		83.0900		0.4		P

TOTAL URANIUM ANALYSIS RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 12/20/97

Client Name: Los Alamos National Lab. Date Analyzed : 01/20/98

Client Project ID: 4018R

Lab Sample ID Series: 97-12-242 Sample Matrix : Water

Client Sample ID	Lab Sample ID	Total Uranium (ug/L)	Reporting Limit	Flag
04LA-97-0627	12-242-01	1.83 ± 0.25	0.10	
04LA-97-0628	12-242-02	1.37 ± 0.19	0.10	
Blank	12-242-B1	BDL	0.10	U
Duplicate	12-242-D1	1.78 ± 0.24	0.10	

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

FLAGS = J - 'Estimated Value' - result between Method Detection Limit and Reporting Limit.
U - 'Not Detected' - result less than Method Detection Limit.

BDL = Below Detection Limit; see method for DL determination.

Remarks:

Sample 97-12-242-D1 is a duplicate of 97-12-242-01.

BP

TOTAL URANIUM MATRIX SPIKE RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 12/20/97

Client Name: Los Alamos National Lab. Date Analyzed : 01/20/98

Client Project ID: 4018R

Lab Sample ID Series: 97-12-242 Sample Matrix : Water

Lab Sample ID	Known Conc. (ug/L)	Rep't Conc. (ug/L)
97-12-242-M1	11.4 ± 2.8	9.6 ± 1.3

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

PAI sets control limits for KPA Uranium measurements as follows:
Blank Spike Control Limits = Known (μ) ± 0.15 * μ.

Matrix Spike Control Limits = Known (μ) + Native Concentration ± 0.25 * (μ + Native Concentration).

PAI uses these control limits for all KPA Uranium measurements

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

Remarks:

Sample 97-12-242-M1 is a matrix spike of 97-12-242-02.

TOTAL URANIUM BLANK SPIKE RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 01/19/98

Client Name: Los Alamos National Lab. Date Analyzed : 01/20/98

Client Project ID: 4018R

Lab Sample ID Series: 97-12-242 Sample Matrix : Water

Lab Sample ID	Spike Conc. (ug/L)	Rep't Conc. (ug/L)
97-12-242-S1	10.0 ± 1.5	9.1 ± 1.2

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

PAI sets control limits for KPA Uranium measurements as follows:
Blank Spike Control Limits = Known (μ) ± 0.15 * μ.

Matrix Spike Control Limits = Known (μ) + Native Concentration ± 0.25 * (μ + Native Concentration).

PAI uses these control limits for all KPA Uranium measurements

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

Total CN in Water Calculations and Quality Control Results

Date analyzed: 01/06/98
Time analyzed: 1400

std (ug/L)	Abs (578nm)	calc soln conc (ug/L)
0	0.000	-1.3
10	0.024	10.8
50	0.100	49.4
100	0.197	98.6
200	0.403	203.2
300	0.598	302.2
400	0.785	397.1

Regression Output:

Constant		-1.3488
Std Err of Y Est		2.3727
R Squared		0.9998
No. of Observations		7
Degrees of Freedom		5
X Coefficient(s)	507.5660	
Std Err of Coef.	3.1953	

ID:	sample aliq (mL)	trap vol (mL)	aliq for color dev (mL)	Abs (578nm)	calc soln conc (ug/L)	sample conc mg/L	Rep Limit mg/L	ICV/CCV recovery %
ICV			10	0.195	97.6			98
ICB			10	0.004	0.7			
M Blank	50	50	10	0.008	2.7	0.00	0.01	
LCS	50	50	10	0.387	195.1	0.195	0.01	
9712242-2	50	50	10	0.004	0.7	0.001	0.01	
9712242-2 dup	50	50	10	0.008	2.7	0.003	0.01	
9712242-2 MS	50	50	10	0.201	100.7	0.101	0.01	
9712242-2 MSD	50	50	10	0.199	99.7	0.10	0.01	
9712252-1	50	50	10	0.006	1.7	0.00	0.01	
9712265-1	50	50	10	0.006	1.7	0.00	0.01	
CCV			10	0.199	99.7			100
CCB			10	0.003	0.2			

Total CN in Water Quality Control Results

Date analyzed: 01/06/98

BLANK SUMMARY

ID	blank CN conc (mg/L)	accept. limit (mg/L)
M Blank	0.003	< 0.01

LCS SUMMARY

ID	true CN conc (mg/L)	CN conc found (mg/L)	recovery %	recovery accept. limit
LCS	0.200	0.195	98	85-115%

MATRIX SPIKE SUMMARY

ID	spike added CN conc (mg/L)	sample CN conc (mg/L)	CN conc found in spkd sample (mg/L)	recovery %	recovery accept. limit	RPD %	RPD accept. limit
9712242-2 MS	0.100	ND	0.101	101	63-126%		
9712242-2 MSD	0.100	ND	0.100	100	63-126%	1	0-30%

DUPLICATE SUMMARY

ID	sample alk conc (mg/L)	duplic alk conc (mg/L)	RPD %	accept. limits
9712242-2 dup	ND	ND	NA	0-30%

ND = Not Detected
Not Applicable

TOTAL CYANIDE
Method 9010

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID: 4018R
Client Project No:
Lab Workorder Number: 9712242

Date Collected: 12/20/97
Date Analyzed: 01/06/98
Sample Matrix: Water

Client ID	Lab Sample ID	Total Cyanide Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.01
04LA-97-0628	9712242-2	ND	0.01

ND = Not Detected

Tuesday, December 23, 1997

REQUEST NUMBER: 4018R
ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

AMENDED

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

97.12.242

Please analyze the enclosed samples according to the schedule indicated:

These samples are on:

SHIP DATE: 12/22/97
REPORT DUE: 1/22/98
TURN AROUND REQ'D: 30 days

LANL Request Number: 4018R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; AMENDED: ADDITIONAL ANALYSIS ADDED U BY KPA. JV 12/23/97

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
METTAL	+ U	04LA-97-0627	14	W	12/20/97	
TCN		04LA-97-0628	04	W	12/20/97	
ANWQ		04LA-97-0628	06	W	12/20/97	
CL(-1)		04LA-97-0628	06	W	12/20/97	
PO4(-3)		04LA-97-0628	06	W	12/20/97	
SIO2DISS		04LA-97-0628	06	W	12/20/97	
METTAL	+ U	04LA-97-0628	08	W	12/20/97	
NO3-N		04LA-97-0628	11	W	12/20/97	

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: LAB NAME: LAB CODE_____

NAME OF VALIDATOR: **Antonia Tallarico** COMPANY: **LATA**

VALIDATION DATE: EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- o INORGANICS
- X RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ō if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? - YES - NO

Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

Total U was analyzed by KPA.

Signature/1st validation: [signature]

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

TOTAL URANIUM BLANK SPIKE RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 01/19/98

Client Name: Los Alamos National Lab. Date Analyzed : 01/20/98

Client Project ID: 4018R

Lab Sample ID Series: 97-12-242 Sample Matrix : Water

Lab Sample ID	Spike Conc. (ug/L)	Rep't Conc. (ug/L)
97-12-242-S1	10.0 ± 1.5	9.1 ± 1.2

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

PAI sets control limits for KPA Uranium measurements as follows:
Blank Spike Control Limits = Known (μ) ± 0.15 * μ.

Matrix Spike Control Limits = Known (μ) + Native Concentration ± 0.25 * (μ + Native Concentration).

PAI uses these control limits for all KPA Uranium measurements

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

TOTAL URANIUM MATRIX SPIKE RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 12/20/97

Client Name: Los Alamos National Lab. Date Analyzed : 01/20/98

Client Project ID: 4018R

Lab Sample ID Series: 97-12-242 Sample Matrix : Water

Lab Sample ID	Known Conc. (ug/L)	Rep't Conc. (ug/L)
97-12-242-M1	11.4 ± 2.8	9.6 ± 1.3

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

PAI sets control limits for KPA Uranium measurements as follows:
Blank Spike Control Limits = Known (μ) ± 0.15 * μ.

Matrix Spike Control Limits = Known (μ) + Native Concentration ± 0.25 * (μ + Native Concentration).

PAI uses these control limits for all KPA Uranium measurements

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

Remarks:

Sample 97-12-242-M1 is a matrix spike of 97-12-242-02.

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgment based on data use . It usually has an "M" with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analytes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likely because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1c Carrier recovery 10-40% and result > EQL.

1d Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

3b Spike recovery outside criterion but sample is not of same matrix as was matrix spike sample

4 Sample result > EQL but < 5X the amount found in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

6d LCS tracer/carrier recovery < 10 % and sample result is a non-detect.

7 For the set of duplicates, both results are > EQL or no EQL is available, but there is not a 3 σ agreement between the results - within an SDG.

8 One result > EQL and the difference > a factor of 1xEQL for water and 2xEQL for soil.

9a Result < MDA and MDA is < EQL.

9b Result > MDA but < EQL.

10a Result < both MDA and EQL.

10b Result < MDA but > EQL.

11 Result is less than three times the reported 1-sigma uncertainty.

17 A zero was added to the result field because the laboratory did not provide a value or a MDC.

RADIOCHEMISTRY

Lab Control Sample (LCS) **Present? X yes no** **1/SDG** **75-125% recovery** *Paragon uses a blank spike as the LCS.*	**OK** See comment	**Obtain from lab. Q=A** **If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 75% and J+ for > 125%** **If the LCS sample tracer/ carrier recovery is < 10%, qualify the associated sample data as P for non-detects.**	 **R6a** **R6** **R6d**
Matrix Spike (MS) **1/SDG** **Present? X yes no** **75-125% recovery** **(Note: As opposed to other tests, the matrix spike test will qualify samples on the basis of their connection by SDG and not by analytical batch).**	**OK**	**Obtain from lab. Q=A** **If criterion not met, qualify all analytes associated with the MS with a J- for <75%** **and J+ for > 125%,** **if all samples in batch of same matrix. If there is variation of matrix, P for samples not of same matrix as spiked sample.**	 **R3a** **R3** **R3b**
Method blank **Present? X yes no** **1/SDG** **target analytes ≤5x the amount in the blank**	**OK**	**Obtain from lab. Q=A** **If the sample result > EQL or no EQL is available but <5x the amount found in the associated blank, it should be qualified as U. In making this comparison the differing aliquot size of the blank and sample being tested should be taken into account.**	 **R4**

AT 9 Feb 98

Duplicate Present? X yes no 1/SDG (Note: As opposed to other tests, the duplicate tests will qualify samples on the basis of their connection by SDG and not by analytical batch).	OK	Obtain from lab. Q=A If both results are above the EQL or no EQL is available, all results for same analyte in same SDG should be qualified as J if there is not 3σ agreement between results. If both results are < EQL no test should be done. If one result > EQL and difference > factor of 1X EQL for water and 2X EQL for soil, qualify with J.	 R7 R8
EQL Denote those samples where the result is less than the reported sample MDA or EQL. Confirm that the MDA of each reported analyte in each sample and blank is <EQL.	NA	When the MDA < the EQL or no EQL is available: Qualify as U those sample results < the MDA. Qualify as U those sample results > MDA but < EQL. When the MDA is >EQL: Qualify as U those sample and blank results < both the MDA and EQL. Qualify as U those sample and blank results < than the MDA but > EQL.	 R9a R9b R10a R10b
Detection with respect to the reported uncertainty This is a more conservative test of detection than simply considering the MDA or EQL since sample results > than both the EQL and MDA may still be qualified using this test.	NA	Qualify as U those results < three times the reported 1-sigma uncertainty. Equivalently qualify as U those results < 1.5 times the reported 2-sigma uncertainty or < the reported 3-sigma uncertainty.	R11

M 9 Feb 98

Tracer/carrier recovery	**NA**		
Present? yes no		**Obtain from lab. Q=A**	
Tracer recovery for alpha spec analyses 330 %		**If tracer/carrier recovery < 10 %, qualify results as R**	**R10**
Carrier recovery for beta/gamma analyses 3 40%		**If tracer recovery is 10-30%, Q=J**	**R11a**
		if result > EQL and UJ if result < EQL	**R11b**
		If carrier recovery is 10-40%, Q=J	**R11c**
		if result > EQL and UJ if < EQL	**R11d**

19 Feb 98

TOTAL URANIUM ANALYSIS RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 12/20/97

Client Name: Los Alamos National Lab. Date Analyzed : 01/20/98

Client Project ID: 4018R

Lab Sample ID Series: 97-12-242 Sample Matrix : Water

Client Sample ID	Lab Sample ID	Total Uranium (ug/L)	Reporting Limit	Flag
04LA-97-0627	12-242-01	1.83 ± 0.25	0.10	
04LA-97-0628	12-242-02	1.37 ± 0.19	0.10	
Blank	12-242-B1	BDL	0.10	U
Duplicate	12-242-D1	1.78 ± 0.24	0.10	

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

FLAGS = J - 'Estimated Value' - result between Method Detection Limit and Reporting Limit.
U - 'Not Detected' - result less than Method Detection Limit.

BDL = Below Detection Limit; see method for DL determination.

Remarks:

Sample 97-12-242-D1 is a duplicate of 97-12-242-01.

5/P

M 9 Feb 98

CUSTOMER #:
03640

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403
Phone: (303) 278-4455 • FAX: (303) 278-7012

DATE 1/7/98
LAB# 100398
P.O.
RECD 01/05/98

ANALYSIS REPORT

LANCE STEERE
PARAGON ANALYTICS, INC.
225 COMMERCE DRIVE
FORT COLLINS CO 80524

SEQUENCE/	01
SAMPLE ID	04LA-97-0628

DISSOLVED
SIO2-------MG/L - - - 24.1

RAW DATA ENCLOSED.

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403

LAB NO.	CUSTOMER	RUN DATE
1003	Paragon	1/6/98
		ANALYSIS
		Si02

INORGANIC ANALYSIS COVERSHEET

STANDARD METHOD REF: REVISION/ISSUE

SAMPLE MATRIX: water

A. SAMPLE PREPARATION - Describe any modifications to the referenced standard procedure. If no standard method was used, describe the preparatory procedure used. Describe problems encountered and how they were overcome.

no prep

SAMPLES PREPARED BY DATE

B. ANALYSIS PROCEDURE - Describe any modifications to the standard method that were necessary. If no standard method was used, describe the analytical procedure. Describe problems encountered and how they were overcome.

USEPA 270.1

Scaled down method 1/10

C. REFERENCES

ANALYST	DATE	REVIEWED	DATE
[illegible]	1/7/98	RLK	010798

REVISED 8/21/92

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403

METHOD REF USEPA 600 method 3701
INSTRUMENT TYPE Spec 200 | NO.
BALANCE NO. —

SAMPLE NO.										
DCI	40 SiO2							ABS		
		ABS				100 3				
CB		0.002				0.2 ml		0.161		
10.0 µg/ml	SiO2		BN 4710					0.163		
	ml 0.1	0.034				0.5		0.397		
	0.3	0.103						0.405		
	0.5	0.177				0.9		0.731		
	0.7	0.239						0.721		
	0.9	0.306				100 3	dilution	0.45 µ filter		
50.0 µg/ml	SiO2		BN 4710			0.2		0.170		
	0.2	0.330						0.163		
	0.3	0.499				0.5		0.404		
	0.4	0.644						0.403		
	0.5	0.828				0.9		0.721		
MB-1		0.007						0.696		
CCS 10.0 µg/L	Si	BN 5581				MB-2		0.003		
	0.2	0.150				CCS	10.0 µg/L	Si BN 5584		
CCS 50 µg/L	Si	BN 5584					0.2	0.148		
	0.2	0.451				CCS	50.0 µg/L	Si. BN 5584		
							0.2	0.440		

ANALYST AK | DATE 1/6/98 | REVIEWED | DATE

OTHER REFERENCES

2/28/92

Correlation data for SIO2 POLY.BAS

Blank correction used; blank value .002

Standard	Area or Height, ABS
1.000	0.034
3.000	0.103
5.000	0.177
7.000	0.239
9.000	0.306
10.000	0.330
15.000	0.499
20.000	0.644
25.000	0.828

A = .999452
B = 30.0502
(r) = .99961

B= 30.0502
M= .999452
(r)= .99961
BLK ABS= .002

SILICA, DISSOLVED
COLORMETRIC USEPA METHOD 370.1

ID.	ABSORB.	UG	VOLUME USED (ML)	DILUTION FACTOR	MG/L OR PPM SIO2	MG/L OR PPM SI
10.0ug/l	0.034	0.96	0.10	1.0	9.63	4.50
N4710	0.103	3.04	0.30	1.0	10.13	4.73
	0.177	5.26	0.50	1.0	10.53	4.91
	0.239	7.13	0.70	1.0	10.18	4.75
	0.306	9.14	0.90	1.0	10.16	4.74
0.0 mg/l	0.330	9.86	0.20	1.0	49.31	23.01
	0.499	14.94	0.30	1.0	49.80	23.24
	0.644	19.30	0.40	1.0	48.24	22.51
	0.828	24.82	0.50	1.0	49.65	23.17

B= 30.0502
M= .999452
'r)= .99961
L ABS= .002

SILICA, DISSOLVED
COLORMETRIC USEPA METHOD 370.1

ID.	ABSORB.	UG	VOLUME USED (ML)	DILUTION FACTOR	MG/L OR PPM SIO2	MG/L OR PPM SI
MB-1	0.002	0.00	1.00	1.0	0.00	0.00
10.0 mg/l Si BN5584	0.150	4.45	0.20	1.0	22.26	10.39
30.0mg/l	0.451	13.50	0.20	1.0	67.49	31.50
1003-1	0.161	4.78	0.20	1.0	23.91	11.16
	0.163	4.84	0.20	1.0	24.21	11.30
	0.397	11.88	0.50	1.0	23.75	11.08
	0.408	12.21	0.50	1.0	24.41	11.39
	0.731	21.91	0.90	1.0	24.34	11.36
	0.720	21.58	0.90	1.0	23.98	11.19
1003-1	0.170	5.05	0.20	1.0	25.27	11.79
THRU 0.45u	0.163	4.84	0.20	1.0	24.21	11.30
	0.404	12.10	0.50	1.0	24.20	11.30
	0.403	12.06	0.50	1.0	24.12	11.26
	0.726	21.76	0.90	1.0	24.18	11.28
	0.696	20.86	0.90	1.0	23.18	10.82
mb-2	0.003	0.03	1.00	1.0	0.03	0.01
10.0mg/l Si BN 5584	0.148	4.39	0.20	1.0	21.96	10.25
30.0 mg/l	0.440	13.17	0.20	1.0	65.84	30.73

TOTAL CYANIDE

Method 9010

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID: 4018R
Client Project No:
Lab Workorder Number: 9712242

Date Collected: 12/20/97
Date Analyzed: 01/06/98
Sample Matrix: Water

Client ID	Lab Sample ID	Total Cyanide Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.01
04LA-97-0628	9712242-2	ND	0.01

ND = Not Detected

BROMIDE

Method 300.0

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID: 4018R
Client Project No:
Lab Workorder Number: 9712242

Date Collected: 12/20/97
Date Analyzed: 01/08/98
Sample Matrix: Water

Client ID	Lab Sample ID	Bromide Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.1
04LA-97-0628	9712242-2	0.2	0.1

ND = Not Detected

CHLORIDE
Method 300.0

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID: 4018R
Client Project No:
Lab Workorder Number: 9712242

Date Collected: 12/20/97
Date Analyzed: 01/09/98
Sample Matrix: Water

Client ID	Lab Sample ID	Chloride Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.1
04LA-97-0628	9712242-2	14.1	0.5

ND = Not Detected

FLUORIDE

Method 300.0

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID: 4018R
Client Project No:
Lab Workorder Number: 9712242

Date Collected: 12/20/97
Date Analyzed: 01/08/98
Sample Matrix: Water

Client ID	Lab Sample ID	Fluoride Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.05
04LA-97-0628	9712242-2	1.0	0.05

ND = Not Detected

NITRATE

Method 300.0

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID: 4018R
Client Project No:
Lab Workorder Number: 9712242

Date Collected: 12/20/97
Date Analyzed: 01/08/98
Sample Matrix: Water

Client ID	Lab Sample ID	Nitrate as N Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.1
04LA-97-0628	9712242-2	2.8	0.1

ND = Not Detected

ORTHOPHOSPHATE

Method 300.0

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID: 4018R
Client Project No:
Lab Workorder Number: 9712242

Date Collected: 12/20/97
Date Analyzed: 01/08/98
Sample Matrix: Water

Client ID	Lab Sample ID	Orthophosphate as P Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.1
04LA-97-0628	9712242-2	ND	0.1

ND = Not Detected

SULFATE

Method 300.0

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID: 4018R
Client Project No:
Lab Workorder Number: 9712242

Date Collected: 12/20/97
Date Analyzed: 01/08/98
Sample Matrix: Water

Client ID	Lab Sample ID	Sulfate Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.2
04LA-97-0628	9712242-2	15.8	0.2

ND = Not Detected

TOTAL URANIUM BLANK SPIKE RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 01/19/98

Client Name: Los Alamos National Lab. Date Analyzed : 01/20/98

Client Project ID: 4018R

Lab Sample ID Series: 97-12-242 Sample Matrix : Water

Lab Sample ID	Spike Conc. (ug/L)	Rep't Conc. (ug/L)
97-12-242-S1	10.0 ± 1.5	9.1 ± 1.2

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

PAI sets control limits for KPA Uranium measurements as follows:
Blank Spike Control Limits = Known (μ) ± 0.15 * μ.

Matrix Spike Control Limits = Known (μ) + Native Concentration ± 0.25 * (μ + Native Concentration).

PAI uses these control limits for all KPA Uranium measurements

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

TOTAL URANIUM MATRIX SPIKE RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 12/20/97

Client Name: Los Alamos National Lab. Date Analyzed : 01/20/98

Client Project ID: 4018R

Lab Sample ID Series: 97-12-242 Sample Matrix : Water

Lab Sample ID	Known Conc. (ug/L)	Rep't Conc. (ug/L)
97 12-242-M1	11.4 ± 2.8	9.6 ± 1.3

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

PAI sets control limits for KPA Uranium measurements as follows:
Blank Spike Control Limits = Known (μ) ± 0.15 * μ.

Matrix Spike Control Limits = Known (μ) + Native Concentration ± 0.25 * (μ + Native Concentration).

PAI uses these control limits for all KPA Uranium measurements

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

Remarks:

Sample 97-12-242-M1 is a matrix spike of 97-12-242-02.

U.S. EPA - CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4018R_

SOW No.: ILM03.0

EPA Sample No.	Lab Sample ID
_04LA-97-0627_	_9712242-1_____
_04LA-97-0627_	_9712242-1D_____
_04LA-97-0627_	_9712242-1S_____
_04LA-97-0628_	_9712242-2_____

Were ICP interelement corrections applied ? Yes/No YES

Were ICP background corrections applied ? Yes/No YES

If yes - were raw data generated before application of background corrections ? Yes/No NO_

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: _____

Date: _____ Title: _____

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum	25250.0	24670.86	97.7	50500.0	51104.85	101.2	51146.48	101.3	P
Antimony	250.0	250.31	100.1	500.0	493.85	98.8	505.91	101.2	P
Arsenic	250.0	246.95	98.8	500.0	503.30	100.7	513.95	102.8	P
Barium	250.0	242.28	96.9	500.0	483.04	96.6	491.79	98.4	P
Beryllium	250.0	253.47	101.4	500.0	515.24	103.0	525.40	105.1	P
Cadmium	250.0	248.78	99.5	500.0	495.93	99.2	510.61	102.1	P
Calcium	25250.0	23130.78	91.6	50500.0	52970.91	104.9	54364.70	107.7	P
Chromium	250.0	240.26	96.1	500.0	497.32	99.5	507.96	101.6	P
Cobalt	250.0	241.14	96.5	500.0	484.25	96.8	491.35	98.3	P
Copper	250.0	248.18	99.3	500.0	513.71	102.7	516.17	103.2	P
Iron	10250.0	10358.97	101.1	20500.0	21419.65	104.5	21890.42	106.8	P
Lead	250.0	244.82	97.9	500.0	497.60	99.5	508.89	101.8	P
Magnesium	25250.0	25565.14	101.2	50500.0	52828.28	104.6	53661.88	106.3	P
Manganese	250.0	244.73	97.9	500.0	495.95	99.2	503.36	100.7	P
Mercury	2.5	2.51	100.4	2.0	2.06	103.0	1.98	99.0	AV
Molybdenu	500.0	496.29	99.3	1000.0	970.10	97.0	980.88	98.1	P
Nickel	250.0	241.75	96.7	500.0	481.88	96.4	493.85	98.8	P
Potassium	10000.0	9595.33	96.0	20000.0	19097.65	95.5	18451.33	92.3	P
Selenium	250.0	250.97	100.4	500.0	497.71	99.5	505.50	101.1	P
Silver	250.0	243.25	97.3	500.0	491.96	98.4	501.62	100.3	P
Sodium	10250.0	9511.16	92.8	20500.0	19487.30	95.1	19106.14	93.2	P
Thallium	250.0	249.39	99.8	500.0	496.34	99.3	511.52	102.3	P
Uranium	5000.0	5357.17	107.1	10000.0	10820.80	108.2	10359.95	103.6	P
Vanadium	250.0	250.76	100.3	500.0	508.68	101.7	516.25	103.2	P
Zinc	250.0	243.62	97.4	500.0	490.65	98.1	498.65	99.7	P

Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum				50500.0	50004.78	99.0			P
Antimony				500.0	506.22	101.2			P
Arsenic				500.0	518.14	103.6			P
Barium				500.0	493.13	98.6			P
Beryllium				500.0	529.18	105.8			P
Cadmium				500.0	524.80	105.0			P
Calcium				50500.0	52334.72	103.6			P
Chromium				500.0	511.78	102.4			P
Cobalt				500.0	494.93	99.0			P
Copper				500.0	506.41	101.3			P
Iron				20500.0	21066.32	102.8			P
Lead				500.0	518.13	103.6			P
Magnesium				50500.0	50971.52	100.9			P
Manganese				500.0	506.07	101.2			P
Mercury									NR
Molybdenu									NR
Nickel				500.0	504.20	100.8			P
Potassium				20000.0	18969.60	94.8			P
Selenium				500.0	509.52	101.9			P
Silver				500.0	503.50	100.7			P
Sodium				20500.0	19772.47	96.5			P
Thallium				500.0	515.44	103.1			P
Uranium				10000.0	10390.64	103.9			P
Vanadium				500.0	516.99	103.4			P
Zinc				500.0	507.92	101.6			P

Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2B
CRDL STANDARD FOR AA AND ICP

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

AA CRDL Standard Source: PLASMACHEM__

ICP CRDL Standard Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
					Initial		Final	
	True	Found	%R	True	Found	%R	Found	%R
Aluminum				400.0	362.72	90.7	394.83	98.7
Antimony				120.0	122.16	101.8	128.14	106.8
Arsenic				20.0	19.79	99.0	21.40	107.0
Barium				400.0	389.59	97.4	413.96	103.5
Beryllium				10.0	10.97	109.7	11.92	119.2
Cadmium				10.0	9.40	94.0	11.11	111.1
Calcium				10000.0	9745.14	97.5	9975.95	99.8
Chromium				20.0	19.56	97.8	20.40	102.0
Cobalt				100.0	98.97	99.0	105.01	105.0
Copper				50.0	48.69	97.4	51.91	103.8
Iron				200.0	190.11	95.1	189.18	94.6
Lead				6.0	6.34	105.7	8.22	137.0
Magnesium				10000.0	9929.08	99.3	9925.94	99.3
Manganese				30.0	29.76	99.2	32.17	107.2
Mercury	0.2	0.19	95.0					
Molybdenu								
Nickel				80.0	80.39	100.5	88.95	111.2
Potassium				10000.0	9371.02	93.7	9140.21	91.4
Selenium				10.0	9.28	92.8	7.66	76.6
Silver				20.0	21.81	109.0	22.37	111.8
Sodium				10000.0	9119.91	91.2	9175.26	91.8
Thallium				20.0	20.87	104.4	22.85	114.2
Uranium				400.0	397.68	99.4	372.93	93.2
Vanadium				100.0	100.30	100.3	105.54	105.5
Zinc				40.0	39.75	99.4	47.45	118.6

U.S. EPA - CLP

2B
CRDL STANDARD FOR AA AND ICP

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

AA CRDL Standard Source: PLASMACHEM__

ICP CRDL Standard Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
					Initial		Final	
	True	Found	%R	True	Found	%R	Found	%R
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead								
Magnesium								
Manganese								
Mercury								
Molybdenu				60.0	58.93	98.2	62.20	103.7
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Uranium								
Vanadium								
Zinc								

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	-38.6	B	7.5	B	-25.2	B	18.4	B	-37.790	B	P
Antimony	4.2	B	5.3	B	6.5	B	5.0	B	3.400	U	P
Arsenic	2.8	U	2.8	U	2.8	U	2.8	U	2.800	U	P
Barium	0.1	U	0.2	B	0.1	B	0.1	B	0.060	U	P
Beryllium	0.5	B	0.6	B	0.7	B	1.0	B	0.400	B	P
Cadmium	-0.6	B	-0.5	B	-0.6	B	0.2	B	0.200	U	P
Calcium	22.9	B	68.6	B	28.3	B	56.7	B	29.120	B	P
Chromium	1.6	B	1.7	B	1.7	B	1.1	B	1.340	B	P
Cobalt	0.4	U	0.4	U	0.4	U	0.4	U	0.440	B	P
Copper	-0.6	B	0.4	U	-0.6	B	-0.9	B	0.400	U	P
Iron	7.0	U	25.6	B	8.2	B	14.1	B	7.000	U	P
Lead	-1.3	B	1.3	U	1.3	U	1.3	U	1.300	U	P
Magnesium	-42.9	B	8.9	B	-34.4	B	3.7	U	-36.550	B	P
Manganese	-0.3	B	-0.2	B	-0.2	B	-0.2	B	-0.370	B	P
Mercury	0.04	U	0.04	U	0.04	U			0.040	U	AV
Molybdenu	4.2	U	4.2	U	4.2	U			4.200	U	P
Nickel	0.4	U	0.4	U	0.4	U	0.4	U	0.400	U	P
Potassium	-59.8	B	-70.4	B	58.8	B	141.6	B	49.500	B	P
Selenium	2.6	U	2.6	U	2.6	U	2.6	U	-2.830	B	P
Silver	0.7	U	0.7	U	0.7	U	0.7	U	0.700	U	P
Sodium	-37.4	B	-46.4	B	-36.0	B	-48.1	B	3.600	U	P
Thallium	3.5	B	6.1	B	7.8	B	3.8	B	5.960	B	P
Uranium	64.0	U	64.0	U	64.0	U	64.0	U	-97.610	B	P
Vanadium	-0.7	B	0.5	U	0.5	U	0.5	U	0.500	U	P
Zinc	-2.6	B	-3.0	B	-3.0	B	0.4	U	-0.450	B	P

U.S. EPA - CLP

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No: _____ SDG No.: 4018R_

ICP ID Number: TJA 61E 4___ ICS Source: HIGH PURITY_

Concentration Units: ug/L

Analyte	True Sol. A	True Sol. AB	Initial Found Sol. A	Initial Found Sol. AB	Initial Found %R	Final Found Sol. A	Final Found Sol. AB	Final Found %R
Aluminum_	500000	500000	512348	499691.1	99.9	519595	504695.4	100.9
Antimony_								
Arsenic__								
Barium___		500		482.0	96.4		492.3	98.5
Beryllium		500		473.4	94.7		495.6	99.1
Cadmium__		1000		884.8	88.5		948.2	94.8
Calcium__	500000	500000	534968	520695.2	104.1	533469	526314.8	105.3
Chromium_		500		463.2	92.6		484.4	96.9
Cobalt___		500		440.6	88.1		458.1	91.6
Copper___		500		529.2	105.8		530.4	106.1
Iron_____	200000	200000	209112	204545.6	102.3	207976	205050.8	102.5
Lead_____		1000		925.0	92.5		973.3	97.3
Magnesium	500000	500000	533485	520626.4	104.1	524905	515566.6	103.1
Manganese		500		465.1	93.0		483.0	96.6
Mercury__								
Molybdenu								
Nickel___		1000		871.5	87.2		925.7	92.6
Potassium								
Selenium_								
Silver___		1000		1097.3	109.7		1130.8	113.1
Sodium___								
Thallium_								
Uranium__								
Vanadium_		500		481.0	96.2		497.9	99.6
Zinc_____		1000		880.4	88.0		928.1	92.8

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

04LA-97-0627

Lab Name: PARAGON_ANALYTICS_____ Contract:_____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

Matrix: __WATER_____ Level (low/med): _LOW____

% Solids for Sample: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum	75-125	11064.6500		7864.1800		2000.00	160.0	N	P
Antimony	75-125	455.1600		3.4000	U	500.00	91.0		P
Arsenic	75-125	2108.9700		4.7100	B	2000.00	105.2		P
Barium	75-125	2189.3200		174.8900	B	2000.00	100.7		P
Beryllium	75-125	52.9600		0.4600	B	50.00	105.0		P
Cadmium	75-125	47.4900		0.2000	U	50.00	95.0		P
Calcium									NR
Chromium	75-125	259.5700		74.9700		200.00	92.3		P
Cobalt	75-125	501.8000		10.1100	B	500.00	98.3		P
Copper	75-125	287.4100		23.1400	B	250.00	105.7		P
Iron		37224.7200		36632.1400		1000.00	59.3		P
Lead	75-125	578.6600		77.5700		500.00	100.2		P
Magnesium									NR
Manganese	75-125	1514.3700		1044.6700		500.00	93.9		P
Mercury	75-125	1.0100		0.0400	U	1.00	101.0		AV
Molybdenu	75-125	987.8000		35.8700		1000.00	95.2		P
Nickel	75-125	536.7300		44.2000		500.00	98.5		P
Potassium									NR
Selenium	75-125	2210.4600		3.4000	B	2000.00	110.4		P
Silver	75-125	49.4800		0.7000	U	50.00	99.0		P
Sodium									NR
Thallium	75-125	2039.4000		11.3100		2000.00	101.4		P
Uranium	75-125	11513.9700		64.0000	U	10000.00	115.1		P
Vanadium	75-125	502.6700		11.7800	B	500.00	98.2		P
Zinc	75-125	559.4500		83.4300		500.00	95.2		P

Comments:

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

04LA-97-0627

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

Matrix (soil/water): WATER Level (low/med): _LOW__

% Solids for Sample: __0.0 % Solids for Duplicate: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum_		7864.1800		7612.0700		3.3		P
Antimony_		3.4000	U	3.4000	U			P
Arsenic__		4.7100	B	3.1700	B	39.1		P
Barium___		174.8900	B	174.6700	B	0.1		P
Beryllium		0.4600	B	0.5300	B	14.1		P
Cadmium__		0.2000	U	0.2000	U			P
Calcium__		29974.7000		29968.2800		0.0		P
Chromium_		74.9700		75.5200		0.7		P
Cobalt___		10.1100	B	10.3400	B	2.2		P
Copper___		23.1400	B	22.7600	B	1.7		P
Iron_____		36632.1400		36695.0900		0.2		P
Lead_____		77.5700		77.8000		0.3		P
Magnesium		4370.6900	B	4309.4900	B	1.4		P
Manganese		1044.6700		1044.2400		0.0		P
Mercury__		0.0400	U	0.0400	U			AV
Molybdenu	10.0	35.8700		34.8200		3.0		P
Nickel___	40.0	44.2000		44.6500		1.0		P
Potassium		4289.1000	B	4302.4800	B	0.3		P
Selenium_		3.4000	B	2.6000	U	200.0		P
Silver___		0.7000	U	0.7000	U			P
Sodium___		29175.1300		29128.7200		0.2		P
Thallium_	10.0	11.3100		8.4000	B	29.5		P
Uranium__		64.0000	U	89.9200	B	200.0		P
Vanadium_		11.7800	B	11.7200	B	0.5		P
Zinc_____	20.0	83.4300		83.0900		0.4		P

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

olid LCS Source: _____

queous LCS Source: PLASMACHEM__

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum	2000.0	1987.31	99.4						
Antimony	500.0	512.56	102.5						
Arsenic	2000.0	2110.84	105.5						
Barium	2000.0	1977.50	98.9						
Beryllium	50.0	53.44	106.9						
Cadmium	50.0	49.45	98.9						
Calcium	40000.0	40710.65	101.8						
Chromium	200.0	187.49	93.7						
Cobalt	500.0	498.22	99.6						
Copper	250.0	256.25	102.5						
Iron	1000.0	979.17	97.9						
Lead	500.0	510.74	102.1						
gnesium	40000.0	40282.23	100.7						
Manganese	500.0	497.45	99.5						
Mercury									
Molybdenu	1000.0	982.34	98.2						
Nickel	500.0	503.32	100.7						
Potassium	40000.0	34194.54	85.5						
Selenium	2000.0	2221.35	111.1						
Silver	50.0	48.52	97.0						
Sodium	40000.0	36059.79	90.1						
Thallium	2000.0	2053.99	102.7						
Uranium	10000.0	11485.42	114.9						
Vanadium	500.0	498.20	99.6						
Zinc	500.0	492.04	98.4						

FORM VII - IN

ILM03.0

000024

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

Solid LCS Source: _____

Aqueous LCS Source: PLASMACHEM__

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum_									
Antimony_									
Arsenic__									
Barium___									
Beryllium									
Cadmium__									
Calcium__									
Chromium_									
Cobalt___									
Copper___									
Iron____									
Lead____									
Magnesium									
Manganese									
Mercury__	1.0	1.02	102.0						
Molybdenu									
Nickel___									
Potassium									
Selenium_									
Silver___									
Sodium___									
Thallium_									
Uranium__									
Vanadium_									
Zinc____									

FORM VII - IN

ILM03.0

U.S. EPA - CLP

9

ICP SERIAL DILUTION

EPA SAMPLE NO.

04LA-97-06L7

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: 4018R_

Matrix (soil/water): WATER Level (low/med): LOW

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	M
Aluminum	7864.18		7428.75		5.5		P
Antimony	3.40	U	17.00	U			P
Arsenic	4.71	B	14.00	U	100.0		P
Barium	174.89	B	172.90	B	1.1		P
Beryllium	0.46	B	2.40	B	421.7		P
Cadmium	0.20	U	1.00	U			P
Calcium	29974.70		31163.40		4.0		P
Chromium	74.97		80.00		6.7		P
Cobalt	10.11	B	9.70	B	4.1		P
Copper	23.14	B	20.25	B	12.5	E	P
Iron	36632.14		35477.80		3.2		P
Lead	77.57		86.15		11.1	E	P
Magnesium	4370.69	B	4294.00	B	1.8		P
Manganese	1044.67		1060.65		1.5		P
Mercury							NR
Molybdenu	35.87		48.45	B	35.1		P
Nickel	44.20		43.05	B	2.6		P
Potassium	4289.10	B	4141.60	B	3.4		P
Selenium	3.40	B	13.00	U	100.0		P
Silver	0.70	U	3.50	U			P
Sodium	29175.13		27477.65		5.8		P
Thallium	11.31		27.30	B	141.4		P
Uranium	64.00	U	320.00	U			P
Vanadium	11.78	B	10.30	B	12.6		P
Zinc	83.43		75.05	B	10.0		P

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_
ICP ID Number: TJA61_4_____ Date: 10/15/97
Flame AA ID Number : _____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum_			200		NR
Antimony_			60		NR
Arsenic__			10		NR
Barium___			200		NR
Beryllium			5		NR
Cadmium__			5		NR
Calcium__			5000		NR
Chromium_			10		NR
Cobalt___			50		NR
Copper___			25		NR
Iron_____			100		NR
Lead_____			3		NR
Magnesium			5000		NR
Manganese			15		NR
Mercury__			0.2		NR
Molybdenu	202.00		10	4.2	P
Nickel___			40		NR
Potassium			5000		NR
Selenium_			5		NR
Silver___			10		NR
Sodium___			5000		NR
Thallium_			10		NR
Uranium__			200		NR
Vanadium_			50		NR
Zinc_____			20		NR

Comments:

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_
ICP ID Number: _____ Date: 10/15/97
Flame AA ID Number : LEEMAN_4____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum			200		NR
Antimony			60		NR
Arsenic			10		NR
Barium			200		NR
Beryllium			5		NR
Cadmium			5		NR
Calcium			5000		NR
Chromium			10		NR
Cobalt			50		NR
Copper			25		NR
Iron			100		NR
Lead			3		NR
Magnesium			5000		NR
Manganese			15		NR
Mercury	253.70		0.2	0.04 ~~0.0~~	AV
Molybdenu			10	DP 1/20/98	NR
Nickel			40		NR
Potassium			5000		NR
Selenium			5		NR
Silver			10		NR
Sodium			5000		NR
Thallium			10		NR
Uranium			200		NR
Vanadium			50		NR
Zinc			20		NR

Comments:

FORM X - IN ILM03.0

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_
ICP ID Number: TJA_61E_4___ Date: 10/15/97
Flame AA ID Number : _____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum	308.22		200	6.2	P
Antimony	206.84		60	3.4	P
Arsenic	189.04		10	2.8	P
Barium	493.41		200	0.1	P
Beryllium	313.04		5	0.1	P
Cadmium	226.50		5	0.2	P
Calcium	317.93		5000	1.5	P
Chromium	267.72		10	0.3	P
Cobalt	228.62		50	0.4	P
Copper	324.75		25	0.4	P
Iron	271.44		100	7.0	P
Lead	220.35		3	1.3	P
Magnesium	279.08		5000	3.7	P
Manganese	257.61		15	0.1	P
Mercury			0.2		NR
Molybdenu			10		NR
Nickel	231.60		40	0.4	P
Potassium	766.49		5000	24.0	P
Selenium	196.03		5	2.6	P
Silver	328.07		10	0.7	P
Sodium	588.99		5000	3.6	P
Thallium	190.86		10	2.6	P
Uranium	292.35		200	64.0	P
Vanadium	292.40		50	0.5	P
Zinc	206.20		20	0.4	P

Comments:

U.S. EPA - CLP

11A
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

ICP ID Number: TJA61 4_____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : Al	Ca	Fe	Mg	BA_
Aluminum	308.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony	217.60	0.0001730	0.0000000	-0.0000700	0.0000000	0.0000000
Arsenic	193.70	0.0032220	0.0000000	0.0002370	0.0000000	0.0000000
Barium	493.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium	226.50	0.0000300	0.0000000	0.0002950	0.0000000	0.0000000
Calcium	315.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium	267.70	0.0000000	0.0000000	-0.0000410	0.0000000	0.0000000
Cobalt	228.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0001880
Copper	324.80	0.0000000	0.0000000	-0.0000450	0.0000000	0.0000000
Iron	259.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.40	0.0007590	0.0000000	0.0001130	0.0000000	0.0000000
Magnesium	383.20	0.0000000	0.0012260	-0.0007120	0.0000000	0.0000000
Manganese	257.60	0.0000000	0.0000000	0.0000170	0.0000000	0.0000000
Mercury						
Molybdenu	202.00	0.0000000	0.0000000	-0.0000800	0.0000000	0.0000000
Nickel	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.00	0.0000000	0.0000000	0.0003760	0.0000000	0.0000000
Silver	328.10	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium	589.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	377.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Uranium						
Vanadium	292.40	0.0000000	-0.0000300	0.0000500	0.0000000	0.0000000
Zinc	206.20	0.0000000	0.0000000	0.0000390	0.0000370	0.0000000

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

ICP ID Number: TJA61 4_____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : BE_	CD_	CO_	CR_	MO_
Aluminum	308.20	0.0000000	0.0000000	-0.0047560	0.0000000	0.0084920
Antimony	217.60	0.0019940	0.0000000	0.0000000	0.0000000	-0.0004360
Arsenic	193.70	0.0000000	0.0000000	0.0006940	0.0009930	0.0008130
Barium	493.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium	226.50	0.0000000	0.0000000	0.0001370	0.0000000	0.0001390
Calcium	315.90	0.0000000	0.0000000	0.0032140	0.0000000	0.0000000
Chromium	267.70	0.0000000	0.0002200	0.0000000	0.0000000	-0.0037690
Cobalt	228.60	0.0000000	0.0000000	0.0000000	0.0002450	-0.0019700
Copper	324.80	0.0000000	0.0000000	-0.0003080	0.0000000	0.0006200
Iron	259.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Magnesium	383.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.60	0.0000000	0.0000000	0.0000000	0.0000000	-0.0001510
Mercury						
Molybdenu	202.00	0.0000000	0.0000000	-0.0001540	0.0000000	0.0000000
Nickel	231.60	0.0000000	0.0000000	0.0004950	0.0000000	-0.0018550
Potassium	766.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.00	0.0000000	0.0000000	0.0009940	0.0000000	0.0000000
Silver	328.10	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium	589.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	377.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Uranium						
Vanadium	292.40	0.0000000	0.0000000	0.0000000	0.0000000	-0.0108000
Zinc	206.20	0.0000000	0.0000000	0.0000000	0.0022430	0.0005240

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

ICP ID Number: TJA61 4_____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : NI_	PB_	SN_	TI_	TL_
Aluminum_	308.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony_	217.60	0.0011230	0.0009460	0.0000000	0.0000000	0.0000000
Arsenic__	193.70	0.0009940	0.0000000	0.0000000	0.0000000	0.0000000
Barium___	493.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium__	226.50	-0.0005820	0.0000000	0.0000000	0.0001910	0.0000000
Calcium__	315.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.70	0.0000000	0.0000000	0.0000000	0.0001660	0.0000000
Cobalt___	228.60	0.0000000	0.0000000	-0.0014620	0.0017260	0.0000000
Copper___	324.80	0.0000000	0.0000000	0.0000000	0.0004930	0.0000000
Iron_____	259.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead_____	220.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Magnesium	383.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury__						
Molybdenu	202.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Nickel___	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0014850
Potassium	766.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Silver___	328.10	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	589.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	377.60	0.0162630	0.0000000	0.0000000	-0.1373560	0.0000000
Uranium__						
Vanadium_	292.40	0.0000000	0.0000000	0.0000000	0.0005070	0.0000000
Zinc_____	206.20	-0.0007590	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

ICP ID Number: TJA61 4_____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : V__	___	___	___	___
Aluminum	308.20	-0.0198620				
Antimony	217.60	0.0011570				
Arsenic	193.70	0.0102320				
Barium	493.40	0.0000000				
Beryllium	313.00	0.0018680				
Cadmium	226.50	0.0000000				
Calcium	315.90	0.0000000				
Chromium	267.70	0.0014660				
Cobalt	228.60	0.0000000				
Copper	324.80	0.0000000				
Iron	259.90	0.0000000				
Lead	220.40	0.0000000				
Magnesium	383.20	0.0000000				
Manganese	257.60	-0.0001330				
Mercury						
Molybdenu	202.00	0.0000000				
Nickel	231.60	-0.0003500				
Potassium	766.50	0.0000000				
Selenium	196.00	0.0000000				
Silver	328.10	-0.0053240				
Sodium	589.60	0.0000000				
Thallium	377.60	0.0000000				
Uranium						
Vanadium	292.40	0.0000000				
Zinc	206.20	0.0000000				

Comments:

_____

_____

_____

U.S. EPA - CLP

11A
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

ICP ID Number: TJA 61E 4___ Date: 04/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : Al	Ca	Fe	Mg	BA_
Aluminum_	308.22	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony_	206.84	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Arsenic__	189.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Barium___	493.41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium__	226.50	0.0000000	0.0000000	0.0001030	0.0000000	0.0000000
Calcium__	317.93	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.72	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt___	228.62	0.0000000	0.0000000	0.0000000	0.0000000	-0.0003500
Copper___	324.75	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Iron____	271.44	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead____	220.35	0.0003970	0.0000000	0.0000630	0.0000000	0.0000000
Magnesium	279.08	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.61	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury__						
Molybdenu						
Nickel___	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.03	0.0000040	0.0000000	-0.0001270	0.0000000	0.0000000
Silver___	328.07	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	588.99	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	190.86	0.0000000	0.0000000	-0.0001380	0.0000000	0.0000000
Uranium__	292.35	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Vanadium_	292.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc____	206.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

ab Name: PARAGON_ANALYTICS_____ Contract: _____

ab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

ICP ID Number: TJA 61E 4___ Date: 04/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : CO_	CR_	MN_	NI_	V__
Aluminum	308.22	-0.0058000	0.0000000	0.0000000	-0.0013000	0.0270000
Antimony	206.84	0.0000000	0.0010000	0.0000000	0.0000000	0.0000000
Arsenic	189.04	0.0000000	-0.0029800	0.0000000	0.0000000	0.0000000
Barium	493.41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.04	0.0000000	0.0000000	0.0000000	0.0000000	-0.0031300
Cadmium	226.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Calcium	317.93	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium	267.72	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt	228.62	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Copper	324.75	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Iron	271.44	0.0723000	0.0000000	0.0000000	0.0000000	0.0150000
Lead	220.35	-0.0018800	0.0000000	0.0001820	0.0002430	0.0000000
Magnesium	279.08	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.61	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury						
Molybdenu						
Nickel	231.60	-0.0013000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.03	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Silver	328.07	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium	588.99	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	190.86	0.0010370	0.0000000	-0.0001340	0.0000000	0.0000000
Uranium	292.35	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Vanadium	292.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc	206.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

U.S. EPA - CLP

12
ICP Linear Ranges (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

ICP ID Number: TJA61 4_____ Date: 10/15/97

Analyte	Integ. Time (sec.)	Concentration (ug/L)	M
Aluminum_	8.00	1000000.0	P
Antimony_	8.00	10000.0	P
Arsenic__	8.00	100000.0	P
Barium___	8.00	50000.0	P
Beryllium	8.00	25000.0	P
Cadmium__	8.00	50000.0	P
Calcium__	8.00	1000000.0	P
Chromium_	8.00	100000.0	P
Cobalt___	8.00	100000.0	P
Copper___	8.00	100000.0	P
Iron_____	8.00	1000000.0	P
Lead_____	8.00	100000.0	P
Magnesium	8.00	1000000.0	P
Manganese	8.00	50000.0	P
Mercury__			NR
Molybdenu	8.00	100000.0	P
Nickel___	8.00	100000.0	P
Potassium	8.00	1000000.0	P
Selenium_	8.00	100000.0	P
Silver___	8.00	10000.0	P
Sodium___	8.00	1000000.0	P
Thallium_	8.00	100000.0	P
Uranium__			NR
Vanadium_	8.00	100000.0	P
Zinc_____	8.00	100000.0	P

Comments:

U.S. EPA - CLP

12
ICP Linear Ranges (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4018R_

ICP ID Number: TJA 61E 4___ Date: 10/15/97

Analyte	Integ. Time (sec.)	Concentration (ug/L)	M
Aluminum_	15.00	500000.0	P
Antimony_	15.00	10000.0	P
Arsenic__	15.00	10000.0	P
Barium___	15.00	10000.0	P
Beryllium	15.00	10000.0	P
Cadmium__	15.00	10000.0	P
Calcium__	15.00	500000.0	P
Chromium_	15.00	10000.0	P
Cobalt___	15.00	10000.0	P
Copper___	15.00	10000.0	P
Iron_____	15.00	200000.0	P
Lead_____	15.00	10000.0	P
Magnesium	15.00	500000.0	P
Manganese	15.00	10000.0	P
Mercury__			NR
Molybdenu			NR
Nickel___	15.00	10000.0	P
Potassium	15.00	100000.0	P
Selenium_	15.00	10000.0	P
Silver___	15.00	2000.0	P
Sodium___	15.00	100000.0	P
Thallium_	15.00	10000.0	P
Uranium__	15.00	250000.0	P
Vanadium_	15.00	10000.0	P
Zinc_____	15.00	10000.0	P

Comments:

U.S. EPA - CLP

13
PREPARATION LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.:_____ SAS No.: _____ SDG No.:4018R_

Method: AV

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
04LA-97	01/06/98		20
04LA-97	01/06/98		20
04LA-97	01/06/98		20
04LA-97	01/06/98		20
LCSW	01/06/98		20
PBW	01/06/98		20

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4018R_

Instrument ID Number: TJA61 4_____ Method: P_

Start Date: 01/07/98 End Date: 01/07/98

EPA Sample No.	D/F	Time	% R	Analytes																								
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	MO	NI	K	SE	AG	NA	TL	U	V
STD-BLAN	1.00	0945																	X								
A1	1.00	0948																									
B1	1.00	0950																	X								
ZZZZZZ	1.00	0953																									
ZZZZZZ	1.00	0956																									
ICV	1.00	1000																	X								
ICB	1.00	1002																	X								
CRI	1.00	1005																	X								
ICSA	1.00	1008																	X								
ICSAB	1.00	1010																	X								
V	1.00	1013																	X								
CCB	1.00	1016																	X								
PBW	1.00	1018																	X								
LCSW	1.00	1021																	X								
04LA-97-	1.00	1024																	X								
04LA-97-	1.00	1026																	X								
04LA-97-	1.00	1029																	X								
04LA-97-	5.00	1032																	X								
04LA-97-	1.00	1034																	X								
CRI	1.00	1037																	X								
ICSA	1.00	1040																	X								
ICSAB	1.00	1042																	X								
CCV	1.00	1045																	X								
CCB	1.00	1048																	X								

U.S. EPA - CLP

14
ANALYSIS RUN LOG

_ab Name: PARAGON_ANALYTICS_____ Contract: _____

ab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4018R_

Instrument ID Number: TJA61 4_____ Method: P_

tart Date: 01/07/98 End Date: 01/07/98

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
STD-BLAN	1.00	0945																									
A1	1.00	0948																									
B1	1.00	0950																									
ZZZZZZ	1.00	0953																									
ZZZZZZ	1.00	0956																									
ICV	1.00	1000																									
ICB	1.00	1002																									
CRI	1.00	1005																									
ICSA	1.00	1008																									
ICSAB	1.00	1010																									
V	1.00	1013																									
CCB	1.00	1016																									
PBW	1.00	1018																									
LCSW	1.00	1021																									
04LA-97-	1.00	1024																									
04LA-97-	1.00	1026																									
04LA-97-	1.00	1029																									
04LA-97-	5.00	1032																									
04LA-97-	1.00	1034																									
CRI	1.00	1037																									
ICSA	1.00	1040																									
ICSAB	1.00	1042																									
CCV	1.00	1045																									
CCB	1.00	1048																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4018R_

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 01/06/98 End Date: 01/06/98

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	MO	NI	K	SE	AG	NA	TL	U	V
S0	1.00	1321																X									
S0.2	1.00	1323																X									
S1	1.00	1326																X									
S2	1.00	1328																X									
S5	1.00	1331																X									
S10	1.00	1333																X									
ZZZZZZ	1.00	1338																									
ICV	1.00	1340																X									
ICB	1.00	1342																X									
PBW	1.00	1342																X									
[illegible]A	1.00	1345																X									
LCSW	1.00	1347																X									
ZZZZZZ	1.00	1350																									
ZZZZZZ	1.00	1352																									
ZZZZZZ	1.00	1355																									
ZZZZZZ	1.00	1357																									
ZZZZZZ	1.00	1359																									
ZZZZZZ	1.00	1402																									
ZZZZZZ	1.00	1404																									
ZZZZZZ	1.00	1407																									
CCV	1.00	1409																X									
CCB	1.00	1411																X									
ZZZZZZ	1.00	1414																									
ZZZZZZ	1.00	1416																									
ZZZZZZ	1.00	1419																									
ZZZZZZ	1.00	1421																									
ZZZZZZ	1.00	1424																									
04LA-97-	1.00	1426																X									
04LA-97-	1.00	1428																X									
04LA-97-	1.00	1431																X									
04LA-97-	1.00	1433																X									
ZZZZZZ	1.00	1436																									

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4018R_

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 01/06/98 End Date: 01/06/98

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
S0	1.00	1321																									
S0.2	1.00	1323																									
S1	1.00	1326																									
S2	1.00	1328																									
S5	1.00	1331																									
S10	1.00	1333																									
ZZZZZZ	1.00	1338																									
ICV	1.00	1340																									
ICB	1.00	1342																									
PBW	1.00	1342																									
[illegible]A	1.00	1345																									
LCSW	1.00	1347																									
ZZZZZZ	1.00	1350																									
ZZZZZZ	1.00	1352																									
ZZZZZZ	1.00	1355																									
ZZZZZZ	1.00	1357																									
ZZZZZZ	1.00	1359																									
ZZZZZZ	1.00	1402																									
ZZZZZZ	1.00	1404																									
ZZZZZZ	1.00	1407																									
CCV	1.00	1409																									
CCB	1.00	1411																									
ZZZZZZ	1.00	1414																									
ZZZZZZ	1.00	1416																									
ZZZZZZ	1.00	1419																									
ZZZZZZ	1.00	1421																									
ZZZZZZ	1.00	1424																									
04LA-97-	1.00	1426																									
04LA-97-	1.00	1428																									
04LA-97-	1.00	1431																									
04LA-97-	1.00	1433																									
ZZZZZZ	1.00	1436																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4018R_

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 01/06/98 End Date: 01/06/98

EPA Sample No.	D/F	Time	% R	Analytes																								
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	MO	NI	K	SE	AG	NA	TL	U	V
CCV	1.00	1438																X									
CCB	1.00	1441																X									

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4018R_

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 01/06/98 End Date: 01/06/98

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
CCV	1.00	1438																									
CCB	1.00	1441																									

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4018R_

Instrument ID Number: TJA 61E 4____ Method: P_

Start Date: 01/07/98 End Date: 01/07/98

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	MO	NI	K	SE	AG	NA	TL	U	V
100PPM_U	1.00	1015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
ZZZZZZ	1.00	1058		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1102		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1106		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICV	1.00	1116		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
ICB	1.00	1121		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
CRI	1.00	1128		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
ICSA	1.00	1135		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
ICSAB	1.00	1139		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
CCV	1.00	1143		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
CCB	1.00	1146		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
PBW	1.00	1150		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
LCSW	1.00	1154		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
04LA-97-	1.00	1159		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
04LA-97-	1.00	1202		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
ZZZZZZ	5.00	1206																									
04LA-97-	1.00	1210		X	X	X	X	X	X	-	X	X	X	X	X	-	X	-	-	X	-	X	X	-	X	X	X
ZZZZZZ	1.00	1213																									
04LA-97-	1.00	1223		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
04LA-97-	5.00	1227		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
CCV	1.00	1233		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
CCB	1.00	1238		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
ZZZZZZ	1.00	1247																									
ZZZZZZ	1.00	1250		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1252		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1256		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1300		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1303		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1306		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CRI	1.00	1312		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
ICSA	1.00	1316		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
ICSAB	1.00	1319		X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X

U.S. EPA - CLP

14
ANALYSIS RUN LOG

ab Name: PARAGON_ANALYTICS_____ Contract: _____

ab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4018R_

Instrument ID Number: TJA 61E 4____ Method: P_

tart Date: 01/07/98 End Date: 01/07/98

EPA Sample No.	D/F	Time	% R	Analytes																						
				ZN																						
100PPM_U	1.00	1015																								
ZZZZZZ	1.00	1058																								
ZZZZZZ	1.00	1102																								
ZZZZZZ	1.00	1106																								
ICV	1.00	1116		X																						
ICB	1.00	1121		X																						
CRI	1.00	1128		X																						
ICSA	1.00	1135		X																						
ICSAB	1.00	1139		X																						
CCV	1.00	1143		X																						
CCB	1.00	1146		X																						
PBW	1.00	1150		X																						
LCSW	1.00	1154		X																						
04LA-97-	1.00	1159		X																						
04LA-97-	1.00	1202		X																						
ZZZZZZ	5.00	1206																								
04LA-97-	1.00	1210		X																						
ZZZZZZ	1.00	1213																								
04LA-97-	1.00	1223		X																						
04LA-97-	5.00	1227		X																						
CCV	1.00	1233		X																						
CCB	1.00	1238		X																						
ZZZZZZ	1.00	1247																								
ZZZZZZ	1.00	1250																								
ZZZZZZ	1.00	1252																								
ZZZZZZ	1.00	1256																								
ZZZZZZ	1.00	1300																								
ZZZZZZ	1.00	1303																								
ZZZZZZ	1.00	1306																								
CRI	1.00	1312		X																						
ICSA	1.00	1316		X																						
ICSAB	1.00	1319		X																						

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4018R_

Instrument ID Number: TJA 61E 4____ Method: P_

Start Date: 01/07/98 End Date: 01/07/98

EPA Sample No.	D/F	Time	% R	Analytes																								
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	MO	NI	K	SE	AG	NA	TL	U	V
CCV	1.00	1323		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	_	X	X	X	X	X	X	X	X
CCB	1.00	1327		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	_	X	X	X	X	X	X	X	X

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4018R_

Instrument ID Number: TJA 61E 4____ Method: P_

Start Date: 01/07/98 End Date: 01/07/98

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
CCV	1.00	1323		X																							
CCB	1.00	1327		X																							

FORM XIV - IN ILM03.0

000049

Bromide Quality Control Results

Analysis Date: 01/08/98
Ion Chromatograph Analytical Sequence: S980108.seq

BLANK SUMMARY

	blank Br conc (mg/L)	blank reporting limit (mg/L)
ICB (Method Blank)	ND	< 0.1
CCB-1	ND	< 0.1
CCB-2	ND	< 0.1

ND = Not Detected

CALIBRATION VERIFICATION SUMMARY

	spike added Br conc (mg/L)	Br conc found (mg/L)	recovery %	accept. limit
ICV (LCS)	4.00	4.07	102	85-115%
CCV-1	4.00	4.10	103	90-110%
CCV-2	4.00	4.31	108	90-110%

MATRIX SPIKE SUMMARY

ID	spike added Br conc (mg/L)	sample Br conc (mg/L)	spiked sample Br conc (mg/L)	recovery %	recovery accept. limit	RPD %	RPD accept. limit
9712242-2 MS	5.00	0.22	5.42	104	85-115%		
9712242-2 MSD	5.00	0.22	5.49	105	85-115%	1.2	0-15%

Chloride Quality Control Results

Analysis Date: 01/08/98
Ion Chromatograph Analytical Sequence: S980108.seq

BLANK SUMMARY

	blank Cl conc (mg/L)	blank reporting limit (mg/L)
ICB (Method Blank)	ND	< 0.1
CCB-1	ND	< 0.1
CCB-2	ND	< 0.1

ND = Not Detected

CALIBRATION VERIFICATION SUMMARY

	spike added Cl conc (mg/L)	Cl conc found (mg/L)	recovery %	accept. limit
ICV (LCS)	4.00	3.95	99	75-115%
CCV-1	4.00	4.05	101	90-110%
CCV-2	4.00	4.19	105	90-110%

Chloride Quality Control Results

Analysis Date: 01/09/98
Ion Chromatograph Analytical Sequence: S980109.seq

BLANK SUMMARY

	blank Cl conc (mg/L)	blank reporting limit (mg/L)
ICB (Method Blank)	ND	< 0.1
CCB-1	ND	< 0.1

ND = Not Detected

CALIBRATION VERIFICATION SUMMARY

	spike added Cl conc (mg/L)	Cl conc found (mg/L)	recovery %	accept. limit
ICV (LCS)	4.00	4.02	100	75-115%
CCV-1	4.00	4.13	103	90-110%

MATRIX SPIKE SUMMARY

ID	spike added Cl conc (mg/L)	sample Cl conc (mg/L)	spiked sample Cl conc (mg/L)	recovery %	recovery accept. limit	RPD %	RPD accept. limit
9712242-2 MS	25.0	14.1	37.5	94	75-115%		
9712242-2 MSD	25.0	14.1	37.7	94	75-115%	0.5	0-20%

Fluoride Quality Control Results

Analysis Date: 01/08/98
Ion Chromatograph Analytical Sequence: S980108.seq

BLANK SUMMARY

	blank F conc (mg/L)	blank reporting limit (mg/L)
ICB (Method Blank)	ND	< 0.05
CCB-1	ND	< 0.05
CCB-2	ND	< 0.05

ND = Not Detected

CALIBRATION VERIFICATION SUMMARY

	spike added F conc (mg/L)	F conc found (mg/L)	recovery %	accept. limit
ICV (LCS)	2.00	2.02	101	80-120%
CCV-1	2.00	2.09	105	90-110%
CCV-2	2.00	2.03	101	90-110%

MATRIX SPIKE SUMMARY

ID	spike added F conc (mg/L)	sample F conc (mg/L)	spiked sample F conc (mg/L)	recovery %	recovery accept. limit	RPD %	RPD accept. limit
9712242-2 MS	2.00	1.00	2.94	97	80-120%		
9712242-2 MSD	2.00	1.00	3.07	103	80-120%	4	0-20%

Nitrate Quality Control Results

Analysis Date: 01/08/98
Ion Chromatograph Analytical Sequence: S980108.seq

BLANK SUMMARY

	blank NO3-N conc (mg/L)	blank reporting limit (mg/L)
ICB (Method Blank)	ND	< 0.1
CCB-1	ND	< 0.1
CCB-2	ND	< 0.1

ND = Not Detected

CALIBRATION VERIFICATION SUMMARY

	spike added NO3-N conc (mg/L)	NO3-N conc found (mg/L)	recovery %	accept. limit
ICV (LCS)	4.00	4.04	101	85-115%
CCV-1	4.00	4.11	103	90-110%
CCV-2	4.00	4.12	103	90-110%

MATRIX SPIKE SUMMARY

ID	spike added NO3-N conc (mg/L)	sample NO3-N conc (mg/L)	spiked sample NO3-N conc (mg/L)	recovery %	recovery accept. limit	RPD %	RPD accept. limit
9712242-2 MS	5.00	2.85	7.82	99	85-115%		
9712242-2 MSD	5.00	2.85	7.88	101	85-115%	0.8	0-15%

Orthophosphate Quality Control Results

Analysis Date: 01/08/98
Ion Chromatograph Analytical Sequence: S980108.seq

BLANK SUMMARY

	blank PO4-P conc (mg/L)	blank reporting limit (mg/L)
ICB (Method Blank)	ND	< 0.1
CCB-1	ND	< 0.1
CCB-2	ND	< 0.1

ND = Not Detected

CALIBRATION VERIFICATION SUMMARY

	spike added PO4-P conc (mg/L)	PO4-P conc found (mg/L)	recovery %	accept. limit
ICV (LCS)	4.00	3.97	99	85-115%
CCV-1	4.00	3.98	100	90-110%
CCV-2	4.00	4.28	107	90-110%

MATRIX SPIKE SUMMARY

ID	spike added PO4-P conc (mg/L)	sample PO4-P conc (mg/L)	spiked sample PO4-P conc (mg/L)	recovery %	recovery accept. limit	RPD %	RPD accept. limit
9712242-2 MS	5.00	ND	5.14	103	85-115%		
9712242-2 MSD	5.00	ND	5.45	109	85-115%	5.8	0-15%

Sulfate Quality Control Results

Analysis Date: 01/08/98
Ion Chromatograph Analytical Sequence: S980108.seq

BLANK SUMMARY

	blank SO4 conc (mg/L)	blank reporting limit (mg/L)
ICB (Method Blank)	ND	< 0.2
CCB-1	ND	< 0.2
CCB-2	ND	< 0.2

ND = Not Detected

CALIBRATION VERIFICATION SUMMARY

	spike added SO4 conc (mg/L)	SO4 conc found (mg/L)	recovery %	accept. limit
ICV (LCS)	20.00	19.97	100	85-115%
CCV-1	20.00	20.97	105	90-110%
CCV-2	20.00	20.31	102	90-110%

MATRIX SPIKE SUMMARY

ID	spike added SO4 conc (mg/L)	sample SO4 conc (mg/L)	spiked sample SO4 conc (mg/L)	recovery %	recovery accept. limit	RPD %	RPD accept. limit
9712242-2 MS	20.0	15.8	34.8	95	85-115%		
9712242-2 MSD	20.0	15.8	35.5	99	85-115%	2.1	0-15%

Total CN in Water Calculations and Quality Control Results

Date analyzed: 01/06/98
Time analyzed: 1400

std (ug/L)	Abs (578nm)	calc soln conc (ug/L)
0	0.000	-1.3
10	0.024	10.8
50	0.100	49.4
100	0.197	98.6
200	0.403	203.2
300	0.598	302.2
400	0.785	397.1

Regression Output:

Constant		-1.3488
Std Err of Y Est		2.3727
R Squared		0.9998
No. of Observations		7
Degrees of Freedom		5
X Coefficient(s)	507.5660	
Std Err of Coef.	3.1953	

ID:	sample aliq (mL)	trap vol (mL)	aliq for color dev (mL)	Abs (578nm)	calc soln conc (ug/L)	sample conc mg/L	Rep Limit mg/L	ICV/CCV recovery %
ICV			10	0.195	97.6			98
ICB			10	0.004	0.7			
M Blank	50	50	10	0.008	2.7	0.00	0.01	
LCS	50	50	10	0.387	195.1	0.195	0.01	
9712242-2	50	50	10	0.004	0.7	0.001	0.01	
9712242-2 dup	50	50	10	0.008	2.7	0.003	0.01	
9712242-2 MS	50	50	10	0.201	100.7	0.101	0.01	
9712242-2 MSD	50	50	10	0.199	99.7	0.10	0.01	
9712252-1	50	50	10	0.006	1.7	0.00	0.01	
9712265-1	50	50	10	0.006	1.7	0.00	0.01	
CCV			10	0.199	99.7			100
CCB			10	0.003	0.2			

Total CN in Water Quality Control Results

Date analyzed: 01/06/98

BLANK SUMMARY

ID	blank CN conc (mg/L)	accept. limit (mg/L)
M Blank	0.003	< 0.01

LCS SUMMARY

ID	true CN conc (mg/L)	CN conc found (mg/L)	recovery %	recovery accept. limit
LCS	0.200	0.195	98	85-115%

MATRIX SPIKE SUMMARY

ID	spike added CN conc (mg/L)	sample CN conc (mg/L)	CN conc found in spkd sample (mg/L)	recovery %	recovery accept. limit	RPD %	RPD accept. limit
9712242-2 MS	0.100	ND	0.101	101	63-126%		
9712242-2 MSD	0.100	ND	0.100	100	63-126%	1	0-30%

DUPLICATE SUMMARY

ID	sample alk conc (mg/L)	duplic alk conc (mg/L)	RPD %	accept. limits
9712242-2 dup	ND	ND	NA	0-30%

ND = Not Detected
NA = Not Applicable

148419

Total CN in Water Calculations and Quality Control Results

Date analyzed: 01/06/98
Time analyzed: 1400

std (ug/L)	Abs (578nm)	calc soln conc (ug/L)
0	0.000	-1.3
10	0.024	10.8
50	0.100	49.4
100	0.197	98.6
200	0.403	203.2
300	0.598	302.2
400	0.785	397.1

Regression Output:

Constant		-1.3488
Std Err of Y Est		2.3727
R Squared		0.9998
No. of Observations		7
Degrees of Freedom		5
X Coefficient(s)	507.5660	
Std Err of Coef.	3.1953	

ID:	sample aliq (mL)	trap vol (mL)	aliq for color dev (mL)	Abs (578nm)	calc soln conc (ug/L)	sample conc mg/L	Rep Limit mg/L	ICV/CCV recovery %
ICV			10	0.195	97.6			98
ICB			10	0.004	0.7			
M Blank	50	50	10	0.008	2.7	0.00	0.01	
LCS	50	50	10	0.387	195.1	0.195	0.01	
9712242-2	50	50	10	0.004	0.7	0.001	0.01	
9712242-2 dup	50	50	10	0.008	2.7	0.003	0.01	
9712242-2 MS	50	50	10	0.201	100.7	0.101	0.01	
9712242-2 MSD	50	50	10	0.199	99.7	0.10	0.01	
9712252-1	50	50	10	0.006	1.7	0.00	0.01	
9712265-2	50	50	10	0.006	1.7	0.00	0.01	
CCV			10	0.199	99.7			100
CCB			10	0.003	0.2			

Total CN in Water Quality Control Results

Date analyzed: 01/06/98

BLANK SUMMARY

ID	blank CN conc (mg/L)	accept. limit (mg/L)
M Blank	0.003	< 0.01

LCS SUMMARY

ID	true CN conc (mg/L)	CN conc found (mg/L)	recovery %	recovery accept. limit
LCS	0.200	0.195	98	85-115%

MATRIX SPIKE SUMMARY

ID	spike added CN conc (mg/L)	sample CN conc (mg/L)	CN conc found in spkd sample (mg/L)	recovery %	recovery accept. limit	RPD %	RPD accept. limit
9712242-2 MS	0.100	ND	0.101	101	63-126%		
9712242-2 MSD	0.100	ND	0.100	100	63-126%	1	0-30%

DUPLICATE SUMMARY

ID	sample alk conc (mg/L)	duplic alk conc (mg/L)	RPD %	accept. limits
9712242-2 dup	ND	ND	NA	0-30%

ND = Not Detected
NA = Not Applicable

DM 1-7-98

000024

Tuesday, December 23, 1997

Los Alamos
NATIONAL LABORATORY

AMENDED

REQUEST NUMBER: 4020R
ANALYSIS TYPE: RAD

97-12-241

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 12/22/97
REPORT DUE: 1/22/98
TURN AROUND REQ'D: 30 days

These samples are on:

LANL Request Number: 4020R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; AMENDED: CORRECTION ON ANALYSIS ORDER CODE. JV 12/23/97

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
AM241		04LA-97-0627	06	W	12/20/97	
GROSSAB		04LA-97-0627	06	W	12/20/97	
GROSSG		04LA-97-0627	06	W	12/20/97	
GSCAN		04LA-97-0627	06	W	12/20/97	
ISOPU		04LA-97-0627	06	W	12/20/97	01
ISOU		04LA-97-0627	06	W	12/20/97	
SR90		04LA-97-0627	06	W	12/20/97	
AM241		04LA-97-0628	02	W	12/20/97	
GROSSAB		04LA-97-0628	02	W	12/20/97	
GROSSG		04LA-97-0628	02	W	12/20/97	02
GSCAN		04LA-97-0628	02	W	12/20/97	
ISOPU		04LA-97-0628	02	W	12/20/97	
ISOU		04LA-97-0628	02	W	12/20/97	
SR90		04LA-97-0628	02	W	12/20/97	

Final Page of REQUEST NUMBER 4020R

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: **4020R** LAB NAME: **Paragon** LAB CODE_____

NAME OF VALIDATOR: **Antonia Tallarico** COMPANY: **LATA**

VALIDATION DATE: **16 March 98** EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- o INORGANICS
- **X** RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? " YES " NO

Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

_____

_____

_____

Signature/1st validation: _____ 16March98

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/01/96 10:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed : 01/07/98 13:01

Lab Sample ID: 97-12-241-S1

Sample Matrix : Water

Client Sample ID: Lab Control

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	106000	103000	103	Pass
Cd-109	1470000	1400000	107	Pass
Co-57	30700	30700	100	Pass
Ce-139	45100	46900	96.1	Pass
Sn-113	79700	78200	102	Pass
Cs-137	41600	39100	107	Pass
Y-88	133000	139000	95.6	Pass
Co-60	62200	64400	96.5	Pass

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known ± 15%

Data stored in file \gdr\prt\W12241S1.97P

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 01/05/98 17:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 01/06/98 20:46

Lab Sample ID: 97-12-241-B1

Sample Matrix: Water

Client Sample ID: Blank

Count Duration: 800 Min.

Nuclide	Dec. Level (pCi/L)	Nuclide	Dec. Level (pCi/L)
Am-241	10.6	Np-237	9.46
Cd-109	31.0	Th-234	103
Co-57	0.736 *	Ce-144	5.69
Ce-139	0.955	U-235	3.95
Ra-226	65.3	Th-227	7.65
Pb-212	7.43	Ra-224	25.4
Se-75	2.34	Hg-203	2.27
Pa-231	77.3	Pa-233	3.83
Ra-223	46.2	Eu-152	3.41
Bi-211	8.64	Pb-214	14.0
Sn-113	1.66	Rn-219	21.9
Pb-211	37.7	Ann-Rad	5.14
Sr-85	2.01	Ba-140	6.85
Tl-208	5.13	Cs-134	1.62
Bi-214	24.4	Ru-106	14.4
Cs-137	1.75	Mn-54	2.34
Y-88	3.83	Ac-228	15.8
Pa-234m	546	Zn-65	3.25
Co-60	1.56	Na-22	2.74
K-40	47.1	La-140	3.27
Bi-212	65.2		

Decision Level Values calculated as recommended by ANSI N42.2
Reported sample activities should be compared to these Decision Levels

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 12/20/97 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 01/06/98 20:46

Lab Sample ID: 97-12-241-D1

Sample Matrix: Water

Client Sample ID: Dup of 02

Count Duration: 800 Min.

Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)
Th-234	61.8 ± 53.1	Cd-109	73.0 ± 24.1 S
Bi-211	12.9 ± 18.9	K-40	37.0 ± 36.6
Am-241	-1.44 ± 4.33	Np-237	-18.9 ± 7.62
Co-57	0.085 ± 0.721	Ce-144	3.00 ± 5.63
Ce-139	-1.52 ± 0.905	U-235	-0.841 ± 3.05
Ra-226	-13.9 ± 50.3	Th-227	-13.2 ± 6.25
Pb-212	-2.49 ± 3.46	Ra-224	-106 ± 23.5
Se-75	-0.176 ± 1.25	Hg-203	0.441 ± 1.17
Pa-231	-6.15 ± 30.5	Pa-233	1.05 ± 1.78
Ra-223	-16.6 ± 18.4	Eu-152	-1.14 ± 2.68
Pb-214	-0.443 ± 6.01	Sn-113	0.764 ± 1.22
Rn-219	-5.63 ± 10.8	Pb-211	15.0 ± 27.6
Ann-Rad	-23.6 ± 3.59	Sr-85	-0.777 ± 1.90
Ba-140	-4.09 ± 12.2	Tl-208	-2.40 ± 2.49
Cs-134	-0.829 ± 1.15	Bi-214	-0.605 ± 6.89
Ru-106	3.56 ± 10.2	Cs-137	-0.576 ± 1.13
Mn-54	0.011 ± 1.12	Y-88	-1.77 ± 2.82
Ac-228	-0.887 ± 8.64	Pa-234m	203 ± 398
Zn-65	1.97 ± 2.38	Co-60	0.481 ± 1.06
Na-22	-0.965 ± 1.21	La-140	712 ± 1460
Bi-212	-27.3 ± 46.2		

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

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

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Thursday, January 29, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID:
Lab ID: 9712241-S1LCS1

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 06-Jan-98
Date Analyzed: 15-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: FILTERED
Count Time (min.): 350

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
U-234	6.42 +/- 0.42	0.066	5.83	pCi/L	110%	+/- 25%	Pass
U-235	0.301 +/- 0.044	0.057	N/A	pCi/L	N/A	N/A	
U-238	6.75 +/- 0.43	0.066	5.83	pCi/L	116%	+/- 25%	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	3.86	3.19	pCi/L	83%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Thursday, January 29, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID:
Lab ID: 9712241-B1MB1

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 06-Jan-98
Date Analyzed: 15-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: FILTERED
Count Time (min.): 350

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.036 +/- 0.015	0.040	pCi/L	U
U-235	0.0013 +/- 0.0082	0.047	pCi/L	U
U-238	0.055 +/- 0.018	0.044	pCi/L	LTB

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	3.86	3.26	pCi/L	84%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

B - Analyte concentration greater than MDC.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Decision Level Report

Reported on: Thursday, January 29, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID:
Lab ID: 9712241-B1MB1

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 06-Jan-98
Date Analyzed: 15-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: FILTERED

Target Nuclide	Decision Level	Reporting Units
U-234	0.027	pCi/L
U-235	0.035	pCi/L
U-238	0.032	pCi/L

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	3.86	3.26	pCi/L	84%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Wednesday, January 28, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

	Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID: 04LA-97-0627				
Lab ID: 9712241-1	1/6/98	1/15/98	AS00601	1
DUP ID: 9712241-1DUP1	1/6/98	1/15/98	AS00601	1

Sample Matrix: WATER
Date Collected: 20-Dec-97
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 778R3
Aliquot Units: L
Report Basis: FILTERED

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
U-234	1.092 +/- 0.097	0.907 +/- 0.083	pCi/L	0.72	< 1.42	
U-235	-0.0003 +/- 0.0081	0.032 +/- 0.013	pCi/L	1.04	< 1.42	U
U-238	0.761 +/- 0.076	0.690 +/- 0.069	pCi/L	0.35	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	3.86	3.5	pCi/L	91%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

DER - Duplicate Error Ratio

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 4020R

Date File Saved: 1/21/98

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0627	97-12-241-01
04LA-97-0628	97-12-241-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Sr-90

Samples under Request Number 4020R (Work Order 97-12-241) were received on 12/23/97 and scheduled for strontium-90 analyses, which were completed on 1/20/98.

Total radiostrontium is reported as Sr-90. The presence of other radioisotopes of strontium may cause positive bias in the measured strontium concentration.

The results for the water samples are reported in units of pCi/L

This work order was prepared using PAI SOP707R3 and analyzed using PAI SOP724R5.

All samples in this batch were inadvertently counted immediately after preparation, resulting in low percent recovery for sample 97-12-241-S1 (76.4%). The result for this sample was not acceptable for a client in this batch. All samples were counted for a second time after five days of ingrowth, resulting in percent recovery of 82.9%. Results from the second count were reported.

No further anomalies were encountered during the preparation or analysis of these samples. All remaining quality control criteria were met.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Chris McNerney — 1/22/98
Radiochemistry Instrument Technician — Date

Radiochemistry Final Review — 1/23/98
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple — 1-30-98
Laboratory Manager — Date

Sr-90 LCS RESULTS

Method ASTM D5918-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 01/14/98

Client Name: Shared QC

Date Analyzed : 01/20/98

Client Project ID : Blank Spike

Sample Matrix : Water

Lab Workorder Number : 97-12-241

Count Duration: 240 Min.

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
97-12-241-S1	13.6 ± 3.41	11.3 ± 2.07	82.9%	Pass

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

PAI sets control limits for Sr-90 measurements based on Historical Data.

Control Limits = Known ± 25% for Sr-90.

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

Remarks:

Blank Spike shared for work orders 97-12-241 and 97-08-086.

Sr-90 ANALYSIS RESULTS SUMMARY

Method ASTM D5811-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 01/14/98

Client Name: Shared QC

Date Analyzed : 01/20/98

Client Project ID: Blank

Sample Matrix : Water

Lab Sample ID Series: 97-12-241

Count Duration: 240 Min.

Analyzed by: CJM

Client Sample ID	Lab Sample ID	Sr-90 (pCi/l)
Blank	97-12-241-B1	-0.03 ± 0.17
Blank	Decision Level	0.18

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

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP707FC and analyzed using PAI SOP724FC.

Remarks:

Blank shared work orders 97-12-241 and 97-08-086.

Sr-90 MATRIX SPIKE RESULTS

Method ASTM D5811-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 12/20/97

Client Name: Los Alamos National Lab

Date Analyzed : 01/20/98

Client Project ID : 4020R

Sample Matrix : Water

Lab Workorder Number : 97-12-241

Count Duration: 240 Min.

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
97-12-241-M1	13.7 ± 3.42	16.0 ± 2.94	117%	Pass

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

Control Limits = Known ± 25% for Sr-90.

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

Remarks:

Sample 97-12-241-M1 is a matrix spike of sample 97-12-241-02.

GROSS ALPHA/BETA BLANK SPIKE RESULTS

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc. Date Collected: 01/06/98

Client Name: Shared QC Date Analyzed : 01/11/98

Client Project ID : Blank Spike Sample Matrix : Water

Lab Workorder Number : 97-12-063 Units : pCi/l

Alpha Recovery Data

Lab Sample ID	Alpha Spike Added	Alpha Reported	Percent Recovery	Flag
97-12-063-S1	209.2	172.5	82.5	Pass

Beta Recovery Data

Lab Sample ID	Beta Spike Added	Beta Reported	Percent Recovery	Flag
97-12-063-S1	271.2	235.5	86.8	Pass

PAI sets control limits for gross alpha/beta measurements based on EPA/EMSL Laboratory Intercomparison Control Limits.

Acceptance Range for Percent Recovery of blank spike samples is known ± 30%.

Remarks:

Blank Spike shared for work orders 97-12-063, 97-12-217, 97-12-230, 97-12-241, 97-12-181, and 97-12-255.

ALPHA/BETA ANALYSIS RESULTS SUMMARY

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 01/06/98

Client Name: Shared QC

Date Analyzed : 01/11/98

Client Project ID: Blank

Sample Matrix : Water

Lab Sample ID Series: 97-12-063

Count Duration: 1000 Min.

Analyzed By : CJM

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/liter)	Gross Beta (pCi/liter)
Blank	12-063-B1	-0.68 ± 0.48	-0.65 ± 0.73
Decision Level	12-063-B1	1.3	2.4

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

Reported Activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP702FC and analyzed using PAI SOP705FC.

Remarks:

Blank shared for work orders 97-12-063, 97-12-181, 97-12-217, 97-12-230, 97-12-241, and 97-12-255.

Paragon Analytics, Inc.
Case Narrative File

Request Number: 4020R
Date File Saved: 01/21/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0627	97-12-241-01
04LA-97-0628	97-12-241-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gross Gamma

The samples under Request Number 4020R (PAI Work Order 97-12-241) were received on 12/23/97 and scheduled for gross gamma analyses, which were completed on 01/07/98.

The analysis results for these samples are reported in units of pCi/Liter referenced to Cs-137.

These samples were prepared according to Paragon Analytics, Inc. procedure PAI SOP739R2.

The HPGe gamma photon detectors were calibrated using a standard of Cesium-137 in water. Counting efficiencies were calculated as the ratio of the net integrated count rate in a region of interest between 50 and 2000 keV to the known photon emission rate of the standard. Samples were analyzed in the same geometry and counts integrated in the same manner.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported. Each result should be compared to the result for the appropriate blank for determination of the validity of that measurement.

The duplicate error ratio (DER) for the analysis of sample 04LA-97-0628 (97-12-241-02) and its duplicate (97-12-241-D1) was elevated above our warning limit. DER is defined as :

$$DER = \frac{/S - D/}{2 * \sqrt{\sigma_S^2 + \sigma_D^2}}$$

The warning limit for DER is 1.42. The DER for this analysis is 2.19, which is outside the acceptance range defined in PAI SOP 715 Rev.9.

Gross gamma activity was detected in the blank at a concentration in excess of the minimum detectable concentration (MDC). However, the blank activity is well below that reported for the client samples and is also below the required quantification limit of 100 pCi/Liter. As the sample was depleted for other analyses, no reanalysis is possible, and these results are submitted.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill
Radiochemistry Instrumentation

1-21-98
Date

Radiochemistry Final Review

1/22/98
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

1/30/98
Date

Gross Gamma

Laboratory Control Sample Results

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	1/7/98
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-12-241	Units	pCi/L

Sample ID	Reported Activity	Known Value	Percent Recovery	Flag
97-12-241-S1	8741	8668	100.8%	PASS

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

Prepared by MaP 1/21/98

Gross Gamma Results Summary

Blank Results

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	1/6/98
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-12-241	Units:	pCi/L

Client Sample ID	Lab Sample ID	Activity	Uncertainty	MDC
Blank	97-12-241-B1	51	11	17

~~(U,R96)~~ m

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate.

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

Prepared by mcf 1/21/98

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Wednesday, January 28, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID:
Lab ID: 9712241-S1LCS1

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 06-Jan-98
Date Analyzed: 21-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: FILTERED
Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Am-241	8.11 +/- 0.52	0.060	7.16	pCi/L	113%	+/- 25%	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.62	pCi/L	74%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Wednesday, January 28, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID:
Lab ID: 9712241-B1MB1

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 06-Jan-98
Date Analyzed: 21-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: FILTERED
Count Time (min.): 400

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.004 +/- 0.014	0.068	pCi/L	U

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.85	pCi/L	78%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

B - Analyte concentration greater than MDC.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Decision Level Report

Reported on: Wednesday, January 28, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID:
Lab ID: 9712241-B1MB1

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 06-Jan-98
Date Analyzed: 21-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: FILTERED

Target Nuclide	Decision Level	Reporting Units
Am-241	0.059	pCi/L

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.85	pCi/L	78%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Wednesday, January 28, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

		Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID:	04LA-97-0627				
Lab ID:	9712241-1	1/6/98	1/20/98	AS00601	1
DUP ID:	9712241-1DUP1	1/6/98	1/20/98	AS00601	1

Sample Matrix: WATER
Date Collected: 20-Dec-97
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 778R3
Aliquot Units: L
Report Basis: FILTERED

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
Am-241	0.004 +/- 0.014	0.051 +/- 0.017	pCi/L	1.09	< 1.42	LT

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.77	pCi/L	77%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

DER - Duplicate Error Ratio

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Thursday, January 29, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID:
Lab ID: 9712241-S1LCS1

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 06-Jan-98
Date Analyzed: 26-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: FILTERED
Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Pu-238	0.022 +/- 0.016	0.063	N/A	pCi/L	N/A	N/A	U
Pu-239	5.04 +/- 0.34	0.073	4.85	pCi/L	104%	+/- 25%	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.74	pCi/L	62%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Thursday, January 29, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID:
Lab ID: 9712241-B1MB1

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 06-Jan-98
Date Analyzed: 26-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: FILTERED
Count Time (min.): 400

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.013 +/- 0.012	0.049	pCi/L	U
Pu-239	0.0010 +/- 0.0078	0.034	pCi/L	U

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.59	pCi/L	82%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

B - Analyte concentration greater than MDC.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Decision Level Report

Reported on: Thursday, January 29, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID:
Lab ID: 9712241-B1MB1

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 06-Jan-98
Date Analyzed: 26-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: FILTERED

Target Nuclide	Decision Level	Reporting Units
Pu-238	0.039	pCi/L
Pu-239	0.022	pCi/L

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.59	pCi/L	82%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Wednesday, January 28, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

	Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID: 04LA-97-0627				
Lab ID: 9712241-1	1/6/98	1/26/98	AS00601	1
DUP ID: 9712241-1DUP1	1/6/98	1/26/98	AS00601	1

Sample Matrix: WATER
Date Collected: 20-Dec-97
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 778R3
Aliquot Units: L
Report Basis: FILTERED

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
Pu-238	0.020 +/- 0.015	0.013 +/- 0.014	pCi/L	0.16	< 1.42	U
Pu-239	-0.0152 +/- 0.0077	0.016 +/- 0.010	pCi/L	1.22	< 1.42	U

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.45	pCi/L	78%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

DER - Duplicate Error Ratio

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgment based on data use . It usually has an "M" with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analytes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likely because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1c Carrier recovery 10-40% and result > EQL.

1d Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

3b Spike recovery outside criterion but sample is not of same matrix as was matrix spike sample

4 Sample result > EQL but < 5X the amount found in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

6d LCS tracer/carrier recovery < 10 % and sample result is a non-detect.

7 For the set of duplicates, both results are > EQL or no EQL is available, but there is not a 3 σ agreement between the results - within an SDG.

8 One result > EQL and the difference > a factor of 1xEQL for water and 2xEQL for soil.

9a Result < MDA and MDA is < EQL.

9b Result > MDA but < EQL.

10a Result < both MDA and EQL.

10b Result < MDA but > EQL.

11 Result is less than three times the reported 1-sigma uncertainty.

17 A zero was added to the result field because the laboratory did not provide a value or a MDC.

RADIOCHEMISTRY

Lab Control Sample (LCS) **Present? yes no** **1/SDG** **75-125% recovery** *The γ spec. LCS contains Am-241, Cd-109, Co-57, Ce-139, Sn-113, Cs-137, Y-88, and Co-60. The Iso-U LCS contained U-234 and U-238.* *Paragon uses a blank spike as a LCS for the gross α/β analysis.*	**OK** **See comment**	**Obtain from lab. Q=A** **If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 75% and J+ for > 125%** **If the LCS sample tracer/ carrier recovery is < 10%, qualify the associated sample data as P for non-detects.**	 **R6a** **R6** **R6d**
Matrix Spike (MS) **1/SDG** **Present? X yes no** **75-125% recovery** **(Note: As opposed to other tests, the matrix spike test will qualify samples on the basis of their connection by SDG and not by analytical batch).** *A matrix spike is required for Sr-90 only.*	**OK** **See comment**	**Obtain from lab. Q=A** **If criterion not met, qualify all analytes associated with the MS with a J- for <75%** **and J+ for > 125%,** **if all samples in batch of same matrix. If there is variation of matrix, P for samples not of same matrix as spiked sample.**	 **R3a** **R3** **R3b**

MIG March 98

Method blank **Present? yes no** **1/SDG** **target analytes ≤5x the amount in the blank** *Five times the decision level result from the blank was used to qualify γ spec. results.*	**U** **See comment**	**Obtain from lab. Q=A** **If the sample result > EQL or no EQL is available but <5x the amount found in the associated blank, it should be qualified as U. In making this comparison the differing aliquot size of the blank and sample being tested should be taken into account.**	**R4**
Duplicate **Present? X yes no** **1/SDG** **(Note: As opposed to other tests, the duplicate tests will qualify samples on the basis of their connection by SDG and not by analytical batch).** *For the gross γ analysis, there is not a 3σ agreement between the sample and duplicate. Both sample results are qualified as J.*	**J** **See comment**	**Obtain from lab. Q=A** **If both results are above the EQL or no EQL is available, all results for same analyte in same SDG should be qualified as J if there is not 3σ agreement between results.** **If both results are < EQL no test should be done.** **If one result > EQL and difference > factor of 1X EQL for water and 2X EQL for soil, qualify with J.**	**R7** **R8**

M/6 March 98

EQL **Denote those samples where the result is less than the reported sample MDA or EQL.** **Confirm that the MDA of each reported analyte in each sample and blank is <EQL.** *The decision level result from the blank was used in place of the MDA for the γ spec., Sr-90*	**U** **See comment**	**When the MDA < the EQL or no EQL is available:** **Qualify as U those sample results < the MDA.** **Qualify as U those sample results > MDA but < EQL.** **When the MDA is >EQL:** **Qualify as U those sample and blank results < both the MDA and EQL.** **Qualify as U those sample and blank results < than the MDA but > EQL.**	 **R9a** **R9b** **R10a** **R10b**
Detection with respect to the reported uncertainty **This is a more conservative test of detection than simply considering the MDA or EQL since sample results > than both the EQL and MDA may still be qualified using this test.**	**NA**	**Qualify as U those results < three times the reported 1-sigma uncertainty. Equivalently qualify as U those results < 1.5 times the reported 2-sigma uncertainty or < the reported 3-sigma uncertainty.**	**R11**
Tracer/carrier recovery **Present? yes no** **Tracer recovery for alpha spec analyses 330 %** **Carrier recovery for beta/gamma analyses 3 40%**		**Obtain from lab. Q=A** **If tracer/carrier recovery < 10 %, qualify results as R** **If tracer recovery is 10-30%, Q=J** **if result > EQL and UJ if result < EQL** **If carrier recovery is 10-40%, Q=J** **if result > EQL and UJ if < EQL**	 **R10** **R11a** **R11b** **R11c** **R11d**

M16March98

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 12/20/97 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 01/05/98 18:04

Lab Sample ID: 97-12-241-01

Sample Matrix: Water

Client Sample ID: 04LA-97-0627

Count Duration: 800 Min.

(U, R9a)

Nuclide	Activity (pCi/L)		Nuclide	Activity (pCi/L)	
Cd-109	80.0 ± 24.8	S	Bi-211	27.0 ± 9.48	S
Bi-212	45.2 ± 41.4	*	Am-241	0.490 ± 4.30	
Np-237	-23.7 ± 7.73		Th-234	-210 ± 75.2	
Co-57	0.155 ± 0.737		Ce-144	-2.39 ± 5.53	
Ce-139	-0.933 ± 0.900		U-235	-6.08 ± 3.07	
Ra-226	-33.8 ± 50.2		Th-227	-18.5 ± 6.38	
Pb-212	-1.08 ± 3.46		Ra-224	-91.7 ± 23.6	
Se-75	-0.757 ± 1.26		Hg-203	0.827 ± 1.14	
Pa-231	-4.35 ± 31.0		Pa-233	0.754 ± 1.80	
Ra-223	-17.8 ± 18.1		Eu-152	2.23 ± 2.75	
Pb-214	-15.1 ± 6.06		Sn-113	-0.593 ± 1.18	
Rn-219	3.72 ± 10.9		Pb-211	14.3 ± 27.8	
Ann-Rad	-25.6 ± 3.64		Sr-85	0.919 ± 1.88	
Ba-140	-5.30 ± 11.6		Tl-208	-2.99 ± 2.49	
Cs-134	-0.110 ± 1.12		Bi-214	-17.1 ± 6.94	
Ru-106	-0.426 ± 10.0		Cs-137	-0.245 ± 1.19	
Mn-54	-0.580 ± 1.09		Y-88	-1.14 ± 2.81	
Ac-228	-2.90 ± 8.63		Pa-234m	-192 ± 400	
Zn-65	-0.205 ± 2.47		Co-60	0.797 ± 1.07	
Na-22	-0.865 ± 1.18		K-40	-23.2 ± 34.1	
La-140	-1810 ± 1270				

(U, R4)
(U, R9a)

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank. Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

An asterisk (*) indicates that the reporting software anomalously reports a peak for this radionuclide. The result is an artifact of net reporting.

000039

M 16 March 98

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 12/20/97 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 01/06/98 20:42

Lab Sample ID: 97-12-241-02

Sample Matrix: Water

Client Sample ID: 04LA-97-0628

Count Duration: 800 Min.

	Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)	
(U, R4)	Am-241	11.0 ± 12.2	Cd-109	37.4 ± 44.2	(U, R4)
	Pb-214	15.5 ± 8.57	Bi-214	21.7 ± 11.5	
(U, R9a)	Np-237	-22.5 ± 13.2	Th-234	-381 ± 132	(U, R9a)
(U, R4)	Co-57	0.790 ± 1.41	Ce-144	-0.767 ± 10.8	
(U, R9a)	Ce-139	-1.21 ± 1.50	U-235	-5.12 ± 5.37	
	Ra-226	11.9 ± 88.9	Th-227	1.38 ± 13.1	
	Pb-212	-0.969 ± 7.48	Ra-224	-93.1 ± 41.9	
	Se-75	1.78 ± 2.81	Hg-203	0.884 ± 2.57	
	Pa-231	45.9 ± 69.0	Pa-233	-0.536 ± 4.02	
	Ra-223	3.24 ± 40.7	Eu-152	5.02 ± 6.21	(U, R4)
	Bi-211	0.000 ± 0.000	Sn-113	-1.51 ± 2.76	(U, R9a)
	Rn-219	6.40 ± 24.6	Pb-211	-28.5 ± 55.6	
	Ann-Rad	-29.3 ± 7.63	Sr-85	1.00 ± 4.41	
(U, R4)	Ba-140	11.8 ± 21.1	Tl-208	2.38 ± 6.01	
(U, R9a)	Cs-134	-0.057 ± 2.45	Ru-106	17.6 ± 23.1	(U, R4)
	Cs-137	-1.51 ± 2.39	Mn-54	-1.46 ± 2.72	(U, R9a)
	Y-88	-1.85 ± 6.98	Ac-228	13.0 ± 9.79	
	Pa-234m	-159 ± 451	Zn-65	-3.72 ± 6.21	
	Co-60	-2.76 ± 2.83	Na-22	-0.812 ± 3.14	
	K-40	-35.7 ± 71.7	La-140	2210 ± 4410	
	Bi-212	8.87 ± 122			

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

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

000010

AT 16 March 98

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Wednesday, January 28, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID: 04LA-97-0627
Lab ID: 9712241-1

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 20-Dec-97
Date Analyzed: 15-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: FILTERED
Count Time (min.): 350

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	1.092 +/- 0.097	0.055	pCi/L	
U-235	-0.0003 +/- 0.0081	0.040	pCi/L	U (U, R9a)
U-238	0.761 +/- 0.076	0.047	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	3.86	3.09	pCi/L	80%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000011

M 16 March 98

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Wednesday, January 28, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID: 04LA-97-0628
Lab ID: 9712241-2

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 20-Dec-97
Date Analyzed: 15-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 350

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.773 +/- 0.076	0.045	pCi/L	
U-235	0.019 +/- 0.011	0.038	pCi/L	U (U, R9a)
U-238	0.571 +/- 0.062	0.048	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	3.86	3.24	pCi/L	84%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000012

M 16 March 98

Sr-90 ANALYSIS RESULTS SUMMARY

Method ASTM D5811-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 12/20/97

Client Name: Los Alamos National Lab

Date Analyzed : 01/20/98

Client Project ID: 4020R

Sample Matrix : Water

Lab Sample ID Series: 97-12-241

Count Duration: 240 Min.

Analyzed by: CJM

Client Sample ID	Lab Sample ID	Sr-90 (pCi/l)
04LA-97-0627	97-12-241-01	0.03 ± 0.18
04LA-97-0628	97-12-241-02	0.01 ± 0.17
04LA-97-0628	97-12-241-D1	0.17 ± 0.17

(U, R9a)

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

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP707FC and analyzed using PAI SOP724FC.

Remarks:

Sample 97-12-241-D1 is a duplicate of 97-12-241-02.

M16 March 98

ALPHA/BETA ANALYSIS RESULTS SUMMARY

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 12/20/97

Client Name: Los Alamos National Labor

Date Analyzed : 01/11/98

Client Project ID: 4020R

Sample Matrix : Water

Lab Sample ID Series: 97-12-241

Count Duration: 1000 Min.

Analyzed By : CJM

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/liter) 1.3	Gross Beta (pCi/liter) 2.4
04LA-97-0627	12-241-01	4.08 ± 0.92	7.6 ± 1.2
~~04LA-97-0628~~	~~12-241-02~~	(U,Ra) 1.03 ± 0.50	2.95 ± 0.76 (U,R9b)
04LA-97-0628	12-241-D1	0.69 ± 0.48	3.25 ± 0.80

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

Reported Activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP702FC and analyzed using PAI SOP705FC.

Remarks:

Sample 97-12-241-D1 is a duplicate of sample 97-12-241-02.

A716 March 98

Gross Gamma Results Summary

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	1/5/98
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-12-241	Units:	pCi/L

Client Sample ID	Lab Sample ID	Collection Date	Activity	Uncertainty	MDC	
04LA-97-0627	97-12-241-01	12/20/97	188	14	12	(J, R7)
04LA-97-0628	97-12-241-02	12/20/97	228	18	19	(J, R7)
04LA-97-0628	97-12-241-D1	12/20/97	178	13	12	
Blank	97-12-241-B1	1/5/98	51	11	17	

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate.

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

97-12-241-D1 is a duplicate of sample 97-12-241-02.

Prepared by 1/21/98

16 March 98

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Wednesday, January 28, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID: 04LA-97-0627
Lab ID: 9712241-1

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 20-Dec-97
Date Analyzed: 20-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: FILTERED
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.004 +/- 0.014	0.066	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.94	pCi/L	80%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000011

M16 March 98

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Wednesday, January 28, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID: 04LA-97-0628
Lab ID: 9712241-2

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 20-Dec-97
Date Analyzed: 20-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.046 +/- 0.021	0.067	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.24	pCi/L	66%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000012

AHG March 98

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Wednesday, January 28, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID: 04LA-97-0627
Lab ID: 9712241-1

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 20-Dec-97
Date Analyzed: 26-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: FILTERED
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.020 +/- 0.015	0.063	pCi/L	U
Pu-239	-0.0152 +/- 0.0077	0.054	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.65	pCi/L	83%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

AT6 March 98

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Wednesday, January 28, 1998

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4020R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9712241

Field ID: 04LA-97-0628
Lab ID: 9712241-2

Sample Matrix: WATER
Date Prepared: 06-Jan-98
Prep SOP: PAI SOP 778R3
Prep Batch: AS00601

Date Collected: 20-Dec-97
Date Analyzed: 26-Jan-98
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.008 +/- 0.017	0.078	pCi/L	U
Pu-239	-0.0032 +/- 0.0085	0.047	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.29	pCi/L	75%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 16 March 98

DATA ENTERED

010798 RT

Monday, December 22, 1997

REQUEST NUMBER: 4021R

ANALYSIS TYPE: RADOTH

Los Alamos
NATIONAL LABORATORY

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 12/22/97
REPORT DUE: 1/22/98
TURN AROUND REQ'D: 30 days

These samples are on:

LANL Request Number: 4021R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
D2H		04LA-97-0627	12	W	12/20/97	
O18O16		04LA-97-0627	12	W	12/20/97	

Final Page of REQUEST NUMBER 4021R

RECRA
LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

26 January 1998

Mr. John Miglio
Los Alamos National Laboratory
TA-3, Building 271
DP. O1U MS-H865
Los Alamos, NM 87545

Ref: Subcontract No. 7791L0014-8M
Data Package for RFW Batch 9712L922
LANL Request No. 4021R

Dear Mr. Miglio:

Enclosed please find the data package for 1 water sample received 23 December 1997 for LANL Request #4021R. This sample was analyzed for D2H and O18/O16 ratios at Geochron Laboratories.

Please do not hesitate to contact me at (610) 280-3000 with any question you may have regarding either the hard copy or electronic report.

Very truly yours,

Recra LabNet Philadelphia

Judith L. Stone
Senior Project Manager

Report Cont. To: _____
Approved By: _____
Date Cont: 1/29/98

Enclosure:

FIELD COPY

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610)-280-3000 • Fax (610) 280-3041

RECRA LabNet Use Only

97 12L922

Custody Transfer Record/Lab Work Request

RECRA LabNet

Client LANL - BCQ # 4021R
Est. Final Proj. Sampling Date
Project # 02744-064-001-5999-06
Project Contact/Phone # J.S.
RECRA Project Manager
QC SPCC Del CLP TAT 30 DAY
Date Rec'd 12-23-97 Date Due 1-22-98
Account # LANL-LOSAL

Refrigerator #								6									
#/Type Container	Liquid							1AG									
	Solid																
Volume	Liquid							950									
	Solid																
Preservatives																	
ANALYSES REQUESTED →		ORGANIC							INORG								
		VOA	BNA	Pest/ PCB	Herb				Metal	CN							
								RECRA LabNet Use Only									
								BCUB									

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected													
001	04LA-97-0627 R			W	12/20/97	—						✓							

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Special Instructions:
RSR - CLIENT INRO

DATE/REVISIONS:
12/29/97 BATCH SUBBED TO GEOCHRON
2.
3.
4.
5.
6.

53°C

Relinquished by	Received by	Date	Time
RBnBx	[illegible]	12/23/97	930

Relinquished by	Received by	Date	Time

ORIGINAL REWRITTEN

RECRA LabNet Use Only

Samples were:
1) Shipped ✓ or
Hand Delivered ___
Airbill # ___
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Labels Indicate Properly Preserved Y or N
5) Received Within Holding Times Y or N

COC Tape was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N
COC Record Present Upon Sample Rec't Y or N

Discrepancies Between Samples Lables and COC Record? Y or N
NOTES:

Monday, December 22, 1997

REQUEST NUMBER: 4021R
ANALYSIS TYPE: RADOTH

Los Alamos
NATIONAL LABORATORY

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

922

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 12/22/97
REPORT DUE: 1/22/98
TURN AROUND REQ'D: 30 days

These samples are on:

LANL Request Number: 4021R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
D2H		04LA-97-0627	12	W	12/20/97	
O18O16		04LA-97-0627	12	W	12/20/97	

Final Page of REQUEST NUMBER 4021R

5.3

Monday, December 22, 1997

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 4021RC

REQUEST NUMBER: 4021R
ANALYSIS TYPE: RADOTH

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-97-0627	12	1 L amber glass	D2H
04LA-97-0627	12	1 L amber glass	O18O16

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 4021R **Page 1**

Relinquished By:		Date	Time
John Kemp	John Kemp	12/22/97	2:00
PRINTED NAME	SIGNATURE		
FED EX		12/23/97	930A
PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE		

Received By:		Date	Time
PRINTED NAME	SIGNATURE		
		12/23/97	930
PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE		

Received for DISPOSAL By:		Date	Time
PRINTED NAME	SIGNATURE		

Remarks:

GEOCHRON LABORATORIES a division of
KRUEGER ENTERPRISES, INC.

711 CONCORD AVENUE ✦ CAMBRIDGE, MASSACHUSETTS 02138 ✦ U.S.A
TELEPHONE: (617) 876-3691 TELEFAX: (617) 661-0148

Req # 4021R
LANL 97121922

STABLE ISOTOPE RATIO ANALYSES — REPORT OF ANALYTICAL WORK

Submitted by: Judy Stone
RECRA
208 Welsh Pool Road
Lionville, PA 19341-1225

Date Received: 12/30/97
Date Reported: 01/15/98
Your Reference: Req. No. 4021R

Our Lab. Number	Your Sample Number	Description	δD*	$\delta^{18}O$*
HOR-95909	04LA-97-0627 12	Water	-71	-10.1 -10.1 **

** Duplicate analyses on separate aliquots of original sample.

*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{sample}‰ = \left[\frac{R_{sample}}{R_{standard}} - 1 \right] \times 1000$$

Where:

D/H standard is SMOW
$^{18}O/^{16}O$ standard is SMOW

And:

$D/H_{standard}$ = 0.000316**
$^{18}O/^{16}O_{standard}$ = 0.0039948**

**Double atom ratio

GEOCHRON LABORATORIES a division of
KRUEGER ENTERPRISES, INC.

711 CONCORD AVENUE ◆ CAMBRIDGE, MASSACHUSETTS 02138 ◆ U.S.A
TELEPHONE: (617) 876-3691 TELEFAX: (617) 661-0148

STABLE ISOTOPE RATIO ANALYSES — REPORT OF ANALYTICAL WORK

Submitted by: Judy Stone
RECRA
208 Welsh Pool Road
Lionville, PA 19341-1225

Date Received: 12/30/97
Date Reported: 01/15/98
Your Reference: Req. No. 4021R

Our Lab. Number	Your Sample Number	Description	δD*	$\delta^{18}O$*
HOR-95909	04LA-97-0627 12	Water	-71	-10.1 -10.1 **

** Duplicate analyses on separate aliquots of original sample.

*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{sample}‰ = \left[\frac{R_{sample}}{R_{standard}} - 1 \right] \times 1000$$

Where:

D/H standard is SMOW
$^{18}O/^{16}O$ standard is SMOW

And:

$D/H_{standard}$ = 0.000316**
$^{18}O/^{16}O_{standard}$ = 0.0020048**

COASTAL SCIENCE LABORATORIES, INC.
6000 Mountain Shadows Drive • Austin, Texas 78735 • (512) 288-5533

March 20, 1998

Recra LabNet Philadelphia
Attn: Ms. Judy Stone
208 Welsh Pool Rd.
Lionville, PA 19341

Dear Ms. Stone:

We have completed the stable nitrogen isotope analysis of your samples received recently. Data are reported relative to air N_2 and are believed accurate to ± 1‰. Nitrogen values represent isotopic ratios of the nitrate+nitrite nitrogen of the water sample. Oxygen data are reported relative to the SMOW standard and are believed accurate to ± 0.2 per mil.

SAMPLE	REQ. #	$\delta\ ^{15}N_{AIR}$	REQ. #	$\delta\ ^{18}O_{SMOW}$
04LA-98-0001	4036R	+2.8, +3.3	4035R	-10.4
04LA 98-0002	4043R	+7.9, +7.8	4042R	-11.2
04LA-98-0004	4043R	+1.3, +1.8	4042R	-11.3

Yours truly,

Kenneth Winters
Laboratory Manager

CSL Ref.#CJ3

Report Sent To: K. Lindheimer
Approved By: _____
Date Sent: 3/31/98

FIELD COPY

Thursday, January 08, 1998

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 4036RC

REQUEST NUMBER: 4036R
ANALYSIS TYPE: RADOTHER

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-98-0001	01	1 L poly	N15N14

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 4036R Page 1

Relinquished By:		Date	Time	Received By:		Date	Time
[illegible]	[illegible]	1-8-98	10:30	R. ANDERSON	R Anderson	1/9/98	
PRINTED NAME	SIGNATURE			PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE			PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE			PRINTED NAME	SIGNATURE		

Received for DISPOSAL By:		Date	Time
PRINTED NAME	SIGNATURE		

Remarks:

Monday, January 12, 1998

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 4043RC

REQUEST NUMBER: 4043R
ANALYSIS TYPE: RADOTHER

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-98-0002	01	1 L poly	N15N14
04LA-98-0004	01	1 L poly	N15N14

Relinquished By:		Date	Time
John Kemp (PRINTED NAME)	John Kemp (SIGNATURE)	1/12/98	2:10
PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE		

Received By:		Date	Time
R. Anderson (PRINTED NAME)	Richard Anderson (SIGNATURE)	1/13/98	
PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE		

Received for DISPOSAL By:		Date	Time
PRINTED NAME	SIGNATURE		

Remarks:

Thursday, January 08, 1998

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 4035RC

REQUEST NUMBER: 4035R
ANALYSIS TYPE: RADOTH

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-98-0001	02	1 L poly	O18O16

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 4035R Page 1

Relinquished By:		Date	Time	Received By:		Date	Time
PRINTED NAME	SIGNATURE	1-8-98	14:30	R. Anderson	R Anderson	1/9/98	
PRINTED NAME	SIGNATURE			PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE			PRINTED NAME	SIGNATURE		

Received for DISPOSAL By:		Date	Time
PRINTED NAME	SIGNATURE		

Remarks:

Monday, January 12, 1998

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 4042RC

REQUEST NUMBER: 4042R
ANALYSIS TYPE: RADOTH

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-98-0002	02	1 L poly	O18O16
04LA-98-0004	02	1 L poly	O18O16

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 4042R Page 1

Relinquished By:		Date	Time	Received By:		Date	Time
John Kemp	John Kemp	1/12/98	2:10	RICHARD ANDERSON	Richard Anderson	1/13/98	
PRINTED NAME	SIGNATURE			PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE			PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE			PRINTED NAME	SIGNATURE		

Received for DISPOSAL By:		Date	Time
PRINTED NAME	SIGNATURE		

Remarks:

Friday, January 30, 1998

REQUEST NUMBER: 4069R

ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

These samples are on:

SHIP DATE: 1/30/98
REPORT DUE: 3/2/98
TURN AROUND REQ'D: 30 day

LANL Request Number: 4069R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

9801239

Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED		COMMENTS
METTAL	+ U	04LA-98-0026	05	W	1/27/98	01	
METTAL	+ U	04LA-98-0027	02	W	1/27/98	02	
METTAL	+ U	04LA-98-0028	05	W	1/26/98	03	
METTAL	+ U	04LA-98-0029	02	W	1/26/98	04	
METTAL	+ U	04LA-98-0030	05	W	1/27/98	05	
METTAL	+ U	04LA-98-0031	02	W	1/27/98	06	
METTAL	+ U	04LA-98-0032	05	W	1/26/98	07	
METTAL	+ U	04LA-98-0033	02	W	1/26/98	08	

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: **4069R** LAB NAME: **Paragon** LAB CODE_____

NAME OF VALIDATOR: **Antonia Tallarico** COMPANY: **LATA**

VALIDATION DATE: **12 March 98** EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- **X** INORGANICS
- o RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? " YES " NO
Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

The total U was analyzed by KPA. All appropriate ~~the~~ results are qualified using the Rad. checklist.

Signature/1st validation: _____ 12March98

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

TOTAL URANIUM BLANK SPIKE RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 02/25/98

Client Name: Los Alamos National Lab. Date Analyzed : 02/27/98

Client Project ID: 4069R

Lab Sample ID Series: 98-01-239 Sample Matrix : Water

Lab Sample ID	Spike Conc. (ug/L)	Rep't Conc. (ug/L)
98-01-239-S1	10.0 ± 1.5	9.7 ± 1.3

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

PAI sets control limits for KPA Uranium measurements as follows:
Blank Spike Control Limits = Known (μ) ± 0.15 * μ.

Matrix Spike Control Limits = Known (μ) + Native Concentration ± 0.25 * (μ + Native Concentration).

PAI uses these control limits for all KPA Uranium measurements

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

BP

TOTAL URANIUM MATRIX SPIKE RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 01/27/98

Client Name: Los Alamos National Lab. Date Analyzed : 02/27/98

Client Project ID: 4069R

Lab Sample ID Series: 98-01-239 Sample Matrix : Water

Lab Sample ID	Known Conc. (ug/L)	Rep't Conc. (ug/L)
98-01-239-M1	7.8 ± 1.9	6.97 ± 0.95

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

PAI sets control limits for KPA Uranium measurements as follows:
Blank Spike Control Limits = Known (μ) ± 0.15 * μ.

Matrix Spike Control Limits = Known (μ) + Native Concentration ± 0.25 * (μ + Native Concentration).

PAI uses these control limits for all KPA Uranium measurements

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

Remarks:

Sample 98-01-239-M1 is a matrix spike of 98-01-239-01.

BP

Paragon Analytics, Inc.

TOTAL METALS
CASE NARRATIVE

Los Alamos National Laboratory SMO

4069R

Order Number - 9801239

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Inorganic Qualifiers
Section 4: Sample Results
Section 5: Summary Report Forms
Section 6: Supporting Raw Data

Appendix A: Digestion Bench Sheets

Section 1: Case Narrative

1.1 This report consists of 8 water samples.

Due to limitation of the reporting software:

a) Some mercury values appear as 0.0. When this occurs the actual value is hand entered.

b) For Mercury, the ICB is also used as the preparation blank, therefore the run chronology will show the same time for both.

c) Trace ICP elements which are calibrated daily with a multipoint calibration do not appear on the run log. The calibration standards can be located at the beginning of each raw data package for this instrument.

1.2 The samples were received cool and intact on 01/31/98. The client had not designated a sample for quality control. The lab designated PAI sample ID 9801239-1 as the quality control sample for the ICP digestion, and a sample from

LANL Request Number 4079R as the quality control sample for the mercury digestion.

1.3 The samples had not been preserved for the requested analyses. The pH of each sample was adjusted to below 2 pH units with HNO_3 upon receipt.

1.4 The samples were prepared for analysis based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0.

1.5 The samples were analyzed and reported based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0.

1.6 All standards and solutions are NIST traceable and were used within their recommended shelf life.

1.7 The samples were prepared and analyzed within the established hold times.

All in house quality control procedures were followed, as described below.

1.8 General quality control procedures.

- A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in each digestion batch. There were not more than 20 samples in the digestion batch.
- The preparation (method) blank results associated with each batch were below the practical quantitation limits for the requested analytes.
- The laboratory control sample associated with each batch was within acceptance limits. This indicates complete digestion according to the method.
- All initial and continuing calibration blanks associated with each batch were below the practical quantitation limits for the requested analytes.
- All initial and continuing calibration verifications associated with each batch were within acceptance criteria for the requested analytes. This indicates a valid calibration and stable instrument conditions.
- The interference check samples associated with analyses by ILM03.0 were within acceptance criteria.

1.9 Matrix specific quality control procedures.

- A matrix spike was digested and analyzed with each batch. All acceptance criteria for accuracy were met with the following exceptions.

Analyte	Sample ID
Aluminum	9801239-1S
Iron	9801239-1S

The concentration of each analyte in the native sample was greater than 4 times the concentration of matrix spike added during the digestion. When sample concentration is that much greater than the spike added, spike recoveries may not be accurate. The laboratory control sample indicates that the digestion and analysis were in control.

- A sample duplicate was digested and analyzed with each batch. All acceptance criteria for precision were met.
- A serial dilution was analyzed with each ICP batch. All acceptance criteria were met.

1.10. Sample dilutions were required as indicated in the run log and raw data.

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_INC.___ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	97.9	B	46.3	B	37.7	B	37.3	B	113.660	B	P
Antimony	3.4	U	3.4	U	3.4	U	3.4	U	3.400	U	P
Arsenic	2.5	U	2.5	U	2.5	U	2.5	U	2.500	U	P
Barium	-0.2	B	0.2	B	0.1	U	0.1	U	-0.170	B	P
Beryllium	0.2	U	0.3	B	0.4	B	0.4	B	0.200	U	P
Boron	16.5	B	16.8	B	15.6	B	12.6	B	7.900	U	P
Cadmium	0.3	U	0.3	U	0.3	U	0.3	U	0.300	B	P
Calcium	63.5	B	84.6	B	84.5	B	76.4	B	131.020	B	P
Chromium	3.0	B	2.8	B	0.9	U	0.9	U	2.130	B	P
Cobalt	0.8	U	0.8	U	0.8	U	0.8	U	0.800	U	P
Copper	0.6	U	-0.7	B	0.6	U	0.6	U	-0.620	B	P
Iron	15.9	U	15.9	U	20.7	B	15.9	U	29.990	B	P
Lead	-1.7	B	-1.5	B	1.4	U	1.4	U	-2.200	B	P
Magnesium	51.2	B	68.2	B	66.9	B	63.9	B	118.550	B	P
Manganese	-0.3	B	0.2	U	0.2	U	0.2	U	-0.350	B	P
Mercury	0.02	U	0.03	B	0.04	B	0.04	B	0.020	U	AV
Molybdenu	2.9	U	2.9	U	2.9	U	2.9	U	2.900	U	P
Nickel	0.7	U	0.7	U	0.7	U	0.7	U	0.700	U	P
Potassium	46.9	U	46.9	U	47.4	B	46.9	U	46.900	U	P
Selenium	3.1	U	3.1	U	3.1	U	-3.4	B	3.100	U	P
Silver	0.9	U	0.9	U	0.9	U	0.9	U	0.900	U	P
Sodium	-15.3	B	2.1	U	8.2	B	-11.2	B	-14.890	B	P
Thallium	3.8	U	6.5	B	4.0	B	5.8	B	3.800	U	P
Uranium	80.4	U	80.4	U	80.4	U	80.4	U	80.400	U	P
Vanadium	0.8	U	0.8	U	0.8	U	0.8	U	0.800	U	P
Zinc	-0.9	B	-0.9	B	0.8	U	-0.9	B	0.800	U	P

FORM III - IN

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_INC.___ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum			95.8	B							P
Antimony			3.4	U							P
Arsenic			2.5	U							P
Barium			0.1	U							P
Beryllium			0.5	B							P
Boron			11.5	B	13.5	B					P
Cadmium			0.4	B							P
Calcium			119.8	B							P
Chromium			0.9	U							P
Cobalt			0.8	U							P
Copper			-0.7	B							P
Iron			31.9	B							P
Lead			-1.8	B							P
Magnesium			109.8	B							P
Manganese			0.2	U							P
Mercury											NR
Molybdenu			2.9	U	4.3	B					P
Nickel			0.7	U							P
Potassium			46.9	U							P
Selenium			3.1	U							P
Silver			0.9	U							P
Sodium			-10.3	B							P
Thallium			5.4	B							P
Uranium			80.4	U							P
Vanadium			0.8	U							P
Zinc			0.8	U							P

FORM III - IN

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

04LA-98-0026

Lab Name: PARAGON_ANALYTICS_INC.___ Contract:_____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_
Matrix: __WATER_____ Level (low/med): _LOW____
% Solids for Sample: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum		20649.3900		16327.9500		2000.00	216.1		P
Antimony	75-125	407.2100		3.4000	U	500.00	81.4		P
Arsenic	75-125	2022.1400		3.8800	B	2000.00	100.9		P
Barium	75-125	2163.2700		256.7300		2000.00	95.3		P
Beryllium	75-125	51.7800		1.0500	B	50.00	101.5		P
Boron	75-125	1019.1800		35.8800	B	1000.00	98.3		P
Cadmium	75-125	45.2400		0.3000	U	50.00	90.5		P
Calcium									NR
Chromium	75-125	218.9700		39.2200		200.00	89.9		P
Cobalt	75-125	480.7200		10.2800	B	500.00	94.1		P
Copper	75-125	260.2000		13.9200	B	250.00	98.5		P
Iron		28097.7900		27856.8900		1000.00	24.1		P
Lead	75-125	499.3200		16.7000		500.00	96.5		P
Magnesium									NR
Manganese	75-125	1161.2800		716.3200		500.00	89.0		P
Mercury									NR
Molybdenu	75-125	998.3000		48.5200		1000.00	95.0		P
Nickel	75-125	504.1900		33.1400	B	500.00	94.2		P
Potassium									NR
Selenium	75-125	2082.3600		3.1000	U	2000.00	104.1		P
Silver	75-125	47.6600		0.9000	U	50.00	95.3		P
Sodium									NR
Thallium	75-125	1985.3300		5.9300	B	2000.00	99.0		P
Uranium	75-125	10801.5800		80.4000	U	10000.00	108.0		P
Vanadium	75-125	493.0400		21.4000	B	500.00	94.3		P
Zinc	75-125	512.1800		54.4000		500.00	91.6		P

Comments:

FORM V (Part 1) - IN

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

HG QC

Lab Name: PARAGON_ANALYTICS_INC.___ Contract:_____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_
Matrix: __WATER_____ Level (low/med): _LOW____
% Solids for Sample: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Boron									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead									NR
Magnesium									NR
Manganese									NR
Mercury	75-125	1.0000		0.0300	B	1.00	97.0		AV
Molybdenu									NR
Nickel									NR
Potassium									NR
Selenium									NR
Silver									NR
Sodium									NR
Thallium									NR
Uranium									NR
Vanadium									NR
Zinc									NR

Comments:

FORM V (Part 1) - IN

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

04LA-98-0026

Lab Name: PARAGON_ANALYTICS_INC.___ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_

Matrix (soil/water): WATER Level (low/med): _LOW__

% Solids for Sample: __0.0 % Solids for Duplicate: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		16327.9500		16011.7000		2.0		P
Antimony		3.4000	U	3.4000	U			P
Arsenic		3.8800	B	2.5000	U	200.0		P
Barium	200.0	256.7300		253.4700		1.3		P
Beryllium		1.0500	B	1.0900	B	3.7		P
Boron		35.8800	B	34.6300	B	3.5		P
Cadmium		0.3000	U	0.3000	U			P
Calcium		37607.6200		37342.9600		0.7		P
Chromium	10.0	39.2200		38.9600		0.7		P
Cobalt		10.2800	B	10.0200	B	2.6		P
Copper		13.9200	B	13.7000	B	1.6		P
Iron		27856.8900		27553.4600		1.1		P
Lead		16.7000		16.5300		1.0		P
Magnesium	5000.0	5959.3500		5860.8300		1.7		P
Manganese		716.3200		710.9600		0.8		P
Mercury								NR
Molybdenu	10.0	48.5200		49.9100		2.8		P
Nickel		33.1400	B	33.1700	B	0.1		P
Potassium	5000.0	5057.5700		4988.5000	B	1.4		P
Selenium		3.1000	U	3.1000	U			P
Silver		0.9000	U	0.9000	U			P
Sodium		29491.5900		29290.6200		0.7		P
Thallium		5.9300	B	3.8000	U	200.0		P
Uranium		80.4000	U	100.7300	B	200.0		P
Vanadium		21.4000	B	21.5100	B	0.5		P
Zinc	20.0	54.4000		53.5100		1.6		P

FORM VI - IN

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

HG QC

Lab Name: PARAGON_ANALYTICS_INC.___ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_

Matrix (soil/water): WATER Level (low/med): _LOW__

% Solids for Sample: __0.0 % Solids for Duplicate: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum_								NR
Antimony_								NR
Arsenic__								NR
Barium___								NR
Beryllium								NR
Boron____								NR
Cadmium__								NR
Calcium__								NR
Chromium_								NR
Cobalt___								NR
Copper___								NR
Iron_____								NR
Lead_____								NR
Magnesium								NR
Manganese								NR
Mercury__		0.0300	B	0.0460	B	42.1_		AV
Molybdenu								NR
Nickel___								NR
Potassium								NR
Selenium_								NR
Silver___								NR
Sodium___								NR
Thallium_								NR
Uranium__								NR
Vanadium_								NR
Zinc_____								NR

FORM VI - IN

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgment based on data use . It usually has an "M" with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analytes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likely because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

INORGANICS (I)

3 Spike recovery > upper limit (125%) and the results > the EDL.

3a Spike recovery < lower limit (75%) and the results are > the EDL.

3d Spike recovery < 30 % and results < EDL.

3e Spike recovery 30-74% and sample results < EDL.

4 Using the worse case blank, the sample results > the EDL but < 5X the concentration of the related analyte in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

7 ICS recovery > 120% and results > EDL.

7a ICS recovery 50-79% .

7b ICS recovery < 50% and result < EDL.

8a For ICV and CCV, recovery is lower than specification

8b For ICV and CCV, recovery is higher than specification

8c For ICV and CCV, results are positive, but < MDL and recovery is lower than the specification.

8d For ICV and CCV, recovery is extremely low and detection may be impaired.

8e For ICV and CCV, recovery is abnormally high - apply to results > MDL.

9 Holding time for Hg has been exceeded. Positive results may be biased low and non-detects may potential be false negatives.

INORGANICS

Calibration **Present? X yes no** **Initial calibration verification** **Present? X yes no** **Continuing calibration verification** **Present? X yes no**	**NA**	**Obtain from lab. Q=A** **Obtain form lab. Q=A**	

AJ 12 March 98

<u>Blanks</u> (Applies to each) **Present? X yes no** **<u>Initial & continuing calibration blanks</u>** **Analyze at each wavelength** **Beginning and end of each run** **ICB and CCB analyzed at a frequency of 10% or 2 hours** **If blank results > EDL reanalyze previous 10 samples** **<u>Preparation blank</u>** **One per batch** **≤ EDL, or if concentration of analyte < 10X EDL, repeat all samples in batch** *The following analytes were detected in the prep. blank:* *Al (113.66 ug/l,* *Ca (131.20 ug/l),* *Cr (2.130 ug/l),* *Fe (29.99 ug/l), and* *Mg (118.55 ug/l).* *Al was qualified as U in samples 04LA-98-0027, 04LA-98-0029, 04LA-98-0031, and 04LA-98-0033. Cr was qualified as U in 04LA-98-0031. Fe was qualified as U in 04LA-98-0027 and 04LA-98-0033. Mg is qualified as U in 04LA-98-0031.* *The following analytes were detected in an ICB and/or a CCB: Al, Be, B, Ca, Cd, Cr, Fe, Mg, Hg, K, Na, and Tl. No action taken.*	**U** **See comment**	**Obtain from lab. Q=A** **Use "worse" case blank. Sample results > EDL but < 5 X amount found in the blank should be qualified as <u>U</u>.**	**<u>I4</u>**

M12 March 98

ICP Interference check sample Present? X yes no Solution contains Ag, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, V, & Zn Analyze at beginning of each run Each wavelength used for samples ICS results must be ± 20%of true value	OK	Obtain from lab. Q=A If the ICS recovery is >120% and the results are >EDL, qualify data as J+ If recovery is 50-79%, qualify data as J- If ICS recovery is < 50% and results are < EDL, qualify results as R, PM	 I7 I7a I7b
Spike sample analysis Present? X yes no One per run, per matrix, concentration, SDG % recovery: 75-125% (unless conc. > 4X spike conc.)	OK	Obtain from lab. Q=A If spike recovery > 125% and results < EDL, OK If spike recovery < 75% and results are >EDL, qualify results as J- if same matrix, P if not. If spike recovery > 125% and results are >EDL, qualify data as J+ if same matrix, P if not. If spike recovery 30-74% and sample results < EDL, qualify as UJ if same matrix, P if not. If spike recovery results < 30% and results < EDL, qualify as R, PM.	 I3a I3 I3e I3d

AT12March98

Duplicate Present? X yes no One per batch of sample of like matrix for each SDG RPD : ≤ 20% (advisory) If either the sample or duplicate value is less than 5 X EDL, there is a control limit of ± EDL	OK	Obtain from lab. Q=A Q=P because of nature of LANL samples.	
Laboratory Control Sample (LCS) Aqueous LCS per batch/SDG % recovery : 80-120% (except Ag & Sb)	OK	If criterion not met, qualify each analyte associated with the LCS in the same batch as J- for < 80% and J+ for > 120%	I6a I6
Holding time Analyze water samples for Hg within 28 days of sample collection Analyze water samples for CN within 14 days of sample collection	OK	Compare analysis date with date of sample collection on the Analysis Request. Q=PM	

MI2March98

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-98-0026

Lab Name: PARAGON_ANALYTICS_INC.___ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_

Matrix (soil/water): WATER Lab Sample ID: 9801239-1

Level (low/med): LOW__ Date Received: 01/31/98

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	16300			P
7440-36-0	Antimony_	3.4	U		P
7440-38-2	Arsenic__	3.9	B		P
7440-39-3	Barium___	257			P
7440-41-7	Beryllium	1.0	B		P
7440-42-8	Boron____	35.9	B		P
7440-43-9	Cadmium__	0.30	U		P
7440-70-2	Calcium__	37600			P
7440-47-3	Chromium_	39.2			P
7440-48-4	Cobalt___	10.3	B		P
7440-50-8	Copper___	13.9	B		P
7439-89-6	Iron_____	27900			P
7439-92-1	Lead_____	16.7			P
7439-95-4	Magnesium	5960			P
7439-96-5	Manganese	716			P
7439-97-6	Mercury__	0.05	B		AV
7439-98-7	Molybdenu	48.5			P
7440-02-0	Nickel___	33.1	B		P
7440-09-7	Potassium	5060			P
7782-49-2	Selenium_	3.1	U		P
7440-22-4	Silver___	0.90	U		P
7440-23-5	Sodium___	29500			P
7440-28-0	Thallium_	5.9	B		P
7440-61-1	Uranium__	80.4	U		P
7440-62-2_	Vanadium_	21.4	B		P
7440-66-6_	Zinc_____	54.4			P

Color Before: BROWN____ Clarity Before: CLOUDY Texture: N/A___

Color After: LT._BROWN Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

M12 March 98

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-98-0027

Lab Name: PARAGON_ANALYTICS_INC.___ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_

Matrix (soil/water): WATER Lab Sample ID: 9801239-2

Level (low/med): LOW__ Date Received: 01/31/98

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	76.8	B		P	(U,I4)
7440-36-0	Antimony_	3.4	U		P_	
7440-38-2	Arsenic__	2.5	U		P_	
7440-39-3	Barium___	64.6	B		P_	
7440-41-7	Beryllium	0.20	U		P_	
7440-42-8	Boron____	32.3	B		P_	
7440-43-9	Cadmium__	0.30	U		P_	
7440-70-2	Calcium__	24600			P_	
7440-47-3	Chromium_	0.90	U		P_	
7440-48-4	Cobalt___	0.80	U		P_	
7440-50-8	Copper___	0.60	U		P	
7439-89-6	Iron_____	39.5	B		P	(U,I4)
7439-92-1	Lead_____	1.4	U		P_	
7439-95-4	Magnesium	1330	B		P_	
7439-96-5	Manganese	162			P_	
7439-97-6	Mercury__	0.04	B		AV	
7439-98-7	Molybdenu	50.5			P_	
7440-02-0	Nickel___	2.0	B		P_	
7440-09-7	Potassium	3340	B		P_	
7782-49-2	Selenium_	3.1	U		P_	
7440-22-4	Silver___	0.90	U		P_	
7440-23-5	Sodium___	27700			P_	
7440-28-0	Thallium_	3.8	U		P_	
7440-61-1	Uranium__	88.4	B		P_	
7440-62-2_	Vanadium_	0.80	U		P_	
7440-66-6_	Zinc_____	0.80	U		P_	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: N/A___

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

M17, March 98

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-98-0028

Lab Name: PARAGON_ANALYTICS_INC.___ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_

Matrix (soil/water): WATER Lab Sample ID: 9801239-3

Level (low/med): LOW__ Date Received: 01/31/98

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	536000			P
7440-36-0	Antimony_	34.0	U		P
7440-38-2	Arsenic__	103			P
7440-39-3	Barium___	8770			P
7440-41-7	Beryllium	57.9			P
7440-42-8	Boron____	306	B		P
7440-43-9	Cadmium__	3.0	U		P
7440-70-2	Calcium__	1240000			P
7440-47-3	Chromium_	2980			P
7440-48-4	Cobalt___	459	B		P
7440-50-8	Copper___	2550			P
7439-89-6	Iron_____	1960000			P
7439-92-1	Lead_____	3930			P
7439-95-4	Magnesium	176000			P
7439-96-5	Manganese	42300			P
7439-97-6	Mercury__	0.74			AV
7439-98-7	Molybdenu	326			P
7440-02-0	Nickel___	1620			P
7440-09-7	Potassium	129000			P
7782-49-2	Selenium_	42.2	B		P
7440-22-4	Silver___	9.0	U		P
7440-23-5	Sodium___	239000			P
7440-28-0	Thallium_	70.6	B		P
7440-61-1	Uranium__	2630			P
7440-62-2_	Vanadium_	770			P
7440-66-6_	Zinc_____	5800			P

Color Before: BROWN____ Clarity Before: CLOUDY Texture: N/A___

Color After: BROWNISH_ Clarity After: CLOUDY Artifacts: _____

Comments:

FORM I - IN

M12 March98

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-98-0029

Lab Name: PARAGON_ANALYTICS_INC.___ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_

Matrix (soil/water): WATER Lab Sample ID: 9801239-4

Level (low/med): LOW__ Date Received: 01/31/98

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	385			P	(U,24)
7440-36-0	Antimony_	3.4	U		P_	
7440-38-2	Arsenic__	2.5	U		P_	
7440-39-3	Barium___	83.0	B		P_	
7440-41-7	Beryllium	0.20	U		P_	
7440-42-8	Boron____	65.1	B		P_	
7440-43-9	Cadmium__	0.30	U		P_	
7440-70-2	Calcium__	32000			P_	
7440-47-3	Chromium_	0.90	U		P_	
7440-48-4	Cobalt___	0.91	B		P_	
7440-50-8	Copper___	3.2	B		P_	
7439-89-6	Iron_____	358			P_	
7439-92-1	Lead_____	1.4	U		P_	
7439-95-4	Magnesium	1390	B		P_	
7439-96-5	Manganese	466			P_	
7439-97-6	Mercury__	0.05	B		AV	
7439-98-7	Molybdenu	126			P_	
7440-02-0	Nickel___	7.6	B		P_	
7440-09-7	Potassium	25100			P_	
7782-49-2	Selenium_	3.1	U		P_	
7440-22-4	Silver___	0.90	U		P_	
7440-23-5	Sodium___	156000			P_	
7440-28-0	Thallium_	4.9	B		P_	
7440-61-1	Uranium__	121	B		P_	
7440-62-2_	Vanadium_	0.80	U		P_	
7440-66-6_	Zinc_____	3.5	B		P_	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: N/A___

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

AT 12 March 98

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-98-0030

Lab Name: PARAGON_ANALYTICS_INC.___ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_

Matrix (soil/water): WATER Lab Sample ID: 9801239-5

Level (low/med): LOW__ Date Received: 01/31/98

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	76300			P
7440-36-0	Antimony_	3.4	U		P
7440-38-2	Arsenic__	6.1	B		P
7440-39-3	Barium___	1000			P
7440-41-7	Beryllium	5.6			P
7440-42-8	Boron____	426	B		P
7440-43-9	Cadmium__	0.30	U		P
7440-70-2	Calcium__	68200			P
7440-47-3	Chromium_	63.1			P
7440-48-4	Cobalt___	36.0	B		P
7440-50-8	Copper___	243			P
7439-89-6	Iron_____	74700			P
7439-92-1	Lead_____	88.7			P
7439-95-4	Magnesium	26000			P
7439-96-5	Manganese	2230			P
7439-97-6	Mercury__	0.06	B		AV
7439-98-7	Molybdenu	137			P
7440-02-0	Nickel___	139			P
7440-09-7	Potassium	10500			P
7782-49-2	Selenium_	6.0			P
7440-22-4	Silver___	0.90	U		P
7440-23-5	Sodium___	38400			P
7440-28-0	Thallium_	3.8	U		P
7440-61-1	Uranium__	266			P
7440-62-2_	Vanadium_	60.4			P
7440-66-6_	Zinc_____	398			P

Color Before: BROWN____ Clarity Before: CLOUDY Texture: N/A___

Color After: LT_BROWN_ Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

17/12 March 98

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-98-0031

Lab Name: PARAGON_ANALYTICS_INC.___ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_

Matrix (soil/water): WATER Lab Sample ID: 9801239-6

Level (low/med): LOW__ Date Received: 01/31/98

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	394			P	(U,I4)
7440-36-0	Antimony_	3.4	U		P	
7440-38-2	Arsenic__	2.5	U		P	
7440-39-3	Barium___	12.7	B		P	
7440-41-7	Beryllium	0.20	U		P	
7440-42-8	Boron____	64.0	B		P	
7440-43-9	Cadmium__	0.30	U		P	
7440-70-2	Calcium__	12000			P	
7440-47-3	Chromium_	4.2	B		P	(U,I4)
7440-48-4	Cobalt___	0.80	U		P	
7440-50-8	Copper___	2.8	B		P	
7439-89-6	Iron____	301			P	
7439-92-1	Lead____	1.4	U		P	
7439-95-4	Magnesium	440	B		P	(U,I4)
7439-96-5	Manganese	25.3			P	
7439-97-6	Mercury__	0.04	B		AV	
7439-98-7	Molybdenu	18.4			P	
7440-02-0	Nickel___	4.6	B		P	
7440-09-7	Potassium	3060	B		P	
7782-49-2	Selenium_	8.2			P	
7440-22-4	Silver___	0.90	U		P	
7440-23-5	Sodium___	34700			P	
7440-28-0	Thallium_	3.8	U		P	
7440-61-1	Uranium__	80.4	U		P	
7440-62-2_	Vanadium_	1.8	B		P	
7440-66-6_	Zinc_____	2.2	B		P	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: N/A___

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

17/12 March 98

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-98-0032

Lab Name: PARAGON_ANALYTICS_INC.___ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_

Matrix (soil/water): WATER Lab Sample ID: 9801239-7

Level (low/med): LOW__ Date Received: 01/31/98

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	62100			P
7440-36-0	Antimony_	3.4	U		P
7440-38-2	Arsenic__	6.0	B		P
7440-39-3	Barium___	545			P
7440-41-7	Beryllium	1.5	B		P
7440-42-8	Boron____	60.8	B		P
7440-43-9	Cadmium__	0.30	U		P
7440-70-2	Calcium__	70300			P
7440-47-3	Chromium_	69.7			P
7440-48-4	Cobalt___	40.9	B		P
7440-50-8	Copper___	301			P
7439-89-6	Iron_____	63800			P
7439-92-1	Lead_____	30.0			P
7439-95-4	Magnesium	24100			P
7439-96-5	Manganese	1140			P
7439-97-6	Mercury__	0.05	B		AV
7439-98-7	Molybdenu	11.5			P
7440-02-0	Nickel___	149			P
7440-09-7	Potassium	6370			P
7782-49-2	Selenium_	4.0	B		P
7440-22-4	Silver___	0.90	U		P
7440-23-5	Sodium___	30600			P
7440-28-0	Thallium_	3.8	U		P
7440-61-1	Uranium__	97.1	B		P
7440-62-2_	Vanadium_	51.9			P
7440-66-6_	Zinc_____	271			P

Color Before: BROWN____ Clarity Before: CLOUDY Texture: N/A___

Color After: LT_BROWN_ Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

M 12 March 98

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-98-0033

Lab Name: PARAGON_ANALYTICS_INC.___ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4069R_

Matrix (soil/water): WATER Lab Sample ID: 9801239-8

Level (low/med): LOW__ Date Received: 01/31/98

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	94.4	B		P	(U,I4
7440-36-0	Antimony_	3.4	U		P_	
7440-38-2	Arsenic__	2.9	B		P_	
7440-39-3	Barium___	44.0	B		P_	
7440-41-7	Beryllium	0.20	U		P_	
7440-42-8	Boron____	63.6	B		P_	
7440-43-9	Cadmium__	0.30	U		P_	
7440-70-2	Calcium__	27000			P_	
7440-47-3	Chromium_	0.90	U		P_	
7440-48-4	Cobalt___	0.80	U		P_	
7440-50-8	Copper___	2.1	B		P	
7439-89-6	Iron_____	75.3	B		P	(U,I4)
7439-92-1	Lead_____	1.4	U		P_	
7439-95-4	Magnesium	4270	B		P_	
7439-96-5	Manganese	48.5			P_	
7439-97-6	Mercury__	0.04	B		AV	
7439-98-7	Molybdenu	8.5	B		P_	
7440-02-0	Nickel___	6.8	B		P_	
7440-09-7	Potassium	3720	B		P_	
7782-49-2	Selenium_	3.1	U		P_	
7440-22-4	Silver___	0.90	U		P_	
7440-23-5	Sodium___	19900			P_	
7440-28-0	Thallium_	3.8	U		P_	
7440-61-1	Uranium__	80.4	U		P_	
7440-62-2_	Vanadium_	4.1	B		P_	
7440-66-6_	Zinc_____	0.80	U		P_	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: N/A___

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

M 12 March 98

RADIOCHEMISTRY

Lab Control Sample (LCS) **Present? X yes no** **1/SDG** **75-125% recovery** *Paragon analyzed a blank spike as the LCS.*	**OK** **See comment**	**Obtain from lab. Q=A** **If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 75% and J+ for > 125%** **If the LCS sample tracer/ carrier recovery is < 10%, qualify the associated sample data as P for non-detects.**	 **R6a** **R6** **R6d**
Matrix Spike (MS) **1/SDG** **Present? X yes no** **75-125% recovery** **(Note: As opposed to other tests, the matrix spike test will qualify samples on the basis of their connection by SDG and not by analytical batch).**	**OK**	**Obtain from lab. Q=A** **If criterion not met, qualify all analytes associated with the MS with a J- for <75%** **and J+ for > 125%,** **if all samples in batch of same matrix. If there is variation of matrix, P for samples not of same matrix as spiked sample.**	 **R3a** **R3** **R3b**
Method blank **Present? X yes no** **1/SDG** **target analytes ≤5x the amount in the blank**	**OK**	**Obtain from lab. Q=A** **If the sample result > EQL or no EQL is available but <5x the amount found in the associated blank, it should be qualified as U. In making this comparison the differing aliquot size of the blank and sample being tested should be taken into account.**	 **R4**

MJ 12 March 18

Duplicate Present? X yes no 1/SDG (Note: As opposed to other tests, the duplicate tests will qualify samples on the basis of their connection by SDG and not by analytical batch).	OK	Obtain from lab. Q=A If both results are above the EQL or no EQL is available, all results for same analyte in same SDG should be qualified as J if there is not 3σ agreement between results. If both results are < EQL no test should be done. If one result > EQL and difference > factor of 1X EQL for water and 2X EQL for soil, qualify with J.	 R7 R8
EQL Denote those samples where the result is less than the reported sample MDA or EQL. Confirm that the MDA of each reported analyte in each sample and blank is <EQL.	NA	When the MDA < the EQL or no EQL is available: Qualify as U those sample results < the MDA. Qualify as U those sample results > MDA but < EQL. When the MDA is >EQL: Qualify as U those sample and blank results < both the MDA and EQL. Qualify as U those sample and blank results < than the MDA but > EQL.	 R9a R9b R10a R10b
Detection with respect to the reported uncertainty This is a more conservative test of detection than simply considering the MDA or EQL since sample results > than both the EQL and MDA may still be qualified using this test.	NA	Qualify as U those results < three times the reported 1-sigma uncertainty. Equivalently qualify as U those results < 1.5 times the reported 2-sigma uncertainty or < the reported 3-sigma uncertainty.	R11

M/12 March 98

Tracer/carrier recovery	**NA**		
Present? yes no		**Obtain from lab. Q=A**	
Tracer recovery for alpha spec analyses 330 %		**If tracer/carrier recovery < 10 %, qualify results as R**	**R10**
Carrier recovery for beta/gamma analyses 3 40%		**If tracer recovery is 10-30%, Q=J**	**R11a**
		if result > EQL and UJ if result < EQL	**R11b**
		If carrier recovery is 10-40%, Q=J	**R11c**
		if result > EQL and UJ if < EQL	**R11d**

MIZ March 98

TOTAL URANIUM ANALYSIS RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 01/27/98

Client Name: Los Alamos National Lab. Date Analyzed : 02/27/98

Client Project ID: 4069R

Lab Sample ID Series: 98-01-239 Sample Matrix : Water

Client Sample ID	Lab Sample ID	Total Uranium (ug/L)	Reporting Limit	Flag
04LA-98-0026	01-239-01	2.81 ± 0.38	0.10	
04LA-98-0027	01-239-02	2.08 ± 0.28	0.10	
04LA-98-0028	01-239-03	25.1 ± 3.4	1.00	
04LA-98-0029	01-239-04	2.17 ± 0.30	0.10	
04LA-98-0030	01-239-05	4.13 ± 0.57	0.10	
04LA-98-0031	01-239-06	1.41 ± 0.19	0.10	
04LA-98-0032	01-239-07	2.03 ± 0.28	0.10	
04LA-98-0033	01-239-08	1.63 ± 0.22	0.10	
Blank	01-239-B1	BDL	0.10	U
Duplicate	01-239-D1	1.61 ± 0.22	0.10	

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

FLAGS = J - 'Estimated Value' - result between Method Detection Limit and Reporting Limit.
U - 'Not Detected' - result less than Method Detection Limit.

BDL = Below Detection Limit; see method for DL determination.

Remarks:

Sample 98-01-239-D1 is a duplicate of 98-01-239-08.

BP

M 12 March 98

Friday, January 30, 1998

REQUEST NUMBER: 4070R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 1/30/98
REPORT DUE: 3/2/98
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 4070R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

9801240

Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
AM241		04LA-98-0026	01	W	1/27/98	01
GROSSAB		04LA-98-0026	01	W	1/27/98	
GROSSG		04LA-98-0026	01	W	1/27/98	
GSCAN		04LA-98-0026	01	W	1/27/98	
ISOPU		04LA-98-0026	01	W	1/27/98	
ISOU		04LA-98-0026	01	W	1/27/98	
SR90		04LA-98-0026	01	W	1/27/98	
AM241		04LA-98-0027	01	W	1/27/98	02
GROSSAB		04LA-98-0027	01	W	1/27/98	
GROSSG		04LA-98-0027	01	W	1/27/98	
GSCAN		04LA-98-0027	01	W	1/27/98	
ISOPU		04LA-98-0027	01	W	1/27/98	
ISOU		04LA-98-0027	01	W	1/27/98	
SR90		04LA-98-0027	01	W	1/27/98	
AM241		04LA-98-0028	01	W	1/26/98	03
GROSSAB		04LA-98-0028	01	W	1/26/98	
GROSSG		04LA-98-0028	01	W	1/26/98	
GSCAN		04LA-98-0028	01	W	1/26/98	
ISOPU		04LA-98-0028	01	W	1/26/98	
ISOU		04LA-98-0028	01	W	1/26/98	
SR90		04LA-98-0028	01	W	1/26/98	
AM241		04LA-98-0029	01	W	1/26/98	04
GROSSAB		04LA-98-0029	01	W	1/26/98	

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
GROSSG		04LA-98-0029	01	W	1/26/98	04
GSCAN		04LA-98-0029	01	W	1/26/98	
ISOPU		04LA-98-0029	01	W	1/26/98	
ISOU		04LA-98-0029	01	W	1/26/98	
SR90		04LA-98-0029	01	W	1/26/98	
AM241		04LA-98-0030	01	W	1/27/98	05
GROSSAB		04LA-98-0030	01	W	1/27/98	
GROSSG		04LA-98-0030	01	W	1/27/98	
GSCAN		04LA-98-0030	01	W	1/27/98	
ISOPU		04LA-98-0030	01	W	1/27/98	
ISOU		04LA-98-0030	01	W	1/27/98	
SR90		04LA-98-0030	01	W	1/27/98	
AM241		04LA-98-0031	01	W	1/27/98	06
GROSSAB		04LA-98-0031	01	W	1/27/98	
GROSSG		04LA-98-0031	01	W	1/27/98	
GSCAN		04LA-98-0031	01	W	1/27/98	
ISOPU		04LA-98-0031	01	W	1/27/98	
ISOU		04LA-98-0031	01	W	1/27/98	
SR90		04LA-98-0031	01	W	1/27/98	
AM241		04LA-98-0032	01	W	1/26/98	07
GROSSAB		04LA-98-0032	01	W	1/26/98	
GROSSG		04LA-98-0032	01	W	1/26/98	
GSCAN		04LA-98-0032	01	W	1/26/98	
ISOPU		04LA-98-0032	01	W	1/26/98	
ISOU		04LA-98-0032	01	W	1/26/98	
SR90		04LA-98-0032	01	W	1/26/98	
AM241		04LA-98-0033	01	W	1/26/98	08
GROSSAB		04LA-98-0033	01	W	1/26/98	
GROSSG		04LA-98-0033	01	W	1/26/98	
GSCAN		04LA-98-0033	01	W	1/26/98	
ISOPU		04LA-98-0033	01	W	1/26/98	
ISOU		04LA-98-0033	01	W	1/26/98	
SR90		04LA-98-0033	01	W	1/26/98	

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: **4070R** LAB NAME: **Paragon** LAB CODE_____

NAME OF VALIDATOR: **Antonia Tallarico** COMPANY: **LATA**

VALIDATION DATE: **17 March 98** EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- o INORGANICS
- **X** RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? " YES " NO
Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

_____
_____
_____

Signature/1st validation: _____ 17 March 98

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Monday, March 02, 1998 9:55:52 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:
Lab ID: AS00671BLK1

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 04-Feb-98
Date Analyzed: 20-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 300

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.033 +/- 0.018	0.065	pCi/L	U
U-235	0.0154 +/- 0.0099	0.032	pCi/L	U
U-238	0.024 +/- 0.014	0.053	pCi/L	U

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.42	pCi/L	84%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

B - Analyte concentration greater than MDC.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Decision Level Report

Reported on: Monday, March 02, 1998 9:55:58 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:
Lab ID: AS00671BLK1

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 04-Feb-98
Date Analyzed: 20-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1
Aliquot Units: L
Report Basis: As Received

Target Nuclide	Decision Level	Reporting Units
U-234	0.054	pCi/L
U-235	0.016	pCi/L
U-238	0.04	pCi/L

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.42	pCi/L	84%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Monday, March 02, 1998 9:55:54 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:
Lab ID: AS00671LCS1

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 04-Feb-98
Date Analyzed: 20-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 300

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
U-234	4.49 +/- 0.30	0.043	4.85	pCi/L	93%	+/- 25%	Pass
U-235	0.194 +/- 0.034	0.049	N/A	pCi/L	N/A	N/A	
U-238	4.52 +/- 0.30	0.067	4.85	pCi/L	93%	+/- 25%	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.54	pCi/L	88%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Monday, March 02, 1998 4:33:45 PM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:
Lab ID: AS00671-LCS1-D

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 04-Feb-98
Date Analyzed: 20-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 300

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
U-234	4.85 +/- 0.33	0.054	4.85	pCi/L	100%	+/- 25%	Pass
U-235	0.185 +/- 0.034	0.039	N/A	pCi/L	N/A	N/A	
U-238	4.75 +/- 0.32	0.057	4.85	pCi/L	98%	+/- 25%	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.37	pCi/L	83%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Monday, March 02, 1998
9:55:56 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

		Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID:	04LA-98-0026				
Lab ID:	9801240-1	2/4/98	2/19/98	AS00671	1
DUP ID:	9801240-1D	2/4/98	2/20/98	AS00671	1

Sample Matrix: WATER
Date Collected: 27-Jan-98
Analytical SOP: PAI SOP 714R3
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: As Received

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
U-234	1.35 +/- 0.11	1.15 +/- 0.10	pCi/L	0.63	< 1.42	
U-235	0.055 +/- 0.019	0.059 +/- 0.020	pCi/L	0.06	< 1.42	LT
U-238	0.949 +/- 0.090	0.863 +/- 0.084	pCi/L	0.35	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.61	pCi/L	89%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

DER - Duplicate Error Ratio

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Monday, March 02, 1998 4:33:49 PM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:	Prep Date	Analysis Date	Prep Batch	Final Aliquot
Lab ID: AS00671LCS1	2/4/98	2/20/98	AS00671	1
DUP ID: AS00671-LCS1-D	2/4/98	2/20/98	AS00671	1

Sample Matrix: WATER
Date Collected: 04-Feb-98
Analytical SOP: PAI SOP 714R3
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: As Received

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
U-234	4.49 +/- 0.30	4.85 +/- 0.33	pCi/L	0.41	< 1.42	Pass
U-235	0.194 +/- 0.034	0.185 +/- 0.034	pCi/L	0.09	< 1.42	
U-238	4.52 +/- 0.30	4.75 +/- 0.32	pCi/L	0.26	< 1.42	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.37	pCi/L	83%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

DER - Duplicate Error Ratio

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Monday, March 02, 1998 9:55:05 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:
Lab ID: AS00671BLK1

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 04-Feb-98
Date Analyzed: 28-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.023 +/- 0.018	0.075	pCi/L	U

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.51	pCi/L	71%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

B - Analyte concentration greater than MDC.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Decision Level Report

Reported on: Monday, March 02, 1998 9:55:10 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:
Lab ID: AS00671BLK1

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 04-Feb-98
Date Analyzed: 28-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1
Aliquot Units: L
Report Basis: As Received

Target Nuclide	Decision Level	Reporting Units
Am-241	0.065	pCi/L

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.51	pCi/L	71%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Thursday, March 05, 1998 9:33:14 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:
Lab ID: AS00671LCS1

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 04-Feb-98
Date Analyzed: 28-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Am-241	6.90 +/- 0.44	0.058	7.16	pCi/L	96%	+/- 25%	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	4.2	pCi/L	86%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Monday, March 02, 1998 4:33:44 PM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:
Lab ID: AS00671-LCS1-D

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 04-Feb-98
Date Analyzed: 28-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Am-241	7.94 +/- 0.50	0.051	7.16	pCi/L	111%	+/- 25%	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.92	pCi/L	80%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Thursday, March 05, 1998 9:33:16 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Sample Matrix: WATER
Date Collected: 04-Feb-98
Analytical SOP: PAI SOP 714R3
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: As Received

Field ID:	Prep Date	Analysis Date	Prep Batch	Final Aliquot
Lab ID: AS00671LCS1	2/4/98	2/28/98	AS00671	1
DUP ID: AS00671-LCS1-D	2/4/98	2/28/98	AS00671	1

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
Am-241	6.90 +/- 0.44	7.94 +/- 0.50	pCi/L	0.79	< 1.42	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.92	pCi/L	80%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

DER - Duplicate Error Ratio

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Monday, March 02, 1998 9:55:08 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

	Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID: 04LA-98-0026				
Lab ID: 9801240-1	2/4/98	2/26/98	AS00671	1
DUP ID: 9801240-1D	2/4/98	2/28/98	AS00671	1

Sample Matrix: WATER
Date Collected: 27-Jan-98
Analytical SOP: PAI SOP 714R3
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: As Received

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
Am-241	0.029 +/- 0.015	0.023 +/- 0.024	pCi/L	0.11	< 1.42	U

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.37	pCi/L	69%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

DER - Duplicate Error Ratio

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 4070R

Date File Saved: 03/02/98

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-98-0026	9801240-1
04LA-98-0027	9801240-2
04LA-98-0028	9801240-3
04LA-98-0029	9801240-4
04LA-98-0030	9801240-5
04LA-98-0031	9801240-6
04LA-98-0032	9801240-7
04LA-98-0033	9801240-8

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOPU

The samples under Request Number 4070R (Work Order 9801240) were received on 01/31/98 and scheduled for isotopic plutonium analyses.

These samples were prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

These samples were analyzed by alpha spectrometry for isotopic plutonium according to Paragon Analytics, Inc. procedure PAI SOP714R3. The analyses were completed on 03/02/98. The analysis results for these samples are reported in units of pCi/liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2,

the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

The filter paper for sample 04LA-98-0033 (PAI ID 9801240-8) was mounted upside down on the planchette. The initial count results verify that the paper was incorrectly mounted. The filter paper was then remounted correctly. In the process of remounting the filter paper was torn and lowered chemical recovery was expected. The recount of the corrected sample confirms the loss of recovered activity. The requested chemical yield limit is 30% and the sample recovery for the recount is 20%. Because the recount results fail to meet acceptable yield criteria the original planchette was stripped of the filter paper which was then placed on a new planchette. Both planchettes were counted. The chemical recovery of the original planchette containing the tape is within acceptable limits. The tracer activity adhered to the tape of the original planchette and chemical recovery is 38%. Sample results will be reported.

No further problems were observed in the preparation and analyses of the samples listed above. All remaining method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrumentation

Veronica Quappo
Radiochemistry Final Review

3-5-98
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple

Date

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Monday, March 02, 1998 9:55:30 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:
Lab ID: AS00671LCS1

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 04-Feb-98
Date Analyzed: 22-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Pu-238	-0.001 +/- 0.018	0.090	N/A	pCi/L	N/A	N/A	U
Pu-239	5.36 +/- 0.35	0.050	4.85	pCi/L	110%	+/- 25%	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.42	pCi/L	78%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Monday, March 02, 1998 4:33:45 PM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:
Lab ID: AS00671-LCS1-D

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 04-Feb-98
Date Analyzed: 22-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Pu-238	0.021 +/- 0.012	0.042	N/A	pCi/L	N/A	N/A	U
Pu-239	4.76 +/- 0.31	0.028	4.85	pCi/L	98%	+/- 25%	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.78	pCi/L	86%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Monday, March 02, 1998 9:55:28 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:
Lab ID: AS00671BLK1

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 04-Feb-98
Date Analyzed: 22-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.001 +/- 0.010	0.054	pCi/L	U
Pu-239	0.0111 +/- 0.0090	0.036	pCi/L	U

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.45	pCi/L	79%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

B - Analyte concentration greater than MDC.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Decision Level Report

Reported on: Monday, March 02, 1998 9:55:33 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:
Lab ID: AS00671BLK1

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 04-Feb-98
Date Analyzed: 22-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1
Aliquot Units: L
Report Basis: As Received

Target Nuclide	Decision Level	Reporting Units
Pu-238	0.044	pCi/L
Pu-239	0.023	pCi/L

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.45	pCi/L	79%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Monday, March 02, 1998 4:33:49 PM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID:		Prep Date	Analysis Date	Prep Batch	Final Aliquot
Lab ID:	AS00671LCS1	2/4/98	2/22/98	AS00671	1
DUP ID:	AS00671-LCS1-D	2/4/98	2/22/98	AS00671	1

Sample Matrix: WATER
Date Collected: 04-Feb-98
Analytical SOP: PAI SOP 714R3
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: As Received

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
Pu-238	-0.001 +/- 0.018	0.021 +/- 0.012	pCi/L	0.5	< 1.42	U
Pu-239	5.36 +/- 0.35	4.76 +/- 0.31	pCi/L	0.63	< 1.42	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.78	pCi/L	86%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

DER - Duplicate Error Ratio

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Monday, March 02, 1998 9:55:31 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

		Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID:	04LA-98-0026				
Lab ID:	9801240-1	2/4/98	2/20/98	AS00671	1
DUP ID:	9801240-1D	2/4/98	2/22/98	AS00671	1

Sample Matrix: WATER
Date Collected: 27-Jan-98
Analytical SOP: PAI SOP 714R3
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: As Received

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
Pu-238	0.0156 +/- 0.0097	0.016 +/- 0.012	pCi/L	0.01	< 1.42	U
Pu-239	-0.0074 +/- 0.0065	0.021 +/- 0.011	pCi/L	1.06	< 1.42	U

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.11	pCi/L	71%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

DER - Duplicate Error Ratio

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

Sr-90 LCS RESULTS

Method ASTM D5918-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 02/11/98

Client Name: Shared QC

Date Analyzed : 02/13/98

Client Project ID : 4070r

Sample Matrix : Water

Lab Workorder Number : 98-01-240

Count Duration: 30 Min.

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
98-01-240-S1	16.3 ± 4.08	14.2 ± 2.95	87.1%	Pass

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

PAI sets control limits for Sr-90 measurements based on Historical Data.

Control Limits = Known ± 25% for Sr-90.

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

Sr-90 MATRIX SPIKE RESULTS

Method ASTM D5811-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 01/27/98

Client Name: Los Alamos Natl. Lab SMO

Date Analyzed : 02/13/98

Client Project ID : 4070R

Sample Matrix : Water

Lab Workorder Number : 98-01-240

Count Duration: 30 Min.

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
98-01-240-M2	16.4 ± 4.09	15.0 ± 3.15	91.8%	Pass

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

Control Limits = Known ± 25% for Sr-90.

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

Remarks:

Sample 98-01-240-M2 is a matrix spike of sample 98-01-240-02.

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 4070R

Date File Saved: 3/06/98

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-98-0026	9801240-1
04LA-98-0027	9801240-2
04LA-98-0028	9801240-3
04LA-98-0029	9801240-4
04LA-98-0030	9801240-5
04LA-98-0031	9801240-6
04LA-98-0032	9801240-7
04LA-98-0033	9801240-8

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: GROSS AB

Samples under Request Number 4070R (PAI Work Order 98-01-240) were received on 1/31/98 and scheduled for gross alpha/beta analysis, which was completed on 2/24/98.

The analytical results for these samples are reported in units of pCi/L.

This work order was prepared using PAI SOP702R11, and analyzed using PAI SOP724R5.

Gross alpha results are referenced to ^{241}Am. Gross beta results are referenced to ^{90}Sr/Y.

Due to the depletion of samples 04LA-98-0026, -0027, -0029, -0031, -0033 (PAI ID 98-01-240-01, -02, -04, -06 and -08), the aliquots used for the preparation and analysis were taken from the gamma fractions which were filtered.

Following an extended count the requested MDA's for gross alpha/beta for samples 04LA-98-0028, 04LA-98-0030, and 04LA-98-0032 were were not achieved due to the presence of elevated levels of dissolved / suspended solids native to the sample. The requested method limits the amount of sample solids residue taken for analysis to 5 mg/cm^2. The sample aliquot sizes was optimized for all samples. If desired, alternative methodologies for gross alpha are available which can generally address solids interference in water samples.

No further problems were noted during the preparation and analysis of these samples. All remaining quality control criteria were met.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Chris McNerney — 3/6/98

Chris McNerney
Radiochemistry Instrument Technician

Date

3/9/98

Radiochemistry Final Review

Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Donald Gipple
Laboratory Manager

Date

ALPHA/BETA ANALYSIS RESULTS SUMMARY

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 02/17/98

Client Name: Shared QC

Date Analyzed : 02/24/98

Client Project ID: Blank

Sample Matrix : Water

Lab Sample ID Series: 98-01-204

Count Duration: 600 Min.

Analyzed By : CJM

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/liter)	Gross Beta (pCi/liter)
Blank	01-204-B1	-0.03 ± 0.73	-0.11 ± 0.97
Decision Level	01-204-B1	0.62	0.80

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

Reported Activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP702FC and analyzed using PAI SOP705FC.

Remarks:

Blank shared for work order 98-01-204, 98-01-240, 98-02-018, 98-02-026, 98-02-043, 98-02-056, and 98-02-071.

GROSS ALPHA/BETA BLANK SPIKE RESULTS

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc. Date Collected: 02/17/98

Client Name: Shared QC Date Analyzed : 02/23/98

Client Project ID : Blank Spike Sample Matrix : Water

Lab Workorder Number : 98-01-204 Units : pCi/l

Alpha Recovery Data

Lab Sample ID	Alpha Spike Added	Alpha Reported	Percent Recovery	Flag
98-01-204-S1	209.5	160.8	76.7	Pass

Beta Recovery Data

Lab Sample ID	Beta Spike Added	Beta Reported	Percent Recovery	Flag
98-01-204-S1	271.0	257.4	95.0	Pass

PAI sets control limits for gross alpha/beta measurements based on EPA/EMSL Laboratory Intercomparison Control Limits.

Acceptance Range for Percent Recovery of blank spike samples is known ± 30%.

Remarks:

Blank Spike shared for work orders 98-01-204, 98-01-240, 98-02-018, 98-02-026, 98-02-043, 98-02-056, and 98-02-071.

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 4070R

Date File Saved: 03/06/98

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-98-0026	98-01-240-01
04LA-98-0027	98-01-240-02
04LA-98-0028	98-01-240-03
04LA-98-0029	98-01-240-04
04LA-98-0030	98-01-240-05
04LA-98-0031	98-01-240-06
04LA-98-0032	98-01-240-07
04LA-98-0033	98-01-240-08

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

All samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gamma Spectroscopy

The samples under Request Number 4070R (Work Order 9801240) were received on 01/31/98 and scheduled for gamma spec. analyses, which were completed on 02/10/98.

The analysis results for these samples are reported in units of pCi/Liter. Samples 04LA-98-0026 (98-01-240-01), 04LA-98-0028 (98-01-240-03), 04LA-98-0030 (98-01-240-05), and 04LA-98-0032 (98-01-240-07) were filtered prior to analysis. The remainder of the samples under this work order were not filtered prior to analysis.

This work order was prepared using PAI SOP739R2 and analyzed using PAI SOP713R4.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Cadmium-109 and ^{237}Np are often misidentified when using the required library. The observed photopeak at 87 keV is attributed to the K_β x ray of Pb. Likewise, ^{211}Bi and ^{224}Ra are misidentified due to interference from ^{214}Pb at 351 keV and 241 keV, respectively. Activity concentration results above the 2σ total propagated uncertainty (TPU) for radionuclides identified as present by the analysis software for which spectral interference is suspected are given an "S" flag.

Activity concentrations above the 2σ TPU are reported in some instances where no supporting photopeaks are observed. These anomalous identifications result from the GDR software attempting to calculate net activity concentrations for analytes for which no peaks are observed. Such data have been flagged with an asterisk.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill — 3-6-98
Radiochemistry Instrumentation — Date

Radiochemistry Final Review — 3/9/98
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple — Date
Laboratory Manager

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/01/96 10:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed : 02/09/98 14:53

Lab Sample ID: 98-01-240-S1

Sample Matrix : Water

Client Sample ID: Lab Control

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	111000	103000	108	Pass
Cd-109	1470000	1400000	106	Pass
Co-57	30400	30700	99.0	Pass
Ce-139	47800	46900	102	Pass
Sn-113	78600	78200	100	Pass
Cs-137	40800	39100	105	Pass
Y-88	144000	139000	104	Pass
Co-60	65600	64400	102	Pass

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known ± 15%

Data stored in file \gdr\prt\W01240S1.98P

M6

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 02/05/98 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 02/10/98 17:33

Lab Sample ID: 98-01-240-B1

Sample Matrix: Water

Client Sample ID: Blank

Count Duration: 800 Min.

Nuclide	Dec. Level (pCi/L)	Nuclide	Dec. Level (pCi/L)
Am-241	18.4	Np-237	8.27
Cd-109	58.6	Th-234	103
Co-57	1.36	Ce-144	5.90
Ce-139	1.13 *	U-235	3.79
Ra-226	60.9	Th-227	7.99
Pb-212	4.84	Ra-224	25.7
Se-75	1.87	Hg-203	2.39
Pa-231	44.6	Pa-233	2.50
Ra-223	27.0	Eu-152	3.81
Bi-211	10.5	Pb-214	7.57
Sn-113	1.71	Rn-219	33.6
Pb-211	36.7	Ann-Rad	5.57
Sr-85	2.44	Ba-140	12.1
Tl-208	4.07	Cs-134	2.37
Bi-214	9.13	Ru-106	22.2
Cs-137	1.57	Mn-54	1.85
Y-88	2.19	Ac-228	15.5
Pa-234m	634	Zn-65	3.89
Co-60	3.34	Na-22	2.84
K-40	49.2	La-140	21.7
Bi-212	62.9		

Decision Level Values calculated as recommended by ANSI N42.2
Reported sample activities should be compared to these Decision Levels

M6

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 01/27/98 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 02/10/98 17:39

Lab Sample ID: 98-01-240-D1

Sample Matrix: Water

Client Sample ID: Dup of 02

Count Duration: 800 Min.

Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)
Pa-233	3.43 ± 3.48	Ann-Rad	5.12 ± 6.72
Sr-85	3.95 ± 3.74 *	Am-241	-1.49 ± 10.4
Np-237	0.694 ± 11.9	Cd-109	6.76 ± 39.8
Th-234	-273 ± 111	Co-57	0.299 ± 1.17
Ce-144	-1.20 ± 9.00	Ce-139	-1.28 ± 1.24
U-235	-2.49 ± 4.45	Ra-226	-15.7 ± 73.5
Th-227	2.32 ± 9.27	Pb-212	0.075 ± 6.06
Ra-224	-52.6 ± 30.3	Se-75	-0.837 ± 2.25
Hg-203	-0.012 ± 2.02	Pa-231	-21.5 ± 57.8
Ra-223	-48.6 ± 34.3	Eu-152	0.99 ± 5.17
Bi-211	2.33 ± 11.9	Pb-214	-5.85 ± 8.26
Sn-113	0.521 ± 2.22	Rn-219	7.57 ± 21.8
Pb-211	23.4 ± 47.6	Ba-140	4.34 ± 14.6
Tl-208	-1.69 ± 4.70	Cs-134	-0.478 ± 2.08
Bi-214	-7.64 ± 11.3	Ru-106	3.14 ± 19.0
Cs-137	1.06 ± 2.02	Mn-54	-0.552 ± 2.19
Y-88	2.76 ± 2.59	Ac-228	-2.39 ± 16.4
Pa-234m	39.1 ± 367	Zn-65	2.21 ± 4.95
Co-60	-0.072 ± 2.32	Na-22	0.980 ± 2.35
K-40	-52.0 ± 62.0	La-140	-1510 ± 1160
Bi-212	-30.4 ± 90.3		

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank. Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

An asterisk (*) indicates that the reporting software anomalously reports a peak for this radionuclide. The result is an artifact of net reporting.

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 4070R

Date File Saved: 03/04/98

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-98-0026	98-01-240-01
04LA-98-0027	98-01-240-02
04LA-98-0028	98-01-240-03
04LA-98-0029	98-01-240-04
04LA-98-0030	98-01-240-05
04LA-98-0031	98-01-240-06
04LA-98-0032	98-01-240-07
04LA-98-0033	98-01-240-08

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

All samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gross Gamma

The samples under Request Number 4070R (Work Order 9801240) were received on 01/31/98 and scheduled for gamma spec. analyses, which were completed on 02/12/98.

The analysis results for these samples are reported in units of pCi/Liter. The samples were not filtered prior to analysis.

This work order was prepared using PAI SOP739R2 and analyzed using PAI SOP713R4.

The HPGe gamma photon detectors were calibrated using a standard of Cesium-137 in water. Counting efficiencies were calculated as the ratio of the net integrated count rate in a region of interest between 50 and 2000 keV to the known photon emission rate of the standard. Samples were analyzed in the same geometry and counts integrated in the same manner.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Gross gamma activity was detected in the blank at a concentration in excess of the minimum detectable concentration (MDC). However, the blank activity is well below that reported for the client samples and is also below the required quantification limit of 100 pCi/Liter.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Renee Gallegos
Radiochemistry Instrumentation

3/4/98
Date

Radiochemistry Final Review

3/6/98
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple
Laboratory Manager

Date

Gross Gamma

Laboratory Control Sample Results

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	3/3/98
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	98-01-240	Units	pCi/L

Sample ID	Reported Activity	Known Value	Percent Recovery	Flag
98-R1-240-S2	8539	8638	98.9%	PASS

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

Prepared by PG 3/4/98

Gross Gamma Results Summary

Blank Results

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	2/10/98
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	98-01-240	Units:	pCi/L

Client Sample ID	Lab Sample ID	Activity	Uncertainty	MDC
Blank	98-01-240-B1	63	12	19

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate.

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

Prepared by RG 3/3/98

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgment based on data use . It usually has an "M" with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analytes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likely because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1c Carrier recovery 10-40% and result > EQL.

1d Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

3b Spike recovery outside criterion but sample is not of same matrix as was matrix spike sample

4 Sample result > EQL but < 5X the amount found in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

6d LCS tracer/carrier recovery < 10 % and sample result is a non-detect.

7 For the set of duplicates, both results are > EQL or no EQL is available, but there is not a 3 σ agreement between the results - within an SDG.

8 One result > EQL and the difference > a factor of 1xEQL for water and 2xEQL for soil.

9a Result < MDA and MDA is < EQL.

9b Result > MDA but < EQL.

10a Result < both MDA and EQL.

10b Result < MDA but > EQL.

11 Result is less than three times the reported 1-sigma uncertainty.

17 A zero was added to the result field because the laboratory did not provide a value or a MDC.

RADIOCHEMISTRY

Lab Control Sample (LCS) **Present? X yes no** **1/SDG** **75-125% recovery** *The γ spec. LCS contains Am-241, Cd-109, Co-57, Ce-139, Sn-113, Cs-137, Y-88, and Co-60. The Iso-U LCS contained U-234 and U-238.* *Paragon uses a blank spike as a LCS for the gross α/β analysis.*	**OK** **See comment**	**Obtain from lab. Q=A** **If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 75% and J+ for > 125%** **If the LCS sample tracer/ carrier recovery is < 10%, qualify the associated sample data as P for non-detects.**	 **R6a** **R6** **R6d**
Matrix Spike (MS) **1/SDG** **Present? X yes no** **75-125% recovery** **(Note: As opposed to other tests, the matrix spike test will qualify samples on the basis of their connection by SDG and not by analytical batch).** *A matrix spike is required for Sr-90 only.*	**OK** **See comment**	**Obtain from lab. Q=A** **If criterion not met, qualify all analytes associated with the MS with a J- for <75%** **and J+ for > 125%,** **if all samples in batch of same matrix. If there is variation of matrix, P for samples not of same matrix as spiked sample.**	 **R3a** **R3** **R3b**

M 17 March 98

Method blank **Present? yes no** **1/SDG** **target analytes ≤5x the amount in the blank** *Five times the decision level result from the blank was used to qualify γ spec. results.*	**U** **See comment**	**Obtain from lab. Q=A** **If the sample result > EQL or no EQL is available but <5x the amount found in the associated blank, it should be qualified as U. In making this comparison the differing aliquot size of the blank and sample being tested should be taken into account.**	**R4**
Duplicate **Present? X yes no** **1/SDG** **(Note: As opposed to other tests, the duplicate tests will qualify samples on the basis of their connection by SDG and not by analytical batch).**	**OK**	**Obtain from lab. Q=A** **If both results are above the EQL or no EQL is available, all results for same analyte in same SDG should be qualified as J if there is not 3σ agreement between results.** **If both results are < EQL no test should be done.** **If one result > EQL and difference > factor of 1X EQL for water and 2X EQL for soil, qualify with J.**	**R7** **R8**

M 17 March 98

EQL **Denote those samples where the result is less than the reported sample MDA or EQL.** **Confirm that the MDA of each reported analyte in each sample and blank is <EQL.** *The decision level result from the blank was used in place of the MDA for the γ spec., Sr-90, and gross α/β.*	**U** **See comment**	**When the MDA < the EQL or no EQL is available:** **Qualify as U those sample results < the MDA.** **Qualify as U those sample results > MDA but < EQL.** **When the MDA is >EQL:** **Qualify as U those sample and blank results < both the MDA and EQL.** **Qualify as U those sample and blank results < than the MDA but > EQL.**	 **R9a** **R9b** **R10a** **R10b**
Detection with respect to the reported uncertainty **This is a more conservative test of detection than simply considering the MDA or EQL since sample results > than both the EQL and MDA may still be qualified using this test.**	**NA**	**Qualify as U those results < three times the reported 1-sigma uncertainty. Equivalently qualify as U those results < 1.5 times the reported 2-sigma uncertainty or < the reported 3-sigma uncertainty.**	**R11**
Tracer/carrier recovery **Present? X yes no** **Tracer recovery for alpha spec analyses 330 %** **Carrier recovery for beta/gamma analyses 3 40%**	**OK**	**Obtain from lab. Q=A** **If tracer/carrier recovery < 10 %, qualify results as R** **If tracer recovery is 10-30%, Q=J** **if result > EQL and UJ if result < EQL** **If carrier recovery is 10-40%, Q=J** **if result > EQL and UJ if < EQL**	 **R10** **R11a** **R11b** **R11c** **R11d**

M 17 March 98

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:55:46 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0026
Lab ID: 9801240-1

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 27-Jan-98
Date Analyzed: 19-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 300

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	1.35 +/- 0.11	0.044	pCi/L	
U-235	0.055 +/- 0.019	0.050	pCi/L	LT (U,R9b)
U-238	0.949 +/- 0.090	0.068	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.49	pCi/L	86%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

A 17 March 98

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:55:46 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0027
Lab ID: 9801240-2

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 27-Jan-98
Date Analyzed: 19-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 300

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	1.018 +/- 0.096	0.052	pCi/L	
U-235	0.042 +/- 0.016	0.037	pCi/L	LT (U,R9b)
U-238	0.870 +/- 0.086	0.055	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.52	pCi/L	87%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:55:47 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0028
Lab ID: 9801240-3

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 26-Jan-98
Date Analyzed: 19-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 300

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	5.06 +/- 0.34	0.048	pCi/L	
U-235	0.132 +/- 0.028	0.041	pCi/L	
U-238	2.81 +/- 0.20	0.053	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.59	pCi/L	89%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:55:47 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0029
Lab ID: 9801240-4

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 26-Jan-98
Date Analyzed: 19-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 300

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	1.30 +/- 0.11	0.050	pCi/L	
U-235	0.016 +/- 0.013	0.052	pCi/L	U (U, B9a)
U-238	0.698 +/- 0.073	0.047	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.55	pCi/L	88%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

A 17 March 98

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:55:48 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0030
Lab ID: 9801240-5

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 27-Jan-98
Date Analyzed: 19-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 300

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	2.14 +/- 0.16	0.043	pCi/L	
U-235	0.120 +/- 0.027	0.046	pCi/L	
U-238	1.74 +/- 0.14	0.054	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.57	pCi/L	88%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:55:49 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0031
Lab ID: 9801240-6

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 27-Jan-98
Date Analyzed: 19-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 300

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.688 +/- 0.077	0.068	pCi/L	
U-235	0.030 +/- 0.014	0.036	pCi/L	U (U, R9a)
U-238	0.449 +/- 0.059	0.048	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.12	pCi/L	77%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:55:50 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0032
Lab ID: 9801240-7

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 26-Jan-98
Date Analyzed: 19-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 300

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	2.05 +/- 0.16	0.075	pCi/L	
U-235	0.033 +/- 0.017	0.058	pCi/L	U (U, R9a)
U-238	1.47 +/- 0.13	0.070	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.28	pCi/L	81%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:55:50 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0033
Lab ID: 9801240-8

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 26-Jan-98
Date Analyzed: 20-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 300

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	1.26 +/- 0.11	0.038	pCi/L	
U-235	0.067 +/- 0.020	0.032	pCi/L	LT
U-238	0.691 +/- 0.074	0.042	pCi/L	

(U,R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	4.04	3.4	pCi/L	84%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:54:58 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0026
Lab ID: 9801240-1

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 27-Jan-98
Date Analyzed: 26-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.029 +/- 0.015	0.052	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.67	pCi/L	75%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:54:58 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0027
Lab ID: 9801240-2

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 27-Jan-98
Date Analyzed: 26-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.0111 +/- 0.0090	0.036	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.74	pCi/L	76%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:54:59 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0028
Lab ID: 9801240-3

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 26-Jan-98
Date Analyzed: 26-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.013 +/- 0.012	0.051	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.71	pCi/L	76%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

A 17 March 98

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:55:00 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0029
Lab ID: 9801240-4

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 26-Jan-98
Date Analyzed: 26-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.012 +/- 0.011	0.044	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	4.26	pCi/L	87%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:55:00 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0030
Lab ID: 9801240-5

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 27-Jan-98
Date Analyzed: 26-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.010 +/- 0.016	0.074	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.86	pCi/L	79%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

A 17 March 98

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:55:01 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0031
Lab ID: 9801240-6

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 27-Jan-98
Date Analyzed: 26-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.019 +/- 0.017	0.069	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	4.1	pCi/L	83%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:55:02 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0032
Lab ID: 9801240-7

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 26-Jan-98
Date Analyzed: 26-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.042 +/- 0.017	0.051	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.6	pCi/L	73%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, March 02, 1998 9:55:02 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0033
Lab ID: 9801240-8

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 26-Jan-98
Date Analyzed: 26-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.0135 +/- 0.0091	0.031	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.89	pCi/L	79%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Tuesday, March 03, 1998 8:44:29 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0026
Lab ID: 9801240-1

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 27-Jan-98
Date Analyzed: 20-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 600

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.0156 +/- 0.0097	0.034	pCi/L	U
Pu-239	-0.0074 +/- 0.0065	0.041	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.98	pCi/L	68%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

A 17 March 98

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Tuesday, March 03, 1998 8:44:29 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0027
Lab ID: 9801240-2

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 27-Jan-98
Date Analyzed: 20-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 600

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	-0.001 +/- 0.020	0.086	pCi/L	U
Pu-239	-0.0015 +/- 0.0067	0.038	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.25	pCi/L	74%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Tuesday, March 03, 1998 8:44:30 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0028
Lab ID: 9801240-3

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 26-Jan-98
Date Analyzed: 28-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.006 +/- 0.011	0.051	pCi/L	U
Pu-239	0.0000 +/- 0.0077	0.014	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.75	pCi/L	85%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

A 17 March 98

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Tuesday, March 03, 1998 8:44:30 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0029
Lab ID: 9801240-4

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 26-Jan-98
Date Analyzed: 22-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier	
Pu-238	0.009 +/- 0.012	0.058	pCi/L	U	(U, R9a)
Pu-239	0.028 +/- 0.013	0.017	pCi/L	LT	(U, R9b)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.95	pCi/L	67%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Tuesday, March 03, 1998 8:44:31 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0030
Lab ID: 9801240-5

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 27-Jan-98
Date Analyzed: 22-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	-0.0010 +/- 0.0078	0.039	pCi/L	U
Pu-239	0.0058 +/- 0.0078	0.035	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.5	pCi/L	80%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Tuesday, March 03, 1998 8:44:32 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0031
Lab ID: 9801240-6

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 27-Jan-98
Date Analyzed: 22-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.000 +/- 0.012	0.062	pCi/L	U
Pu-239	0.0080 +/- 0.0081	0.030	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.31	pCi/L	75%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Tuesday, March 03, 1998 8:44:33 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0032
Lab ID: 9801240-7

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 26-Jan-98
Date Analyzed: 23-Feb-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.020 +/- 0.014	0.052	pCi/L	U
Pu-239	-0.0058 +/- 0.0079	0.039	pCi/L	U

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.52	pCi/L	80%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Tuesday, March 03, 1998 8:44:33 AM

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 4070R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9801240

Field ID: 04LA-98-0033
Lab ID: 9801240-8

Sample Matrix: WATER
Date Prepared: 04-Feb-98
Prep SOP: PAI SOP 780R2
Prep Batch: AS00671

Date Collected: 26-Jan-98
Date Analyzed: 02-Mar-98
Analytical SOP: PAI SOP 714R3

Final Aliquot: 1.000
Aliquot Units: L
Report Basis: As Received
Count Time (min.): 1000

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	-0.025 +/- 0.012	0.065	pCi/L	U
Pu-239	0.0127 +/- 0.0090	0.013	pCi/L	LT

(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	1.69	pCi/L	39%	30-110%

Comments: Requested MDC = 0.100

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

M 17 March 98

Sr-90 ANALYSIS RESULTS SUMMARY

Method ASTM D5811-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 01/27/98

Client Name: Los Alamos Natl. Lab SMO

Date Analyzed : 02/13/98

Client Project ID: 4070R

Sample Matrix : Water

Lab Sample ID Series: 98-01-240

Count Duration: 30 Min.

Analyzed by: VG

Client Sample ID	Lab Sample ID	Sr-90 (pCi/l)
04LA-98-0026	98-01-240-01	-0.42 ± 0.66
04LA-98-0027	98-01-240-02	-0.14 ± 0.69
04LA-98-0028	98-01-240-03	-0.23 ± 0.68
04LA-98-0029	98-01-240-04	-0.21 ± 0.87
04LA-98-0030	98-01-240-05	-0.17 ± 0.64
04LA-98-0031	98-01-240-06	0.13 ± 0.63
04LA-98-0032	98-01-240-07	0.36 ± 0.67
04LA-98-0033	98-01-240-08	-0.02 ± 0.84
Blank	98-01-240-B1	-0.16 ± 0.67
Blank	Decision Level	0.47
Duplicate -08	98-01-240-D1	0.13 ± 0.77

(U, R9a)

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

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP707FC and analyzed using PAI SOP724FC.

Remarks:

Sample 98-01-240-D1 is a duplicate of 98-01-240-08.

M 17 March 98

ALPHA/BETA ANALYSIS RESULTS SUMMARY

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 01/27/98

Client Name: Los Alamos National Lab

Date Analyzed : 02/23/98

Client Project ID: 4070R

Sample Matrix : Water

Lab Sample ID Series: 98-01-240

Count Duration: 240 Min.

Analyzed By : CJM

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/liter) 0.62	Gross Beta (pCi/liter) .80
04LA-98-0026	01-240-01	(U,R9b) 1.9 ± 1.7	3.7 ± 1.8
04LA-98-0027	01-240-02	0.7 ± 1.0	4.2 ± 1.7
04LA-98-0028	01-240-03	580 ± 180	820 ± 230
04LA-98-0029	01-240-04	(U,R9b) 1.4 ± 1.3	17.2 ± 2.5
04LA-98-0030	01-240-05	270 ± 120	310 ± 100
04LA-98-0031	01-240-06	(U,R9b) 1.20 ± 0.93	3.3 ± 1.5
04LA-98-0032	01-240-07	34 ± 35	113 ± 42
04LA-98-0033	01-240-08	(U,R9a) -0.1 ± 1.3	2.0 ± 1.5 (U,R9b)
04LA-98-0032	01-240-D1	-1.3 ± 37	103 ± 40

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

Reported Activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP702FC and analyzed using PAI SOP705FC.

Remarks:

Sample 98-01-240-D1 is a duplicate of sample 98-01-240-07.

M 17 March 98

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 01/27/98 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 02/09/98 14:40

Lab Sample ID: 98-01-240-01

Sample Matrix: Water

Client Sample ID: 04LA-98-0026

Count Duration: 800 Min.

(U,R9a)

Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)
Cd-109	56.1 ± 53.3 *	Ann-Rad	5.37 ± 8.62
Pa-234m	436 ± 521	Am-241	-5.05 ± 12.6
Np-237	-13.7 ± 16.0	Th-234	-192 ± 151
Co-57	0.126 ± 1.46	Ce-144	2.16 ± 11.3
Ce-139	-1.15 ± 1.56	U-235	-0.150 ± 5.79
Ra-226	0.248 ± 95.7	Th-227	-0.668 ± 11.6
Pb-212	-5.33 ± 6.98	Ra-224	-93.4 ± 37.8
Se-75	0.123 ± 2.81	Hg-203	-0.320 ± 2.58
Pa-231	32.4 ± 76.8	Pa-233	-0.343 ± 4.27
Ra-223	-47.6 ± 44.7	Eu-152	-0.099 ± 6.55
Bi-211	-27.0 ± 16.3	Pb-214	-6.04 ± 10.9
Sn-113	1.40 ± 2.98	Rn-219	1.83 ± 27.3
Pb-211	6.12 ± 60.3	Sr-85	-1.30 ± 4.36
Ba-140	0.000 ± 17.9	Tl-208	-5.25 ± 6.84
Cs-134	-0.394 ± 2.76	Bi-214	3.44 ± 12.8
Ru-106	3.39 ± 24.9	Cs-137	-0.322 ± 2.68
Mn-54	-3.90 ± 3.11	Y-88	1.66 ± 3.44
Ac-228	2.17 ± 23.1	Zn-65	1.17 ± 6.86
Co-60	0.000 ± 3.48	Na-22	0.121 ± 3.27
K-40	-9.28 ± 86.5	La-140	-1040 ± 1130
Bi-212	-14.3 ± 142		

(U,R9a)

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank. Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

An asterisk (*) indicates that the reporting software anomalously reports a peak for this radionuclude. The result is an artifact of net reporting.

A17 March 98 000009 MO

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc. Date Collected: 01/27/98 12:00

Client Name: Los Alamos Natl Lab/SMO Date Analyzed: 02/09/98 14:43

Lab Sample ID: 98-01-240-02 Sample Matrix: Water

Client Sample ID: 04LA-98-0027 Count Duration: 800 Min.

Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)
Cd-109	49.4 ± 41.2 *	Ra-226	54.2 ± 92.4
Hg-203	2.38 ± 2.17 *	Sn-113	2.33 ± 2.49
Ann-Rad	3.69 ± 7.03	Pa-234m	542 ± 386 *
Zn-65	6.30 ± 5.39 *	Am-241	5.18 ± 11.0
Np-237	-10.1 ± 12.3	Th-234	-185 ± 119
Co-57	-0.430 ± 1.21	Ce-144	-0.600 ± 9.23
Ce-139	0.742 ± 1.32	U-235	-1.80 ± 4.75
Th-227	-1.92 ± 9.87	Pb-212	-0.547 ± 5.91
Ra-224	-65.0 ± 31.0	Se-75	0.644 ± 2.43
Pa-231	-16.9 ± 61.5	Pa-233	-0.815 ± 3.62
Ra-223	-22.0 ± 37.7	Eu-152	2.15 ± 5.44
Bi-211	11.0 ± 14.5	Pb-214	-2.57 ± 9.00
Rn-219	-16.3 ± 22.0	Pb-211	-10.9 ± 49.0
Sr-85	-6.31 ± 2.91	Ba-140	-16.4 ± 26.8
Tl-208	-2.77 ± 5.27	Cs-134	0.538 ± 2.33
Bi-214	-4.51 ± 11.4	Ru-106	-2.52 ± 20.9
Cs-137	-0.837 ± 2.31	Mn-54	0.127 ± 2.10
Y-88	-0.587 ± 5.61	Ac-228	-2.52 ± 19.0
Co-60	1.37 ± 2.17	Na-22	-2.07 ± 2.54
K-40	-32.6 ± 63.5	La-140	-155 ± 735
Bi-212	9.37 ± 101		

(U,R9a) (U,R4) (U,R9a) (U,R9σ4) (U,R9a) (U,R9a) (U,R4) (U,R9a)

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank. Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

An asterisk (*) indicates that the reporting software anomalously reports a peak for this radionuclide. The result is an artifact of net reporting.

M 17 March 98 000010 MG

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 01/26/98 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 02/09/98 14:44

Lab Sample ID: 98-01-240-03

Sample Matrix: Water

Client Sample ID: 04LA-98-0028

Count Duration: 800 Min.

	Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)	
(U,R9a)	Co-57	0.880 ± 1.14	Rn-219	15.1 ± 20.8	(U,R9a)
(U,R4)	Ba-140	13.6 ± 15.5	Tl-208	4.48 ± 6.05	(U,R4)
	K-40	65.0 ± 69.9	Am-241	2.73 ± 10.1	(U,R9a)
(U,R9a)	Np-237	-11.1 ± 10.8	Cd-109	4.22 ± 36.3	
	Th-234	-212 ± 127	Ce-144	-2.15 ± 8.89	
	Ce-139	-0.581 ± 1.47	U-235	-0.903 ± 4.60	
	Ra-226	1.09 ± 76.1	Th-227	-0.802 ± 10.9	
	Pb-212	-1.10 ± 6.02	Ra-224	-86.0 ± 35.0	
	Se-75	0.415 ± 2.35	Hg-203	1.07 ± 2.10	
	Pa-231	12.2 ± 58.1	Pa-233	1.05 ± 3.54	
	Ra-223	-14.9 ± 35.4	Eu-152	3.61 ± 5.26	
	Bi-211	-23.9 ± 13.6	Pb-214	-3.87 ± 9.33	
	Sn-113	-0.314 ± 2.38	Pb-211	-6.96 ± 45.7	
	Ann-Rad	-24.4 ± 6.99	Sr-85	-8.75 ± 3.33	
	Cs-134	-0.451 ± 2.14	Bi-214	-3.30 ± 11.1	
	Ru-106	-5.32 ± 20.0	Cs-137	-0.045 ± 2.13	
	Mn-54	-1.93 ± 2.41	Y-88	2.08 ± 3.13	
	Ac-228	4.57 ± 19.2	Pa-234m	-95.5 ± 774	
	Zn-65	0.542 ± 5.11	Co-60	-1.08 ± 2.47	
	Na-22	-1.85 ± 2.38	La-140	-411 ± 1150	
	Bi-212	-20.3 ± 103			

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

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

A 17 March 98 000011 MG

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 01/26/98 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 02/09/98 14:50

Lab Sample ID: 98-01-240-04

Sample Matrix: Water

Client Sample ID: 04LA-98-0029

Count Duration: 800 Min.

	Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)	
(U,R4)	Bi-211	15.9 ± 11.8 S	Ann-Rad	3.87 ± 6.70	(U,R9a)
(U,R9a)	Pa-234m	313 ± 359	Zn-65	4.32 ± 5.00	(U,R4)
	K-40	46.8 ± 66.3	Am-241	0.115 ± 10.8	(U,R9a)
	Np-237	-3.34 ± 12.2	Cd-109	0.845 ± 39.6	
	Th-234	-288 ± 112	Co-57	0.727 ± 1.17	
	Ce-144	-0.451 ± 9.02	Ce-139	0.783 ± 1.28	
	U-235	-2.58 ± 4.48	Ra-226	-11.2 ± 74.0	
	Th-227	-4.98 ± 9.20	Pb-212	0.286 ± 6.05	
	Ra-224	-86.5 ± 29.8	Se-75	-0.323 ± 2.31	
	Hg-203	0.097 ± 2.11	Pa-231	29.3 ± 58.9	
	Pa-233	-0.234 ± 3.37	Ra-223	-26.2 ± 36.1	
	Eu-152	1.58 ± 5.01	Pb-214	-3.80 ± 8.23	
	Sn-113	0.091 ± 2.29	Rn-219	-10.3 ± 20.9	
(U,R4)	Pb-211	43.6 ± 46.8	Sr-85	-5.24 ± 3.48	
(U,R9a)	Ba-140	-7.97 ± 14.8	Tl-208	-1.35 ± 4.72	
	Cs-134	-0.130 ± 2.16	Bi-214	-6.28 ± 11.3	
	Ru-106	1.34 ± 19.0	Cs-137	-0.688 ± 2.11	
	Mn-54	-1.23 ± 2.29	Y-88	1.74 ± 2.59	
	Ac-228	-3.23 ± 16.4	Co-60	0.575 ± 2.36	
	Na-22	-1.51 ± 2.41	La-140	-1050 ± 1050	
	Bi-212	-76.0 ± 91.7			

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

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

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

M 17 March 98 000012 MO

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 01/27/98 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 02/09/98 14:51

Lab Sample ID: 98-01-240-05

Sample Matrix: Water

Client Sample ID: 04LA-98-0030

Count Duration: 800 Min.

	Nuclide	Activity (pCi/L)		Nuclide	Activity (pCi/L)	
(U, ~~R4~~ R9a)	Rn-219	20.8 ± 26.6		Ann-Rad	5.12 ± 8.09	(U, R9a)
(U, R4)	Ba-140	27.3 ± 16.8	*	Am-241	1.27 ± 12.2	
(U, R9a)	Np-237	-12.0 ± 13.9		Cd-109	5.64 ± 46.0	
	Th-234	-348 ± 139		Co-57	0.049 ± 1.39	
	Ce-144	2.22 ± 11.1		Ce-139	-0.480 ± 1.58	
	U-235	-3.37 ± 5.40		Ra-226	-15.0 ± 89.1	
	Th-227	-35.5 ± 14.1		Pb-212	6.80 ± 7.11	(U, R4)
	Ra-224	-136 ± 43.7		Se-75	-0.928 ± 2.75	(U, R9a)
	Hg-203	1.67 ± 2.46		Pa-231	-53.5 ± 70.9	
	Pa-233	-3.12 ± 4.27		Ra-223	-31.4 ± 41.9	
	Eu-152	3.32 ± 6.37		Bi-211	-7.20 ± 15.8	
	Pb-214	-5.18 ± 9.86		Sn-113	0.096 ± 2.75	
	Pb-211	-26.9 ± 57.5		Sr-85	-10.3 ± 4.16	
	Tl-208	-0.627 ± 6.44		Cs-134	-2.60 ± 2.53	
	Bi-214	-4.61 ± 12.6		Ru-106	-8.14 ± 23.6	
	Cs-137	-0.826 ± 2.42		Mn-54	0.389 ± 2.95	
	Y-88	-5.88 ± 6.29		Ac-228	0.504 ± 12.6	
	Pa-234m	371 ± 729		Zn-65	1.51 ± 6.11	
	Co-60	0.282 ± 2.95		Na-22	0.910 ± 3.10	
	K-40	11.0 ± 72.4		La-140	-267 ± 908	
(U, R4)	Bi-212	76.9 ± 120				

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank. Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

An asterisk (*) indicates that the reporting software anomalously reports a peak for this radionuclide. The result is an artifact of net reporting.

A 17 March 98

MB

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 01/27/98 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 02/09/98 14:55

Lab Sample ID: 98-01-240-06

Sample Matrix: Water

Client Sample ID: 04LA-98-0031

Count Duration: 800 Min.

Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)
Cd-109	68.0 ± 24.2 *	Co-57	0.599 ± 0.727
Hg-203	1.75 ± 1.12 *	Ann-Rad	3.34 ± 3.52
Zn-65	2.74 ± 2.43 *	K-40	70.7 ± 37.0
Am-241	0.674 ± 4.35	Np-237	-9.57 ± 7.01
Th-234	-246 ± 75.8	Ce-144	3.40 ± 5.68
Ce-139	-0.666 ± 0.892	U-235	-1.25 ± 3.04
Ra-226	-20.6 ± 50.1	Th-227	-8.97 ± 6.25
Pb-212	-0.770 ± 3.48	Ra-224	-98.4 ± 22.8
Se-75	-1.42 ± 1.22	Pa-231	15.2 ± 31.5
Pa-233	0.023 ± 1.81	Ra-223	-13.5 ± 18.4
Eu-152	1.09 ± 2.73	Bi-211	7.45 ± 9.57
Pb-214	-8.35 ± 6.02	Sn-113	0.672 ± 1.20
Rn-219	7.20 ± 11.2	Pb-211	4.19 ± 28.1
Sr-85	0.153 ± 1.84	Ba-140	2.95 ± 6.83
Tl-208	-2.09 ± 2.52	Cs-134	0.248 ± 1.16
Bi-214	-8.09 ± 6.85	Ru-106	2.40 ± 10.2
Cs-137	-1.43 ± 1.20	Mn-54	-0.917 ± 1.11
Y-88	-0.709 ± 2.67	Ac-228	0.209 ± 8.83
Pa-234m	-216 ± 432	Co-60	-0.034 ± 1.09
Na-22	-0.044 ± 1.24	La-140	-95.8 ± 330
Bi-212	13.2 ± 42.8		

(U, R4)
(U, R9a)

(U, R9a)
(U, R4)
(U, R9a)

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank. Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

An asterisk (*) indicates that the reporting software anomalously reports a peak for this radionuclide. The result is an artifact of net reporting.

M 17 March 98 000014

MB

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 01/26/98 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 02/09/98 14:56

Lab Sample ID: 98-01-240-07

Sample Matrix: Water

Client Sample ID: 04LA-98-0032

Count Duration: 800 Min.

	Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)	
(U,R9a)	Cd-109	30.7 ± 43.0	Hg-203	1.99 ± 1.95 *	(U,R9a)
(U,R4)	K-40	78.4 ± 66.0	Bi-212	73.2 ± 77.3	(U,R4)
(U,R9a)	Am-241	-3.28 ± 14.4	Np-237	-1.98 ± 12.9	(U,R9a)
	Th-234	-82.1 ± 137	Co-57	0.257 ± 1.10	
	Ce-144	-3.30 ± 8.13	Ce-139	0.383 ± 1.38	
	U-235	-0.520 ± 4.38	Ra-226	-8.38 ± 72.2	
	Th-227	0.250 ± 9.73	Pb-212	-2.18 ± 6.09	
	Ra-224	-133 ± 32.1	Se-75	0.976 ± 2.03	
	Pa-231	-5.92 ± 51.5	Pa-233	1.11 ± 3.07	
	Ra-223	-33.2 ± 30.3	Eu-152	0.392 ± 4.48	
	Bi-211	-17.8 ± 10.0	Pb-214	-4.25 ± 8.31	
	Sn-113	0.017 ± 2.36	Rn-219	13.4 ± 22.2	
	Pb-211	-43.8 ± 46.7	Ann-Rad	-26.7 ± 6.38	
	Sr-85	-2.76 ± 2.97	Ba-140	2.65 ± 13.3	
	Tl-208	-0.741 ± 4.79	Cs-134	1.41 ± 1.94	
	Bi-214	3.51 ± 9.52	Ru-106	-0.617 ± 16.7	
	Cs-137	-0.381 ± 2.03	Mn-54	-0.057 ± 1.94	
	Y-88	-5.56 ± 5.00	Ac-228	-5.12 ± 16.0	
	Pa-234m	247 ± 370	Zn-65	1.53 ± 4.39	
	Co-60	-0.455 ± 2.01	Na-22	-0.231 ± 2.19	
	La-140	-36.4 ± 954			

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank. Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

An asterisk (*) indicates that the reporting software anomalously reports a peak for this radionuclide. The result is an artifact of net reporting.

M 17 March 98

MB

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 01/26/98 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 02/10/98 17:31

Lab Sample ID: 98-01-240-08

Sample Matrix: Water

Client Sample ID: 04LA-98-0033

Count Duration: 800 Min.

(U,R9a)

Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)
Cd-109	39.7 ± 40.7	Hg-203	2.73 ± 2.22 *
Ru-106	18.7 ± 21.0	Am-241	4.01 ± 11.2
Np-237	-20.1 ± 12.3	Th-234	-195 ± 118
Co-57	-0.291 ± 1.22	Ce-144	-3.78 ± 9.40
Ce-139	0.319 ± 1.34	U-235	-5.03 ± 4.73
Ra-226	-25.1 ± 78.0	Th-227	-5.17 ± 9.90
Pb-212	-1.58 ± 5.88	Ra-224	-99.1 ± 30.3
Se-75	-1.30 ± 2.43	Pa-231	-35.1 ± 61.3
Pa-233	0.260 ± 3.69	Ra-223	-17.9 ± 36.7
Eu-152	0.392 ± 5.21	Bi-211	7.20 ± 14.2
Pb-214	-3.42 ± 8.94	Sn-113	1.03 ± 2.49
Rn-219	3.10 ± 22.5	Pb-211	21.3 ± 50.0
Ann-Rad	-25.9 ± 6.54	Sr-85	-8.89 ± 2.99
Ba-140	0.528 ± 30.3	Tl-208	-0.761 ± 5.27
Cs-134	1.62 ± 2.19	Bi-214	-1.23 ± 11.3
Cs-137	0.598 ± 2.18	Mn-54	-0.703 ± 2.04
Y-88	-1.41 ± 5.62	Ac-228	5.75 ± 19.3
Pa-234m	99.4 ± 372	Zn-65	2.91 ± 4.91
Co-60	-1.59 ± 2.32	Na-22	1.51 ± 2.71
K-40	-53.1 ± 62.4	La-140	375 ± 1820
Bi-212	-50.7 ± 98.6		

(U,R4)
(U,R9a)

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank. Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

An asterisk (*) indicates that the reporting software anomalously reports a peak for this radionuclide. The result is an artifact of net reporting.

M 17 March 98

MB

Gross Gamma Results Summary

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	2/9/98
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	98-01-240	Units:	pCi/L

Client Sample ID	Lab Sample ID	Collection Date	Activity	Uncertainty	MDC	
04LA-98-0026	98-01-240-01	1/27/98	274	21	20	(U, R4)
04LA-98-0027	98-01-240-02	1/27/98	274	21	18	
04LA-98-0028	98-01-240-03	1/26/98	340	25	19	
04LA-98-0029	98-01-240-04	1/26/98	280	21	17	(U, R4)
04LA-98-0030	98-01-240-05	1/27/98	351	25	18	
04LA-98-0031	98-01-240-06	1/27/98	178	13	12	(U, R4)
04LA-98-0032	98-01-240-07	1/26/98	237	19	18	
04LA-98-0033	98-01-240-08	1/26/98	252	19	18	
04LA-98-0027	98-01-240-D1	1/27/98	237	18	17	
Blank	98-01-240-B1	2/2/98	63	12	19	

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate.

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

97-01-240-D1 is a duplicate of sample 97-01-240-02.

Prepared by _____ 3/6/98 17 March 98

Friday, January 30, 1998

DATA ENTERED

021898 M

REQUEST NUMBER: 4071R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 1/30/98
REPORT DUE: 3/2/98
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 4071R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; PLEASE SHIP SAMPLES TO TELEDYNE.

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
LH3		04LA-98-0026	02	W	1/27/98	
LH3		04LA-98-0028	02	W	1/26/98	
LH3		04LA-98-0030	02	W	1/27/98	
LH3		04LA-98-0032	02	W	1/26/98	

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: **4071R** LAB NAME: **TELEDYNE** LAB CODE_____

NAME OF VALIDATOR: **Antonia Tallarico** COMPANY: **LATA**

VALIDATION DATE: **17 April 98** EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- o INORGANICS
- **X** RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? ¨ YES ¨ NO
Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

This request is for low level tritium. A matrix spike and a duplicate were not analyzed with this request.

Signature/1st validation: _____ 17 Apr 98

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

Friday, January 30, 1998

REQUEST NUMBER: 4071R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 1/30/98
REPORT DUE: 3/2/98
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 4071R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; PLEASE SHIP SAMPLES TO TELEDYNE.

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
LH3		04LA-98-0026	02	W	1/27/98	
LH3		04LA-98-0028	02	W	1/26/98	
LH3		04LA-98-0030	02	W	1/27/98	
LH3		04LA-98-0032	02	W	1/26/98	

Final Page of REQUEST NUMBER 4071R

Analyst F.D.
Preparation Date 2/23/98
Distilled

TRITIUM BY DIRECT COUNT
LIQUID SCINTILLATION
WITH SECONDARY RESULT

(B) = BLANK ; (S) = SPIKE

Counter P-2550
Disk

	Tl No	Type	Mid Count (MM/DD HHMM)	N	At min	VLS ml	Bkg. cpm	Eff.	VT or S gm wet	VT or S gm dry	10 ml H_2O RS/SW gm/aliq	Result
(B)	69697	WO	2/24/98	157	100	1.0	1.87	0.14				L.T. 2. E+03
	Secondary	Result	"	"		"	"					9.7 ± 11.9 E+02
(B)	69698	WO	2/23/98	139		10.0	1.33	0.09				L.T. 3. E+02
	Secondary	Result	"	"		"	"	"				3.0 ± 16.5 E+01
(S)	69699	WO	2/24/98.	695		1.0	1.87	0.14				1.6 ± 0.2 E+04
	Secondary	Result		"		"	"					L.T. 2. E+03
(S)	69700	WO	2/23/98	494		10.0	1.33	0.09				1.8 ± 0.3 E+03
	Secondary	Result	"	"		"	"	"				L.T. 3. E+02
	Secondary	Result										
	Secondary	Result										
	Secondary	Result										
	Seondary	Result										
	Secondary	Result										

Result Units pCi/l
Code A

Calc. by RT Date 02-25-98
Checked by JMD Date 2-26-98

IWL-39d Issued 07/05/84 Rev. 12/04/91

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgment based on data use . It usually has an "M" with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analytes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likely because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

RADIOCHEMISTRY (R)

1	Tracer/carrier recovery < 10%.
1a	Tracer recovery 10-30% and the result > EQL.
1b	Tracer recovery 10-30% and the result < EQL.
1c	Carrier recovery 10-40% and result > EQL.
1d	Carrier recovery 10-40% and the result < EQL.
3	Spike recovery > upper limit.
3a	Spike recovery < lower limit.
3b	Spike recovery outside criterion but sample is not of same matrix as was matrix spike sample
4	Sample result > EQL but < 5X the amount found in the blank.
6	Recovery of analyte in the LCS > upper limit.
6a	Recovery of analyte in the LCS < lower limit.
6d	LCS tracer/carrier recovery < 10 % and sample result is a non-detect.
7	For the set of duplicates, both results are > EQL or no EQL is available, but there is not a 3 σ agreement between the results - within an SDG.
8	One result > EQL and the difference > a factor of 1xEQL for water and 2xEQL for soil.
9a	Result < MDA and MDA is < EQL.
9b	Result > MDA but < EQL.
10a	Result < both MDA and EQL.
10b	Result < MDA but > EQL.
11	Result is less than three times the reported 1-sigma uncertainty.
17	A zero was added to the result field because the laboratory did not provide a value or a MDC.

RADIOCHEMISTRY

Lab Control Sample (LCS) **Present? X yes no** **1/SDG** **75-125% recovery** *The LCS can be found on page 1 of the data package. It is called a TIQA Spike.*	**OK** **See comment**	**Obtain from lab. Q=A** **If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 75% and J+ for > 125%** **If the LCS sample tracer/ carrier recovery is < 10%, qualify the associated sample data as P for non-detects.**	 **R6a** **R6** **R6d**
Matrix Spike (MS) **1/SDG** **Present? yes X no** **75-125% recovery** **(Note: As opposed to other tests, the matrix spike test will qualify samples on the basis of their connection by SDG and not by analytical batch).** *As per a conversation with Al Hogan on 15 April 98, a matrix spike was not requested. Results are qualified as A.*	**A** **See comment**	**Obtain from lab. Q=A** **If criterion not met, qualify all analytes associated with the MS with a J- for <75%** **and J+ for > 125%,** **if all samples in batch of same matrix. If there is variation of matrix, P for samples not of same matrix as spiked sample.**	 **R3a** **R3** **R3b**

AT 17 April 98

Method blank **Present? X yes no** **1/SDG** **target analytes ≤5x the amount in the blank** *Two blanks were analyzed. The first is a 1.0 ml aliquot and the second is a 10 ml aliquot. The 10 ml blank aliquot was used because the volume corresponds with that of the samples.*	**OK** **See comment**	**Obtain from lab. Q=A** **If the sample result > EQL or no EQL is available but <5x the amount found in the associated blank, it should be qualified as U. In making this comparison the differing aliquot size of the blank and sample being tested should be taken into account.**	**R4**
Duplicate **Present? yes X no** **1/SDG** **(Note: As opposed to other tests, the duplicate tests will qualify samples on the basis of their connection by SDG and not by analytical batch).** *As per a conversation with Al Hogan on 15 April 98, a duplicate was not requested. Results are qualified as A.*	**A** **See comment**	**Obtain from lab. Q=A** **If both results are above the EQL or no EQL is available, all results for same analyte in same SDG should be qualified as J if there is not 3σ agreement between results.** **If both results are < EQL no test should be done.** **If one result > EQL and difference > factor of 1X EQL for water and 2X EQL for soil, qualify with J.**	**R7** **R8**

AT 17 Apr 98

EQL **Denote those samples where the result is less than the reported sample MDA or EQL.** **Confirm that the MDA of each reported analyte in each sample and blank is <EQL.** *The MDC is reported as L.T.(less than).*	**U** **See comment**	**When the MDA < the EQL or no EQL is available:** **Qualify as U those sample results < the MDA.** **Qualify as U those sample results > MDA but < EQL.** **When the MDA is >EQL:** **Qualify as U those sample and blank results < both the MDA and EQL.** **Qualify as U those sample and blank results < than the MDA but > EQL.**	 **R9a** **R9b** **R10a** **R10b**
Detection with respect to the reported uncertainty **This is a more conservative test of detection than simply considering the MDA or EQL since sample results > than both the EQL and MDA may still be qualified using this test.**	**NA**	**Qualify as U those results < three times the reported 1-sigma uncertainty. Equivalently qualify as U those results < 1.5 times the reported 2-sigma uncertainty or < the reported 3-sigma uncertainty.**	**R11**
Tracer/carrier recovery **Present? yes no** **Tracer recovery for alpha spec analyses 330 %** **Carrier recovery for beta/gamma analyses 3 40%**	**NA**	**Obtain from lab. Q=A** **If tracer/carrier recovery < 10 %, qualify results as R** **If tracer recovery is 10-30%, Q=J** **if result > EQL and UJ if result < EQL** **If carrier recovery is 10-40%, Q=J** **if result > EQL and UJ if < EQL**	 **R10** **R11a** **R11b** **R11c** **R11d**

M17 April 98

TELEDYNE BROWN ENGINEERING Environmental Services

REPORT OF ANALYSIS

Mar 30 1998, 01:20 pm

LOGIN # L249

ddress:	Work Order #:	Cust. P.O. #:	Date Received	Delivery Date	PAGE: 1
UDY STONE ECRA ENVIRONMENTAL INC 08 WELSH POOL ROAD IONVILLE PA 19341-1333	L249	LSA# LL-2293-F4 MOD1 Release #:	02/03/98	03/05/98	

eledyne ample #	Customer's Identification	Sta. #	Collection-Dates Start Date/Time	Stop Date/Time	Matrix/ Nuclide	Activity	Units	Count Date	Volume	Units	Lab	Comment
atrix - W-Other												
249-1	04LA-98-0026-02		01/27/98 00:00		Water							
I#-68750					H-3	L.T. 3. E 00	pCi/l	03/13/98	A (U, R9a)		52	
					H-3	-9.3 +-17.7E-01		03/13/98			52	
249-2	04LA-98-0028-02		01/26/98 00:00		Water							
I#-68751					H-3	2.1 +-0.2 E 01		03/17/98	A		52	
					H-3	L.T. 2. E 00		03/17/98			52	
249-3	04LA-98-0030-02		01/27/98 00:00		Water							
I#-68752					H-3	8.9 +-1.5 E 00		03/19/98	A		52	
					H-3	L.T. 2. E 00		03/19/98			52	
249-4	04LA-98-0032-02		01/26/98 00:00		Water							
I#-68753					H-3	9.9 +-1.5 E 00		03/18/98	A		52	
					H-3	L.T. 2. E 00		03/18/98			52	

Approved By: J Guenther

Last Page of Report

b Key: 22 - Gas Lab; 32 - Radiochemistry Lab; 42 - GE(Li) Gamma Spec Lab; 52 - Tritium Lab; 62 - Alpha Spec Lab; 12 - Environmental TLD; 72 - Consulting;

Copy: 1 of 1

M 17 Apr 98

DATA ENTERED
021898 RT

Monday, February 02, 1998

Los Alamos
NATIONAL LABORATORY

REQUEST NUMBER: 4072R
ANALYSIS TYPE: RAD

ATTN: H. Gote Ostlund
UOM TRITIUM LABORATORY
4600 RICKENBACKER CSWY.
MIAMI, FL 33149-1098

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 2/2/98
REPORT DUE: 3/2/98
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 4072R
Per Agreement Number: PO 256BA
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP; PO# G5015

LANL ER SMO CONTACT: JOHN KEMP MS H865 505665-9968
Signature: John Kemp

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
LH3		04LA-98-0026	03	W	1/27/98	
LH3		04LA-98-0028	03	W	1/26/98	
LH3		04LA-98-0030	03	W	1/27/98	
LH3		04LA-98-0032	03	W	1/26/98	

Final Page of REQUEST NUMBER 4072R

4072R

UNIVERSITY OF Miami

February 18, 1998

TRITIUM LABORATORY

RECEIVED FEB 1998

Data Release #98-32
Job # 1043

LOS ALAMOS NATIONAL LABORATORY
TRITIUM SAMPLES

Purchase Order No. G5015-TEL-8-2A

FIELD COPY

James D. Happell
Dr. James D. Happell
Associate Research Professor

Distribution:
Mr. John Miglio
University of California, LANL
SMO, TA-3, BLDG. 271, MS H865
Los Alamos, New Mexico 87545

Report Sent To: Robert A. Trujillo
Approved By:
Date Sent: 2/25/98

Rosenstiel School of Marine and Atmospheric Science
Tritium Laboratory
4600 Rickenbacker Causeway
Miami, Florida 33149-1098
(305) 361-4100
Fax (305) 361-4112

GENERAL COMMENTS ON TRITIUM RESULTS

Tritium Scale (New)

Tritium concentrations are expressed in TU, where 1 TU indicates a T/H ratio of 10^{-18}. The values refer to the new tritium scale of U.S. National Institute of Science and Technology (formerly NBS), and based on their tritium water standard #4926 as measured on 1961/09/03 and again 1978/09/03, and age-corrected with the new half-life of 12.43 years, i.e., $\lambda = 5.576\%$ year^{-1}. In this scale, 1 TU is 7.088 dpm/kg H_2O, or 3.193 pCi/kg H_2O, or 0.1181 Bq/kg H_2O (Bq = disint/sec). TU values are calculated for date of sample collection, REFDATE in the table, as provided by the submitter. If no such date is available, date of sample arrival at our laboratory is used. The stated errors, eTU, are one standard deviation (1 sigma) including all conceivable contributions. In the table, QUANT is quantity of sample received, and ELYS is the amount of water taken for electrolytic enrichment. DIR means direct run (no enrichment).

Through 31 December 1993, we reported tritium values in the "old" scale using the half-life 12.26 years, i.e., $\lambda = 5.65\%$ year^{-1}. In that old scale, 1 TU(old) is 7.186 dpm/kg H_2O, 3.237 pCi/kg H_2O. To convert from the new scale back to the old at any given point in time, multiply the listed TU(new)-values by F, where

$$F = 0.9645 - (\text{year}-1990) \times 0.0008$$

i.e. for 1994 the factor is 0.9613. The formula is correct within 0.02% between 1962 and 1999. To convert data from the old scale to the new, divide by F.

Very low tritium values

In some cases, negative TU values are listed. Such numbers can occur because the net tritium count rate is, in principle the difference between the count rate of the sample and that of a tritium-free sample (background count or blank sample). Given a set of "unknown" samples with no tritium, the distribution of net results should become symmetrical around 0 TU. The negative values are reported as such for the benefit of allowing the user unbiased statistical treatment of sets of the data. For other applications, 0 TU should be used.

Reliability of results

Refer to Services Rendered (Tritium), Section II.8, in the "Tritium Laboratory Price Schedule; Procedures and Standards; Advice on Sampling". Tritium efficiencies and background values are different in the nine counters and values are corrected for cosmic intensity, gas pressure and other parameters. For tritium, the efficiency is typically 1.00 cpm per 100 TU (direct counting). At 50× enrichment, the efficiency is equivalent to 1.00 cpm per 2 TU. The background is about 0.3 cpm, known to about ± 0.02 cpm. Our reported results include not only the Poisson statistics, but also other experimental uncertainties such as enrichment error, etc.

References

Mann, W.B., M.P. Unterweger, and B.M. Coursey, Comments on the NBS tritiated-water standards and their use, *Int. J. Appl. Radiat. Isot.*, 33, 383-386, 1982.

Taylor, C.B., and W. Roether, A uniform scale for reporting low-level tritium measurements in water, *Int. J. Appl. Radiat. Isot.*, *33*, 377-382, 1982.

Client: LOS ALAMOS NATIONAL LAB - MIGLIO Purchase Order: G5015-TEL8-2A
Recvd : 98/02/03 Contact: J. Kemp 505/665-9968
Job# : 1043 Env. Sci & Waste Tech. (f) 665-9972
Final : 98/02/17 CC: P. Longmire, -9118(F) CTS-7, Los Alamos, NM 87545

Cust	LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
LANL-REQ#4072R	04LA-98-0026	1043.01	980127	500	180	0.97r	0.09
LANL-REQ#4072R	04LA-98-0028	1043.02	980126	500	203	9.5	0.3
LANL-REQ#4072R	04LA-98-0030	1043.03	980127	500	218	4.52r	0.15
LANL-REQ#4072R	04LA-98-0032	1043.04	980126	500	210	4.52	0.15

r: Laboratory RERUN in progress

4072K

UNIVERSITY OF Miami

April 8, 1998

APR 1998

TRITIUM LABORATORY

Data Release #98-32 - Amendment
Job # 1043

LOS ALAMOS NATIONAL LABORATORY
TRITIUM SAMPLES

Purchase Order No. G5015-TEL-8-2A

FIELD COPY

James D Happell

Dr. James D. Happell
Associate Research Professor

Distribution:
Mr. John Miglio
University of California, LANL
SMO, TA-3, BLDG. 271, MS H865
Los Alamos, New Mexico 87545

Report Certified: Robert A. Trujillo

Approved By:

Date Copy: 4/14/98

Rosenstiel School of Marine and Atmospheric Science
Tritium Laboratory
4600 Rickenbacker Causeway
Miami, Florida 33149-1098
(305) 361-4100
Fax (305) 361-4112

Revised 12 September 1995

GENERAL COMMENTS ON TRITIUM RESULTS

Tritium Scale (New)

Tritium concentrations are expressed in TU, where 1 TU indicates a T/H ratio of 10^{-18}. The values refer to the new tritium scale of U.S. National Institute of Science and Technology (formerly NBS), and based on their tritium water standard #4926 as measured on 1961/09/03 and again 1978/09/03, and age-corrected with the new half-life of 12.43 years, i.e., $\lambda = 5.576\%$ year^{-1}. In this scale, 1 TU is 7.088 dpm/kg H_2O, or 3.193 pCi/kg H_2O, or 0.1181 Bq/kg H_2O (Bq = disint/sec). TU values are calculated for date of sample collection, REFDATE in the table, as provided by the submitter. If no such date is available, date of sample arrival at our laboratory is used. The stated errors, eTU, are one standard deviation (1 sigma) including all conceivable contributions. In the table, QUANT is quantity of sample received, and ELYS is the amount of water taken for electrolytic enrichment. DIR means direct run (no enrichment).

Through 31 December 1993, we reported tritium values in the "old" scale using the half-life 12.26 years, i.e., $\lambda = 5.65\%$ year^{-1}. In that old scale, 1 TU(old) is 7.186 dpm/kg H_2O, 3.237 pCi/kg H_2O. To convert from the new scale back to the old at any given point in time, multiply the listed TU(new)-values by F, where

$$F = 0.9645 - (\text{year}-1990) \times 0.0008$$

i.e. for 1994 the factor is 0.9613. The formula is correct within 0.02% between 1962 and 1999. To convert data from the old scale to the new, divide by F.

Very low tritium values

In some cases, negative TU values are listed. Such numbers can occur because the net tritium count rate is, in principle the difference between the count rate of the sample and that of a tritium-free sample (background count or blank sample). Given a set of "unknown" samples with no tritium, the distribution of net results should become symmetrical around 0 TU. The negative values are reported as such for the benefit of allowing the user unbiased statistical treatment of sets of the data. For other applications, 0 TU should be used.

Reliability of results

Refer to Services Rendered (Tritium), Section II.8, in the "Tritium Laboratory Price Schedule; Procedures and Standards; Advice on Sampling". Tritium efficiencies and background values are different in the nine counters and values are corrected for cosmic intensity, gas pressure and other parameters. For tritium, the efficiency is typically 1.00 cpm per 100 TU (direct counting). At 50× enrichment, the efficiency is equivalent to 1.00 cpm per 2 TU. The background is about 0.3 cpm, known to about ± 0.02 cpm. Our reported results include not only the Poisson statistics, but also other experimental uncertainties such as enrichment error, etc.

References

Mann, W.B., M.P. Unterweger, and B.M. Coursey, Comments on the NBS tritiated-water standards and their use, *Int. J. Appl. Radiat. Isot.*, 33, 383-386, 1982.

Taylor, C.B., and W. Roether, A uniform scale for reporting low-level tritium measurements in water, *Int. J. Appl. Radiat. Isot.*, *33*, 377-382, 1982.

Client: LOS ALAMOS NATIONAL LAB - MIGLIO Purchase Order: G5015-TEL8-2A
Recvd : 98/02/03 Contact: J. Kemp 505/665-9968
Job# : 1043 Env. Sci & Waste Tech. (f) 665-9972
Final : 98/04/06 CC: P. Longmire, -9118(F) CTS-7, Los Alamos, NM 87545

Cust	LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
LANL-REQ#4072R	04LA-98-0026	1043.01	980127	500	176	0.85*	0.09
LANL-REQ#4072R	04LA-98-0028	1043.02	980126	500	203	9.5	0.3
LANL-REQ#4072R	04LA-98-0030	1043.03	980127	500	138	4.36*	0.14
LANL-REQ#4072R	04LA-98-0032	1043.04	980126	500	210	4.52	0.15

* Average of duplicate runs

Monday, February 02, 1998

REQUEST NUMBER: 4072R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

ATTN: H. Gote Ostlund
UOM TRITIUM LABORATORY
4600 RICKENBACKER CSWY.
MIAMI, FL 33149-1098

Please analyze the enclosed samples according to the schedule indicated:

These samples are on:

SHIP DATE: 2/2/98
REPORT DUE: 3/2/98
TURN AROUND REQ'D: 30 day

LANL Request Number: 4072R
Per Agreement Number: PO 256BA
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; PO# G5015

LANL ER SMO CONTACT: JOHN KEMP MS H865 505665-9968

Signature: John Kemp

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
LH3		04LA-98-0026	03	W	1/27/98	
LH3		04LA-98-0028	03	W	1/26/98	
LH3		04LA-98-0030	03	W	1/27/98	
LH3		04LA-98-0032	03	W	1/26/98	

Final Page of REQUEST NUMBER 4072R

Tuesday, February 17, 1998

REQUEST NUMBER: 4113R

ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

98-02-123

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 2/17/98
REPORT DUE: 3/17/98
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 4113R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
METTAL		04LA-98-0034	01	S	2/13/98	

Paragon Analytics, Inc.

TOTAL METALS CASE NARRATIVE

Los Alamos National Laboratory SMO

4113R

Order Number - 9802123

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Inorganic Qualifiers
Section 4: Sample Results
Section 5: Summary Report Forms
Section 6: Raw Data

Appendix A: Digestion Bench Sheets

Section 1: Case Narrative

1.1 This report consists of 1 soil sample.

Due to limitation of the reporting software:

a) Some mercury values appear as 0.0. When this occurs the actual value is hand entered.

b) For Mercury, the ICB is also used as the preparation blank, therefore the run chronology will show the same time for both.

c) Trace ICP elements which are calibrated daily with a multipoint calibration do not appear on the run log. The calibration standards can be located at the beginning of each raw data package for this instrument.

1.2 The sample was received cool and intact on 02/18/98.

1.3 The client had not designated a sample for quality control. The lab designated PAI sample ID 9802123-1 as the quality control sample for this Order Number.

1.4 The sample was prepared for analysis based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0.

1.5 The sample was analyzed and reported based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0.

1.6 All standards and solutions are NIST traceable and were used within their recommended shelf life.

1.7 The sample was prepared and analyzed within the established hold times.

All in house quality control procedures were followed, as described below.

1.8 General quality control procedures.

- A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in each digestion batch. There were not more than 20 samples in each digestion batch.
- The preparation (method) blank results associated with each batch were below the contract required detection limits for the requested analytes.
- The laboratory control sample associated with each batch was within acceptance limits. This indicates complete digestion according to the method.
- All initial and continuing calibration blanks associated with each batch were below the contract required detection limits for the requested analytes.
- All initial and continuing calibration verifications associated with each batch were within acceptance criteria for the requested analytes. This indicates a valid calibration and stable instrument conditions.
- The interference check samples associated with CLP analyses were within acceptance criteria.

1.9 Matrix specific quality control procedures.

- A matrix spike was digested and analyzed with each batch. All acceptance criteria for accuracy were met with the following exception.

Analyte	Sample ID
Antimony	9802123-1MS

The associated sample results are flagged for antimony.

- A sample duplicate was digested and analyzed with each batch. All acceptance criteria for precision were met.
- A serial dilution was analyzed with the ICP batch. All acceptance criteria were met with the following exception.

Analyte	Sample ID
Sodium	9802123-1L

Associated sample results for these elements have been flagged in the report.

Sodium results in the diluted sample did not agree within 10% with the undiluted sample results. Results for this element are flagged with an "E" indicating a potential matrix effect. The concentrations of sodium in the diluted and undiluted samples were

below the CRDL. These relatively low concentrations may have contributed to the greater than 10% difference between the two sets of results.

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

Darryl Patrick — 3/17/98

Darryl Patrick
Senior Inorganic Chemist

Date

SW — 3/17/98

Reviewer's Initials

Date

CERTIFICATION

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

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: 4113R LAB NAME Paragon_____ LAB CODE_____

NAME OF CCS CHECKER_____ COMPANY_____

NAME OF VALIDATOR R. Sherman_____ COMPANY LATA_____

CCS DATE_____ VALIDATION DATE 3/27/98 EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- x INORGANICS
- o RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? ¨ YES ¨ NO
Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

_____
_____
_____

Signature/1st validation Ruth J. Sherman 3/27/98
Signature/2nd validation _____
Qualifiers entered _____ Date_____

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgement based on data use . It usually has an "M"with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analyltes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likley because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

5 Sample result < EQL and < 5X (10X as above) the concentration of the analyte in the blank, which indicates the detected result was indistinguishable from blank contamination and the detected result was changed to non-detected at the EQL.

5a Sample result > EQL and > 5X (10X as above) the concentration of the analyte in the blank, which indicates the reported result is not likely to be related to the contamination in the associated blank.

6 Recovery of surrogates or analyte in the LCS > upper limit, which indicates a potential high bias in the results and a potential for false positive results.

6a Recovery of surrogates or analyte in the LCS < lower limit, which indicates a potential low bias in the results.

6d Result is a non-detect and the recovery of surrogates or the analyte in the LCS is < the lower limit, which indicates a potential for false negative results.

7 % RSD or %D exceeds specification - apply to a positive resultresult, which indicates potential quantitation problems in the analyses and the potential for false positive results.

8 % RSD or %D exceeds the specification - apply to a non-detect, which indicates potential quantitation problems in the analyses and the potential false negative results.

9. Holding time is exceeded. An evaluation of the data of interest with respect to holding time exceedance impact (technically) is recommended. Factors to consider include sample preservation, sample storage practices, use of the data, levels of contamination found in the sample, and the physical, chemical, and biological stability of the target analytes in the sample matrix.

10. Duplicate RPD > advisory 20% limit.

INORGANICS (I)

3 Spike recovery > upper limit (125%) and the results > the EDL.

3a Spike recovery < lower limit (75%) and the results are > the EDL.

3d Spike recovery < 30 % and results < EDL.

3e Spike recovery 30-74% and sample results < EDL.

4 Using the worse case blank, the sample results > the EDL but < 5X the concentration of the related analyte in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

7 ICS recovery > 120% and results > EDL.

7a ICS recovery 50-79% .

7b ICS recovery < 50% and result < EDL.

8a For ICV and CCV, recovery is lower than specification

8b For ICV and CCV, recovery is higher than specification

8c For ICV and CCV, results are positive, but < MDL and recovery is lower than the specification.

8d For ICV and CCV, recovery is extremely low and detection may be impaired.

8e For ICV and CCV, recovery is abnormally high - apply to results > MDL.

9 Holding time for Hg has been exceeded. Positive results may be biased low and non-detects may potential be false negatives.

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1c Carrier recovery 10-40% and result > EQL.

1d Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

INORGANICS

Calibration Present? X yes no **Initial calibration verification** Present? X yes no **Continuing calibration verification** Present? X yes no	NA OK OK	Obtain from lab. Q=A Obtain form lab. Q=A	
Blanks (Applies to each) Present? X yes no **Initial & continuing calibration blanks** Analyze at each wavelength Beginning and end of each run ICB and CCB analyzed at a frequency of 10% or 2 hours If blank results > EDL reanalyze previous 10 samples **Preparation blank** One per batch ≤ EDL, or if concentration of analyte < 10X EDL, repeat all samples in batch. *Ba, Be, Ca, Fe, Ni, K, Se, Tl, and Mg detected in blanks. No action required.*	 OK	 Obtain from lab. Q=A Use "worse" case blank. Sample results > EDL but < 5 X amount found in the blank should be qualified as U.	 I4

RS
3/27/98

ICP Interference check sample **Present? X yes no** **Solution contains Ag, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, V, & Zn** **Analyze at beginning of each run** **Each wavelength used for samples** **ICS results must be ± 20%of true value**	**OK**	**Obtain from lab. Q=A** **If the ICS recovery is >120% and the results are >EDL, qualify data as J+** **If recovery is 50-79%, qualify data as J-** **If ICS recovery is < 50% and results are < EDL, qualify results as R, PM**	 **I7** **I7a** **I7b**
Spike sample analysis **Present? X yes no** **One per run, per matrix, concentration, SDG** **% recovery: 75-125% (unless conc. > 4X spike conc.)** ***Spike recovery of Sb = 72.0%***	**UJ**	**Obtain from lab. Q=A** **If spike recovery > 125% and results < EDL, OK** **If spike recovery < 75% and results are >EDL, qualify results as J- if same matrix, P if not.** **If spike recovery > 125% and results are >EDL, qualify data as J+ if same matrix, P if not.** **If spike recovery 30-74% and sample results < EDL, qualify as UJ if same matrix, P if not.** **If spike recovery results < 30% and results < EDL, qualify as R, PM.**	 **I3a** **I3** **I3e** **I3d**

DJS 3/27/98

Duplicate **Present? X yes no** **One per batch of sample of like matrix for each SDG** **RPD : ≤ 20% (advisory)** **If either the sample or duplicate value is less than 5 X EDL, there is a control limit of ± EDL**	**OK**	**Obtain from lab. Q=A** **Q=P because of nature of LANL samples.**	
Laboratory Control Sample (LCS) **Aqueous LCS per batch/SDG** **% recovery : 80-120% (except Ag & Sb)** ***A solid LCS was analyzed. All analytes met aqueous criteria except Na (79.3%)***	**OK**	**If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 80% and J+ for > 120%**	**I6a** **I6**
Holding time **Analyze water samples for Hg within 28 days of sample collection** **Analyze water samples for CN within 14 days of sample collection**	NA	**Compare analysis date with date of sample collection on the Analysis Request.** **Q=PM**	

ajs
3/27/98

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-98-0034

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Matrix (soil/water): SOIL_ Lab Sample ID: 9802123-1

Level (low/med): LOW__ Date Received: 02/18/98

% Solids: _98.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	2830			P
7440-36-0	Antimony_	0.69	U	N	P
7440-38-2	Arsenic__	0.61	B		P
7440-39-3	Barium___	57.1			P
7440-41-7	Beryllium	0.22	B		P
7440-43-9	Cadmium__	0.06	U		P
7440-70-2	Calcium__	2280			P
7440-47-3	Chromium_	6.0			P
7440-48-4	Cobalt___	2.6	B		P
7440-50-8	Copper___	12.4			P
7439-89-6	Iron_____	5820			P
7439-92-1	Lead_____	2.3			P
7439-95-4	Magnesium	1300			P
7439-96-5	Manganese	76.0			P
7439-97-6	Mercury__	0.01	B		AV
7440-02-0	Nickel___	6.4	B		P
7440-09-7	Potassium	880	B		P
7782-49-2	Selenium_	0.63	U		P
7440-22-4	Silver___	0.18	U		P
7440-23-5	Sodium___	182	B	E	P
7440-28-0	Thallium_	0.77	U		P
7440-62-2	Vanadium_	11.1			P
7440-66-6	Zinc_____	15.7			P

U1, B2e

Color Before: GRAY_____ Clarity Before: N/A___ Texture: FINE/C

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:
SAMPLE_MATRIX_CONSISTED_OF_A_FINE_MATERIAL_WITH_SMALL_PEBBLES._____

FORM I - IN

RJS 3/27/98

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Preparation Blank Matrix (soil/water): SOIL_

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	-61.6	B	-47.5	B	-58.9	B	-34.0	B	-16.104	B	P
Antimony	3.4	U	3.4	U	3.4	U	3.4	U	0.680	U	P
Arsenic	2.5	U	2.5	U	2.5	U	2.5	U	0.500	U	P
Barium	0.4	B	0.1	B	0.2	B	0.3	B	0.018	U	P
Beryllium	0.4	B	0.2	U	0.3	B	0.2	U	0.040	U	P
Cadmium	0.3	U	0.3	U	0.3	U	0.3	U	0.060	U	P
Calcium	82.2	B	107.5	B	79.0	B	87.8	B	14.730	B	P
Chromium	-1.4	B	-1.9	B	-1.6	B	-1.4	B	-0.274	B	P
Cobalt	0.8	U	0.8	U	0.8	U	0.8	U	0.160	U	P
Copper	0.6	U	0.6	U	0.6	U	0.6	U	0.120	U	P
Iron	42.4	B	46.4	B	40.8	B	42.2	B	9.788	B	P
Lead	1.4	U	1.4	U	1.4	U	1.4	U	0.280	U	P
Magnesium	-12.3	B	17.6	B	-15.6	B	-9.8	B	-4.894	B	P
Manganese	-0.4	B	-0.6	B	-0.5	B	-0.4	B	-0.114	B	P
Mercury	0.02	U	0.02	U	0.02	U			0.010	U	AV
Nickel	1.0	B	0.7	U	0.7	U	0.7	U	0.140	U	P
Potassium	62.1	B	46.9	U	46.9	U	743.8	B	9.380	U	P
Selenium	3.1	U	3.1	U	3.1	U	3.1	B	0.620	U	P
Silver	0.9	U	0.9	U	0.9	U	0.9	U	0.180	U	P
Sodium	-46.9	B	-61.9	B	-58.8	B	-36.8	B	-13.580	B	P
Thallium	3.8	U	4.9	B	7.0	B	4.8	B	0.760	U	P
Vanadium	0.8	U	0.8	U	0.8	U	0.8	U	0.160	U	P
Zinc	0.8	U	0.8	U	0.8	U	0.8	U	0.160	U	P

FORM III - IN

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum			10.2	U							P
Antimony			3.4	U							P
Arsenic			2.5	U							P
Barium			0.1	U							P
Beryllium			-0.3	B							P
Cadmium			0.3	U							P
Calcium			127.2	B							P
Chromium			-2.0	B							P
Cobalt			0.8	U							P
Copper			0.6	U							P
Iron			51.3	B							P
Lead			1.4	U							P
Magnesium			29.5	B							P
Manganese			-0.6	B							P
Mercury											NR
Nickel			0.7	U							P
Potassium			711.0	B							P
Selenium			3.1	U							P
Silver			0.9	U							P
Sodium			-49.6	B							P
Thallium			3.8	U							P
Vanadium			0.8	U							P
Zinc			-0.8	B							P

FORM III - IN

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

04LA-98-0034

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Matrix (soil/water): SOIL_ Level (low/med): _LOW__

% Solids for Sample: _98.6 % Solids for Duplicate: __98.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		2832.0568		3071.4077		8.1		P
Antimony		0.6897	U	0.6897	U			P
Arsenic		0.6146	B	0.5071	U	200.0		P
Barium	40.5680	57.0609		51.6694		9.9		P
Beryllium		0.2231	B	0.2373	B	6.2		P
Cadmium		0.0609	U	0.0609	U			P
Calcium	1014.199	2275.2901		2346.6694		3.1		P
Chromium	2.0280	5.9533		6.3793		6.9		P
Cobalt		2.6389	B	2.4929	B	5.7		P
Copper	5.0710	12.4178		12.7302		2.5		P
Iron		5824.2049		5882.5152		1.0		P
Lead	0.6090	2.3489		2.7424		15.5		P
Magnesium	1014.199	1298.2252		1369.4970		5.3		P
Manganese		76.0041		78.5842		3.3		P
Mercury		0.0127	B	0.0172	B	30.1		AV
Nickel		6.3955	B	8.0507	B	22.9		P
Potassium		880.2779	B	886.7424	B	0.7		P
Selenium		0.6288	U	0.6288	U			P
Silver		0.1826	U	0.1826	U			P
Sodium		182.3144	B	182.9716	B	0.4		P
Thallium		0.7708	U	0.7708	U			P
Vanadium	10.1420	11.0974		10.7830		2.9		P
Zinc	4.0570	15.7160		15.8803		1.0		P

FORM VI - IN

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

04LA-98-0034

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Matrix (soil/water): SOIL__ Level (low/med): LOW___

% Solids for Sample: _98.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Antimony	75-125	73.0365		0.6897	U	101.42	72.0	N	P
Arsenic	75-125	376.9128		0.6146	B	405.68	92.8		P
Barium	75-125	418.8621		57.0609		405.68	89.2		P
Beryllium	75-125	9.9655		0.2231	B	10.14	96.1		P
Cadmium	75-125	9.0852		0.0609	U	10.14	89.6		P
Calcium									NR
Chromium	75-125	44.4503		5.9533		40.57	94.9		P
Cobalt	75-125	95.1034		2.6389	B	101.42	91.2		P
Copper	75-125	61.1602		12.4178		50.71	96.1		P
Iron									NR
Lead	75-125	98.0061		2.3489		101.42	94.3		P
Magnesium									NR
Manganese	75-125	173.8519		76.0041		101.42	96.5		P
Mercury	75-125	2.5355		0.0127	B	2.54	99.3		AV
Nickel	75-125	98.8276		6.3955	B	101.42	91.1		P
Potassium									NR
Selenium	75-125	386.3245		0.6288	U	405.68	95.2		P
Silver	75-125	9.5193		0.1826	U	10.14	93.9		P
Sodium									NR
Thallium	75-125	371.0730		0.7708	U	405.68	91.5		P
Vanadium	75-125	104.5497		11.0974		101.42	92.1		P
Zinc	75-125	112.4118		15.7160		101.42	95.3		P

Comments:
SAMPLE_MATRIX_CONSISTED_OF_A_FINE_MATERIAL_WITH_SMALL_PEBBLES.

FORM V (Part 1) - IN

Tuesday, February 17, 1998

REQUEST NUMBER: 4113R

ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

98-02-123

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 2/17/98
REPORT DUE: 3/17/98
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 4113R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
METTAL		04LA-98-0034	01	S	2/13/98	

Final Page of REQUEST NUMBER 4113R

PARAGON ANALYTICS, INC.
225 Commerce Drive ◆ Fort Collins, CO 80524 ◆ (800) 443-1511◆ (970) 490-1511 ◆ FAX (970) 490-1522

March 23, 1998

Dr. John Miglio
Los Alamos National Laboratory SMO
SMO TA-3, Building 271
Los Alamos, NM 87545

RE: Paragon Workorder: 98-02-123
LANL Request Number: 4113R

Dear Dr. Miglio:

One water sample was received from LANL on February 18, 1998. The sample was scheduled for Total Metals analysis. The results for this analysis are contained in the enclosed report pages 1-109.

Please note that the EDD was sent on March 23, 1998.

Thank you for your confidence in Paragon Analytics, Inc. Should you have any questions, please call.

Sincerely,

Paragon Analytics, Inc.
Lance Steere
Senior Project Manager

Report Cont To: K. Burchman
Approved By: _____
Date Sent: 3/25/98

LS/asg
Enclosure: Report

FIELD COPY

Paragon Analytics, Incorporated

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 9802123
Client Name: Los Alamos National Laboratory SMO
Client Project Name: 4113R
Client Project Number:
Client PO Number:

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
04LA-98-0034	9802123-1		Soil	2/13/98	

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-98-0034

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Matrix (soil/water): SOIL_ Lab Sample ID: 9802123-1

Level (low/med): LOW__ Date Received: 02/18/98

% Solids: _98.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	2830	_		P_
7440-36-0	Antimony_	0.69	U	N	P_
7440-38-2	Arsenic__	0.61	B		P_
7440-39-3	Barium___	57.1	_		P_
7440-41-7	Beryllium	0.22	B		P_
7440-43-9	Cadmium__	0.06	U		P_
7440-70-2	Calcium__	2280	_		P_
7440-47-3	Chromium_	6.0	_		P_
7440-48-4	Cobalt___	2.6	B		P_
7440-50-8	Copper___	12.4	_		P_
7439-89-6	Iron____	5820	_		P_
7439-92-1	Lead____	2.3	_		P_
7439-95-4	Magnesium	1300	_		P_
7439-96-5	Manganese	76.0	_		P_
7439-97-6	Mercury__	0.01	B		AV
7440-02-0	Nickel___	6.4	B		P_
7440-09-7	Potassium	880	B		P_
7782-49-2	Selenium_	0.63	U		P_
7440-22-4	Silver___	0.18	U		P_
7440-23-5	Sodium___	182	B	E	P_
7440-28-0	Thallium_	0.77	U		P_
7440-62-2	Vanadium_	11.1	_		P_
7440-66-6	Zinc____	15.7	_		P_

Color Before: GRAY_____ Clarity Before: N/A___ Texture: FINE/C

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:
SAMPLE_MATRIX_CONSISTED_OF_A_FINE_MATERIAL_WITH_SMALL_PEBBLES._____

FORM I - IN

U.S. EPA - CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4113R_

SOW No.: ILM03.0

EPA Sample No.	Lab Sample ID
_04LA-98-0034_	_9802123-1_____
_04LA-98-0034_	_9802123-1D_____
_04LA-98-0034_	_9802123-1MS____

Were ICP interelement corrections applied ? Yes/No YES

Were ICP background corrections applied ? Yes/No YES

If yes - were raw data generated before application of background corrections ? Yes/No NO_

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: _____

Date: _____ Title: _____

U.S. EPA - CLP

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Initial Calibration Source: IV_____

Continuing Calibration Source: IV_____

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum	25250.0	25820.06	102.3	50500.0	52122.36	103.2	50526.61	100.1	P
Antimony	250.0	255.82	102.3	500.0	476.63	95.3	474.28	94.9	P
Arsenic	250.0	252.03	100.8	500.0	478.23	95.6	476.64	95.3	P
Barium	250.0	247.06	98.8	500.0	469.84	94.0	470.09	94.0	P
Beryllium	250.0	257.13	102.9	500.0	498.67	99.7	487.82	97.6	P
Cadmium	250.0	252.33	100.9	500.0	463.60	92.7	467.82	93.6	P
Calcium	25250.0	25955.29	102.8	50500.0	50521.81	100.0	49890.30	98.8	P
Chromium	250.0	258.31	103.3	500.0	504.82	101.0	495.89	99.2	P
Cobalt	250.0	249.40	99.8	500.0	473.31	94.7	464.53	92.9	P
Copper	250.0	248.91	99.6	500.0	493.68	98.7	484.27	96.9	P
Iron	10250.0	10191.02	99.4	20500.0	19726.00	96.2	19531.51	95.3	P
Lead	250.0	260.58	104.2	500.0	485.01	97.0	482.38	96.5	P
Magnesium	25250.0	26619.23	105.4	50500.0	51986.48	102.9	50905.36	100.8	P
Manganese	250.0	251.69	100.7	500.0	484.58	96.9	476.39	95.3	P
Mercury	4.0	4.11	102.8	5.0	5.04	100.8	4.95	99.0	AV
Nickel	250.0	246.78	98.7	500.0	458.01	91.6	457.52	91.5	P
Potassium	10000.0	10061.36	100.6	20000.0	19691.44	98.5	19762.50	98.8	P
Selenium	250.0	258.56	103.4	500.0	490.72	98.1	485.63	97.1	P
Silver	125.0	129.55	103.6	250.0	256.25	102.5	253.01	101.2	P
Sodium	10250.0	10343.50	100.9	20500.0	20468.01	99.8	20684.61	100.9	P
Thallium	250.0	252.27	100.9	500.0	485.95	97.2	479.86	96.0	P
Vanadium	250.0	251.30	100.5	500.0	486.28	97.3	476.17	95.2	P
Zinc	250.0	246.23	98.5	500.0	461.78	92.4	475.94	95.2	P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Initial Calibration Source: IV_____

Continuing Calibration Source: IV_____

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum				50500.0	50596.45	100.2	53399.48	105.7	P
Antimony				500.0	491.66	98.3	507.83	101.6	P
Arsenic				500.0	486.61	97.3	503.56	100.7	P
Barium				500.0	491.30	98.3	503.76	100.8	P
Beryllium				500.0	509.55	101.9	526.29	105.3	P
Cadmium				500.0	494.88	99.0	507.71	101.5	P
Calcium				50500.0	51381.66	101.7	53583.71	106.1	P
Chromium				500.0	503.33	100.7	524.13	104.8	P
Cobalt				500.0	487.41	97.5	503.28	100.7	P
Copper				500.0	485.85	97.2	504.06	100.8	P
Iron				20500.0	20547.77	100.2	21341.30	104.1	P
Lead				500.0	491.41	98.3	505.41	101.1	P
Magnesium				50500.0	50384.81	99.8	52796.18	104.5	P
Manganese				500.0	479.26	95.9	495.93	99.2	P
Mercury									NR
Nickel				500.0	481.81	96.4	495.84	99.2	P
Potassium				20000.0	20254.24	101.3	20730.28	103.7	P
Selenium				500.0	502.86	100.6	518.05	103.6	P
Silver				250.0	250.27	100.1	259.14	103.7	P
Sodium				20500.0	19077.85	93.1	19594.69	95.6	P
Thallium				500.0	497.57	99.5	513.92	102.8	P
Vanadium				500.0	491.70	98.3	508.39	101.7	P
Zinc				500.0	497.93	99.6	515.92	103.2	P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2B
CRDL STANDARD FOR AA AND ICP

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

AA CRDL Standard Source: IV_____

ICP CRDL Standard Source: IV_____

Concentration Units: ug/L

Analyte	CRDL Standard for AA True	Found	%R	CRDL Standard for ICP True	Initial Found	%R	Final Found	%R
Aluminum				400.0	332.80	83.2	387.24	96.8
Antimony				120.0	120.51	100.4	127.41	106.2
Arsenic				20.0	21.57	107.8	22.98	114.9
Barium				400.0	387.35	96.8	411.16	102.8
Beryllium				10.0	10.69	106.9	10.65	106.5
Cadmium				10.0	9.85	98.5	10.10	101.0
Calcium				10000.0	9806.12	98.1	10301.64	103.0
Chromium				20.0	17.69	88.4	17.86	89.3
Cobalt				100.0	99.15	99.2	105.05	105.0
Copper				50.0	49.39	98.8	51.48	103.0
Iron				200.0	192.32	96.2	203.50	101.8
Lead				6.0	5.59	93.2	6.68	111.3
Magnesium				10000.0	10213.71	102.1	10403.25	104.0
Manganese				30.0	28.81	96.0	29.46	98.2
Mercury	0.2	0.22	110.0					
Nickel				80.0	79.21	99.0	84.26	105.3
Potassium				10000.0	9758.53	97.6	10599.68	106.0
Selenium				10.0	11.56	115.6	11.85	118.5
Silver				20.0	21.23	106.2	21.08	105.4
Sodium				10000.0	9555.09	95.6	9155.42	91.6
Thallium				20.0	21.60	108.0	25.05	125.2
Vanadium				100.0	101.53	101.5	105.68	105.7
Zinc				40.0	41.50	103.8	45.60	114.0

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Preparation Blank Matrix (soil/water): SOIL_

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	-61.6	B	-47.5	B	-58.9	B	-34.0	B	-16.104	B	P
Antimony	3.4	U	3.4	U	3.4	U	3.4	U	0.680	U	P
Arsenic	2.5	U	2.5	U	2.5	U	2.5	U	0.500	U	P
Barium	0.4	B	0.1	B	0.2	B	0.3	B	0.018	U	P
Beryllium	0.4	B	0.2	U	0.3	B	0.2	U	0.040	U	P
Cadmium	0.3	U	0.3	U	0.3	U	0.3	U	0.060	U	P
Calcium	82.2	B	107.5	B	79.0	B	87.8	B	14.730	B	P
Chromium	-1.4	B	-1.9	B	-1.6	B	-1.4	B	-0.274	B	P
Cobalt	0.8	U	0.8	U	0.8	U	0.8	U	0.160	U	P
Copper	0.6	U	0.6	U	0.6	U	0.6	U	0.120	U	P
Iron	42.4	B	46.4	B	40.8	B	42.2	B	9.788	B	P
Lead	1.4	U	1.4	U	1.4	U	1.4	U	0.280	U	P
Magnesium	-12.3	B	17.6	B	-15.6	B	-9.8	B	-4.894	B	P
Manganese	-0.4	B	-0.6	B	-0.5	B	-0.4	B	-0.114	B	P
Mercury	0.02	U	0.02	U	0.02	U			0.010	U	AV
Nickel	1.0	B	0.7	U	0.7	U	0.7	U	0.140	U	P
Potassium	62.1	B	46.9	U	46.9	U	743.8	B	9.380	U	P
Selenium	3.1	U	3.1	U	3.1	U	3.1	B	0.620	U	P
Silver	0.9	U	0.9	U	0.9	U	0.9	U	0.180	U	P
Sodium	-46.9	B	-61.9	B	-58.8	B	-36.8	B	-13.580	B	P
Thallium	3.8	U	4.9	B	7.0	B	4.8	B	0.760	U	P
Vanadium	0.8	U	0.8	U	0.8	U	0.8	U	0.160	U	P
Zinc	0.8	U	0.8	U	0.8	U	0.8	U	0.160	U	P

FORM III - IN

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum			10.2	U							P
Antimony			3.4	U							P
Arsenic			2.5	U							P
Barium			0.1	U							P
Beryllium			-0.3	B							P
Cadmium			0.3	U							P
Calcium			127.2	B							P
Chromium			-2.0	B							P
Cobalt			0.8	U							P
Copper			0.6	U							P
Iron			51.3	B							P
Lead			1.4	U							P
Magnesium			29.5	B							P
Manganese			-0.6	B							P
Mercury											NR
Nickel			0.7	U							P
Potassium			711.0	B							P
Selenium			3.1	U							P
Silver			0.9	U							P
Sodium			-49.6	B							P
Thallium			3.8	U							P
Vanadium			0.8	U							P
Zinc			-0.8	B							P

FORM III - IN

U.S. EPA - CLP

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No: _____ SDG No.: 4113R_

ICP ID Number: TJA 61E 1___ ICS Source: HIGH PURITY_

Concentration Units: ug/L

Analyte	True Sol. A	True Sol. AB	Initial Found Sol. A	Initial Found Sol. AB	%R	Final Found Sol. A	Final Found Sol. AB	%R
Aluminum_	500000	500000	519356	509910.6	102.0	541706	538066.6	107.6
Antimony_		500		458.1	91.6		500.8	100.2
Arsenic__		500		467.1	93.4		508.4	101.7
Barium___		500		449.7	89.9		493.6	98.7
Beryllium		500		472.3	94.5		508.5	101.7
Cadmium__		1000		836.0	83.6		925.9	92.6
Calcium__	500000	500000	505207	492475.0	98.5	556240	543044.6	108.6
Chromium_		500		457.2	91.4		476.8	95.4
Cobalt___		500		427.8	85.6		463.9	92.8
Copper___		500		489.1	97.8		509.2	101.8
Iron_____	200000	200000	196047	190967.2	95.5	215541	210606.2	105.3
Lead____		1000		883.0	88.3		915.6	91.6
Magnesium	500000	500000	515354	505547.4	101.1	530716	520108.6	104.0
Manganese		500		450.5	90.1		470.5	94.1
Mercury__								
Nickel___		1000		819.7	82.0		899.5	90.0
Potassium								
Selenium_		500		474.1	94.8		504.8	101.0
Silver___		1000		1006.6	100.7		1035.6	103.6
Sodium___								
Thallium_		500		430.1	86.0		466.8	93.4
Vanadium_		500		463.1	92.6		496.2	99.2
Zinc_____		1000		842.6	84.3		955.5	95.6

FORM IV - IN

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

04LA-98-0034

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Matrix (soil/water): SOIL__ Level (low/med): LOW___

% Solids for Sample: _98.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Antimony	75-125	73.0365		0.6897	U	101.42	72.0	N	P
Arsenic	75-125	376.9128		0.6146	B	405.68	92.8		P
Barium	75-125	418.8621		57.0609		405.68	89.2		P
Beryllium	75-125	9.9655		0.2231	B	10.14	96.1		P
Cadmium	75-125	9.0852		0.0609	U	10.14	89.6		P
Calcium									NR
Chromium	75-125	44.4503		5.9533		40.57	94.9		P
Cobalt	75-125	95.1034		2.6389	B	101.42	91.2		P
Copper	75-125	61.1602		12.4178		50.71	96.1		P
Iron									NR
Lead	75-125	98.0061		2.3489		101.42	94.3		P
Magnesium									NR
Manganese	75-125	173.8519		76.0041		101.42	96.5		P
Mercury	75-125	2.5355		0.0127	B	2.54	99.3		AV
Nickel	75-125	98.8276		6.3955	B	101.42	91.1		P
Potassium									NR
Selenium	75-125	386.3245		0.6288	U	405.68	95.2		P
Silver	75-125	9.5193		0.1826	U	10.14	93.9		P
Sodium									NR
Thallium	75-125	371.0730		0.7708	U	405.68	91.5		P
Vanadium	75-125	104.5497		11.0974		101.42	92.1		P
Zinc	75-125	112.4118		15.7160		101.42	95.3		P

Comments:
SAMPLE_MATRIX_CONSISTED_OF_A_FINE_MATERIAL_WITH_SMALL_PEBBLES.

FORM V (Part 1) - IN

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

04LA-98-0034

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Matrix (soil/water): SOIL_ Level (low/med): _LOW__

% Solids for Sample: _98.6 % Solids for Duplicate: __98.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		2832.0568		3071.4077		8.1		P
Antimony		0.6897	U	0.6897	U			P
Arsenic		0.6146	B	0.5071	U	200.0		P
Barium	40.5680	57.0609		51.6694		9.9		P
Beryllium		0.2231	B	0.2373	B	6.2		P
Cadmium		0.0609	U	0.0609	U			P
Calcium	1014.199	2275.2901		2346.6694		3.1		P
Chromium	2.0280	5.9533		6.3793		6.9		P
Cobalt		2.6389	B	2.4929	B	5.7		P
Copper	5.0710	12.4178		12.7302		2.5		P
Iron		5824.2049		5882.5152		1.0		P
Lead	0.6090	2.3489		2.7424		15.5		P
Magnesium	1014.199	1298.2252		1369.4970		5.3		P
Manganese		76.0041		78.5842		3.3		P
Mercury		0.0127	B	0.0172	B	30.1		AV
Nickel		6.3955	B	8.0507	B	22.9		P
Potassium		880.2779	B	886.7424	B	0.7		P
Selenium		0.6288	U	0.6288	U			P
Silver		0.1826	U	0.1826	U			P
Sodium		182.3144	B	182.9716	B	0.4		P
Thallium		0.7708	U	0.7708	U			P
Vanadium	10.1420	11.0974		10.7830		2.9		P
Zinc	4.0570	15.7160		15.8803		1.0		P

FORM VI - IN

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Solid LCS Source: ERA230_____

Aqueous LCS Source: _____

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum				6210.0	5691.7		3870.0	8570.0	91.7
Antimony				51.2	49.0		12.2	90.1	95.7
Arsenic				62.7	62.0		43.9	81.5	98.9
Barium				260.0	245.8		190.0	330.0	94.5
Beryllium				87.2	88.3		67.0	107.0	101.3
Cadmium				77.4	70.7		51.4	103.0	91.3
Calcium				2760.0	2511.2		1770.0	3750.0	91.0
Chromium				76.9	72.3		59.4	94.6	94.0
Cobalt				101.0	98.9		76.8	125.0	97.9
Copper				58.2	58.5		45.9	70.4	100.5
Iron				15300.0	14030.7		8840.0	21700.0	91.7
Lead				122.0	104.8		82.7	160.0	85.9
Magnesium				1800.0	1657.7		1440.0	2160.0	92.1
Manganese				232.0	228.3		178.0	285.0	98.4
Mercury									
Nickel				163.0	152.9		122.0	204.0	93.8
Potassium				2020.0	1965.8		1410.0	2630.0	97.3
Selenium				91.7	90.3		65.5	118.0	98.5
Silver				69.6	76.6		51.4	87.7	110.1
Sodium				474.0	375.8	B	305.0	645.0	79.3
Thallium				50.5	51.4		24.0	76.8	101.8
Vanadium				142.0	137.1		89.2	195.0	96.5
Zinc				114.0	109.4		84.1	144.0	96.0

FORM VII - IN

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Solid LCS Source: ERA230_____

Aqueous LCS Source: _____

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead									
Magnesium									
Manganese									
Mercury				2.5	2.4		2.0	3.0	96.0
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									

FORM VII - IN

U.S. EPA - CLP

9

ICP SERIAL DILUTION

EPA SAMPLE NO.

04LA-98-0034

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

Matrix (soil/water): SOIL_ Level (low/med): LOW__

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	M
Aluminum	13962.04		13665.90		2.1		P
Antimony	3.40	U	17.00	U			P
Arsenic	3.03	B	12.50	U	100.0		P
Barium	281.31		282.75	B	0.5		P
Beryllium	1.10	B	1.70	B	54.5		P
Cadmium	0.30	U	1.50	U			P
Calcium	11217.18		11331.80	B	1.0		P
Chromium	29.35		20.60	B	29.8		P
Cobalt	13.01	B	11.25	B	13.5		P
Copper	61.22		59.50	B	2.8		P
Iron	28713.33		27536.95		4.1		P
Lead	11.58		7.00	U	100.0		P
Magnesium	6400.25		6416.00	B	0.2		P
Manganese	374.70		378.30		1.0		P
Mercury							NR
Nickel	31.53	B	31.95	B	1.3		P
Potassium	4339.77	B	4598.25	B	6.0		P
Selenium	3.10	U	15.50	U			P
Silver	0.90	U	4.50	U			P
Sodium	898.81	B	647.55	B	28.0	E	P
Thallium	3.80	U	19.00	U			P
Vanadium	54.71		53.20	B	2.8		P
Zinc	77.48		82.65	B	6.7		P

FORM IX - IN

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

ICP ID Number: _____ Date: 01/15/98

Flame AA ID Number : LEEMAN_1____

Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum			200		NR
Antimony			60		NR
Arsenic			10		NR
Barium			200		NR
Beryllium			5		NR
Cadmium			5		NR
Calcium			5000		NR
Chromium			10		NR
Cobalt			50		NR
Copper			25		NR
Iron			100		NR
Lead			3		NR
Magnesium			5000		NR
Manganese			15		NR
Mercury	253.70		0.2	0.02 ~~0.0~~	AV
Nickel			40	DP 3/17/98	NR
Potassium			5000		NR
Selenium			5		NR
Silver			10		NR
Sodium			5000		NR
Thallium			10		NR
Vanadium			50		NR
Zinc			20		NR

Comments:

FORM X - IN

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

ICP ID Number: TJA_61E_1___ Date: 01/15/98

Flame AA ID Number : _____

Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum	308.22		200	10.2	P
Antimony	206.84		60	3.4	P
Arsenic	189.04		10	2.5	P
Barium	493.41		200	0.1	P
Beryllium	313.04		5	0.2	P
Cadmium	226.50		5	0.3	P
Calcium	317.93		5000	1.8	P
Chromium	267.72		10	0.9	P
Cobalt	228.62		50	0.8	P
Copper	324.75		25	0.6	P
Iron	271.44		100	15.9	P
Lead	220.35		3	1.4	P
Magnesium	279.08		5000	7.7	P
Manganese	257.61		15	0.2	P
Mercury			0.2		NR
Nickel	231.60		40	0.7	P
Potassium	766.49		5000	46.9	P
Selenium	196.03		5	3.1	P
Silver	328.07		10	0.9	P
Sodium	588.99		5000	2.1	P
Thallium	190.86		10	3.8	P
Vanadium	292.40		50	0.8	P
Zinc	206.20		20	0.8	P

Comments:

FORM X - IN

U.S. EPA - CLP

11A
ICP INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

ICP ID Number: TJA 61E 1___ Date: 10/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : Al	Ca	Fe	Mg	BA_
Aluminum_	308.22	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony_	206.84	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Arsenic__	189.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Barium___	493.41	0.0000000	0.0000000	0.0000000	0.0000000	-0.0003500
Beryllium	313.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium__	226.50	0.0000000	0.0000000	0.0000860	0.0000000	0.0000000
Calcium__	317.93	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.72	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt___	228.62	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Copper___	324.75	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Iron_____	271.44	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead_____	220.35	0.0003700	0.0000000	0.0000630	0.0000000	0.0000000
Magnesium	279.08	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.61	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury__						
Nickel___	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.03	0.0000040	0.0000000	-0.0000790	0.0000000	0.0000000
Silver___	328.07	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	588.99	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	190.86	0.0000000	0.0000000	-0.0002200	0.0000000	0.0000000
Vanadium_	292.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc_____	206.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

FORM XI (Part 1) - IN

U.S. EPA - CLP

11B
ICP INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

ICP ID Number: TJA 61E 1___ Date: 10/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for :				
		CO_	CR_	MN_	NI_	V__
Aluminum_	308.22	-0.0058000	0.0000000	0.0000000	-0.0013000	0.0270000
Antimony_	206.84	0.0000000	0.0010000	0.0000000	0.0000000	0.0000000
Arsenic__	189.04	0.0000000	-0.0029800	0.0000000	0.0000000	0.0000000
Barium___	493.41	0.0000000	0.0000000	0.0000000	0.0000000	-0.0031300
Beryllium	313.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium__	226.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Calcium__	317.93	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.72	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt___	228.62	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Copper___	324.75	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Iron_____	271.44	0.0723000	0.0000000	0.0000000	0.0000000	0.0150000
Lead_____	220.35	0.0000000	0.0000000	0.0001090	0.0002430	0.0000000
Magnesium	279.08	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.61	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury__						
Nickel___	231.60	-0.0013000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.03	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Silver___	328.07	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	588.99	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	190.86	0.0000000	0.0000000	-0.0047900	0.0000000	0.0000000
Vanadium_	292.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc_____	206.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

U.S. EPA - CLP

12
ICP LINEAR RANGES (QUARTERLY)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 4113R_

ICP ID Number: TJA 61E 1___ Date: 01/15/98

Analyte	Integ. Time (sec.)	Concentration (ug/L)	M
Aluminum	15.00	500000.0	P
Antimony	15.00	10000.0	P
Arsenic	15.00	10000.0	P
Barium	15.00	10000.0	P
Beryllium	15.00	10000.0	P
Cadmium	15.00	10000.0	P
Calcium	15.00	500000.0	P
Chromium	15.00	10000.0	P
Cobalt	15.00	10000.0	P
Copper	15.00	10000.0	P
Iron	15.00	200000.0	P
Lead	15.00	10000.0	P
Magnesium	15.00	500000.0	P
Manganese	15.00	10000.0	P
Mercury			NR
Nickel	15.00	10000.0	P
Potassium	15.00	100000.0	P
Selenium	15.00	10000.0	P
Silver	15.00	2000.0	P
Sodium	15.00	100000.0	P
Thallium	15.00	10000.0	P
Vanadium	15.00	10000.0	P
Zinc	15.00	10000.0	P

Comments:

FORM XII - IN

U.S. EPA - CLP

13
PREPARATION LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.:_____ SAS No.: _____ SDG No.:4113R_

Method: P_

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
04LA-98	03/10/98	1.00	200
04LA-98	03/10/98	1.00	200
04LA-98	03/10/98	1.00	200
LCSS	03/10/98	1.00	200
PBS	03/10/98	1.00	200

FORM XIII - IN

U.S. EPA - CLP

13
PREPARATION LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.:_____ SAS No.: _____ SDG No.:4113R_

Method: AV

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
04LA-98	02/27/98	0.20	100
04LA-98	02/27/98	0.20	100
04LA-98	02/27/98	0.20	100
LCSS	02/27/98	0.20	100
PBS	02/27/98	0.20	100

FORM XIII - IN

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4113R_

Instrument ID Number: LEEMAN 1_____ Method: AV

Start Date: 03/02/98 End Date: 03/02/98

EPA Sample No.	D/F	Time	% R	Analytes																								
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	
S0	1.00	1100																X									
S0.2	1.00	1102																X									
S1	1.00	1105																X									
S2	1.00	1107																X									
S5	1.00	1110																X									
S10	1.00	1113																X									
ICV	1.00	1123																X									
ICB	1.00	1125																X									
PBS	1.00	1125																X									
CRA	1.00	1128																X									
LCSS	1.00	1130																X									
ZZZZZZ	1.00	1133																									
ZZZZZZ	1.00	1135																									
ZZZZZZ	1.00	1138																									
ZZZZZZ	1.00	1140																									
ZZZZZZ	1.00	1143																									
ZZZZZZ	1.00	1145																									
04LA-98-	1.00	1148																X									
04LA-98-	1.00	1150																X									
CCV	1.00	1153																X									
CCB	1.00	1155																X									
04LA-98-	1.00	1158																X									
ZZZZZZ	1.00	1200																									
ZZZZZZ	1.00	1203																									
ZZZZZZ	1.00	1205																									
ZZZZZZ	1.00	1207																									
ZZZZZZ	1.00	1210																									
ZZZZZZ	1.00	1212																									
CCV	1.00	1215																X									
CCB	1.00	1217																X									

FORM XIV - IN

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4113R_

Instrument ID Number: TJA 61E 1____ Method: P_

Start Date: 03/13/98 End Date: 03/13/98

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	
ICV	1.00	0941		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
ICB	1.00	0945		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
CRI	1.00	0948		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
ICSA	1.00	0954		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
ICSAB	1.00	0957		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
CCV	1.00	1000		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
CCB	1.00	1004		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
PBS	1.00	1007		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
ZZZZZZ	1.00	1010																_									_
LCSS	1.00	1012		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
04LA-98-	1.00	1017		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
04LA-98-	1.00	1020		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
04LA-98-	5.00	1022		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
04LA-98-	1.00	1025		_	X	X	X	X	X	_	X	X	X	_	X	_	X	_	X	_	X	X	_	X	X	X	_
ZZZZZZ	1.00	1038		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ZZZZZZ	1.00	1041		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ZZZZZZ	1.00	1046																_									_
CCV	1.00	1048		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
CCB	1.00	1052		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
ZZZZZZ	1.00	1055		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ZZZZZZ	5.00	1057		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ZZZZZZ	1.00	1100		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ZZZZZZ	1.00	1107		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ZZZZZZ	1.00	1110		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ZZZZZZ	1.00	1113		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ZZZZZZ	1.00	1118		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ZZZZZZ	1.00	1121		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ZZZZZZ	5.00	1124																_									_
CCV	1.00	1149		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
CCB	1.00	1153		X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	_
ZZZZZZ	1.00	1157		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ZZZZZZ	1.00	1159		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
				_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_

FORM XIV - IN

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:4113R_

Instrument ID Number: TJA 61E 1____ Method: P_

Start Date: 03/13/98 End Date: 03/13/98

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	
ZZZZZZ	1.00	1204																									
CRI	1.00	1208		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
ICSA	1.00	1211		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
ICSAB	1.00	1214		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
CCV	1.00	1216		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
CCB	1.00	1221		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	

FORM XIV - IN

28-I-98
1/30/98
700 PM

LATA

FEB 06 1998

Memo

TO: Allyn R. Pratt, EES-13, MS J521

FROM: Gabriela M. Lopez Escobedo

DATE: January 30, 1998

SUBJECT: R-9 Intermediate Data Requested by New Mexico Environment Department

Enclosed are the R-9 Borehole Data Review Summary, case narratives, baseline validation reports, and the hard copy data reports for the samples that were collected from the intermediate groundwater for the Environmental Restoration Project. Electronic files for the data are not included with this deliverable because the electronic files in the Facility for Information Management, Analysis, and Display are not complete and accurate at this time. This deliverable is intended to meet your requirement to deliver these data to the New Mexico Environment Department DOE Oversight Bureau.

The R-9 Borehole Data Review Summary summarizes the data review conducted by Bart Vanden Plas of Los Alamos Technical Associates, Inc. The data review will be documented in detail in the R-9 Intermediate Groundwater Data Review, which will be part of the R-9 well report or a Los Alamos Canyon report.

The most significant finding in the R-9 Intermediate Groundwater Data Review is the matrix problem with sample 04LA-97-0483. This sample exhibited matrix interferences in the metals and alpha spectroscopy analyses. The alpha spectroscopy analysis is used to determine the presence of radionuclides, including uranium. The uranium results for this sample are critical to the interpretation of the groundwater chemistry. Unfortunately, the data quality for the uranium results is poor. There was a low recovery of the tracer (^{232}U), which indicates a problem with recovering the uranium in the sample. Because very little uranium was recovered, the ^{235}U result was based on a number of counts just above the normal background for this isotope.

If you have any questions about these data, please call Bart Vanden Plas at 662-1821 or Gabriela Lopez Escobedo at 662-1817.

Attachments:

1. R-9 Borehole Data Review Summary

2. Case narratives, baseline validation reports, and hard copy data reports for the following request numbers: 3777R, 3778R, 3780R, 3781R, 3815R, 3816R, 3817R, 3840R, 3841R, 3842R, 3843R, 3846R, and 3847R

GMLE(8-001):cf

Cy: Pat Longmire, CST-7, w/att., MS J534
Cathy Smith, LATA, w/o att.
Bart Vanden Plas, LATA, w/att.
Field Unit 4 file, LATA, w/att.
LS401 file, w/o att.

R-9 BOREHOLE
DATA REVIEW SUMMARY

The analytical results for five groundwater samples collected from the R-9 borehole at location LA-0168 were evaluated for the report. Samples were collected on September 26, October 6, October 16, and October 20, 1997. The samples were analyzed by external subcontract laboratories for organic and inorganic chemicals (including metals, anions, and dissolved silica); radionuclides; stable isotopes; and humic acids. The five samples are listed in Table 1.

Table 1. Summary of Samples Collected

Sample ID	Sample Type	Sample Depth (ft)	Inorganic	Organic	Radiochemistry	Stable Isotopes	Humic Acids
04LA-97-0480	Total[1]	137	3778R[2]	3777R	3781R	3780R	NA[3]
04LA-97-0481	Filtered[4]	137	3778R	NA	3781R	NA	3779R
04LA-97-0483	Total	280	3815R	NA	3817R	3416R	NA
04LA-97-0486	Total	273	3841R	3840R	3843R	3842R	NA
04LA-97-0487	Filtered	273	3846R	NA	3647R	NA	NA

1. collected from the well without filtration; sample includes any sediment present in the groundwater
2. numbers in columns are request numbers
3. not analyzed
4. filtered in the field through a 0.45-µm membrane filter to remove sediment after the sample was collected from the well

In general, the data quality was good for the sample analyses conducted, and the data are usable as qualified. The data quality was lower for sample 04LA-97-0483 because of suspected matrix interference. It has been reported that vegetable oil was introduced into sample 04LA-97-0483 in the field. Matrix interferences that were indicated in the metals and alpha spectroscopy analyses of sample 04LA-97-0483 appear to be related to this high level of organic material. The matrix interference resulted in low tracer recoveries in the alpha spectroscopy analysis and results outside acceptance criteria for the quality control samples in the metals analysis.

The technical quality review begins with baseline data validation, which identifies potential technical problems associated with sample handling and analyses. In the baseline data validation process, quality control data are reviewed against numerical acceptance criteria as described in the Environmental Restoration Project Quality Assurance Project Plan (LANL 1996, 53450). During the validation process, data that did not meet acceptance criteria were designated by the appropriate qualifier flags.

When potential technical problems were identified during baseline data validation, the data were subjected to a focused validation, which was designed to further explore the data quality. Focused validation was also implemented to investigate problems identified during the later steps of the data review and decision-making processes. The focused validation invoked the professional judgment of an experienced chemist who assessed pertinent aspects of the data set to arrive at the conclusions regarding the data quality. The focused validation chemist overrode data qualifiers assigned during the baseline validation process and qualified data that were not qualified during baseline data validation as described in the full report.

Tuesday, October 07, 1997

Los Alamos
NATIONAL LABORATORY

DATA ENTERED
110397 M

REQUEST NUMBER: 3777R
ANALYSIS TYPE: ORG

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/7/97
REPORT DUE: 10/10/97
TURN AROUND REQ'D: 1 day

These samples are on:

LANL Request Number: 3777R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
VOAGCMS		04LA-97-0480	01	W	10/6/97	
PESTPCB		04LA-97-0480	02	W	10/6/97	
PAH		04LA-97-0480	03	W	10/6/97	
TOC		04LA-97-0480	04	W	10/6/97	
VOAGCMS		04LA-97-0480	19	W	10/6/97	

RECRA LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

Recra LabNet Philadelphia
Analytical Report

Client : LANL-REQ#3777R
RFW# : 9710L692
Subcontract : 7791L0014-9S

W.O.# : 02744-064-001-9999-00
Date Received : 10-08-97

PESTICIDE/PCB

1. The set of samples consisted of one (1) water sample collected on 10-06-97.

2. The sample and its associated QC samples were extracted on 10-09-97 and analyzed based on SW846, 3rd Edition, procedures on 10-10-97. The extraction procedure used was based on Method 3510 and the extracts were analyzed based on Method 8081.

3. The cooler temperature upon receipt has been recorded on the chain-of-custody.

4. All required holding times for extraction and analysis were met.

5. The sample and its associated QC samples received a sulfuric acid cleanup.

6. The method blank was below the reporting limits for all target compounds.

7. All surrogate recoveries were within acceptance criteria.

8. All blank spike recoveries were within acceptance criteria.

9. All initial calibrations associated with this data set were within acceptance criteria.

10. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria.

11. I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this QC Report.

Bruce C Fitzer unit leader
for J. Michael Taylor
Vice President and Laboratory Manager
Lionville Analytical Laboratory

11-5-97
Date

jeh\pcb\10-692.pp

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 330 pages.

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610)-280-3000 • Fax (610) 280-3041

RECRA LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

Recra LabNet Philadelphia
Analytical Report

Client : LANL-REQ#3777R
RFW# : 9710L692

W.O# : 02744-064-001-9999-00
Date Received : 10-08-97

POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC

1. One (1) water sample was collected on 10-06-97.

2. The sample and its associated QC samples were prepared on 10-09-97 and analyzed according to the criteria set forth in EPA Method 8310 for Polynuclear Aromatic Hydrocarbon target compounds on 10-10-97.

3. The cooler temperature upon receipt has been recorded on the chain-of-custody.

4. All required holding times for extraction and analysis were met.

5. All initial calibrations associated with this data set were within acceptance criteria.

6. Continuing calibration criteria were met for all continuing calibration verification standard analyzed prior to the sample extracts.

7. One (1) of four (4) surrogate recoveries were outside acceptance criteria. A copy of the Sample Discrepancy Report (SDR) has been enclosed.

8. One (1) of thirty-two (32) blank spike recoveries was outside acceptance criteria. A copy of the Sample Discrepancy Report (SDR) has been enclosed.

9. I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this QC Report.

Bruce C Spitler unit leader

for J. Michael Taylor
Vice President and Laboratory Manager
Lionville Analytical Laboratory

10-31-97
Date

jeh\gc\10-692.pah

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 106 pages.

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610)-280-3000 • Fax (610) 280-3041

RECRA LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

LIONVILLE LABORATORY
ANALYTICAL REPORT

Client : LANL-REQ#3777R
RFW# : 9710L692
Subcontract# : 7791L0014-9S

W.O.# : 02744-064-001-9999-00
Date Received: 10-08-97

INORGANIC CASE NARRATIVE

1. This narrative covers the analysis of 1 water sample.

2. The sample was prepared and analyzed in accordance with the method checked on the attached glossary.

3. Sample holding time as required by the method and/or contract was met.

4. The cooler temperature was recorded on the chain-of-custody.

5. The method blank was within method criteria.

6. The Laboratory Control Sample (LCS) was within the laboratory control limits. The duplicate LCS was within the 20% Relative Percent Difference (RPD) control limit.

7. I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this QC Report.

Bruce C Squires unit leader
for J. Michael Taylor
Vice President and Laboratory Manager
Lionville Analytical Laboratory

10-25-97
Date

njp\i10-692

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 16 pages.

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610)-280-3000 • Fax (610) 280-3041

RECRA LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

Recra LabNet Philadelphia
Analytical Report

Client : LANL-REQ#3777R
RFW # : 9710L692
Subcontract #: 7791L0014-9S

W.O. #: 02744-064-001-9999-00
Date Received: 10-08-97

GC/MS VOLATILE

One (1) water sample was collected on 10-06-97.

The sample and its associated QC sample were analyzed according to criteria set forth in SW 846 Method 8260A for Client Specified Volatile target compounds on 10-14-97.

The following is a summary of the QC results accompanying these sample results and a description of any problems encountered during their analyses:

1. The cooler temperature upon receipt has been recorded on the chain-of-custody.
2. The required holding time for analysis was met.
3. Non-target compounds were not detected in this sample.
4. All surrogate recoveries were within EPA QC limits.
5. The method blank contained the common contaminants Methylene Chloride and Acetone at levels less than 2x the CRQL and the target compound Trichloroethene at a level less than the CRQL.
6. All internal standard area and retention time criteria were met.
7. As of May 24, 1997, WESTON Lionville Laboratory became Recra LabNet Philadelphia. Some forms may still reference WESTON Lionville Laboratory.
8. I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this QC Report.

Bruce C Miller unit leader
for J. Michael Taylor
Vice President and Laboratory Manager
Lionville Analytical Laboratory

10-28-97
Date

mmz/voa/10-692v.cn

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 85 pages.

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: **3777R** LAB NAME: **RECRA** LAB CODE_____

NAME OF VALIDATOR: **Antonia Tallarico** COMPANY: **LATA**

VALIDATION DATE: **13 November 97** EDS ENTRY DATE_____

ANALYTICAL SUITE:

X VOLATILES	o HIGH EXPLOSIVES
o SEMIVOLATILES	o INORGANICS
X PESTICIDES/AROCLORS	o RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? - YES - NO
Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

_____
_____
_____

Signature/1st validation: _____ 14NOV97

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

Tuesday, October 07, 1997

REQUEST NUMBER: 3777R
ANALYSIS TYPE: ORG

C1

Los Alamos
NATIONAL LABORATORY

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/7/97
REPORT DUE: 10/10/97
TURN AROUND REQ'D: 1 day

These samples are on:

LANL Request Number: 3777R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
VOAGCMS		04LA-97-0480	01	W	10/6/97	
PESTPCB		04LA-97-0480	02	W	10/6/97	
PAH		04LA-97-0480	03	W	10/6/97	
TOC		04LA-97-0480	04	W	10/6/97	
VOAGCMS		04LA-97-0480	19	W	10/6/97	

Final Page of REQUEST NUMBER 3777R

692

t. 7

4117 9900 3465

011

8A
VOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L692

Lab File ID (Standard): X101322 Date Analyzed: 10/13/97

Instrument ID: 5970X Time Analyzed: 2058

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

		IS1 AREA #	RT	IS2(CBZ) AREA #	RT	IS3(DCB) AREA #	RT
	12 HOUR STD	664373	15.97	540256	20.24	363991	23.0
	UPPER LIMIT	1328746	16.47	1080512	20.74	727982	23.5
	LOWER LIMIT	332186	15.47	270128	19.74	181996	22.5
	EPA SAMPLE NO.						
01	VBLKAG	694086	15.96	574523	20.24	364496	23.0
02	04LA-97-0480 01/19	771195	15.96	594352	20.24	389645	23.0
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 = Fluorobenzene
IS2 (CBZ) = Chlorobenzene-d5
IS3 (DCB) = 1,4-Dichlorobenzene-d4

UPPER LIMIT = +100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk.

2A

WATER VOLATILE SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#3777R

RFW Lot No.: 9710L692

	CLIENT SAMPLE NO.	S1 (DCE) #	S2 (TOL) #	S3 (BFB) #	OTHER	TOT OUT
01	04LA-97-0480 01/19	96	93	99		0
02	VBLKAGLVX241-MB1	110	100	110		0

	QC LIMITS
S1 (DCE) = 1,2-Dichloroethane-d4	(76-114)
S2 (TOL) = Toluene-d8	(88-110)
S3 (BFB) = Bromofluorobenzene	(86-115)

Column to be used to flag recovery values
* Values outside of QC limits
D Surrogates diluted out

1A

VOLATILE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

VBLKAG

Lab Name: Recra.LabNet Work Order: 02744064001

Client: LANL-REQ#3777R

Matrix: WATER Lab Sample ID: 97LVX241-MB1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x101328

Level: (low/med) LOW Date Received: 10/13/97

% Moisture: not dec. _____ Date Analyzed: 10/14/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
75-71-8	Dichlorodifluoromethane	10	U
74-87-3	Chloromethane	10	U
75-01-4	Vinyl Chloride	10	U
74-83-9	Bromomethane	10	U
75-00-3	Chloroethane	10	U
75-69-4	Trichlorofluoromethane	5	U
75-35-4	1,1-Dichloroethene	5	U
76-13-1	Trichlorotrifluoroethane	5	U
67-64-1	Acetone	3	J
74-88-4	Iodomethane	5	U
75-15-0	Carbon Disulfide	5	U
75-09-2	Methylene Chloride	8	
156-60-5	Trans-1,2-dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
78-93-3	2-Butanone	20	U
159-59-2	Cis-1,2-dichloroethene	5	U
590-20-7	2,2-Dichloropropane	5	U
74-97-5	Bromochloromethane	5	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
563-58-6	1,1-dichloropropene	5	U
71-43-2	Benzene	5	U
107-06-2	1,2-Dichloroethane	5	U
79-01-6	Trichloroethene	1	J
78-87-5	1,2-Dichloropropane	5	U
74-95-3	Dibromomethane	5	U
75-27-4	Bromodichloromethane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
108-10-1	4-Methyl-2-pentanone	20	U
108-88-3	Toluene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	5	U

1B

VOLATILE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

VBLKAG

Lab Name: Recra.LabNet Work Order: 02744064001

Client: LANL-REQ#3777R

Matrix: WATER Lab Sample ID: 97LVX241-MB1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x101328

Level: (low/med) LOW Date Received: 10/13/97

% Moisture: not dec. _____ Date Analyzed: 10/14/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
142-28-9	1,3-Dichloropropane	5	U
591-78-6	2-Hexanone	20	U
124-48-1	Dibromochloromethane	5	U
106-93-4	1,2-Dibromoethane	5	U
108-90-7	Chlorobenzene	5	U
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
98-82-8	Isopropylbenzene	5	U
108-86-1	Bromobenzene	5	U
96-18-4	1,2,3-Trichloropropane	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
103-65-1	N-propylbenzene	5	U
95-49-8	2-Chlorotoluene	5	U
106-43-4	4-Chlorotoluene	5	U
108-67-8	1,3,5-Trimethylbenzene	5	U
98-06-6	Tert-butylbenzene	5	U
95-63-6	1,2,4-Trimethylbenzene	5	U
135-98-8	Sec-butylbenzene	5	U
541-73-1	1,3-Dichlorobenzene	5	U
106-46-7	1,4-Dichlorobenzene	5	U
99-87-6	4-Isopropyltoluene	5	U
95-50-1	1,2-Dichlorobenzene	5	U
104-51-8	N-butylbenzene	5	U
96-12-8	1,2-Dibromo-3-chloropropane	10	U

FORM 1 V-2 12/88 Rev.

CLIENT SAMPLE NO.

VBLKAG

VOLATILE ORGANICS ANALYSIS SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Recra.LabNet Work Order: 02744064001

Client: LANL-REQ#3777R

Matrix: WATER Lab Sample ID: 97LVX241-MB1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x101328

Level: (low/med) LOW Date Received: 10/13/97

% Moisture: not dec. _____ Date Analyzed: 10/14/97

Column: (pack/cap) CAP Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				

2E

WATER PESTICIDE SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#3777R

RFW Lot No.: 9710L692

	CLIENT SAMPLE NO.	S1 (DCB)#	OTHER TCX
01	04LA-97-0480 02	39	33
02	PBLKABLE1877-MB1	83	68
03	PBLKABLE1877-MB1 BS	81	58
04	PBLKABLE1877-MB1 BSD	85	65

	ADVISORY QC LIMITS
S1 (DCB) = Decachlorobiphenyl	(22-126)
S2 (TCX) = Tetrachloro-m-xylene	(27-129)

Column to be used to flag recovery values
* Values outside of QC limits
D Surrogates diluted out

gw 10-17-97

1D

PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

PBLKAB

Lab Name: Recra.LabNet Work Order: 02744064001

Client: LANL-REQ#3777R

Matrix: WATER Lab Sample ID: 97LE1877-MB1

Sample wt/vol: 1000 (g/mL) ML Lab File ID: 10099709.27

Level: (low/med) LOW Date Received: 10/09/97

% Moisture: not dec. _____ dec. Date Extracted: 10/09/97

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 10/10/97

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
319-84-6	Alpha-BHC	0.050	U
319-85-7	Beta-BHC	0.050	U
319-86-8	Delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421934	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

FORM 1 PEST 12/88 Rev.

gw 10-17-97

3E

WATER PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#3777R RFW Lot No.: 9710L692

MATRIX Spike - Sample No.: PBLKABLE1877-MB1 Level:(low/med) LOW

COMPOUND	SPIKE ADDED UG/L	SAMPLE CONCENTRATION UG/L	MS CONCENTRATION UG/L	MS % REC #	QC LIMITS REC
gamma-BHC (Lindane)	0.200	0	0.140	70	56 -127
Heptachlor	0.200	0	0.150	75	50 -129
Aldrin	0.200	0	0.170	85	48 -133
Dieldrin	0.500	0	0.430	86	57 -131
Endrin	0.500	0	0.390	78	46 -150
4,4'-DDT	0.500	0	0.370	74	38 -138

COMPOUND	SPIKE ADDED UG/L	MSD CONCENTRATION UG/L	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC
gamma-BHC (Lindane)	0.200	0.180	90	25 *	15	56 -127
Heptachlor	0.200	0.160	80	6	20	50 -129
Aldrin	0.200	0.180	90	5	22	48 -133
Dieldrin	0.500	0.480	96	10	18	57 -131
Endrin	0.500	0.480	96	20	21	46 -150
4,4'-DDT	0.500	0.450	90	19	27	38 -138

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 1 out of 6 outside limits
Spike Recovery: 0 out of 12 outside limits

COMMENTS:

JW 10.17.97

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgment based on data use . It usually has an "M "with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analytes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likely because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

VOLATILES (V)

0 The internal standard retention time has shifted by more than ±30 seconds, which could affect compound identification and cause false positives or negatives.

1 The internal standard area count for the quantitating internal standard is outside the - 50, + 100 % window in relation to the previous continuing calibration, which could affect the accuracy of the quantitation of the associated analytes and the correct quantitatiion of surrogate recoveries.

1a Non-detected results, and the area count for the quantitating internal standard is < 50 % of the area count for the previous continuing calibration, which greatly increases the potential for false negative results.

2 Very low or abrupt drop-off of quantitating internal standard, which indicates an increased potential for false negative results and possibly other problems with sample quantitation.

3 SMC (surrogate) % recovery > upper limit, which indicates a potential high bias in the results and a potential for false positive results.

3a SMC % recovery < lower limit but > 10%, which indicates a potential low bias in the results.

3b SMC recovery < 10%, which indicates an increased potential for a low bias in the results.

3c Indicates that the quantitation limit is approximated for non-detects because of SMC recovery < lower limit but > 10%, which also indicates an increased potential for false negative results.

3d SMC % recovery < 10% and result is a non-detect, which indicates a greatly increased potential for false negative results.

4 Sample result > EQL and < 5X (10X for acetone, methylene chloride, and 2-butanone) the concentration of the related analyte in the blank, which indicates the reported detection is considered to be indistinguishable from blank contamination.

5 Sample result < EQL and < 5X (10X as above) the concentration of the analyte in the blank, which indicates the detected result was indistinguishable from blank contamination and the detected result was changed to non-detected at the EQL.

5a Sample result > EQL and > 5X (10X as above) the concentration of the analyte in the blank, which indicates the reported result is not likely to be related to the contamination in the associated blank.

6 Response factor for the analytes is <0.05, indicating a sensitivity problem that could prohibit detection if present at low concentrations.

7 % RSD or % D exceeds the specification which may affect quantitation, which indicates potential quantitation problems in the analyses.

8 Instrument Performance Check has ion ratios our of specification, which may affect compound identification.

9. Holding time is exceeded. An evaluation of the data of interest with respect to holding time exceedance impact (technically) is recommended. Factors to consider include sample preservation, sample storage practices, use of the data, levels of contamination found in the sample, and the physical, chemical, and biological stability of the target analytes in the sample matrix.

10. The result is higher than the high point of the calibration (or outside the linear range). This usually results in a negative bias in the reported concentration.

ORGANOCHLORINE PESTICIDES/AROCLORS (P)

3 Surrogate % recovery > upper limit, which indicates a potential high bias in the results and a potential for false positive results.

3a Surrogate % recovery is > 10% but < the lower limit, which indicates a potential low bias in the results.

3b Surrogate % recovery < 10%, which indicates an increased potential low bias in the results..

3c Result is non-detect and the surrogate % recovery > 10 % but < lower limit, which indicates a potential for false negative results.

3d Result is a non-detect and the surrogate recovery < 10%, which indicates a greatly increased potential for false negative results.

4 Sample result > EQL and < 5X the concentration of the related analyte in the blank, which indicates the reported detection is considered to be indistinguishable from blank contamination.

5 Sample result < EQL and < 5X (10X as above) the concentration of the analyte in the blank, which indicates the detected result was indistinguishable from blank contamination and the detected result was changed to non-detected at the EQL.

5a Sample result > EQL and > 5X (10X as above) the concentration of the analyte in the blank, which indicates the reported result is not likely to be related to the contamination in the associated blank.

6 % RSD or % D exceeds the specification - apply to a positive result, which indicates potential quantitation problems in the analyses and the potential for false positive results.

7 % RSD or %D exceeds the specification - apply to a non-detect, which indicates potential quantitation problems in the analyses and the potential false negative results.

8. Analyte concentration exceeds linear range and sample not diluted to within that range. This usually results in a negative bias in the reported concentration.

9. Holding time is exceeded. An evaluation of the data of interest with respect to holding time exceedance impact (technically) is recommended. Factors to consider include sample preservation, sample storage practices, use of the data, levels of contamination found in the sample, and the physical, chemical, and biological stability of the target analytes in the sample matrix.

10. Breakdown criteria have been exceeded, indicating poor instrument performance which can result in a low bias in the reported results and potential false negative results for labile compounds and potential false positive results for breakdown products.

11. Surrogate retention time has shifted by > 0.05 minutes, possibly affecting analyte identification and causing false positives or negatives.

VOLATILES

Instrument Performance Check **Present? X yes no**	**NA**	**Obtain from lab. Q=A**	
Initial calibration: **Present? X yes no** **Continuing Calibration** **Present? yes X no** *The sample was analyzed within 12 hours of the initial calibration. No action taken.*	**See comment**	**Obtain from lab. Q=A** **Analytes not meeting RRF or % RSD criteria should be circled on Initial Calibration Form** **Obtain from lab. Q=A** **Analytes not meeting RRF or % D criteria should be circled on Continuing Calibration Form**	
Internal Standards **Present? X yes no** **Required IS:** **chlorobenzene-d5** **1,4-difluorobenzene** **1,4-dichlorbenzene -d4** **RT must be < ± 30 sec. from previous continuing calibration** **Response area must not vary by > factor of 2 (+100, -50) from previous continuing calibration** *Fluorobenzene was used as an internal standard in place of 1,4-difluorobenzene.*	**See comment**	**Check manually during baseline validation.** **Obtain from lab. Q=A** **If RT varies by > 30 seconds, qualify with PM, in which case focused validation checks the chromato-graphic profile for false + or -.** **If an IS area count is outside the -50 +100 % criterion, qualify positive results quantified by the IS with J,PM** **Non-detects quantified by the IS as UJ if area count < 50 %** **Very low or abrupt drop-off, R** **Enter % variation in FIMAD table**	 **V1** **V1a** **V2**

M14NOV97

System Monitoring Compounds (SMC) or surrogates **Present? X yes no** **% recovery Water** **Toluene-d8 88-110%** **BFB 86-115%** **Dibromofluoromethane 86-118%** **% recovery Soil** **Toluene-d8 81-117%** **BFB 74-121** **Dibromofluoromethane 80-120** *1,2-Dichloroethane was used in place of dibromofluoromehtane as a SMC. The laboratory reports limit of between 76-114% recovery as acceptable. No action taken.*	See comment	**Obtain from lab. Q=A** **If SMC % recovery > upper limit, detected target compounds are qualified with J+.** **For non-detects, not qualified** **If SMC has % recovery < lower limit but 3 10%, qualify detected compounds with J-** **For detected compounds, same J- qualifier if recovery of SMC < 10%** **For non-detects, the quantitation limit is qualified as approximated, UJ, when SMC is ≥10%** **For non-detected analytes, if SMC recovery <10%, reject R, PM** **Do not qualify results for diluted samples based on SMC/ Surrogate recoveries** **Enter % recovery in FIMAD table**	 **V3** **V3a** **V3b** **V3c** **V3d**

M14NOV97

Method Blanks **Present? X yes no** **Separate blank for each method, matrix and/or 12 hour batch** **Target compounds must be ≤ EQL except acetone, methylene chloride, and 2-butanone which can be present at ≤ 5 X EQL.** *The following analytes were detected in the blank: Acetone (3 ug/L), Methylene Chloride (8 ug/L), and Trichloroethene (1 ug/L). Acetone and methylene chloride were detected in the sample and qualified as U.*	**U** **See comment**	**Obtain from lab. Q=A** **If target compound found in blank but not in sample, no qualifier.** **Sample result > EQL and < 5 X (< 10x for noted exceptions) multiple of blank, elevate EQL to sample result and qualify as U.** **Sample result < EQL and < 5X (< 10x for noted exceptions) multiple of blank, elevate sample results to EQL and qualify as U.** **Sample result > 5X multiple, OK**	**V4** **V5**
Holding time **Analysis within 14 days of sample collection for soil and 7 days for water.** *The 7 day holding time for a water sample was exceeded by 1 day. Sample analytes are qualified as PM.*	**PM** **See comment**	**Compare date of analysis with sampling date on Analytical Request** **Q=PM if not met**	
TICs (if requested) **Present X yes no** *TICs were requested but non were found.*	**See comment**		

M 14 NOV 97

VOLATILE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

04LA-97-0480 01/19

Lab Name: Recra.LabNet Work Order: 02744064001

Client: LANL-REQ#3777R

Matrix: WATER Lab Sample ID: 9710L692-001

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x101334

Level: (low/med) LOW Date Received: 10/08/97

% Moisture: not dec. _____ Date Analyzed: 10/14/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND			
75-71-8	Dichlorodifluoromethane	10	U	
74-87-3	Chloromethane	10	U	
75-01-4	Vinyl Chloride	10	U	
74-83-9	Bromomethane	10	U	
75-00-3	Chloroethane	10	U	
75-69-4	Trichlorofluoromethane	5	U	
75-35-4	1,1-Dichloroethene	5	U	
76-13-1	Trichlorotrifluoroethane	5	U	
67-64-1	Acetone	18	JB	(U, V5)
74-88-4	Iodomethane	5	U	
75-15-0	Carbon Disulfide	5	U	
75-09-2	Methylene Chloride	7	B	(U, V5)
156-60-5	Trans-1,2-dichloroethene	5	U	
75-34-3	1,1-Dichloroethane	5	U	
78-93-3	2-Butanone	20	U	
159-59-2	Cis-1,2-dichloroethene	5	U	
590-20-7	2,2-Dichloropropane	5	U	
74-97-5	Bromochloromethane	5	U	
67-66-3	Chloroform	5	U	
71-55-6	1,1,1-Trichloroethane	5	U	
56-23-5	Carbon Tetrachloride	5	U	
563-58-6	1,1-dichloropropene	5	U	
71-43-2	Benzene	5	U	
107-06-2	1,2-Dichloroethane	5	U	
79-01-6	Trichloroethene	5	U	
78-87-5	1,2-Dichloropropane	5	U	
74-95-3	Dibromomethane	5	U	
75-27-4	Bromodichloromethane	5	U	
10061-01-5	cis-1,3-Dichloropropene	5	U	
108-10-1	4-Methyl-2-pentanone	20	U	
108-88-3	Toluene	5	U	
10061-02-6	Trans-1,3-Dichloropropene	5	U	
79-00-5	1,1,2-Trichloroethane	5	U	
127-18-4	Tetrachloroethene	5	U	

PM

FORM 1 V-1 12/88 Rev.

021

M 14NOV97

1B

VOLATILE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

04LA-97-0480 01/19

Lab Name: Recra.LabNet Work Order: 02744064001

Client: LANL-REQ#3777R

Matrix: WATER Lab Sample ID: 9710L692-001

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x101334

Level: (low/med) LOW Date Received: 10/08/97

% Moisture: not dec. _____ Date Analyzed: 10/14/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
142-28-9	1,3-Dichloropropane	5	U
591-78-6	2-Hexanone	20	U
124-48-1	Dibromochloromethane	5	U
106-93-4	1,2-Dibromoethane	5	U
108-90-7	Chlorobenzene	5	U
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
98-82-8	Isopropylbenzene	5	U
108-86-1	Bromobenzene	5	U
96-18-4	1,2,3-Trichloropropane	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
103-65-1	N-propylbenzene	5	U
95-49-8	2-Chlorotoluene	5	U
106-43-4	4-Chlorotoluene	5	U
108-67-8	1,3,5-Trimethylbenzene	5	U
98-06-6	Tert-butylbenzene	5	U
95-63-6	1,2,4-Trimethylbenzene	5	U
135-98-8	Sec-butylbenzene	5	U
541-73-1	1,3-Dichlorobenzene	5	U
106-46-7	1,4-Dichlorobenzene	5	U
99-87-6	4-Isopropyltoluene	5	U
95-50-1	1,2-Dichlorobenzene	5	U
104-51-8	N-butylbenzene	5	U
96-12-8	1,2-Dibromo-3-chloropropane	10	U

PM

FORM 1 V-2 12/88 Rev.

M14NOV97

1E

VOLATILE ORGANICS ANALYSIS SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT SAMPLE NO.

04LA-97-0480 01/19

Lab Name: Recra.LabNet Work Order: 02744064001

Client: LANL-REQ#3777R

Matrix: WATER Lab Sample ID: 9710L692-001

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x101334

Level: (low/med) LOW Date Received: 10/08/97

% Moisture: not dec. _____ Date Analyzed: 10/14/97

Column: (pack/cap) CAP Dilution Factor: 1.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				

FORM 1 VOA-TIC 12/88 Rev.

023

M 14NOV97

ORGANOCHLORINE PESTICIDES/AROCLORS

Initial calibration: **Present? X yes no** **Daily calibration verification** **Present? X yes no**	 **NA** **NA**	 **Obtain from lab. Q=A** **Obtain from lab. Q=A**	
Surrogates: **Present? X yes no** **% recovery** **Tetrachloro-m-xylene 50-160** **Decachlorbiphenyl50-160** *This sample has a surrogate recovery for tetrachlor-m-xylene was 33% and decachlorobiphenyl was 39%. All analytes are qualified as UJ.*	**UJ** **See comment**	**Obtain from lab. Q=A** **If either surrogate's % recovery is more than upper limit, detected target compounds are qualified with J+.** **If either surrogate's % recovery is ≥ 10% but ≤ lower limit, qualify detected compounds with J-** **and non-detected target analytes as UJ.** **If either surrogate's % recovery <10%, qualify detected compounds as J-** **and non-detects as R, PM.** **Enter % recovery in FIMAD table**	 **P3** **P3a** **P3c** **P3b** **P3d**
Retention Time Windows **Present? X yes no** **Surrogates' retention time should not shift by ± 0.05 minutes.** *The retention time windows from the initial calibration were used to qualify results for this test. Both columns were checked.*	**OK**	 **Obtain from lab. Q=A** **If either of the surrogate's RT shifts >± 0.05 minutes, qualify the results as PM. (An examination of chromatographic peaks will be required to determine if target analytes are present).**	

M 14 NOV 97

Method blanks Present? X yes no Separate for each method, matrix, and/or analytical batch Target analytes < EQL	OK	Obtain from lab. Q=A If target compound found in blank but not in sample, no qualifier. Sample result > EQL and < 5 X multiple of blank, elevate EQL to sample result and qualify as U. Sample result < EQL and < 5X multiple of blank, elevate sample results to EQL and qualify as U. Sample result > 5X multiple, OK	 P4 P5
Breakdown criteria Present? X yes no ≤ 20% for either 4,4'-DDT or endrin or 30% for combined breakdown.	OK	Obtain from lab. Q=A Q=P	
Holding time Extraction within 14 days of sample collection for soil and 7 days for water Analyses within 40 days of extraction	OK	Compare date of extraction with sampling date on Analytical Request and date of analysis with date of extraction. Q=PM	

17/14 NOV 97

1D
PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

04LA-97-0480 02

Lab Name: Recra.LabNet Work Order: 02744064001

Client: LANL-REQ#3777R

Matrix: WATER Lab Sample ID: 9710L692-002

Sample wt/vol: 980 (g/mL) ML Lab File ID: 10099709.26

Level: (low/med) LOW Date Received: 10/08/97

% Moisture: not dec. _____ dec. Date Extracted: 10/09/97

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 10/10/97

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
319-84-6	Alpha-BHC	0.051	U
319-85-7	Beta-BHC	0.051	U
319-86-8	Delta-BHC	0.051	U
58-89-9	gamma-BHC (Lindane)	0.051	U
76-44-8	Heptachlor	0.051	U
309-00-2	Aldrin	0.051	U
1024-57-3	Heptachlor epoxide	0.051	U
959-98-8	Endosulfan I	0.051	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.51	U
53494-70-5	Endrin ketone	0.10	U
7421934	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.051	U
5103-74-2	gamma-Chlordane	0.051	U
8001-35-2	Toxaphene	5.1	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

(US, I P3c)

FORM 1 PEST 12/88 Rev.

gw 10-17-97

M 14NOV97

2A

WATER VOLATILE SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#3777R

RFW Lot No.: 9710L692

	CLIENT SAMPLE NO.	S1 (DCE) #	S2 (TOL) #	S3 (BFB) #	OTHER	TOT OUT
01	04LA-97-0480 01/19	96	93	99		0
02	VBLKAGLVX241-MB1	110	100	110		0

	QC LIMITS
S1 (DCE) = 1,2-Dichloroethane-d4	(76-114)
S2 (TOL) = Toluene-d8	(88-110)
S3 (BFB) = Bromofluorobenzene	(86-115)

Column to be used to flag recovery values
* Values outside of QC limits
D Surrogates diluted out

4A
VOLATILE METHOD BLANK SUMMARY

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L692

Lab File ID: X101328 Lab Sample ID: 97LVX241-MB1

Date Analyzed: 10/14/97 Time Analyzed: 0052

Matrix: (soil/water) WATER Level:(low/med) LOW

Instrument ID: 5970X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	04LA-97-0480 01/19	9710L692-001	X101334	0506
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

COMMENTS:

FORM IV VOA MAC-SW846-4

5A
VOLATILE ORGANIC GC/MS TUNING AND MASS
CALIBRATION - BROMOFLUOROBENZENE (BFB)

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L692

Lab File ID: X101319 BFB Injection Date: 10/13/97

Instrument ID: 5970X BFB Injection Time: 1932

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	8.0 - 40.0% of mass 95	20.0
75	30.0 - 66.0% of mass 95	50.1
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	8.0
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	50.0 - 120.0% of mass 95	84.2
175	4.0 - 9.0% of mass 174	6.5 (7.7)1
176	93.0 - 100.9% of mass 174	84.6 (100.5)1
177	5.0 - 9.0% of mass 176	6.2 (7.3)2

1-Value is % of mass 174 2-Value is % of mass 176

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD10	VSTD10	X101320	10/13/97	1947
02	VSTD20	VSTD20	X101321	10/13/97	2022
03	VSTD50	VSTD50	X101322	10/13/97	2058
04	VSTD100	VSTD100	X101323	10/13/97	2136
05	VSTD200	VSTD200	X101324	10/13/97	2215
06	VSTD05	VSTD05	X101326	10/13/97	2334
07	VBLKAG	97LVX241-MB1	X101328	10/14/97	0052
08	04LA-97-0480 01/19	9710L692-001	X101334	10/14/97	0506
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

8A
VOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L692

Lab File ID (Standard): X101322 Date Analyzed: 10/13/97

Instrument ID: 5970X Time Analyzed: 2058

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

		IS1 AREA #	RT	IS2(CBZ) AREA #	RT	IS3(DCB) AREA #	RT
	12 HOUR STD	664373	15.97	540256	20.24	363991	23.0
	UPPER LIMIT	1328746	16.47	1080512	20.74	727982	23.5
	LOWER LIMIT	332186	15.47	270128	19.74	181996	22.5
	EPA SAMPLE NO.						
01	VBLKAG	694086	15.96	574523	20.24	364496	23.04
02	04LA-97-0480 01/19	771195	15.96	594352	20.24	389645	23.05
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 = Fluorobenzene
IS2 (CBZ) = Chlorobenzene-d5
IS3 (DCB) = 1,4-Dichlorobenzene-d4

UPPER LIMIT = +100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk.

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L692

Instrument ID: 5970X Calibration Date(s): 10/13/97

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

= Min RRF for SPCC Max %RSD for CCC(*) = 30.0%

LAB FILE ID: RRF10 =x101320.d RRF20 =x101321.d
RRF50 =x101322.d RRF100=x101323.d RRF200=x101324.d

COMPOUND		RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	% RSD
Dichlorodifluoromethane		0.403	0.457	0.632	0.580	0.555	0.525	17.7
Chloromethane	#	0.240	0.262	0.306	0.293	0.278	0.276	9.4#
Vinyl Chloride	*	0.221	0.256	0.297	0.288	0.280	0.268	11.3*
Bromomethane		0.203	0.255	0.309	0.314	0.362	0.289	21.2
Chloroethane		0.155	0.179	0.200	0.189	0.182	0.181	9.1
Trichlorofluoromethane		0.552	0.596	0.654	0.615	0.597	0.603	6.1
1,1-Dichloroethene	*	0.162	0.185	0.188	0.183	0.182	0.180	5.8*
Methylene Chloride		0.413	0.440	0.453	0.409	0.369	0.417	7.8
Acetone		0.104	0.098	0.089	0.084	0.075	0.090	12.5
trans-1,2-Dichloroethene		0.377	0.432	0.434	0.420	0.403	0.413	5.8
1,1-Dichloroethane	#	0.596	0.695	0.696	0.672	0.643	0.660	6.3#
cis-1,2-Dichloroethene		0.398	0.449	0.440	0.419	0.390	0.419	6.1
2,2-Dichloropropane		0.519	0.637	0.631	0.602	0.566	0.591	8.3
2-Butanone		0.196	0.171	0.176	0.154	0.155	0.170	10.2
Bromochloromethane		0.307	0.312	0.332	0.297	0.290	0.308	5.2
Chloroform	*	0.771	0.793	0.838	0.791	0.683	0.775	7.4*
1,1,1-Trichloroethane		0.637	0.670	0.735	0.632	0.620	0.659	7.0
Carbon Tetrachloride		0.524	0.576	0.620	0.582	0.566	0.574	6.0
1,1-Dichloropropene		0.172	0.176	0.177	0.162	0.150	0.167	6.9
Benzene		0.833	0.848	0.828	0.793	0.779	0.816	3.5
1,2-Dichloroethane		0.454	0.473	0.445	0.430	0.414	0.443	5.1
Trichloroethene		0.536	0.570	0.533	0.498	0.459	0.519	8.1
1,2-Dichloropropane	*	0.378	0.397	0.385	0.367	0.349	0.375	4.9*
Dibromomethane		0.513	0.552	0.550	0.527	0.460	0.520	7.2
Bromodichloromethane		0.770	0.816	0.808	0.774	0.702	0.774	5.8
cis-1,3-Dichloropropene		0.778	0.728	0.734	0.717	0.681	0.728	4.8
Toluene	*	0.823	0.747	0.737	0.694	0.631	0.726	9.7*
4-Methyl-2-Pentanone		0.553	0.484	0.467	0.464	0.436	0.481	9.1
trans-1,3-Dichloropropene		0.676	0.657	0.668	0.649	0.590	0.648	5.2
1,1,2-Trichloroethane		0.517	0.517	0.508	0.485	0.442	0.494	6.4
Tetrachloroethene		0.634	0.628	0.605	0.569	0.513	0.590	8.5
1,3-Dichloropropane		0.764	0.737	0.708	0.668	0.580	0.691	10.3
2-Hexanone		0.323	0.310	0.319	0.320	0.290	0.312	4.4
Dibromochloromethane		0.848	0.907	0.923	0.896	0.803	0.875	5.6
1,2-Dibromoethane		0.816	0.836	0.821	0.778	0.692	0.789	7.4
Chlorobenzene	#	1.040	1.046	1.008	0.962	0.910	0.993	5.8#
1,1,1,2-Tetrachloroethane		0.585	0.598	0.591	0.551	0.484	0.562	8.4
Ethylbenzene	*	0.466	0.456	0.431	0.391	0.348	0.418	11.6*

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L692

Instrument ID: 5970X Calibration Date(s): 10/13/97

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

= Min RRF for SPCC Max %RSD for CCC(*) = 30.0%

LAB FILE ID: RRF10 =x101320.d RRF20 =x101321.d
RRF50 =x101322.d RRF100=x101323.d RRF200=x101324.d

COMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	% RSD
Xylenes (Total)	1.646	1.646	1.542	1.411	1.205	1.490	12.5
Styrene	1.016	0.956	0.940	0.865	0.750	0.905	11.3
Bromoform #	0.754	0.784	0.823	0.789	0.711	0.772	5.5
Isopropylbenzene	1.437	1.454	1.373	1.264	1.120	1.330	10.5
Bromobenzene	1.932	1.909	1.841	1.775	1.663	1.824	6.0
1,2,3-Trichloropropane	0.340	0.339	0.341	0.335	0.314	0.334	3.4
1,1,2,2-Tetrachloroethane #	1.207	1.094	1.197	1.219	1.170	1.177	4.2
N-Propylbenzene	0.605	0.619	0.602	0.594	0.574	0.599	2.8
2-Chlorotoluene	0.619	0.637	0.605	0.592	0.572	0.605	4.1
4-Chlorotoluene	0.660	0.680	0.657	0.629	0.574	0.640	6.4
1,3,5-Trimethylbenzene	1.953	1.866	1.765	1.727	1.612	1.785	7.3
Tert-Butylbenzene	0.486	0.488	0.469	0.459	0.438	0.468	4.4
1,2,4-Trimethylbenzene	1.969	1.928	1.836	1.779	1.674	1.837	6.4
Sec-Butylbenzene	0.539	0.555	0.525	0.512	0.495	0.525	4.4
1,3-Dichlorobenzene	1.345	1.371	1.284	1.237	1.173	1.282	6.3
1,4-Dichlorobenzene	1.611	1.609	1.576	1.525	1.433	1.551	4.8
4-Isopropyltoluene	2.339	2.280	2.180	2.077	1.880	2.151	8.4
1,2-Dichlorobenzene	1.502	1.444	1.378	1.345	1.290	1.392	6.0
N-Butylbenzene	0.550	0.578	0.566	0.558	0.519	0.554	4.1
1,2-Dibromo-3-chloropropane	0.320	0.354	0.406	0.430	0.442	0.390	13.3
Carbon Disulfide	0.448	0.593	0.502	0.540	0.760	0.569	21.0
Freon-113	0.282	0.318	0.286	0.275	0.341	0.300	9.4
Iodomethane	0.442	0.514	0.489	0.496	0.662	0.521	16.0
1,2-Dichloroethane-d4	0.399	0.434	0.406	0.386	0.391	0.403	4.7
Toluene-d8	1.204	1.118	1.085	1.014	0.966	1.077	8.6
4-Bromofluorobenzene	1.192	1.250	1.227	1.194	1.185	1.210	2.3

2E

WATER ORGANICS SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#3777R RFW Lot No.: 9710L692

GC Column(1): HYPERS ID: 4.6 (mm) GC Column(2): ID: ____(mm)

	CLIENT SAMPLE NO.	1 %REC #	2 %REC #	1 %REC #	2 %REC #	1 %REC #	2 %REC #	TOT OUT
01	04LA-97-0480 03	51 *						1
02	BLK	87						0
03	BLKBS	96						0
04	BLKBSD	93						0

ADVISORY
QC LIMITS
(65-115)

= Triphenylene

Column to be used to flag recovery values
* Values outside of QC limits
D Surrogate diluted out

10/23/97

3E

WATER ORGANICS BLANK SPIKE/BLANK SPIKE DUPLICATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Client : LANL-REQ#3777R RFW Lot No.: 97LE1878-MB1

BLANK Spike - Sample No.: BLK

COMPOUND	SPIKE ADDED ug/L	SAMPLE CONCENTRATION ug/L	BS CONCENTRATION ug/L	BS % REC #	QC LIMITS REC.
Naphthalene	90.0	0	66	74	35-105
Acenaphthylene	115	0	86	75	55-105
Acenaphthene	90.0	0	69	76	55-105
Fluorene	10.5	0	7.8	74	65-100
Phenanthrene	32.0	0	24	77	70-100
Anthracene	33.0	0	28	84	65-125
Fluoranthene	10.5	0	8.1	77	70-105
Pyrene	13.5	0	11	81	65-110
Benzo(a)anthracene	0.650	0	0.55	85	70-115
Chrysene	7.50	0	6.1	81	70-110
Benzo(b)fluoranthrene	0.900	0	0.77	86	70-120
Benzo(k)fluoranthrene	0.850	0	0.70	82	70-120
Benzo(a)pyrene	1.18	0	0.93	79	70-105
Dibenzo(a,h)anthracene	1.50	0	0.91	61	60-115
Benzo(ghi)perylene	3.80	0	1.8	48 *	55-115
Indeno(1,2,3-cd)pyrene	2.15	0	1.6	76	65-115

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

01/23/97

3E

WATER ORGANICS BLANK SPIKE/BLANK SPIKE DUPLICATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Client : LANL-REQ#3777R RFW Lot No.: 97LE1878-MB1

BLANK Spike - Sample No.: BLK

COMPOUND	SPIKE ADDED ug/L	BSD CONCENTRATION ug/L	BSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC
Naphthalene	90.0	67	75	1	88	35-105
Acenaphthylene	115	91	79	5	113	55-105
Acenaphthene	90.0	75	83	8	18	55-105
Fluorene	10.5	8.5	81	9	52	65-100
Phenanthrene	32.0	26	82	6	27	70-100
Anthracene	33.0	30	90	6	52	65-125
Fluoranthene	10.5	8.5	81	5	22	70-105
Pyrene	13.5	12	86	6	56	65-110
Benzo(a)anthracene	0.650	0.56	86	1	17	70-115
Chrysene	7.50	6.5	87	7	29	70-110
Benzo(b)fluoranthrene	0.900	0.84	93	7	53	70-120
Benzo(k)fluoranthrene	0.850	0.76	89	8	17	70-120
Benzo(a)pyrene	1.18	0.98	83	4	28	70-105
Dibenzo(a,h)anthracene	1.50	1.2	81	28	59	60-115
Benzo(ghi)perylene	3.80	2.3	61	24 *	23	55-115
Indeno(1,2,3-cd)pyrene	2.15	1.9	88	14	21	65-115

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 1 out of 16 outside limits
Spike Recovery: 1 out of 32 outside limits

COMMENTS:

Ok 10/23/97

4C

ORGANICS METHOD BLANK SUMMARY

CLIENT SAMPLE NO.

BLK

Lab Name: Recra.LabNet Contract: 2744-64-01

Client: LANL-REQ#3777R

Lab Sample ID: 97LE1878-MB1 Lab File ID: 10109723.11

Matrix:(soil/water) WATER Extraction:(SepF/Cont/Sonc) SEPF

Sulfur Cleanup: (Y/N) _ Date Extracted: 10/09/97

Date Analyzed (1): 10/10/97 Date Analyzed (2): _____

Time Analyzed (1): 1043 Time Analyzed (2): ____

Instrument ID (1): 23 Instrument ID (2):

GC Column (1): HYPERS ID: 4.6 (mm) GC Column (2): ID: ____(mm)

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED 1	DATE ANALYZED 2
01	04LA-97-0480	9710L692-003	10/10/97	
02	BLKBS	97LE1878-MB1S	10/10/97	
03	BLKBSD	97LE1878-MB1T	10/10/97	

COMMENTS: _____

10/20/97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: NONE

Client: LAB

GC Sample ID: 10109723.04

RFW Lot No.:

GC Column: HYPERSIL,4.6m

Instrument ID: 23

Method: 23001

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/01/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 0825
STANDARD ID: STD 5535031D

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Naphthalene								
Acenaphthylene								
Acenaphthene								
Fluorene								
Phenanthrene	5.04	4.99	5.09	181	5.04	183		1.1
Anthracene	5.56	5.50	5.62	409	5.56	416		1.7
Fluoranthene	6.10	6.04	6.16	394	6.10	395		0.3
Pyrene	6.51	6.45	6.57	948	6.51	1004		5.9
Triphenylene	7.09	7.02	7.16	143	7.09	155		8.4
Benzo(a)anthracene	7.95	7.87	8.03	7351	7.95	7502		2.1
Chrysene	8.23	8.15	8.31	555	8.23	585		5.4
Benzo(b)fluoranthren	9.38	9.29	9.47	1293	9.38	1329		2.8
Benzo(k)fluoranthren	9.90	9.80	10.00	6893	9.90	7233		4.9
Benzo(a)pyrene	10.42	10.32	10.52	6923	10.42	6977		0.8
Dibenzo(a,h)anthrace	11.24	11.13	11.35	4360	11.24	4645		6.5
Benzo(ghi)perylene	11.66	11.54	11.78	2979	11.66	3251		9.1
Indeno(1,2,3-cd)pyre								
	12.51	12.38	12.64	3820	12.51	4350		14

%D should not exceed 15%

10/23/97

RFW 9/93 A

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: NONE

Client: LAB

GC Sample ID: 10109723.10

RFW Lot No.:

GC Column: HYPERSIL,4.6m

Instrument ID: 23

Method: 23001

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/01/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 1023
STANDARD ID: STD 5535031D

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Naphthalene								
Acenaphthylene								
Acenaphthene								
Fluorene								
Phenanthrene	5.04	4.99	5.09	181	5.04	188		3.9
Anthracene	5.56	5.50	5.62	409	5.55	427		4.4
Fluoranthene	6.10	6.04	6.16	394	6.10	407		3.3
Pyrene	6.51	6.45	6.57	948	6.50	1012		6.8
Triphenylene	7.09	7.02	7.16	143	7.08	148		3.5
Benzo(a)anthracene	7.95	7.87	8.03	7351	7.95	7640		3.9
Chrysene	8.23	8.15	8.31	555	8.23	589		6.1
Benzo(b)fluoranthren	9.38	9.29	9.47	1293	9.38	1278		- 1.2
Benzo(k)fluoranthren	9.90	9.80	10.00	6893	9.90	7372		6.9
Benzo(a)pyrene	10.42	10.32	10.52	6923	10.42	6993		1.0
Dibenzo(a,h)anthrace	11.24	11.13	11.35	4360	11.24	4577		5.0
Benzo(ghi)perylene	11.66	11.54	11.78	2979	11.66	3296		11
Indeno(1,2,3-cd)pyre								
	12.51	12.38	12.64	3820	12.51	4386		15

%D should not exceed 15%

10/23/97

RFW 9/93 A

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: NONE

Client: LAB

GC Sample ID: 10109723.19

RFW Lot No.:

GC Column: HYPERSIL,4.6m

Instrument ID: 23

Method: 23001

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/01/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 1320
STANDARD ID: STD 5535031D

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Naphthalene								
Acenaphthylene								
Acenaphthene								
Fluorene								
Phenanthrene	5.04	4.99	5.09	181	5.05	182		0.6
Anthracene	5.56	5.50	5.62	409	5.56	418		2.2
Fluoranthene	6.10	6.04	6.16	394	6.10	398		1.0
Pyrene	6.51	6.45	6.57	948	6.51	985		3.9
Triphenylene	7.09	7.02	7.16	143	7.09	149		4.2
Benzo(a)anthracene	7.95	7.87	8.03	7351	7.95	7486		1.8
Chrysene	8.23	8.15	8.31	555	8.23	571		2.9
Benzo(b)fluoranthren	9.38	9.29	9.47	1293	9.38	1347		4.2
Benzo(k)fluoranthren	9.90	9.80	10.00	6893	9.90	7259		5.3
Benzo(a)pyrene	10.42	10.32	10.52	6923	10.42	6803		- 1.7
Dibenzo(a,h)anthrace	11.24	11.13	11.35	4360	11.24	4605		5.6
Benzo(ghi)perylene	11.66	11.54	11.78	2979	11.66	3259		9.4
Indeno(1,2,3-cd)pyre								
	12.51	12.38	12.64	3820	12.56	3666		- 4.0

%D should not exceed 15%

10/23/97

RFW 9/93 A

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: _____

Client: _____

GC Sample ID: 10109724.04

RFW Lot No.: _____

GC Column: HYPERSIL,4.6

Instrument ID: 24

Method: 24001

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/01/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 0825
STANDARD ID: STD 5535031D

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Naphthalene	3.12	3.09	3.15	47	3.12	46		- 2.1
Acenaphthylene	3.64	3.60	3.68	33	3.64	33		0.0
Acenaphthene	4.36	4.32	4.40	22	4.36	22		0.0
Fluorene				235				
Phenanthrene								
Anthracene								
Fluoranthene								
Pyrene								
Triphenylene	7.15	7.08	7.22	989	7.15	1001		1.2
Benzo(a)anthracene								
Chrysene								
Benzo(b)fluoranthren								
Benzo(k)fluoranthren								
Benzo(a)pyrene								
Dibenzo(a,h)anthrace								
Benzo(ghi)perylene								
Indeno(1,2,3-cd)pyre	11.98	11.86	12.10	304	11.98	330		8.6

%D should not exceed 15%

10/13/97

RFW 9/93 A

052

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: _____

Client: _____

GC Sample ID: 10109724.10

RFW Lot No.: _____

GC Column: HYPERSIL,4.6

Instrument ID: 24

Method: 24001

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/01/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 1023
STANDARD ID: STD 5535031D

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Naphthalene	3.12	3.09	3.15	47	3.12	47		0.0
Acenaphthylene	3.64	3.60	3.68	33	3.64	34		3.0
Acenaphthene	4.36	4.32	4.40	22	4.35	22		0.0
Fluorene				235				
Phenanthrene								
Anthracene								
Fluoranthene								
Pyrene								
Triphenylene	7.15	7.08	7.22	989	7.15	1017		2.8
Benzo(a)anthracene								
Chrysene								
Benzo(b)fluoranthren								
Benzo(k)fluoranthren								
Benzo(a)pyrene								
Dibenzo(a,h)anthrace								
Benzo(ghi)perylene								
Indeno(1,2,3-cd)pyre	11.98	11.86	12.10	304	11.99	330		8.6

%D should not exceed 15%

10/23/97

RFW 9/93 A

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: _____

Client: _____

GC Sample ID: 10109724.19

RFW Lot No.: _____

GC Column: HYPERSIL,4.6

Instrument ID: 24

Method: 24001

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/01/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 1320
STANDARD ID: STD 5535031D

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Naphthalene	3.12	3.09	3.15	47	3.13	46		- 2.1
Acenaphthylene	3.64	3.60	3.68	33	3.64	33		0.0
Acenaphthene	4.36	4.32	4.40	22	4.36	22		0.0
Fluorene				235				
Phenanthrene								
Anthracene								
Fluoranthene								
Pyrene								
Triphenylene	7.15	7.08	7.22	989	7.15	998		0.9
Benzo(a)anthracene								
Chrysene								
Benzo(b)fluoranthren								
Benzo(k)fluoranthren								
Benzo(a)pyrene								
Dibenzo(a,h)anthrace								
Benzo(ghi)perylene								
Indeno(1,2,3-cd)pyre	11.98	11.86	12.10	304	11.98	406	*	34

%D should not exceed 15%

10/23/97

RFW 9/93 A

2E

WATER PESTICIDE SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#3777R

RFW Lot No.: 9710L692

	CLIENT SAMPLE NO.	S1 (DCB)#	OTHER TCX
01	04LA-97-0480 02	39	33
02	PBLKABLE1877-MB1	83	68
03	PBLKABLE1877-MB1 BS	81	58
04	PBLKABLE1877-MB1 BSD	85	65

	ADVISORY QC LIMITS
S1 (DCB) = Decachlorobiphenyl	(22-126)
S2 (TCX) = Tetrachloro-m-xylene	(27-129)

Column to be used to flag recovery values
* Values outside of QC limits
D Surrogates diluted out

gw 10-17-97

3E

WATER PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#3777R RFW Lot No.: 9710L692

MATRIX Spike - Sample No.: PBLKABLE1877-MB1 Level:(low/med) LOW

COMPOUND	SPIKE ADDED UG/L	SAMPLE CONCENTRATION UG/L	MS CONCENTRATION UG/L	MS % REC #	QC LIMITS REC
gamma-BHC (Lindane)	0.200	0	0.140	70	56 -127
Heptachlor	0.200	0	0.150	75	50 -129
Aldrin	0.200	0	0.170	85	48 -133
Dieldrin	0.500	0	0.430	86	57 -131
Endrin	0.500	0	0.390	78	46 -150
4,4'-DDT	0.500	0	0.370	74	38 -138

COMPOUND	SPIKE ADDED UG/L	MSD CONCENTRATION UG/L	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC
gamma-BHC (Lindane)	0.200	0.180	90	25 *	15	56 -127
Heptachlor	0.200	0.160	80	6	20	50 -129
Aldrin	0.200	0.180	90	5	22	48 -133
Dieldrin	0.500	0.480	96	10	18	57 -131
Endrin	0.500	0.480	96	20	21	46 -150
4,4'-DDT	0.500	0.450	90	19	27	38 -138

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 1 out of 6 outside limits
Spike Recovery: 0 out of 12 outside limits

COMMENTS:

JW 10.17.97

4C

PESTICIDE METHOD BLANK SUMMARY

Lab Name: Recra.LabNet

Contract: 2744-64-01

Case No.: LANL-REQ#3777R

Lab Sample ID: 97LE1877-MB1

Lab File ID: 10099709 .27

Matrix:(Soil/Water) WATER

Level:(low/med) LOW

Date Extracted: 10/09/97

Extraction:(SepF/Cont/Sonc) SEPF

Date Analyzed (1): 10/10/97

Date Analyzed (2): 10/10/97

Time Analyzed (1): 1028

Time Analyzed (2): 1028

Instrument ID (1): 09

Instrument ID (2): 10

GC Column ID (1): DB608

GC Column ID (2): RTX1701

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED 1	DATE ANALYZED 2
01	04LA-97-0480 02	9710L692-002	10/10/97	10/10/97
02	PBLKABLE1877-MB1 BS	97LE1877-MB1S	10/10/97	10/10/97
03	PBLKABLE1877-MB1 BSD	97LE1877-MB1T	10/10/97	10/10/97

COMMENTS:

10.17.97

FORM IV PEST

5/88 Rev.

8H

PESTICIDE ANALYSIS SEQUENCE

Lab Name: Recra.LabNet

Contract: 02744-064-001-9999-00

Client: LANL-REQ#3777R

GC Sample ID: 10019709

Instrument ID: 09

GC Column ID: DB608

Dates of Analyses: 10/01/97 to 10/02/97

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	ZZZZZ	EVAL 2002	10/01/97	1109
02	ZZZZZ	AR1660 1902	10/01/97	1202
03	ZZZZZ	TOXAPH 2101	10/01/97	1255
04	ZZZZZ	AR1221 1706	10/01/97	1349
05	ZZZZZ	AR1232 2201	10/01/97	1442
06	ZZZZZ	AR1242 1903	10/01/97	1535
07	ZZZZZ	AR1248 2302	10/01/97	1628
08	ZZZZZ	AR1254 1501	10/01/97	1721
09	ZZZZZ	INDA 3501 A	10/01/97	1814
10	ZZZZZ	INDA 3502 B	10/01/97	1907
11	ZZZZZ	INDA 3506 C	10/01/97	2000
12	ZZZZZ	INDA 3504 D	10/01/97	2053
13	ZZZZZ	INDA 3505 E	10/01/97	2146
14	ZZZZZ	INDB 5501 A	10/01/97	2239
15	ZZZZZ	INDB 5502 B	10/01/97	2332
16	ZZZZZ	INDB 5503 C	10/02/97	0025
17	ZZZZZ	INDB 5504 D	10/02/97	0118
18	ZZZZZ	INDB 5505 E	10/02/97	0211
19	ZZZZZ	AR1254 5401 A	10/02/97	0304
20	ZZZZZ	AR1254 5402 B	10/02/97	0357
21	ZZZZZ	AR1254 5403 C	10/02/97	0450
22	ZZZZZ	AR1254 5404 D	10/02/97	0543
23	ZZZZZ	AR1254 5405 E	10/02/97	0636
24	ZZZZZ	AR1660 3401 A	10/02/97	0730
25	ZZZZZ	AR1660 3402 B	10/02/97	0823
26	ZZZZZ	AR1660 3403 C	10/02/97	0916
27	ZZZZZ	AR1660 3404 D	10/02/97	1010
28	ZZZZZ	AR1660 3405 E	10/02/97	1104

gw 10.17.97

FORM VIII PEST

8H

PESTICIDE ANALYSIS SEQUENCE

Lab Name: Recra.LabNet

Contract: 02744-064-001-9999-00

Client: LANL-REQ#3777R

GC Sample ID: 10099709

Instrument ID: 09

GC Column ID: DB608

Dates of Analyses: 10/09/97 to 10/10/97

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	ZZZZZ	INDA 3506 C	10/09/97	1112
02	ZZZZZ	INDB 5503 C	10/09/97	1205
03	ZZZZZ	AR1660 1902	10/09/97	1258
04	ZZZZZ	INDA 3506 C	10/10/97	0042
05	ZZZZZ	INDB 5503 C	10/10/97	0135
06	ZZZZZ	AR1660 1902	10/10/97	0228
07	ZZZZZ	EVAL 2002	10/10/97	0321
08	ZZZZZ	9710L679-007	10/10/97	0414
09	ZZZZZ	9710L679-008	10/10/97	0507
10	ZZZZZ	9710L679-009	10/10/97	0601
11	ZZZZZ	9710L679-010	10/10/97	0654
12	ZZZZZ	9710L679-011	10/10/97	0747
13	ZZZZZ	9710L679-012	10/10/97	0840
14	04LA-97-0480 02	9710L692-002	10/10/97	0934
15	PBLKABLE1877	97LE1877-MB1	10/10/97	1028
16	PBLKABLE1877 MS	97LE1877-MB1S	10/10/97	1122
17	PBLKABLE1877 MSD	97LE1877-MB1T	10/10/97	1215
18	ZZZZZ	HEXANE	10/10/97	1308
19	ZZZZZ	INDA 3506 C	10/10/97	1401
20	ZZZZZ	INDB 5503 C	10/10/97	1454
21	ZZZZZ	AR1660 1902	10/10/97	1547

gw 10-17-97

FORM VIII PEST

8H

PESTICIDE ANALYSIS SEQUENCE

Lab Name: Recra.LabNet

Contract: 02744-064-001-9999-00

Client: LANL-REQ#3777R

GC Sample ID: 10019710

Instrument ID: 10

GC Column ID: RTX1701

Dates of Analyses: 10/01/97 to 10/02/97

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	ZZZZZ	EVAL 2002	10/01/97	1109
02	ZZZZZ	AR1660 1902	10/01/97	1202
03	ZZZZZ	TOXAPH 2101	10/01/97	1255
04	ZZZZZ	AR1221 1706	10/01/97	1349
05	ZZZZZ	AR1232 2201	10/01/97	1442
06	ZZZZZ	AR1242 1903	10/01/97	1535
07	ZZZZZ	AR1248 2302	10/01/97	1628
08	ZZZZZ	AR1254 1501	10/01/97	1721
09	ZZZZZ	INDA 3501 A	10/01/97	1814
10	ZZZZZ	INDA 3502 B	10/01/97	1907
11	ZZZZZ	INDA 3506 C	10/01/97	2000
12	ZZZZZ	INDA 3504 D	10/01/97	2053
13	ZZZZZ	INDA 3505 E	10/01/97	2146
14	ZZZZZ	INDB 5501 A	10/01/97	2239
15	ZZZZZ	INDB 5502 B	10/01/97	2332
16	ZZZZZ	INDB 5503 C	10/02/97	0025
17	ZZZZZ	INDB 5504 D	10/02/97	0118
18	ZZZZZ	INDB 5505 E	10/02/97	0211
19	ZZZZZ	AR1254 5401 A	10/02/97	0304
20	ZZZZZ	AR1254 5402 B	10/02/97	0357
21	ZZZZZ	AR1254 5403 C	10/02/97	0450
22	ZZZZZ	AR1254 5404 D	10/02/97	0543
23	ZZZZZ	AR1254 5405 E	10/02/97	0636
24	ZZZZZ	AR1660 3401 A	10/02/97	0730
25	ZZZZZ	AR1660 3402 B	10/02/97	0823
26	ZZZZZ	AR1660 3403 C	10/02/97	0916
27	ZZZZZ	AR1660 3404 D	10/02/97	1010
28	ZZZZZ	AR1660 3405 E	10/02/97	1104

gd 10-17-97

FORM VIII PEST

8H

PESTICIDE ANALYSIS SEQUENCE

Lab Name: Recra.LabNet

Contract: 02744-064-001-9999-00

Client: LANL-REQ#3777R

GC Sample ID: 10099710

Instrument ID: 10

GC Column ID: RTX1701

Dates of Analyses: 10/09/97 to 10/10/97

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	ZZZZZ	INDA 3506 C	10/09/97	1112
02	ZZZZZ	INDB 5503 C	10/09/97	1205
03	ZZZZZ	AR1660 1902	10/09/97	1258
04	ZZZZZ	INDA 3506 C	10/10/97	0042
05	ZZZZZ	INDB 5503 C	10/10/97	0135
06	ZZZZZ	AR1660 1902	10/10/97	0228
07	ZZZZZ	EVAL 2002	10/10/97	0321
08	ZZZZZ	9710L679-007	10/10/97	0414
09	ZZZZZ	9710L679-008	10/10/97	0507
10	ZZZZZ	9710L679-009	10/10/97	0601
11	ZZZZZ	9710L679-010	10/10/97	0654
12	ZZZZZ	9710L679-011	10/10/97	0747
13	ZZZZZ	9710L679-012	10/10/97	0840
14	04LA-97-0480 02	9710L692-002	10/10/97	0934
15	PBLKABLE1877	97LE1877-MB1	10/10/97	1028
16	PBLKABLE1877 MS	97LE1877-MB1S	10/10/97	1122
17	PBLKABLE1877 MSD	97LE1877-MB1T	10/10/97	1215
18	ZZZZZ	HEXANE	10/10/97	1308
19	ZZZZZ	INDA 3506 C	10/10/97	1401
20	ZZZZZ	INDB 5503 C	10/10/97	1454
21	ZZZZZ	AR1660 1902	10/10/97	1547

gw 10-17-97

FORM VIII PEST

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099709.01

RFW Lot No.: 9710L692

GC Column: DB608

Instrument ID: 09

Method: P093

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/09/97
TIME OF ANALYSIS 1112
STANDARD ID: INDA 3506 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.76	11.71	11.81	4281665	11.76	4107701		- 4.1
Beta-BHC	13.62	13.57	13.67	2320493				
Delta-BHC	15.08	15.03	15.13	3779461				
gamma-BHC (Lindane)	13.35	13.30	13.40	4225365	13.35	4040951		- 4.4
Heptachlor	14.64	14.59	14.69	3492963	14.64	3377801		- 3.3
Aldrin	15.93	15.88	15.98	3239559				
Heptachlor epoxide	18.10	18.05	18.15	3213823				
Endosulfan I	19.46	19.39	19.53	3139383	19.46	3030201		- 3.5
Dieldrin	20.62	20.55	20.69	3127943	20.62	2986651		- 4.5
4,4'-DDE	20.30	20.23	20.37	3379989				
Endrin	22.00	21.93	22.07	2800759	22.00	2682475		- 4.2
Endosulfan II	22.67	22.60	22.74	2719373				
4,4'-DDD	22.38	22.31	22.45	2563269	22.38	2437525		- 4.9
Endosulfan sulfate	24.34	24.26	24.40	2261575				
4,4'-DDT	23.50	23.43	23.57	2772911	23.50	2670351		- 3.7
Methoxychlor	26.77	26.70	26.84	1052793	26.77	1023805		- 2.8
Endrin aldehyde	23.88	23.81	23.95	2161101				
Endrin ketone	27.34	27.28	27.42	2322887				
alpha-Chlordane	19.34	19.27	19.41	3484041				
gamma-Chlordane	18.73	18.66	18.80	3419237				
Tetrachloro-m-xylene	8.95	8.88	9.02	2958511	8.96	2833875		- 4.2
Decachlorobiphenyl	33.86	33.79	33.93	1678963	33.84	1552851		- 7.5

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099709.02

RFW Lot No.: 9710L692

GC Column: DB608

Instrument ID: 09

Method: P093

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/09/97
TIME OF ANALYSIS 1205
STANDARD ID: INDB 5503 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.76	11.71	11.81	4281665				
Beta-BHC	13.62	13.57	13.67	2320493	13.62	2220001		- 4.3
Delta-BHC	15.08	15.03	15.13	3779461	15.08	3720651		- 1.6
gamma-BHC (Lindane)	13.35	13.30	13.40	4225365				
Heptachlor	14.64	14.59	14.69	3492963				
Aldrin	15.93	15.88	15.98	3239559	15.93	3130901		- 3.4
Heptachlor epoxide	18.10	18.05	18.15	3213823	18.10	3144801		- 2.1
Endosulfan I	19.46	19.39	19.53	3139383				
Dieldrin	20.62	20.55	20.69	3127943				
4,4'-DDE	20.30	20.23	20.37	3379989	20.30	3279351		- 3.0
Endrin	22.00	21.93	22.07	2800759				
Endosulfan II	22.67	22.60	22.74	2719373	22.67	2645851		- 2.7
4,4'-DDD	22.38	22.31	22.45	2563269				
Endosulfan sulfate	24.34	24.26	24.40	2261575	24.34	2374125		5.0
4,4'-DDT	23.50	23.43	23.57	2772911				
Methoxychlor	26.77	26.70	26.84	1052793				
Endrin aldehyde	23.88	23.81	23.95	2161101	23.88	2105051		- 2.6
Endrin ketone	27.34	27.28	27.42	2322887	27.34	2322301		0.0
alpha-Chlordane	19.34	19.27	19.41	3484041	19.34	3370151		- 3.3
gamma-Chlordane	18.73	18.66	18.80	3419237	18.73	3224901		- 5.7
Tetrachloro-m-xylene	8.95	8.88	9.02	2958511	8.95	2778851		- 6.1
Decachlorobiphenyl	33.86	33.79	33.93	1678963	33.86	1538201		- 8.4

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099709.03

RFW Lot No.: 9710L692

GC Column: DB608

Instrument ID: 09

Method: A093

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/09/97
TIME OF ANALYSIS 1258
STANDARD ID: AR1660 1902

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Aroclor-1016	11.58	11.51	11.65	80535	11.58	73550		- 8.7
Aroclor-1016	13.24	13.17	13.31	156222	13.24	143700		- 8.0
Aroclor-1016	14.69	14.62	14.76	221103	14.69	204120		- 7.7
Aroclor-1016	15.32	15.25	15.39	117860	15.32	109900		- 6.8
Aroclor-1016	17.18	17.11	17.25	101255	17.18	92890		- 8.3
Total				**676975**		**624160**		**- 7.8**
Aroclor-1260	20.87	20.80	20.94	145560	20.87	139070		- 4.5
Aroclor-1260	21.55	21.48	21.62	233406	21.55	223540		- 4.2
Aroclor-1260	21.86	21.78	21.92	299909	21.86	285400		- 4.8
Aroclor-1260	23.47	23.40	23.54	165063	23.47	151060		- 8.5
Aroclor-1260	25.40	25.33	25.47	416997	25.40	404920		- 2.9
Total				**1260935**		**1203990**		**- 4.5**
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Total								

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099709.16

RFW Lot No.: 9710L692

GC Column: DB608

Instrument ID: 09

Method: P093

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 0042
STANDARD ID: INDA 3506 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.76	11.71	11.81	4281665	11.76	4115001		- 3.9
Beta-BHC	13.62	13.57	13.67	2320493				
Delta-BHC	15.08	15.03	15.13	3779461				
gamma-BHC (Lindane)	13.35	13.30	13.40	4225365	13.34	4013401		- 5.0
Heptachlor	14.64	14.59	14.69	3492963	14.63	3025651		- 13
Aldrin	15.93	15.88	15.98	3239559				
Heptachlor epoxide	18.10	18.05	18.15	3213823				
Endosulfan I	19.46	19.39	19.53	3139383	19.46	2928551		- 6.7
Dieldrin	20.62	20.55	20.69	3127943	20.62	2948601		- 5.7
4,4'-DDE	20.30	20.23	20.37	3379989				
Endrin	22.00	21.93	22.07	2800759	22.00	2624725		- 6.3
Endosulfan II	22.67	22.60	22.74	2719373				
4,4'-DDD	22.38	22.31	22.45	2563269	22.38	2398551		- 6.4
Endosulfan sulfate	24.34	24.26	24.40	2261575				
4,4'-DDT	23.50	23.43	23.57	2772911	23.50	2503951		- 9.7
Methoxychlor	26.77	26.70	26.84	1052793	26.77	994035		- 5.6
Endrin aldehyde	23.88	23.81	23.95	2161101				
Endrin ketone	27.34	27.28	27.42	2322887				
alpha-Chlordane	19.34	19.27	19.41	3484041				
gamma-Chlordane	18.73	18.66	18.80	3419237				
Tetrachloro-m-xylene	8.95	8.88	9.02	2958511	8.95	2907875		- 1.7
Decachlorobiphenyl	33.86	33.79	33.93	1678963	33.84	1492831		- 11

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099709.17

RFW Lot No.: 9710L692

GC Column: DB608

Instrument ID: 09

Method: P093

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 0135
STANDARD ID: INDB 5503 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.76	11.71	11.81	4281665				
Beta-BHC	13.62	13.57	13.67	2320493	13.62	2216351		- 4.5
Delta-BHC	15.08	15.03	15.13	3779461	15.08	3778501		0.0
gamma-BHC (Lindane)	13.35	13.30	13.40	4225365				
Heptachlor	14.64	14.59	14.69	3492963				
Aldrin	15.93	15.88	15.98	3239559	15.92	3077851		- 5.0
Heptachlor epoxide	18.10	18.05	18.15	3213823	18.10	3098601		- 3.6
Endosulfan I	19.46	19.39	19.53	3139383				
Dieldrin	20.62	20.55	20.69	3127943				
4,4'-DDE	20.30	20.23	20.37	3379989	20.29	3243075		- 4.1
Endrin	22.00	21.93	22.07	2800759				
Endosulfan II	22.67	22.60	22.74	2719373	22.67	2577151		- 5.2
4,4'-DDD	22.38	22.31	22.45	2563269				
Endosulfan sulfate	24.34	24.26	24.40	2261575	24.33	2351725		4.0
4,4'-DDT	23.50	23.43	23.57	2772911				
Methoxychlor	26.77	26.70	26.84	1052793				
Endrin aldehyde	23.88	23.81	23.95	2161101	23.88	1869875		- 13
Endrin ketone	27.34	27.28	27.42	2322887	27.34	2298525		- 1.0
alpha-Chlordane	19.34	19.27	19.41	3484041	19.34	3280951		- 5.8
gamma-Chlordane	18.73	18.66	18.80	3419237	18.72	3196801		- 6.5
Tetrachloro-m-xylene	8.95	8.88	9.02	2958511	8.94	2879351		- 2.7
Decachlorobiphenyl	33.86	33.79	33.93	1678963	33.81	1475011		- 12

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099709.18

RFW Lot No.: 9710L692

GC Column: DB608

Instrument ID: 09

Method: A093

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 0228
STANDARD ID: AR1660 1902

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Aroclor-1016	11.58	11.51	11.65	80535	11.58	75040		- 6.8
Aroclor-1016	13.24	13.17	13.31	156222	13.25	146340		- 6.3
Aroclor-1016	14.69	14.62	14.76	221103	14.70	211300		- 4.4
Aroclor-1016	15.32	15.25	15.39	117860	15.33	111930		- 5.0
Aroclor-1016	17.18	17.11	17.25	101255	17.18	94880		- 6.3
Total				**676975**		**639490**		**- 5.5**
Aroclor-1260	20.87	20.80	20.94	145560	20.88	137070		- 5.8
Aroclor-1260	21.55	21.48	21.62	233406	21.56	222750		- 4.6
Aroclor-1260	21.86	21.78	21.92	299909	21.86	288400		- 3.8
Aroclor-1260	23.47	23.40	23.54	165063	23.48	155360		- 5.9
Aroclor-1260	25.40	25.33	25.47	416997	25.41	403010		- 3.4
Total				**1260935**		**1206590**		**- 4.3**
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Total								

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099709.31

RFW Lot No.: 9710L692

GC Column: DB608

Instrument ID: 09

Method: P093

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 1401
STANDARD ID: INDA 3506 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.76	11.71	11.81	4281665	11.74	4204151		- 1.8
Beta-BHC	13.62	13.57	13.67	2320493				
Delta-BHC	15.08	15.03	15.13	3779461				
gamma-BHC (Lindane)	13.35	13.30	13.40	4225365	13.32	4083751		- 3.4
Heptachlor	14.64	14.59	14.69	3492963	14.61	3045501		- 13
Aldrin	15.93	15.88	15.98	3239559				
Heptachlor epoxide	18.10	18.05	18.15	3213823				
Endosulfan I	19.46	19.39	19.53	3139383	19.44	3029251		- 3.5
Dieldrin	20.62	20.55	20.69	3127943	20.60	3062475		- 2.1
4,4'-DDE	20.30	20.23	20.37	3379989				
Endrin	22.00	21.93	22.07	2800759	21.98	2704375		- 3.4
Endosulfan II	22.67	22.60	22.74	2719373				
4,4'-DDD	22.38	22.31	22.45	2563269	22.37	2406925		- 6.1
Endosulfan sulfate	24.34	24.26	24.40	2261575				
4,4'-DDT	23.50	23.43	23.57	2772911	23.48	2558951		- 7.7
Methoxychlor	26.77	26.70	26.84	1052793	26.75	1001620		- 4.9
Endrin aldehyde	23.88	23.81	23.95	2161101				
Endrin ketone	27.34	27.28	27.42	2322887				
alpha-Chlordane	19.34	19.27	19.41	3484041				
gamma-Chlordane	18.73	18.66	18.80	3419237				
Tetrachloro-m-xylene	8.95	8.88	9.02	2958511	8.94	2908151		- 1.7
Decachlorobiphenyl	33.86	33.79	33.93	1678963	33.81	1581171		- 5.8

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099709.32

RFW Lot No.: 9710L692

GC Column: DB608

Instrument ID: 09

Method: P093

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 1454
STANDARD ID: INDB 5503 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.76	11.71	11.81	4281665				
Beta-BHC	13.62	13.57	13.67	2320493	13.61	2283051		- 1.6
Delta-BHC	15.08	15.03	15.13	3779461	15.06	3891651		3.0
gamma-BHC (Lindane)	13.35	13.30	13.40	4225365				
Heptachlor	14.64	14.59	14.69	3492963				
Aldrin	15.93	15.88	15.98	3239559	15.91	3228051		- 0.4
Heptachlor epoxide	18.10	18.05	18.15	3213823	18.08	3226051		0.4
Endosulfan I	19.46	19.39	19.53	3139383				
Dieldrin	20.62	20.55	20.69	3127943				
4,4'-DDE	20.30	20.23	20.37	3379989	20.28	3333675		- 1.4
Endrin	22.00	21.93	22.07	2800759				
Endosulfan II	22.67	22.60	22.74	2719373	22.65	2641451		- 2.9
4,4'-DDD	22.38	22.31	22.45	2563269				
Endosulfan sulfate	24.34	24.26	24.40	2261575	24.32	2396701		6.0
4,4'-DDT	23.50	23.43	23.57	2772911				
Methoxychlor	26.77	26.70	26.84	1052793				
Endrin aldehyde	23.88	23.81	23.95	2161101	23.86	2046225		- 5.3
Endrin ketone	27.34	27.28	27.42	2322887	27.32	2355475		1.4
alpha-Chlordane	19.34	19.27	19.41	3484041	19.32	3419951		- 1.8
gamma-Chlordane	18.73	18.66	18.80	3419237	18.71	3315301		- 3.0
Tetrachloro-m-xylene	8.95	8.88	9.02	2958511	8.94	2904225		- 1.8
Decachlorobiphenyl	33.86	33.79	33.93	1678963	33.79	1522981		- 9.3

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099709.33

RFW Lot No.: 9710L692

GC Column: DB608

Instrument ID: 09

Method: A093

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 1547
STANDARD ID: AR1660 1902

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Aroclor-1016	11.58	11.51	11.65	80535	11.57	77760		- 3.4
Aroclor-1016	13.24	13.17	13.31	156222	13.24	148860		- 4.7
Aroclor-1016	14.69	14.62	14.76	221103	14.68	215160		- 2.7
Aroclor-1016	15.32	15.25	15.39	117860	15.31	116000		- 1.6
Aroclor-1016	17.18	17.11	17.25	101255	17.17	97850		- 3.4
Total				**676975**		**655630**		**- 3.2**
Aroclor-1260	20.87	20.80	20.94	145560	20.87	142740		- 1.9
Aroclor-1260	21.55	21.48	21.62	233406	21.54	227850		- 2.4
Aroclor-1260	21.86	21.78	21.92	299909	21.85	293120		- 2.3
Aroclor-1260	23.47	23.40	23.54	165063	23.46	157950		- 4.3
Aroclor-1260	25.40	25.33	25.47	416997	25.39	422710		1.4
Total				**1260935**		**1244370**		**1.3**
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Total								

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099710.01

RFW Lot No.: 9710L692

GC Column: RTX1701

Instrument ID: 10

Method: P103

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/09/97
TIME OF ANALYSIS 1112
STANDARD ID: INDA 3506 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.93	11.88	11.98	2656805	11.93	2962251		11
Beta-BHC	15.90	15.86	15.96	1578057				
Delta-BHC	16.89	16.84	16.94	1647531				
gamma-BHC (Lindane)	13.41	13.36	13.46	2754541	13.41	3057351		11
Heptachlor	14.42	14.36	14.46	2723119	14.42	2964451		8.9
Aldrin	15.52	15.47	15.57	2571825				
Heptachlor epoxide	17.83	17.78	17.88	2415535				
Endosulfan I	18.89	18.82	18.96	2257001	18.89	2373401		5.2
Dieldrin	20.15	20.08	20.22	2293805	20.15	2392201		4.3
4,4'-DDE	19.56	19.50	19.64	2176469				
Endrin	20.91	20.84	20.98	1972313	20.91	2092325		6.1
Endosulfan II	22.47	22.40	22.54	1919533				
4,4'-DDD	22.20	22.12	22.26	1619277	22.20	1718475		6.1
Endosulfan sulfate	24.81	24.74	24.88	1176619				
4,4'-DDT	22.87	22.80	22.94	1355689	22.87	1457925		7.5
Methoxychlor	24.89	24.82	24.96	759180	24.89	806290		6.2
Endrin aldehyde	23.81	23.74	23.88	497218				
Endrin ketone	26.34	26.28	26.42	1214053				
alpha-Chlordane	19.20	19.13	19.27	2575567				
gamma-Chlordane	18.99	18.92	19.06	2444313				
Tetrachloro-m-xylene	8.85	8.78	8.92	2074181	8.82	2273101		9.6
Decachlorobiphenyl	30.39	30.32	30.46	1067877	30.37	1100741		3.1

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099710.02

RFW Lot No.: 9710L692

GC Column: RTX1701

Instrument ID: 10

Method: P103

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/09/97
TIME OF ANALYSIS 1205
STANDARD ID: INDB 5503 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.93	11.88	11.98	2656805				
Beta-BHC	15.90	15.86	15.96	1578057	15.90	1710851		8.4
Delta-BHC	16.89	16.84	16.94	1647531	16.89	1835001		11
gamma-BHC (Lindane)	13.41	13.36	13.46	2754541				
Heptachlor	14.42	14.36	14.46	2723119				
Aldrin	15.52	15.47	15.57	2571825	15.52	2759851		7.3
Heptachlor epoxide	17.83	17.78	17.88	2415535	17.83	2580801		6.8
Endosulfan I	18.89	18.82	18.96	2257001				
Dieldrin	20.15	20.08	20.22	2293805				
4,4'-DDE	19.56	19.50	19.64	2176469	19.56	2319801		6.6
Endrin	20.91	20.84	20.98	1972313				
Endosulfan II	22.47	22.40	22.54	1919533	22.47	2033301		5.9
4,4'-DDD	22.20	22.12	22.26	1619277				
Endosulfan sulfate	24.81	24.74	24.88	1176619	24.81	1322251		12
4,4'-DDT	22.87	22.80	22.94	1355689				
Methoxychlor	24.89	24.82	24.96	759180				
Endrin aldehyde	23.81	23.74	23.88	497218	23.81	527350		6.1
Endrin ketone	26.34	26.28	26.42	1214053	26.34	1302575		7.3
alpha-Chlordane	19.20	19.13	19.27	2575567	19.20	2727751		5.9
gamma-Chlordane	18.99	18.92	19.06	2444313	18.99	2633201		7.7
Tetrachloro-m-xylene	8.85	8.78	8.92	2074181	8.85	2217725		6.9
Decachlorobiphenyl	30.39	30.32	30.46	1067877	30.39	1083251		1.4

%D should not exceed 15%

041

RFW 9/93 A

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099710.03

RFW Lot No.: 9710L692

GC Column: RTX1701

Instrument ID: 10

Method: A103

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/09/97
TIME OF ANALYSIS 1258
STANDARD ID: AR1660 1902

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Aroclor-1016	12.35	12.28	12.42	109516	12.35	111790		2.1
Aroclor-1016	14.13	14.06	14.20	149857	14.13	156740		4.6
Aroclor-1016	14.57	14.50	14.64	67493	14.57	71980		6.6
Aroclor-1016	16.19	16.12	16.26	76686	16.19	80890		5.5
Aroclor-1016	16.56	16.49	16.63	53610	16.56	57160		6.6
Total				**457162**		**478560**		**4.7**
Aroclor-1260	20.41	20.34	20.48	145516	20.41	154920		6.5
Aroclor-1260	21.23	21.16	21.30	160564	21.23	169830		5.8
Aroclor-1260	22.44	22.36	22.50	123821	22.44	132590		7.1
Aroclor-1260	23.64	23.57	23.71	113581	23.64	118670		4.5
Aroclor-1260	24.62	24.56	24.70	200398	24.62	211880		5.7
Total				**743880**		**787890**		**5.9**
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Total								

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099710.16

RFW Lot No.: 9710L692

GC Column: RTX1701

Instrument ID: 10

Method: P103

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 0042
STANDARD ID: INDA 3506 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.93	11.88	11.98	2656805	11.95	3124801	+	18
Beta-BHC	15.90	15.86	15.96	1578057				
Delta-BHC	16.89	16.84	16.94	1647531				
gamma-BHC (Lindane)	13.41	13.36	13.46	2754541	13.43	3163101		15
Heptachlor	14.42	14.36	14.46	2723119	14.43	2666051		- 2.1
Aldrin	15.52	15.47	15.57	2571825				
Heptachlor epoxide	17.83	17.78	17.88	2415535				
Endosulfan I	18.89	18.82	18.96	2257001	18.90	2419251		7.2
Dieldrin	20.15	20.08	20.22	2293805	20.16	2513101		9.6
4,4'-DDE	19.56	19.50	19.64	2176469				
Endrin	20.91	20.84	20.98	1972313	20.91	2172625		10
Endosulfan II	22.47	22.40	22.54	1919533				
4,4'-DDD	22.20	22.12	22.26	1619277	22.20	1782675		10
Endosulfan sulfate	24.81	24.74	24.88	1176619				
4,4'-DDT	22.87	22.80	22.94	1355689	22.88	1369375		1.0
Methoxychlor	24.89	24.82	24.96	759180	24.90	761235		0.3
Endrin aldehyde	23.81	23.74	23.88	497218				
Endrin ketone	26.34	26.28	26.42	1214053				
alpha-Chlordane	19.20	19.13	19.27	2575567				
gamma-Chlordane	18.99	18.92	19.06	2444313				
Tetrachloro-m-xylene	8.85	8.78	8.92	2074181	8.85	2439251	+	18
Decachlorobiphenyl	30.39	30.32	30.46	1067877	30.38	1118441		4.7

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099710.17

RFW Lot No.: 9710L692

GC Column: RTX1701

Instrument ID: 10

Method: P103

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 0135
STANDARD ID: INDB 5503 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.93	11.88	11.98	2656805				
Beta-BHC	15.90	15.86	15.96	1578057	15.90	1772801		12
Delta-BHC	16.89	16.84	16.94	1647531	16.88	2030101	*	23
gamma-BHC (Lindane)	13.41	13.36	13.46	2754541				
Heptachlor	14.42	14.36	14.46	2723119				
Aldrin	15.52	15.47	15.57	2571825	15.52	2869201		12
Heptachlor epoxide	17.83	17.78	17.88	2415535	17.82	2631251		8.9
Endosulfan I	18.89	18.82	18.96	2257001				
Dieldrin	20.15	20.08	20.22	2293805				
4,4'-DDE	19.56	19.50	19.64	2176469	19.56	2442825		12
Endrin	20.91	20.84	20.98	1972313				
Endosulfan II	22.47	22.40	22.54	1919533	22.46	2068301		7.8
4,4'-DDD	22.20	22.12	22.26	1619277				
Endosulfan sulfate	24.81	24.74	24.88	1176619	24.81	1314425		12
4,4'-DDT	22.87	22.80	22.94	1355689				
Methoxychlor	24.89	24.82	24.96	759180				
Endrin aldehyde	23.81	23.74	23.88	497218	23.80	511075		2.8
Endrin ketone	26.34	26.28	26.42	1214053	26.34	1373051		13
alpha-Chlordane	19.20	19.13	19.27	2575567	19.20	2766701		7.4
gamma-Chlordane	18.99	18.92	19.06	2444313	18.99	2670251		9.2
Tetrachloro-m-xylene	8.85	8.78	8.92	2074181	8.85	2386301		15
Decachlorobiphenyl	30.39	30.32	30.46	1067877	30.36	1096251		2.7

%D should not exceed 15%

044

RFW 9/93 A

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099710.18

RFW Lot No.: 9710L692

GC Column: RTX1701

Instrument ID: 10

Method: A103

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 0228
STANDARD ID: AR1660 1902

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Aroclor-1016	12.35	12.28	12.42	109516	12.36	119970		9.5
Aroclor-1016	14.13	14.06	14.20	149857	14.13	169980		13
Aroclor-1016	14.57	14.50	14.64	67493	14.58	76790		14
Aroclor-1016	16.19	16.12	16.26	76686	16.20	85430		11
Aroclor-1016	16.56	16.49	16.63	53610	16.57	59960		12
Total				**457162**		**512130**		**12**
Aroclor-1260	20.41	20.34	20.48	145516	20.42	158890		9.2
Aroclor-1260	21.23	21.16	21.30	160564	21.24	174100		8.4
Aroclor-1260	22.44	22.36	22.50	123821	22.44	137130		11
Aroclor-1260	23.64	23.57	23.71	113581	23.65	124590		9.7
Aroclor-1260	24.62	24.56	24.70	200398	24.63	219170		9.4
Total				**743880**		**813880**		**9.4**
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Total								

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099710.31

RFW Lot No.: 9710L692

GC Column: RTX1701

Instrument ID: 10

Method: P103

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 1401
STANDARD ID: INDA 3506 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.93	11.88	11.98	2656805	11.93	3260651	*	23
Beta-BHC	15.90	15.86	15.96	1578057				
Delta-BHC	16.89	16.84	16.94	1647531				
gamma-BHC (Lindane)	13.41	13.36	13.46	2754541	13.41	3356201	*	22
Heptachlor	14.42	14.36	14.46	2723119	14.42	3047851		12
Aldrin	15.52	15.47	15.57	2571825				
Heptachlor epoxide	17.83	17.78	17.88	2415535				
Endosulfan I	18.89	18.82	18.96	2257001	18.89	2588801		15
Dieldrin	20.15	20.08	20.22	2293805	20.14	2592351		13
4,4'-DDE	19.56	19.50	19.64	2176469				
Endrin	20.91	20.84	20.98	1972313	20.90	2288025	+	16
Endosulfan II	22.47	22.40	22.54	1919533				
4,4'-DDD	22.20	22.12	22.26	1619277	22.18	1855525		15
Endosulfan sulfate	24.81	24.74	24.88	1176619				
4,4'-DDT	22.87	22.80	22.94	1355689	22.86	1510651		11
Methoxychlor	24.89	24.82	24.96	759180	24.88	830235		9.4
Endrin aldehyde	23.81	23.74	23.88	497218				
Endrin ketone	26.34	26.28	26.42	1214053				
alpha-Chlordane	19.20	19.13	19.27	2575567				
gamma-Chlordane	18.99	18.92	19.06	2444313				
Tetrachloro-m-xylene	8.85	8.78	8.92	2074181	8.84	2449051	+	18
Decachlorobiphenyl	30.39	30.32	30.46	1067877	30.36	1151161		7.8

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099710.32

RFW Lot No.: 9710L692

GC Column: RTX1701

Instrument ID: 10

Method: P103

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 1454
STANDARD ID: INDB 5503 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.93	11.88	11.98	2656805				
Beta-BHC	15.90	15.86	15.96	1578057	15.88	1859151	+	18
Delta-BHC	16.89	16.84	16.94	1647531	16.87	2125501	*	29
gamma-BHC (Lindane)	13.41	13.36	13.46	2754541				
Heptachlor	14.42	14.36	14.46	2723119				
Aldrin	15.52	15.47	15.57	2571825	15.50	3006801	+	17
Heptachlor epoxide	17.83	17.78	17.88	2415535	17.81	2772601		15
Endosulfan I	18.89	18.82	18.96	2257001				
Dieldrin	20.15	20.08	20.22	2293805				
4,4'-DDE	19.56	19.50	19.64	2176469	19.55	2533601	+	16
Endrin	20.91	20.84	20.98	1972313				
Endosulfan II	22.47	22.40	22.54	1919533	22.45	2184501		14
4,4'-DDD	22.20	22.12	22.26	1619277				
Endosulfan sulfate	24.81	24.74	24.88	1176619	24.79	1381601	+	17
4,4'-DDT	22.87	22.80	22.94	1355689				
Methoxychlor	24.89	24.82	24.96	759180				
Endrin aldehyde	23.81	23.74	23.88	497218	23.78	573325		15
Endrin ketone	26.34	26.28	26.42	1214053	26.32	1438201	+	18
alpha-Chlordane	19.20	19.13	19.27	2575567	19.18	2914701		13
gamma-Chlordane	18.99	18.92	19.06	2444313	18.98	2749201		12
Tetrachloro-m-xylene	8.85	8.78	8.92	2074181	8.84	2435551	+	17
Decachlorobiphenyl	30.39	30.32	30.46	1067877	30.34	1131211		5.9

%D should not exceed 15%

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 02744064001

Client: LANL-REQ#3777R

GC Sample ID: 10099710.33

RFW Lot No.: 9710L692

GC Column: RTX1701

Instrument ID: 10

Method: A103

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/02/97

DATE OF ANALYSIS 10/10/97
TIME OF ANALYSIS 1547
STANDARD ID: AR1660 1902

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Aroclor-1016	12.35	12.28	12.42	109516	12.34	124390		14
Aroclor-1016	14.13	14.06	14.20	149857	14.12	176690	+	18
Aroclor-1016	14.57	14.50	14.64	67493	14.56	79690	+	18
Aroclor-1016	16.19	16.12	16.26	76686	16.18	87140		14
Aroclor-1016	16.56	16.49	16.63	53610	16.55	62210	+	16
Total				**457162**		**530120**	+	**16**
Aroclor-1260	20.41	20.34	20.48	145516	20.40	164160		13
Aroclor-1260	21.23	21.16	21.30	160564	21.22	180090		12
Aroclor-1260	22.44	22.36	22.50	123821	22.43	147070	+	19
Aroclor-1260	23.64	23.57	23.71	113581	23.63	126560		11
Aroclor-1260	24.62	24.56	24.70	200398	24.62	225530		13
Total				**743880**		**843410**		**13**
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Total								

%D should not exceed 15%

Paragon Analytics, Inc.

SAMPLE NUMBER(S) CROSS-REFERENCE TABLE

Client Name: Los Alamos National Laboratory SMO

Client Project ID: 3778R

PAI-ID	Client ID	MATRIX	DATE SAMPLED
9710055-1	04LA-97-0480	Water	10/06/97
9710055-2	04LA-97-0481	Water	10/06/97

Tuesday, October 07, 1997

Los Alamos
NATIONAL LABORATORY

DATA ENTERED
110397 NT

REQUEST NUMBER: 3778R
ANALYSIS TYPE: INORG

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/7/97
REPORT DUE: 10/10/97
TURN AROUND REQ'D: 1 day

These samples are on:

LANL Request Number: 3778R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; RAD SCREENING FOR SAMPLE 04LA-97-0480 ONLY.

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
TCN		04LA-97-0480	13	W	10/6/97	
METTAL	+ B	04LA-97-0480	15	W	10/6/97	
METTAL	+ U	04LA-97-0480	15	W	10/6/97	
ANWQ		04LA-97-0481	04	W	10/6/97	
CL(-1)		04LA-97-0481	04	W	10/6/97	
PO4(-3)		04LA-97-0481	04	W	10/6/97	
SIO2DISS		04LA-97-0481	04	W	10/6/97	
TCN		04LA-97-0481	05	W	10/6/97	
METTAL	+ B	04LA-97-0481	09	W	10/6/97	
METTAL	+ U	04LA-97-0481	09	W	10/6/97	
NO3-N		04LA-97-0481	12	W	10/6/97	

Paragon Analytics, Inc.

INORGANICS CASE NARRATIVE

Los Alamos National Laboratory SMO

3778R

Order Number - 9710055

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Sample Results
Section 4: QC and Summary Report Forms
Section 5: Supporting Raw Data/Benchsheets

Section 1: Case Narrative

1. This report consists of data for 1 water sample analyzed for bromide, chloride, nitrite, sulfate, orthophosphate, and total cyanide. Also, another water sample analyzed for total cyanide.
2. The samples were received cool and intact on 10/08/97.
3. The samples have been correctly preserved for the requested analyses.
4. The samples were analyzed using procedures based on the following methods from the USEPA:

Analyte	Method
Bromide	300.0
Chloride	300.0
Nitrate	300.0
Sulfate	300.0
Orthophosphate	300.0
Total Cyanide	9010
Silicate	370.1

5. All standards and solutions were used within their recommended shelf life.

6. The samples were prepared and analyzed within the established hold times for all analyses.
7. Sample results which are below the reporting limit are reported as "ND" on the enclosed report.

All in house quality control procedures were followed, as described below.

8. General quality control procedures.
   - A method blank, a laboratory control sample (LCS), a matrix spike and a matrix spike duplicate (MSD) or a matrix duplicate were prepared and analyzed for each analysis batch.
   - Orthophosphate was detected in the initial and continuing calibration blanks (ICB, CCB) at a concentration above the reporting limit requested by the client (0.1 mg as P/L). We believe that the apparent orthophosphate peak detected in the blanks was an artifact caused by an unknown problem in the injection system. The orthophosphate concentration detected in the sample was below the reporting limit. The blank (ICB, CCB) results were within acceptance limits for all other analyses.
   - The laboratory control sample (LCS) results were within acceptance limits for all analyses.
   - The MS/MSD results were within acceptance limits for all analytes.

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

BS for JM — 10-24-97
Reporter's Initials — Date

BS — 10-24-97
Reviewer's Initials — Date

CERTIFICATION

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple — 10/24/97
Laboratory Manager — Date

Paragon Analytics, Inc.

TOTAL METALS
CASE NARRATIVE

Los Alamos National Laboratory SMO

3778R

Order Number - 9710055

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Inorganic Qualifiers
Section 4: Sample Results
Section 5: Summary Report Forms
Section 6: Supporting Raw Data

Appendix A: Digestion Bench Sheets

Section 1: Case Narrative

1.1 This report consists of 2 water samples.

Due to limitation of the reporting software:

a) Some mercury values appear as 0.0. When this occurs the actual value is hand entered.

b) For Mercury, the ICB is also used as the preparation blank, therefore the run chronology will show the same time for both.

c) Trace ICP elements which are calibrated daily with a multipoint calibration do not appear on the run log. The calibration standards can be located at the beginning of each raw data package for this instrument.

1.2 The samples were received cool and intact on 10/08/97. The client had not designated a sample for quality control. The lab designated PAI sample ID 9710055-2 as the quality control sample for this Order Number.

1.3 The samples had been correctly preserved for the requested analyses.

1.4 The sample was digested, analyzed and reported based on CLP SOW 3.0 procedures.

1.5 All standards and solutions are NIST traceable and were used within their recommended shelf life.

1.6 The samples were prepared and analyzed within the established hold times.

All in house quality control procedures were followed, as described below.

1.7 General quality control procedures.

- A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in each digestion batch. There were not more than 20 samples in each digestion batch.
- The preparation (method) blank results associated with each batch were below the practical quantitation limits for the requested analytes.
- The laboratory control sample associated with each batch was within acceptance limits. This indicates complete digestion according to the method.
- All initial and continuing calibration blanks associated with each batch were below the practical quantitation limits for the requested analytes.
- All initial and continuing calibration verifications associated with each batch were within acceptance criteria for the requested analytes. This indicates a valid calibration and stable instrument conditions.
- The interference check samples associated with CLP SOW 3.0 analyses were within acceptance criteria.

1.8 Matrix specific quality control procedures.

- A matrix spike was digested and analyzed with each batch. All acceptance criteria for accuracy were met.
- A sample duplicate was digested and analyzed with each batch. All acceptance criteria for precision were met.
- A serial dilution was analyzed with each ICP batch. All acceptance criteria were met.

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

Darryl Patrick — 10/14/97
Senior Inorganic Chemist — Date

SW — 10/14/97
Reviewer's Initials — Date

CERTIFICATION

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

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: 3778R LAB NAME Paragon ____ LAB CODE_____

NAME OF CCS CHECKER_____ COMPANY_____

NAME OF VALIDATOR R. Sherman _____ COMPANY LATA _____

CCS DATE_____ VALIDATION DATE 11/11/97 EDS ENTRY DATE_____

ANALYTICAL SUITE:
- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- x INORGANICS
- o RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? ¨ YES ¨ NO
Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

Boron is non-standard and therefore not validated.
Uranium was analyzed by ICP and validated using inorganic baseline criteria.

Signature/1st validation Ruth J Sherman 11/11/97
Signature/2nd validation _____
Qualifiers entered _____ Date_____

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgement based on data use . It usually has an "M"with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analyltes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likley because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

5 Sample result < EQL and < 5X (10X as above) the concentration of the analyte in the blank, which indicates the detected result was indistinguishable from blank contamination and the detected result was changed to non-detected at the EQL.

5a Sample result > EQL and > 5X (10X as above) the concentration of the analyte in the blank, which indicates the reported result is not likely to be related to the contamination in the associated blank.

6 Recovery of surrogates or analyte in the LCS > upper limit, which indicates a potential high bias in the results and a potential for false positive results.

6a Recovery of surrogates or analyte in the LCS < lower limit, which indicates a potential low bias in the results.

6d Result is a non-detect and the recovery of surrogates or the analyte in the LCS is < the lower limit, which indicates a potential for false negative results.

7 % RSD or %D exceeds specification - apply to a positive resultresult, which indicates potential quantitation problems in the analyses and the potential for false positive results.

8 % RSD or %D exceeds the specification - apply to a non-detect, which indicates potential quantitation problems in the analyses and the potential false negative results.

9. Holding time is exceeded. An evaluation of the data of interest with respect to holding time exceedance impact (technically) is recommended. Factors to consider include sample preservation, sample storage practices, use of the data, levels of contamination found in the sample, and the physical, chemical, and biological stability of the target analytes in the sample matrix.

10. Duplicate RPD > advisory 20% limit.

INORGANICS (I)

3 Spike recovery > upper limit (125%) and the results > the EDL.

3a Spike recovery < lower limit (75%) and the results are > the EDL.

3d Spike recovery < 30 % and results < EDL.

3e Spike recovery 30-74% and sample results < EDL.

4 Using the worse case blank, the sample results > the EDL but < 5X the concentration of the related analyte in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

7 ICS recovery > 120% and results > EDL.

7a ICS recovery 50-79% .

7b ICS recovery < 50% and result < EDL.

8a For ICV and CCV, recovery is lower than specification

8b For ICV and CCV, recovery is higher than specification

8c For ICV and CCV, results are positive, but < MDL and recovery is lower than the specification.

8d For ICV and CCV, recovery is extremely low and detection may be impaired.

8e For ICV and CCV, recovery is abnormally high - apply to results > MDL.

9 Holding time for Hg has been exceeded. Positive results may be biased low and non-detects may potential be false negatives.

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1 Carrier recovery 10-40% and result > EQL.

1 Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

INORGANICS

Calibration Present? x yes no **Initial calibration verification** Present? x yes no **Continuing calibration verification** Present? x yes no	NA OK OK	Obtain from lab. Q=A Obtain form lab. Q=A	

AJS
11/11/07

Blanks (Applies to each) Present? x yes no **Initial & continuing calibration blanks** Analyze at each wavelength Beginning and end of each run ICB and CCB analyzed at a frequency of 10% or 2 hours If blank results > EDL reanalyze previous 10 samples **Preparation blank** One per batch ≤ EDL, or if concentration of analyte < 10X EDL, repeat all samples in batch. *Al, Cr, and Fe detected in blanks and in sample no. 04LA-97-0481.* *All analytes detected in blanks except Sb, As, Pb, Hg, Ni, Se, Ag, and U.*	U	Obtain from lab. Q=A Use "worse" case blank. Sample results > EDL but < 5 X amount found in the blank should be qualified as U.	I4

RJS
11/11/97

ICP Interference check sample Present? x yes no Solution contains Ag, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, V, & Zn Analyze at beginning of each run Each wavelength used for samples ICS results must be ± 20%of true value	OK	Obtain from lab. Q=A If the ICS recovery is >120% and the results are >EDL, qualify data as J+ If recovery is 50-79%, qualify data as J- If ICS recovery is < 50% and results are < EDL, qualify results as R, PM	 I7 I7a I7b
Spike sample analysis Present? x yes no One per run, per matrix, concentration, SDG % recovery: 75-125% (unless conc. > 4X spike conc.)	OK	Obtain from lab. Q=A If spike recovery > 125% and results < EDL, OK If spike recovery < 75% and results are >EDL, qualify results as J- if same matrix, P if not. If spike recovery > 125% and results are >EDL, qualify data as J+ if same matrix, P if not. If spike recovery 30-74% and sample results < EDL, qualify as UJ if same matrix, P if not. If spike recovery results < 30% and results < EDL, qualify as R, PM.	 I3a I3 I3e I3d

ABS
11/11/97

Duplicate **Present? x yes no** **One per batch of sample of like matrix for each SDG** **RPD : ≤ 20% (advisory)** **If either the sample or duplicate value is less than 5 X EDL, there is a control limit of ± EDL**	**OK**	**Obtain from lab. Q=A** **Q=P because of nature of LANL samples.**	
Laboratory Control Sample (LCS) **Aqueous LCS per batch/SDG** **% recovery : 80-120% (except Ag & Sb)**	**OK**	**If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 80% and J+ for > 120%**	**I6a** **I6**
Holding time **Analyze water samples for Hg within 28 days of sample collection** **Analyze water samples for CN within 14 days of sample collection**	**OK**	**Compare analysis date with date of sample collection on the Analysis Request.** **Q=PM**	

RJS
11/11/97

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-97-0480

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Matrix (soil/water): WATER Lab Sample ID: W9710055-1

Level (low/med): LOW__ Date Received: 10/08/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	116000			P
7440-36-0	Antimony	3.4	U		P
7440-38-2	Arsenic	13.0			P
7440-39-3	Barium	745			P
7440-41-7	Beryllium	9.6			P
7440-42-8	Boron	24.2	B		P
7440-43-9	Cadmium	0.40	U		P
7440-70-2	Calcium	59000			P
7440-47-3	Chromium	62.9			P
7440-48-4	Cobalt	25.8	B		P
7440-50-8	Copper	257			P
7439-89-6	Iron	71800			P
7439-92-1	Lead	73.4			P
7439-95-4	Magnesium	24000			P
7439-96-5	Manganese	1130			P
7439-97-6	Mercury	0.11	B		AV
7440-02-0	Nickel	86.1			P
7440-09-7	Potassium	14300			P
7782-49-2	Selenium	4.5	B		P
7440-22-4	Silver	1.2	U		P
7440-23-5	Sodium	41500			P
7440-28-0	Thallium	5.5	B		P
7440-61-1	Uranium	70.2	U		P
7440-62-2	Vanadium	66.6			P
7440-66-6	Zinc	290			P

Color Before: BROWN____ Clarity Before: CLOUDY Texture: N/A___

Color After: LT_BROWN_ Clarity After: CLOUDY Artifacts: _____

Comments:

RGS 11/1/97

000012

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-97-0481

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Matrix (soil/water): WATER Lab Sample ID: W9710055-2

Level (low/med): LOW__ Date Received: 10/08/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	105	B		P	U, I4
7440-36-0	Antimony	3.4	U		P	
7440-38-2	Arsenic	2.6	U		P	
7440-39-3	Barium	24.3	B		P	
7440-41-7	Beryllium	0.40	U		P	
7440-42-8	Boron	20.0	B		P	
7440-43-9	Cadmium	1.0	B		P	
7440-70-2	Calcium	14300			P	
7440-47-3	Chromium	2.8	B		P	U I4
7440-48-4	Cobalt	0.97	B		P	
7440-50-8	Copper	4.5	B		P	
7439-89-6	Iron	67.7	B		P	U I4
7439-92-1	Lead	1.6	U		P	
7439-95-4	Magnesium	5350			P	
7439-96-5	Manganese	48.0			P	
7439-97-6	Mercury	0.03	U		AV	
7440-02-0	Nickel	2.0	B		P	
7440-09-7	Potassium	4470	B		P	
7782-49-2	Selenium	2.7	U		P	
7440-22-4	Silver	1.2	U		P	
7440-23-5	Sodium	26500			P	
7440-28-0	Thallium	5.3	B		P	
7440-61-1	Uranium	70.2	U		P	
7440-62-2	Vanadium	1.3	B		P	
7440-66-6	Zinc	6.0	B		P	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: N/A___

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

RJS 12/11/97

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	62.0	B	82.2	B	60.2	B	62.4	B	46.890	B	P
Antimony	3.4	U	3.4	U	3.4	U	3.4	U	3.400	U	P
Arsenic	2.6	U	2.6	U	2.6	U	2.6	U	2.600	U	P
Barium	0.1	U	0.1	B	-0.2	B	-0.2	B	-0.340	B	P
Beryllium	0.4	U	0.5	B	0.4	U	0.4	U	0.400	U	P
Boron	50.5	B	21.7	B	9.8	B	6.9	U	6.900	U	P
Cadmium	0.7	B	0.5	B	0.5	B	0.5	B	0.400	U	P
Calcium	140.7	B	175.4	B	131.9	B	148.4	B	119.940	B	P
Chromium	3.2	B	3.0	B	3.0	B	2.8	B	2.270	B	P
Cobalt	0.9	U	0.9	B	0.9	U	0.9	U	0.900	U	P
Copper	0.9	U	-1.1	B	0.9	U	0.9	U	0.900	U	P
Iron	54.0	B	54.3	B	58.8	B	55.6	B	43.170	B	P
Lead	1.6	U	1.6	U	1.6	U	1.6	U	1.600	U	P
Magnesium	174.8	B	179.9	B	161.3	B	167.3	B	148.870	B	P
Manganese	0.6	B	0.6	B	0.7	B	0.7	B	0.260	B	P
Mercury	0.03	U	0.03	U	-0.04	B			0.030	U	AV
Nickel	1.0	U	1.0	U	1.0	U	1.0	U	1.000	U	P
Potassium	83.5	U	88.9	B	83.5	U	94.3	B	84.470	B	P
Selenium	2.7	U	2.7	U	2.7	U	2.7	U	2.700	U	P
Silver	1.2	U	1.2	U	1.2	U	1.2	U	1.200	U	P
Sodium	-6.9	B	21.2	B	4.9	U	10.6	B	10.330	B	P
Thallium	2.2	U	4.6	B	2.8	B	4.1	B	2.200	U	P
Uranium	70.2	U	70.2	U	70.2	U	70.2	U	70.200	U	P
Vanadium	0.9	U	0.9	U	0.9	U	0.9	U	0.900	U	P
Zinc	0.9	U	0.9	U	0.9	U	0.9	U	0.900	U	P

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum			65.5	B	71.1	B	52.0	B			P
Antimony			3.4	U	3.4	U	3.4	U			P
Arsenic			2.6	U	2.6	U	2.6	U			P
Barium			-0.2	B	-0.1	B	0.1	U			P
Beryllium			0.4	U	0.4	U	0.4	U			P
Boron			6.9	U	6.9	U	6.9	U			P
Cadmium			0.6	B	0.5	B	0.5	B			P
Calcium			135.4	B	133.8	B	139.2	B			P
Chromium			2.9	B	3.1	B	3.0	B			P
Cobalt			0.9	U	0.9	U	0.9	U			P
Copper			0.9	U	0.9	U	0.9	U			P
Iron			54.6	B	54.2	B	55.6	B			P
Lead			1.6	U	1.6	U	1.6	U			P
Magnesium			166.3	B	167.0	B	167.4	B			P
Manganese			1.0	B	0.5	B	0.6	B			P
Mercury											NR
Nickel			1.0	U	1.0	U	1.0	U			P
Potassium			83.5	U	154.0	B	83.5	U			P
Selenium			2.7	U	2.7	U	2.7	U			P
Silver			1.2	U	1.2	U	1.2	U			P
Sodium			7.8	B	15.5	B	7.3	B			P
Thallium			3.6	B	3.1	B	2.2	U			P
Uranium			70.2	U	70.2	U	70.2	U			P
Vanadium			0.9	U	0.9	U	0.9	U			P
Zinc			0.9	U	0.9	U	1.5	B			P

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum			99.7	B							P
Antimony			3.4	U							P
Arsenic			2.6	U							P
Barium			-0.1	B							P
Beryllium			0.4	U							P
Boron			6.9	U	6.9	U					P
Cadmium			0.6	B							P
Calcium			183.4	B							P
Chromium			0.9	U							P
Cobalt			1.0	B							P
Copper			0.9	U							P
Iron			72.1	B							P
Lead			1.6	U							P
Magnesium			218.8	B							P
Manganese			0.5	B							P
Mercury											NR
Nickel			1.0	U							P
Potassium			83.5	U							P
Selenium			2.7	U							P
Silver			1.2	U							P
Sodium			-11.6	B							P
Thallium			4.1	B							P
Uranium			70.2	U							P
Vanadium			0.9	U							P
Zinc			0.9	U							P

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

04LA-97-0481

Lab Name: PARAGON_ANALYTICS_____ Contract:_____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_
Matrix: __WATER_____ Level (low/med): _LOW____
% Solids for Sample: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum_	75-125_	2059.7900	_	105.1400	B	2000.00	97.7	_	P_
Antimony_	75-125_	516.4700	_	3.4000	U	500.00	103.3	_	P_
Arsenic__	75-125_	2017.1400	_	2.6000	U	2000.00	100.9	_	P_
Barium___	75-125_	1984.5900	_	24.2600	B	2000.00	98.0	_	P_
Beryllium	75-125_	53.4700	_	0.4000	U	50.00	106.9	_	P_
Boron____	75-125_	865.7500	_	20.0200	B	1000.00	84.6	_	P_
Cadmium__	75-125_	47.6700	_	1.0400	B	50.00	93.3	_	P_
Calcium__	75-125_	57349.1900	_	14289.1100	_	40000.00	107.7	_	P_
Chromium_	75-125_	196.4000	_	2.8300	B	200.00	96.8	_	P_
Cobalt___	75-125_	515.6400	_	0.9700	B	500.00	102.9	_	P_
Copper___	75-125_	259.1900	_	4.5200	B	250.00	101.9	_	P_
Iron_____	75-125_	937.8400	_	67.6900	B	1000.00	87.0	_	P_
Lead_____	75-125_	480.5100	_	1.6000	U	500.00	96.1	_	P_
Magnesium	75-125_	48058.9400	_	5352.6100	_	40000.00	106.8	_	P_
Manganese	75-125_	539.4400	_	47.9700	_	500.00	98.3	_	P_
Mercury__	75-125_	0.9960	_	0.0300	U	1.00	99.6	_	AV
Nickel___	75-125_	501.8200	_	1.9500	B	500.00	100.0	_	P_
Potassium	75-125_	44307.3500	_	4465.9400	B	40000.00	99.6	_	P_
Selenium_	75-125_	2067.4800	_	2.7000	U	2000.00	103.4	_	P_
Silver___	75-125_	51.1500	_	1.2000	U	50.00	102.3	_	P_
Sodium___	75-125_	67386.7400	_	26544.7000	_	40000.00	102.1	_	P_
Thallium_	75-125_	1951.4400	_	5.2600	B	2000.00	97.3	_	P_
Uranium__	75-125_	10645.5800	_	70.2000	U	10000.00	106.5	_	P_
Vanadium_	75-125_	504.1200	_	1.3400	B	500.00	100.6	_	P_
Zinc_____	75-125_	507.9000	_	5.9500	B	500.00	100.4	_	P_
			_		_			_	_
			_		_			_	_
			_		_			_	_
			_		_			_	_
			_		_			_	_
			_		_			_	_
			_		_			_	_

Comments:

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

04LA-97-0481

.b Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Matrix (soil/water): WATER Level (low/med): _LOW__

% Solids for Sample: __0.0 % Solids for Duplicate: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum_		105.1400	B	95.2800	B	9.8		P
Antimony_		3.4000	U	3.4000	U			P
Arsenic__		2.6000	U	2.6000	U			P
Barium___		24.2600	B	23.4900	B	3.2		P
Beryllium		0.4000	U	0.4000	U			P
Boron____		20.0200	B	23.2000	B	14.7		P
Cadmium__		1.0400	B	1.1500	B	10.0		P
Calcium__	5000.0	14289.1100		14110.6300		1.3		P
Chromium_		2.8300	B	2.9700	B	4.8		P
Cobalt___		0.9700	B	0.9000	U	200.0		P
Copper___		4.5200	B	4.3400	B	4.1		P
Iron_____		67.6900	B	58.4400	B	14.7		P
Lead____		1.6000	U	1.6000	U			P
Magnesium	5000.0	5352.6100		5276.6200		1.4		P
Manganese	15.0	47.9700		47.1600		1.7		P
Mercury__		0.0300	U	0.0300	U			AV
Nickel___		1.9500	B	2.0500	B	5.0		P
Potassium		4465.9400	B	4412.9000	B	1.2		P
Selenium_		2.7000	U	2.7000	U			P
Silver___		1.2000	U	1.2000	U			P
Sodium___		26544.7000		26213.6000		1.3		P
Thallium_		5.2600	B	4.8400	B	8.3		P
Uranium__		70.2000	U	70.2000	U			P
Vanadium_		1.3400	B	1.1200	B	17.9		P
Zinc_____		5.9500	B	6.2800	B	5.4		P

Tuesday, October 07, 1997

REQUEST NUMBER: 3778R

ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

97-10-0555

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/7/97
REPORT DUE: 10/10/97
TURN AROUND REQ'D: 1 day

These samples are on:

LANL Request Number: 3778R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; RAD SCREENING FOR SAMPLE 04LA-97-0480 ONLY.

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
TCN		04LA-97-0480	13	W	10/6/97	
METTAL	+ B	04LA-97-0480	15	W	10/6/97	01
METTAL	+ U	04LA-97-0480	15	W	10/6/97	
ANWQ		04LA-97-0481	04	W	10/6/97	
CL(-1)		04LA-97-0481	04	W	10/6/97	
PO4(-3)		04LA-97-0481	04	W	10/6/97	
SIO2DISS		04LA-97-0481	04	W	10/6/97	
TCN -		04LA-97-0481	05	W	10/6/97	02
METTAL	+ B	04LA-97-0481	09	W	10/6/97	
METTAL	+ U	04LA-97-0481	09	W	10/6/97	
* NO3-N		04LA-97-0481	12	W	10/6/97	

Sent to Hoffman - Not Rec'd at Paragon

Final Page of REQUEST NUMBER 3778R

U.S. EPA - CLP

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum	25250.0	24672.59	97.7	50500.0	49647.22	98.3	49681.41	98.4	P
Antimony	250.0	249.34	99.7	500.0	501.45	100.3	490.93	98.2	P
Arsenic	250.0	244.41	97.8	500.0	495.86	99.2	487.13	97.4	P
Barium	250.0	245.47	98.2	500.0	487.94	97.6	470.05	94.0	P
Beryllium	250.0	254.05	101.6	500.0	502.28	100.5	502.74	100.5	P
Boron	2500.0	2572.02	102.9	5000.0	4865.66	97.3	4867.83	97.4	P
Cadmium	250.0	241.53	96.6	500.0	486.08	97.2	471.99	94.4	P
Calcium	25250.0	24731.30	97.9	50500.0	50887.80	100.8	50664.93	100.3	P
Chromium	250.0	238.16	95.3	500.0	485.30	97.1	484.97	97.0	P
Cobalt	250.0	235.51	94.2	500.0	461.85	92.4	458.65	91.7	P
Copper	250.0	241.11	96.4	500.0	476.07	95.2	472.95	94.6	P
Iron	10250.0	10046.59	98.0	20500.0	20822.93	101.6	20562.78	100.3	P
Lead	250.0	239.31	95.7	500.0	475.30	95.1	468.59	93.7	P
Magnesium	25250.0	24519.02	97.1	50500.0	49998.83	99.0	50245.03	99.5	P
Manganese	250.0	243.03	97.2	500.0	483.24	96.6	476.59	95.3	P
Mercury	2.5	2.56	102.4	2.0	2.01	100.5	2.00	100.0	AV
Nickel	250.0	250.78	100.3	500.0	496.43	99.3	484.89	97.0	P
Potassium	10000.0	9788.32	97.9	20000.0	19959.54	99.8	19587.92	97.9	P
Selenium	250.0	241.31	96.5	500.0	483.42	96.7	472.39	94.5	P
Silver	250.0	236.19	94.5	500.0	469.43	93.9	466.04	93.2	P
Sodium	10250.0	10030.26	97.9	20500.0	20686.22	100.9	20326.36	99.2	P
Thallium	250.0	252.12	100.8	500.0	500.04	100.0	488.01	97.6	P
Uranium	5000.0	5292.52	105.9	10000.0	10677.61	106.8	10323.29	103.2	P
Vanadium	250.0	250.25	100.1	500.0	494.83	99.0	491.91	98.4	P
Zinc	250.0	243.82	97.5	500.0	480.06	96.0	479.68	95.9	P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum				50500.0	50027.93	99.1	53783.89	106.5	P
Antimony				500.0	495.24	99.0	520.77	104.2	P
Arsenic				500.0	485.89	97.2	513.27	102.7	P
Barium				500.0	495.09	99.0	518.54	103.7	P
Beryllium				500.0	504.40	100.9	528.88	105.8	P
Boron				5000.0	5046.82	100.9	4760.99	95.2	P
Cadmium				500.0	474.68	94.9	487.76	97.6	P
Calcium				50500.0	51125.78	101.2	53373.91	105.7	P
Chromium				500.0	488.53	97.7	515.77	103.2	P
Cobalt				500.0	487.05	97.4	511.14	102.2	P
Copper				500.0	473.25	94.6	508.76	101.8	P
Iron				20500.0	20686.57	100.9	21596.03	105.3	P
Lead				500.0	473.10	94.6	489.82	98.0	P
Magnesium				50500.0	50660.78	100.3	53387.14	105.7	P
Manganese				500.0	478.84	95.8	505.81	101.2	P
Mercury									NR
Nickel				500.0	488.18	97.6	504.18	100.8	P
Potassium				20000.0	19702.44	98.5	20713.93	103.6	P
Selenium				500.0	474.06	94.8	500.33	100.1	P
Silver				500.0	490.20	98.0	519.20	103.8	P
Sodium				20500.0	20479.93	99.9	21528.30	105.0	P
Thallium				500.0	489.07	97.8	509.78	102.0	P
Uranium				10000.0	10382.87	103.8	10909.47	109.1	P
Vanadium				500.0	495.29	99.1	521.73	104.3	P
Zinc				500.0	483.97	96.8	509.19	101.8	P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum				50500.0	52224.71	103.4	53818.17	106.6	P
Antimony				500.0	503.13	100.6	512.21	102.4	P
Arsenic				500.0	497.15	99.4	506.46	101.3	P
Barium				500.0	508.19	101.6	515.01	103.0	P
Beryllium				500.0	515.52	103.1	524.77	105.0	P
Boron				5000.0	4753.92	95.1	4581.01	91.6	P
Cadmium				500.0	476.77	95.4	481.06	96.2	P
Calcium				50500.0	51925.73	102.8	52801.22	104.6	P
Chromium				500.0	505.13	101.0	514.82	103.0	P
Cobalt				500.0	502.32	100.5	511.84	102.4	P
Copper				500.0	493.23	98.6	508.99	101.8	P
Iron				20500.0	20911.20	102.0	21146.54	103.2	P
Lead				500.0	478.22	95.6	483.73	96.7	P
Magnesium				50500.0	51915.41	102.8	53012.75	105.0	P
Manganese				500.0	494.17	98.8	504.80	101.0	P
Mercury									NR
Nickel				500.0	491.89	98.4	498.26	99.7	P
Potassium				20000.0	20102.47	100.5	20447.38	102.2	P
Selenium				500.0	484.21	96.8	494.76	99.0	P
Silver				500.0	510.19	102.0	520.20	104.0	P
Sodium				20500.0	20803.09	101.5	21162.83	103.2	P
Thallium				500.0	497.21	99.4	512.93	102.6	P
Uranium				10000.0	10293.58	102.9	10376.63	103.8	P
Vanadium				500.0	510.40	102.1	520.12	104.0	P
Zinc				500.0	501.32	100.3	515.83	103.2	P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum				50500.0	52628.79	104.2			P
Antimony				500.0	499.03	99.8			P
Arsenic				500.0	493.61	98.7			P
Barium				500.0	498.82	99.8			P
Beryllium				500.0	516.16	103.2			P
Boron				5000.0	4626.81	92.5	4655.53	93.1	P
Cadmium				500.0	469.81	94.0			P
Calcium				50500.0	51963.80	102.9			P
Chromium				500.0	503.34	100.7			P
Cobalt				500.0	503.58	100.7			P
Copper				500.0	493.60	98.7			P
Iron				20500.0	20725.55	101.1			P
Lead				500.0	472.73	94.5			P
Magnesium				50500.0	52284.16	103.5			P
Manganese				500.0	495.44	99.1			P
Mercury									NR
Nickel				500.0	488.26	97.7			P
Potassium				20000.0	19932.28	99.7			P
Selenium				500.0	483.84	96.8			P
Silver				500.0	509.05	101.8			P
Sodium				20500.0	20582.82	100.4			P
Thallium				500.0	497.03	99.4			P
Uranium				10000.0	10088.31	100.9			P
Vanadium				500.0	511.65	102.3			P
Zinc				500.0	506.61	101.3			P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2B
CRDL STANDARD FOR AA AND ICP

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

AA CRDL Standard Source: PLASMACHEM__

ICP CRDL Standard Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
					Initial		Final	
	True	Found	%R	True	Found	%R	Found	%R
Aluminum				400.0	396.62	99.2	416.45	104.1
Antimony				120.0	119.53	99.6	123.66	103.0
Arsenic				20.0	22.61	113.0	21.94	109.7
Barium				400.0	392.11	98.0	416.70	104.2
Beryllium				10.0	10.65	106.5	10.93	109.3
Boron								
Cadmium				10.0	10.20	102.0	10.23	102.3
Calcium				10000.0	9221.00	92.2	9803.53	98.0
Chromium				20.0	20.22	101.1	18.73	93.6
Cobalt				100.0	92.71	92.7	104.09	104.1
Copper				50.0	47.38	94.8	50.87	101.7
Iron				200.0	201.11	100.6	207.23	103.6
Lead				6.0	6.05	100.8	5.55	92.5
Magnesium				10000.0	9302.29	93.0	10044.40	100.4
Manganese				30.0	29.32	97.7	31.06	103.5
Mercury	0.2	0.20	100.0					
Nickel				80.0	79.32	99.2	82.99	103.7
Potassium				10000.0	9456.28	94.6	9909.41	99.1
Selenium				10.0	10.26	102.6	10.41	104.1
Silver				20.0	21.24	106.2	23.51	117.6
Sodium				10000.0	9361.43	93.6	9872.93	98.7
Thallium				20.0	23.42	117.1	23.02	115.1
Uranium				400.0	403.10	100.8	372.61	93.2
Vanadium				100.0	97.49	97.5	103.45	103.4
Zinc				40.0	38.80	97.0	45.49	113.7

U.S. EPA - CLP

2B
CRDL STANDARD FOR AA AND ICP

b Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

AA CRDL Standard Source: PLASMACHEM__

ICP CRDL Standard Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
	True	Found	%R	True	Initial Found	%R	Final Found	%R
Aluminum_								
Antimony_								
Arsenic__								
Barium___								
Beryllium								
Boron____				200.0	228.01	114.0	181.57	90.8
Cadmium__								
Calcium__								
Chromium_								
Cobalt___								
Copper___								
Iron_____								
Lead_____								
Magnesium								
Manganese								
Mercury__								
Nickel___								
Potassium								
Selenium_								
Silver___								
Sodium___								
Thallium_								
Uranium__								
Vanadium_								
Zinc_____								

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	62.0	B	82.2	B	60.2	B	62.4	B	46.890	B	P
Antimony	3.4	U	3.4	U	3.4	U	3.4	U	3.400	U	P
Arsenic	2.6	U	2.6	U	2.6	U	2.6	U	2.600	U	P
Barium	0.1	U	0.1	B	-0.2	B	-0.2	B	-0.340	B	P
Beryllium	0.4	U	0.5	B	0.4	U	0.4	U	0.400	U	P
Boron	50.5	B	21.7	B	9.8	B	6.9	U	6.900	U	P
Cadmium	0.7	B	0.5	B	0.5	B	0.5	B	0.400	U	P
Calcium	140.7	B	175.4	B	131.9	B	148.4	B	119.940	B	P
Chromium	3.2	B	3.0	B	3.0	B	2.8	B	2.270	B	P
Cobalt	0.9	U	0.9	B	0.9	U	0.9	U	0.900	U	P
Copper	0.9	U	-1.1	B	0.9	U	0.9	U	0.900	U	P
Iron	54.0	B	54.3	B	58.8	B	55.6	B	43.170	B	P
Lead	1.6	U	1.6	U	1.6	U	1.6	U	1.600	U	P
Magnesium	174.8	B	179.9	B	161.3	B	167.3	B	148.870	B	P
Manganese	0.6	B	0.6	B	0.7	B	0.7	B	0.260	B	P
Mercury	0.03	U	0.03	U	-0.04	B			0.030	U	AV
Nickel	1.0	U	1.0	U	1.0	U	1.0	U	1.000	U	P
Potassium	83.5	U	88.9	B	83.5	U	94.3	B	84.470	B	P
Selenium	2.7	U	2.7	U	2.7	U	2.7	U	2.700	U	P
Silver	1.2	U	1.2	U	1.2	U	1.2	U	1.200	U	P
Sodium	-6.9	B	21.2	B	4.9	U	10.6	B	10.330	B	P
Thallium	2.2	U	4.6	B	2.8	B	4.1	B	2.200	U	P
Uranium	70.2	U	70.2	U	70.2	U	70.2	U	70.200	U	P
Vanadium	0.9	U	0.9	U	0.9	U	0.9	U	0.900	U	P
Zinc	0.9	U	0.9	U	0.9	U	0.9	U	0.900	U	P

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum			65.5	B	71.1	B	52.0	B			P
Antimony			3.4	U	3.4	U	3.4	U			P
Arsenic			2.6	U	2.6	U	2.6	U			P
Barium			-0.2	B	-0.1	B	0.1	U			P
Beryllium			0.4	U	0.4	U	0.4	U			P
Boron			6.9	U	6.9	U	6.9	U			P
Cadmium			0.6	B	0.5	B	0.5	B			P
Calcium			135.4	B	133.8	B	139.2	B			P
Chromium			2.9	B	3.1	B	3.0	B			P
Cobalt			0.9	U	0.9	U	0.9	U			P
Copper			0.9	U	0.9	U	0.9	U			P
Iron			54.6	B	54.2	B	55.6	B			P
Lead			1.6	U	1.6	U	1.6	U			P
Magnesium			166.3	B	167.0	B	167.4	B			P
Manganese			1.0	B	0.5	B	0.6	B			P
Mercury											NR
Nickel			1.0	U	1.0	U	1.0	U			P
Potassium			83.5	U	154.0	B	83.5	U			P
Selenium			2.7	U	2.7	U	2.7	U			P
Silver			1.2	U	1.2	U	1.2	U			P
Sodium			7.8	B	15.5	B	7.3	B			P
Thallium			3.6	B	3.1	B	2.2	U			P
Uranium			70.2	U	70.2	U	70.2	U			P
Vanadium			0.9	U	0.9	U	0.9	U			P
Zinc			0.9	U	0.9	U	1.5	B			P

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum			99.7	B							P
Antimony			3.4	U							P
Arsenic			2.6	U							P
Barium			-0.1	B							P
Beryllium			0.4	U							P
Boron			6.9	U	6.9	U					P
Cadmium			0.6	B							P
Calcium			183.4	B							P
Chromium			0.9	U							P
Cobalt			1.0	B							P
Copper			0.9	U							P
Iron			72.1	B							P
Lead			1.6	U							P
Magnesium			218.8	B							P
Manganese			0.5	B							P
Mercury											NR
Nickel			1.0	U							P
Potassium			83.5	U							P
Selenium			2.7	U							P
Silver			1.2	U							P
Sodium			-11.6	B							P
Thallium			4.1	B							P
Uranium			70.2	U							P
Vanadium			0.9	U							P
Zinc			0.9	U							P

U.S. EPA - CLP

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No: _____ SDG No.: 3778R_

ICP ID Number: TJA 61E 3___ ICS Source: HIGH PURITY_

Concentration Units: ug/L

Analyte	True Sol. A	True Sol. AB	Initial Found Sol. A	Initial Found Sol. AB	%R	Final Found Sol. A	Final Found Sol. AB	%R
Aluminum	500000	500000	497871	483120.7	96.6	549144	525155.5	105.0
Antimony								
Arsenic								
Barium		500		454.8	91.0		476.5	95.3
Beryllium		500		455.3	91.1		477.0	95.4
Boron								
Cadmium		1000		824.7	82.5		832.9	83.3
Calcium	500000	500000	491506	481663.4	96.3	533949	512440.2	102.5
Chromium		500		436.1	87.2		463.3	92.7
Cobalt		500		405.3	81.1		452.6	90.5
Copper		500		462.7	92.5		488.4	97.7
Iron	200000	200000	192955	189634.8	94.8	204446	196819.3	98.4
Lead		1000		836.2	83.6		860.9	86.1
Magnesium	500000	500000	492301	481234.2	96.2	536628	517399.4	103.5
Manganese		500		439.2	87.8		461.3	92.3
Mercury								
Nickel		1000		842.6	84.3		858.8	85.9
Potassium								
Selenium								
Silver		1000		995.4	99.5		1091.2	109.1
Sodium								
Thallium								
Uranium								
Vanadium		500		453.2	90.6		477.9	95.6
Zinc		1000		819.8	82.0		884.4	88.4

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

04LA-97-0481

Lab Name: PARAGON_ANALYTICS_____ Contract:_____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Matrix: __WATER_____ Level (low/med): _LOW____

% Solids for Sample: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum_	75-125_	2059.7900	_	105.1400	B	2000.00	97.7	_	P_
Antimony_	75-125_	516.4700	_	3.4000	U	500.00	103.3	_	P_
Arsenic__	75-125_	2017.1400	_	2.6000	U	2000.00	100.9	_	P_
Barium___	75-125_	1984.5900	_	24.2600	B	2000.00	98.0	_	P_
Beryllium	75-125_	53.4700	_	0.4000	U	50.00	106.9	_	P_
Boron____	75-125_	865.7500	_	20.0200	B	1000.00	84.6	_	P_
Cadmium__	75-125_	47.6700	_	1.0400	B	50.00	93.3	_	P_
Calcium__	75-125_	57349.1900	_	14289.1100	_	40000.00	107.7	_	P_
Chromium_	75-125_	196.4000	_	2.8300	B	200.00	96.8	_	P_
Cobalt___	75-125_	515.6400	_	0.9700	B	500.00	102.9	_	P_
Copper___	75-125_	259.1900	_	4.5200	B	250.00	101.9	_	P_
Iron_____	75-125_	937.8400	_	67.6900	B	1000.00	87.0	_	P_
Lead_____	75-125_	480.5100	_	1.6000	U	500.00	96.1	_	P_
Magnesium	75-125_	48058.9400	_	5352.6100	_	40000.00	106.8	_	P_
Manganese	75-125_	539.4400	_	47.9700	_	500.00	98.3	_	P_
Mercury__	75-125_	0.9960	_	0.0300	U	1.00	99.6	_	AV
Nickel___	75-125_	501.8200	_	1.9500	B	500.00	100.0	_	P_
Potassium	75-125_	44307.3500	_	4465.9400	B	40000.00	99.6	_	P_
Selenium_	75-125_	2067.4800	_	2.7000	U	2000.00	103.4	_	P_
Silver___	75-125_	51.1500	_	1.2000	U	50.00	102.3	_	P_
Sodium___	75-125_	67386.7400	_	26544.7000	_	40000.00	102.1	_	P_
Thallium_	75-125_	1951.4400	_	5.2600	B	2000.00	97.3	_	P_
Uranium__	75-125_	10645.5800	_	70.2000	U	10000.00	106.5	_	P_
Vanadium_	75-125_	504.1200	_	1.3400	B	500.00	100.6	_	P_
Zinc_____	75-125_	507.9000	_	5.9500	B	500.00	100.4	_	P_
			_		_			_	_
			_		_			_	_
			_		_			_	_
			_		_			_	_
			_		_			_	_
			_		_			_	_
			_		_			_	_

Comments:

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

04LA-97-0481

.b Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Matrix (soil/water): WATER Level (low/med): _LOW__

% Solids for Sample: __0.0 % Solids for Duplicate: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum_		105.1400	B	95.2800	B	9.8		P
Antimony_		3.4000	U	3.4000	U			P
Arsenic__		2.6000	U	2.6000	U			P
Barium___		24.2600	B	23.4900	B	3.2		P
Beryllium		0.4000	U	0.4000	U			P
Boron____		20.0200	B	23.2000	B	14.7		P
Cadmium__		1.0400	B	1.1500	B	10.0		P
Calcium__	5000.0	14289.1100		14110.6300		1.3		P
Chromium_		2.8300	B	2.9700	B	4.8		P
Cobalt___		0.9700	B	0.9000	U	200.0		P
Copper___		4.5200	B	4.3400	B	4.1		P
Iron_____		67.6900	B	58.4400	B	14.7		P
Lead_____		1.6000	U	1.6000	U			P
Magnesium	5000.0	5352.6100		5276.6200		1.4		P
Manganese	15.0	47.9700		47.1600		1.7		P
Mercury__		0.0300	U	0.0300	U			AV
Nickel___		1.9500	B	2.0500	B	5.0		P
Potassium		4465.9400	B	4412.9000	B	1.2		P
Selenium_		2.7000	U	2.7000	U			P
Silver___		1.2000	U	1.2000	U			P
Sodium___		26544.7000		26213.6000		1.3		P
Thallium_		5.2600	B	4.8400	B	8.3		P
Uranium__		70.2000	U	70.2000	U			P
Vanadium_		1.3400	B	1.1200	B	17.9		P
Zinc_____		5.9500	B	6.2800	B	5.4		P

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Solid LCS Source: _____

Aqueous LCS Source: PLASMACHEM__

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum	2000.0	1986.70	99.3						
Antimony	500.0	511.95	102.4						
Arsenic	2000.0	1995.57	99.8						
Barium	2000.0	1949.71	97.5						
Beryllium	50.0	53.21	106.4						
Boron	1000.0	830.14	83.0						
Cadmium	50.0	47.67	95.3						
Calcium	40000.0	42132.36	105.3						
Chromium	200.0	194.62	97.3						
Cobalt	500.0	511.61	102.3						
Copper	250.0	247.60	99.0						
Iron	1000.0	926.69	92.7						
Lead	500.0	481.80	96.4						
Magnesium	40000.0	41926.59	104.8						
Manganese	500.0	489.85	98.0						
Mercury									
Nickel	500.0	505.35	101.1						
Potassium	40000.0	38913.07	97.3						
Selenium	2000.0	2052.47	102.6						
Silver	50.0	49.60	99.2						
Sodium	40000.0	41448.28	103.6						
Thallium	2000.0	1952.39	97.6						
Uranium	10000.0	10799.07	108.0						
Vanadium	500.0	499.75	100.0						
Zinc	500.0	503.14	100.6						

FORM VII - IN

ILM03.0

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Solid LCS Source: _____

Aqueous LCS Source: PLASMACHEM__

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum_									
Antimony_									
Arsenic__									
Barium___									
Beryllium									
Boron____									
Cadmium__									
Calcium__									
Chromium_									
Cobalt___									
Copper___									
Iron____									
Lead____									
Magnesium									
Manganese									
Mercury__	1.0	1.00	100.0						
Nickel___									
Potassium									
Selenium_									
Silver___									
Sodium___									
Thallium_									
Uranium__									
Vanadium_									
Zinc____									

FORM VII - IN

ILM03.0

U.S. EPA - CLP

9

ICP SERIAL DILUTION

EPA SAMPLE NO.

04LA-97-0481

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: 3778R_

Matrix (soil/water): WATER Level (low/med): LOW

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	M
Aluminum	105.14	B	223.80	B	112.9		P
Antimony	3.40	U	17.00	U			P
Arsenic	2.60	U	13.00	U			P
Barium	24.26	B	22.25	B	8.3		P
Beryllium	0.40	U	2.00	U			P
Boron	20.02	B	34.50	U	100.0		P
Cadmium	1.04	B	2.25	B	116.3		P
Calcium	14289.11		13526.05	B	5.3		P
Chromium	2.83	B	14.70	B	419.4		P
Cobalt	0.97	B	4.50	U	100.0		P
Copper	4.52	B	5.40	B	19.5		P
Iron	67.69	B	270.70	B	299.9		P
Lead	1.60	U	8.00	U			P
Magnesium	5352.61		5531.55	B	3.3		P
Manganese	47.97		47.55	B	0.9		P
Mercury							NR
Nickel	1.95	B	5.00	U	100.0		P
Potassium	4465.94	B	4743.65	B	6.2		P
Selenium	2.70	U	13.50	U			P
Silver	1.20	U	6.00	U			P
Sodium	26544.70		24469.30	B	7.8		P
Thallium	5.26	B	22.30	B	324.0		P
Uranium	70.20	U	351.00	U			P
Vanadium	1.34	B	4.50	U	100.0		P
Zinc	5.95	B	7.50	B	26.1		P

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_
ICP ID Number: TJA_61_3____ Date: 07/15/97
Flame AA ID Number : _____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum			200		NR
Antimony			60		NR
Arsenic			10		NR
Barium			200		NR
Beryllium			5		NR
Boron	249.60		100	6.9	P
Cadmium			5		NR
Calcium			5000		NR
Chromium			10		NR
Cobalt			50		NR
Copper			25		NR
Iron			100		NR
Lead			3		NR
Magnesium			5000		NR
Manganese			15		NR
Mercury			0.2		NR
Nickel			40		NR
Potassium			5000		NR
Selenium			5		NR
Silver			10		NR
Sodium			5000		NR
Thallium			10		NR
Uranium			200		NR
Vanadium			50		NR
Zinc			20		NR

Comments:

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_
ICP ID Number: _____ Date: 07/15/97
Flame AA ID Number : LEEMAN_3____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum			200		NR
Antimony			60		NR
Arsenic			10		NR
Barium			200		NR
Beryllium			5		NR
Boron			100		NR
Cadmium			5		NR
Calcium			5000		NR
Chromium			10		NR
Cobalt			50		NR
Copper			25		NR
Iron			100		NR
Lead			3		NR
Magnesium			5000		NR
Manganese			15		NR
Mercury	253.70		0.2	0.03 ~~0.0~~	AV
Nickel			40	10 10/13/97	NR
Potassium			5000		NR
Selenium			5		NR
Silver			10		NR
Sodium			5000		NR
Thallium			10		NR
Uranium			200		NR
Vanadium			50		NR
Zinc			20		NR

Comments:

U.S. EPA - CLP

10

Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

ICP ID Number: TJA_61E_3___ Date: 07/15/97

Flame AA ID Number : _____

Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum	308.22		200	24.2	P
Antimony	206.84		60	3.4	P
Arsenic	189.04		10	2.6	P
Barium	493.41		200	0.1	P
Beryllium	313.04		5	0.4	P
Boron			100		NR
Cadmium	226.50		5	0.4	P
Calcium	317.93		5000	2.8	P
Chromium	267.72		10	0.9	P
Cobalt	228.62		50	0.9	P
Copper	324.75		25	0.9	P
Iron	271.44		100	16.6	P
Lead	220.35		3	1.6	P
Magnesium	279.08		5000	10.3	P
Manganese	257.61		15	0.2	P
Mercury			0.2		NR
Nickel	231.60		40	1.0	P
Potassium	766.49		5000	83.5	P
Selenium	196.03		5	2.7	P
Silver	328.07		10	1.2	P
Sodium	588.99		5000	4.9	P
Thallium	190.86		10	2.2	P
Uranium	292.35		200	70.2	P
Vanadium	292.40		50	0.9	P
Zinc	206.20		20	0.9	P

Comments:

U.S. EPA - CLP

11A
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

CP ID Number: TJA 61 3____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : Al	Ca	Fe	Mg	BA_
Aluminum_	308.22	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony_	217.50	0.0001730	0.0000000	-0.0000700	0.0000000	0.0000000
Arsenic__	193.60	0.0032220	0.0000000	0.0002370	0.0000000	0.0000000
Barium___	493.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron____	249.60	0.0000000	0.0000000	-0.0001050	0.0000000	0.0000000
Cadmium__	226.50	0.0000300	0.0000000	0.0002950	0.0000000	0.0000000
Calcium__	315.80	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.70	0.0000000	0.0000000	-0.0000410	0.0000000	0.0000000
Cobalt___	228.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0001880
Copper___	324.70	0.0000000	0.0000000	-0.0000450	0.0000000	0.0000000
Iron_____	259.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead_____	220.30	0.0007590	0.0000000	0.0001130	0.0000000	0.0000000
Magnesium	383.20	0.0000000	0.0012260	-0.0007120	0.0000000	0.0000000
Manganese	257.60	0.0000000	0.0000000	0.0000170	0.0000000	0.0000000
Mercury__						
Nickel___	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.00	0.0000000	0.0000000	0.0003760	0.0000000	0.0000000
Silver___	328.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	589.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	377.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Uranium__						
Vanadium_	292.40	0.0000000	-0.0000300	0.0000500	0.0000000	0.0000000
Zinc_____	206.20	0.0000000	0.0000000	0.0000390	0.0000370	0.0000000

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

ICP ID Number: TJA 61 3____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : BE_	CD_	CO_	CR_	MO_
Aluminum	308.22	0.0000000	0.0000000	-0.0047560	0.0000000	0.0084920
Antimony	217.50	0.0019940	0.0000000	0.0000000	0.0000000	-0.0004360
Arsenic	193.60	0.0000000	0.0000000	0.0006940	0.0009930	0.0008130
Barium	493.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron	249.60	0.0000000	0.0000000	0.0031110	0.0001900	0.0005560
Cadmium	226.50	0.0000000	0.0000000	0.0001370	0.0000000	0.0001390
Calcium	315.80	0.0000000	0.0000000	0.0032140	0.0000000	0.0000000
Chromium	267.70	0.0000000	0.0002200	0.0000000	0.0000000	-0.0037690
Cobalt	228.60	0.0000000	0.0000000	0.0000000	0.0002450	-0.0019700
Copper	324.70	0.0000000	0.0000000	-0.0003080	0.0000000	0.0006200
Iron	259.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.30	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Magnesium	383.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.60	0.0000000	0.0000000	0.0000000	0.0000000	-0.0001510
Mercury						
Nickel	231.60	0.0000000	0.0000000	0.0004950	0.0000000	-0.0018550
Potassium	766.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.00	0.0000000	0.0000000	0.0009940	0.0000000	0.0000000
Silver	328.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium	589.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	377.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Uranium						
Vanadium	292.40	0.0000000	0.0000000	0.0000000	0.0000000	-0.0108000
Zinc	206.20	0.0000000	0.0000000	0.0000000	0.0022430	0.0005240

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

ICP ID Number: TJA 61 3____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : NI_	PB_	SN_	TI_	TL_
Aluminum	308.22	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony	217.50	0.0011230	0.0009460	0.0000000	0.0000000	0.0000000
Arsenic	193.60	0.0009940	0.0000000	0.0000000	0.0000000	0.0000000
Barium	493.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron	249.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium	226.50	-0.0005820	0.0000000	0.0000000	0.0001910	0.0000000
Calcium	315.80	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium	267.70	0.0000000	0.0000000	0.0000000	0.0001660	0.0000000
Cobalt	228.60	0.0000000	0.0000000	-0.0014620	0.0017260	0.0000000
Copper	324.70	0.0000000	0.0000000	0.0000000	0.0004930	0.0000000
Iron	259.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.30	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Magnesium	383.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury						
Nickel	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0014850
Potassium	766.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Silver	328.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium	589.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	377.50	0.0162630	0.0000000	0.0000000	-0.1373560	0.0000000
Uranium						
Vanadium	292.40	0.0000000	0.0000000	0.0000000	0.0005070	0.0000000
Zinc	206.20	-0.0007590	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

ICP ID Number: TJA 61 3____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : V__	___	___	___	___
Aluminum	308.22	-0.0198620				
Antimony	217.50	0.0011570				
Arsenic	193.60	0.0102320				
Barium	493.40	0.0000000				
Beryllium	313.00	0.0018680				
Boron	249.60	0.0000000				
Cadmium	226.50	0.0000000				
Calcium	315.80	0.0000000				
Chromium	267.70	0.0014660				
Cobalt	228.60	0.0000000				
Copper	324.70	0.0000000				
Iron	259.90	0.0000000				
Lead	220.30	0.0000000				
Magnesium	383.20	0.0000000				
Manganese	257.60	-0.0001330				
Mercury						
Nickel	231.60	-0.0003500				
Potassium	766.40	0.0000000				
Selenium	196.00	0.0000000				
Silver	328.00	-0.0053240				
Sodium	589.50	0.0000000				
Thallium	377.50	0.0000000				
Uranium						
Vanadium	292.40	0.0000000				
Zinc	206.20	0.0000000				

Comments:

U.S. EPA - CLP

11A
ICP Interelement Correction Factors (Annually)

b Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

:CP ID Number: TJA 61E 3___ Date: 04/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : Al	Ca	Fe	Mg	BA_
Aluminum_	308.22	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony_	206.84	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Arsenic__	189.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Barium___	493.41	0.0000000	0.0000000	0.0000000	0.0000000	-0.0003500
Beryllium	313.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron____						
Cadmium__	226.50	0.0000000	0.0000000	0.0000860	0.0000000	0.0000000
Calcium__	317.93	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.72	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt___	228.62	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Copper___	324.75	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Iron_____	271.44	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead_____	220.35	0.0003700	0.0000000	0.0000630	0.0000000	0.0000000
gnesium	279.08	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
anganese	257.61	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury__						
Nickel___	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.03	0.0000040	0.0000000	-0.0000790	0.0000000	0.0000000
Silver___	328.07	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	588.99	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	190.86	0.0000000	0.0000000	-0.0002200	0.0000000	0.0000000
Uranium__	292.35	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Vanadium_	292.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc_____	206.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

CP ID Number: TJA 61E 3___ Date: 04/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : CO_	CR_	MN_	NI_	V__
Aluminum_	308.22	-0.0058000	0.0000000	0.0000000	-0.0013000	0.0270000
Antimony_	206.84	0.0000000	0.0010000	0.0000000	0.0000000	0.0000000
Arsenic__	189.04	0.0000000	-0.0029800	0.0000000	0.0000000	0.0000000
Barium___	493.41	0.0000000	0.0000000	0.0000000	0.0000000	-0.0031300
Beryllium	313.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron____						
Cadmium__	226.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Calcium__	317.93	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.72	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt___	228.62	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Copper___	324.75	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Iron_____	271.44	0.0723000	0.0000000	0.0000000	0.0000000	0.0150000
Lead_____	220.35	0.0000000	0.0000000	0.0001090	0.0002430	0.0000000
Magnesium	279.08	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.61	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury__						
Nickel___	231.60	-0.0013000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.03	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Silver___	328.07	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	588.99	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	190.86	0.0000000	0.0000000	-0.0047900	0.0000000	0.0000000
Uranium__	292.35	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Vanadium_	292.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc_____	206.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

U.S. EPA - CLP

12
ICP Linear Ranges (Quarterly)

b Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

CP ID Number: TJA 61 3____ Date: 07/15/97

Analyte	Integ. Time (sec.)	Concentration (ug/L)	M
Aluminum	8.00	500000.0	P
Antimony	8.00	25000.0	P
Arsenic	8.00	50000.0	P
Barium	8.00	25000.0	P
Beryllium	8.00	10000.0	P
Boron	8.00	50000.0	P
Cadmium	8.00	10000.0	P
Calcium	8.00	500000.0	P
Chromium	8.00	50000.0	P
Cobalt	8.00	10000.0	P
Copper	8.00	50000.0	P
Iron	8.00	500000.0	P
Lead	8.00	50000.0	P
Magnesium	8.00	500000.0	P
Manganese	8.00	25000.0	P
Mercury			NR
Nickel	8.00	50000.0	P
Potassium	8.00	500000.0	P
Selenium	8.00	50000.0	P
Silver	8.00	2000.0	P
Sodium	8.00	500000.0	P
Thallium	8.00	50000.0	P
Uranium			NR
Vanadium	8.00	10000.0	P
Zinc	8.00	50000.0	P

Comments:

U.S. EPA - CLP

12
ICP Linear Ranges (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3778R_

ICP ID Number: TJA 61E 3___ Date: 07/15/97

Analyte	Integ. Time (sec.)	Concentration (ug/L)	M
Aluminum	15.00	500000.0	P
Antimony	15.00	10000.0	P
Arsenic	15.00	10000.0	P
Barium	15.00	10000.0	P
Beryllium	15.00	10000.0	P
Boron			NR
Cadmium	15.00	10000.0	P
Calcium	15.00	500000.0	P
Chromium	15.00	10000.0	P
Cobalt	15.00	10000.0	P
Copper	15.00	10000.0	P
Iron	15.00	200000.0	P
Lead	15.00	10000.0	P
Magnesium	15.00	500000.0	P
Manganese	15.00	10000.0	P
Mercury			NR
Nickel	15.00	10000.0	P
Potassium	15.00	100000.0	P
Selenium	15.00	10000.0	P
Silver	15.00	2000.0	P
Sodium	15.00	100000.0	P
Thallium	15.00	10000.0	P
Uranium	15.00	250000.0	P
Vanadium	15.00	10000.0	P
Zinc	15.00	10000.0	P

Comments:

U.S. EPA - CLP

13
PREPARATION LOG

.b Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.:_____ SAS No.: _____ SDG No.:3778R_

Method: P_

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
04LA-97__	10/08/97__		100__
04LA-97__	10/08/97__		100__
04LA-97__	10/08/97__		100__
04LA-97__	10/08/97__		100__
LCSS __	10/08/97__		100__
PBW __	10/08/97__		100__

U.S. EPA - CLP

13
PREPARATION LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.:_____ SAS No.: _____ SDG No.:3778R_

Method: AV

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
04LA-97__	_10/08/97__	_____	____20__
04LA-97__	_10/08/97__	_____	____20__
04LA-97__	_10/08/97__	_____	____20__
04LA-97__	_10/08/97__	_____	____20__
LCSS __	_10/08/97__	_____	____20__
PBW __	_10/08/97__	_____	____20__

U.S. EPA - CLP

14

ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

Instrument ID Number: TJA 61 3_____ Method: P_

Start Date: 10/08/97 End Date: 10/08/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
STD-BLAN	1.00	1131							X																		
A1	1.00	1134																									
B1	1.00	1137							X																		
ZZZZZZ	1.00	1140																									
ZZZZZZ	1.00	1143																									
ICV	1.00	1146							X																		
ICB	1.00	1149							X																		
CRI	1.00	1152							X																		
ICSA	1.00	1155							X																		
ICSAB	1.00	1158							X																		
CCV	1.00	1201							X																		
CCB	1.00	1204							X																		
ZZZZZZ	1.00	1207																									
ZZZZZZ	1.00	1211																									
ZZZZZZ	1.00	1214																									
ZZZZZZ	1.00	1217																									
ZZZZZZ	1.00	1220																									
ZZZZZZ	1.00	1223																									
ZZZZZZ	1.00	1226																									
ZZZZZZ	1.00	1229																									
ZZZZZZ	1.00	1232																									
ZZZZZZ	1.00	1235																									
CCV	1.00	1238							X																		
CCB	1.00	1241							X																		
ZZZZZZ	1.00	1244																									
ZZZZZZ	1.00	1247																									
ZZZZZZ	5.00	1250																									
ZZZZZZ	1.00	1253																									
ZZZZZZ	1.00	1256																									
ZZZZZZ	1.00	1300																									
ZZZZZZ	1.00	1303																									
ZZZZZZ	1.00	1306																									

U.S. EPA - CLP

14

ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

Instrument ID Number: TJA 61 3_____ Method: P_

Start Date: 10/08/97 End Date: 10/08/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
STD-BLAN	1.00	1131																									
A1	1.00	1134																									
B1	1.00	1137																									
ZZZZZZ	1.00	1140																									
ZZZZZZ	1.00	1143																									
ICV	1.00	1146																									
ICB	1.00	1149																									
CRI	1.00	1152																									
ICSA	1.00	1155																									
ICSAB	1.00	1158																									
CCV	1.00	1201																									
CCB	1.00	1204																									
ZZZZZZ	1.00	1207																									
ZZZZZZ	1.00	1211																									
ZZZZZZ	1.00	1214																									
ZZZZZZ	1.00	1217																									
ZZZZZZ	1.00	1220																									
ZZZZZZ	1.00	1223																									
ZZZZZZ	1.00	1226																									
ZZZZZZ	1.00	1229																									
ZZZZZZ	1.00	1232																									
ZZZZZZ	1.00	1235																									
CCV	1.00	1238																									
CCB	1.00	1241																									
ZZZZZZ	1.00	1244																									
ZZZZZZ	1.00	1247																									
ZZZZZZ	5.00	1250																									
ZZZZZZ	1.00	1253																									
ZZZZZZ	1.00	1256																									
ZZZZZZ	1.00	1300																									
ZZZZZZ	1.00	1303																									
ZZZZZZ	1.00	1306																									

U.S. EPA - CLP

14

ANALYSIS RUN LOG

.b Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

Instrument ID Number: TJA 61 3_____ Method: P_

Start Date: 10/08/97 End Date: 10/08/97

EPA Sample No.	D/F	Time	% R	Analytes																						
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
ZZZZZZ	1.00	1309																									
ZZZZZZ	1.00	1312																									
CCV	1.00	1315							X																		
CCB	1.00	1318							X																		
ZZZZZZ	1.00	1321																									
ZZZZZZ	1.00	1324																									
ZZZZZZ	1.00	1327																									
ZZZZZZ	1.00	1330																									
ZZZZZZ	1.00	1333																									
ZZZZZZ	1.00	1336																									
ZZZZZZ	1.00	1339																									
ZZZZZZ	1.00	1342																									
CCV	1.00	1346							X																		
CCB	1.00	1349							X																		
ZZZZZZ	1.00	1352																									
ZZZZZZ	1.00	1355																									
ZZZZZZ	1.00	1358																									
CCV	1.00	1401							X																		
CCB	1.00	1404							X																		
CCV	1.00	1514							X																		
CCB	1.00	1517							X																		
ZZZZZZ	1.00	1520																									
ZZZZZZ	1.00	1523																									
ZZZZZZ	1.00	1526																									
ZZZZZZ	1.00	1529																									
ZZZZZZ	1.00	1532																									
ZZZZZZ	1.00	1535																									
ZZZZZZ	5.00	1538																									
ZZZZZZ	1.00	1541																									
PBW	1.00	1544							X																		
LCSS	1.00	1547							X																		
CCV	1.00	1550							X																		

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14

ANALYSIS RUN LOG

b Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

Instrument ID Number: TJA 61 3_____ Method: P_

Start Date: 10/08/97 End Date: 10/08/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
ZZZZZZ	1.00	1309																									
ZZZZZZ	1.00	1312																									
CCV	1.00	1315																									
CCB	1.00	1318																									
ZZZZZZ	1.00	1321																									
ZZZZZZ	1.00	1324																									
ZZZZZZ	1.00	1327																									
ZZZZZZ	1.00	1330																									
ZZZZZZ	1.00	1333																									
ZZZZZZ	1.00	1336																									
ZZZZZZ	1.00	1339																									
ZZZZZZ	1.00	1342																									
CCV	1.00	1346																									
CCB	1.00	1349																									
ZZZZZZ	1.00	1352																									
ZZZZZZ	1.00	1355																									
ZZZZZZ	1.00	1358																									
CCV	1.00	1401																									
CCB	1.00	1404																									
CCV	1.00	1514																									
CCB	1.00	1517																									
ZZZZZZ	1.00	1520																									
ZZZZZZ	1.00	1523																									
ZZZZZZ	1.00	1526																									
ZZZZZZ	1.00	1529																									
ZZZZZZ	1.00	1532																									
ZZZZZZ	1.00	1535																									
ZZZZZZ	5.00	1538																									
ZZZZZZ	1.00	1541																									
PBW	1.00	1544																									
LCSS	1.00	1547																									
CCV	1.00	1550																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

Instrument ID Number: TJA 61 3_____ Method: P_

Start Date: 10/08/97 End Date: 10/08/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
CCB	1.00	1553							X																		
04LA-97-	1.00	1556							X																		
04LA-97-	1.00	1600							X																		
04LA-97-	1.00	1603							X																		
04LA-97-	1.00	1606							X																		
ZZZZZZ	1.00	1609																									
04LA-97-	5.00	1612							X																		
CRI	1.00	1615							X																		
ICSA	1.00	1618							X																		
ICSAB	1.00	1621							X																		
CCV	1.00	1624							X																		
CCB	1.00	1627							X																		

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

Instrument ID Number: TJA 61 3_____ Method: P_

Start Date: 10/08/97 End Date: 10/08/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
CCB	1.00	1553																									
04LA-97-	1.00	1556																									
04LA-97-	1.00	1600																									
04LA-97-	1.00	1603																									
04LA-97-	1.00	1606																									
ZZZZZZ	1.00	1609																									
04LA-97-	5.00	1612																									
CRI	1.00	1615																									
ICSA	1.00	1618																									
ICSAB	1.00	1621																									
CCV	1.00	1624																									
CCB	1.00	1627																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

b Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

nstrument ID Number: LEEMAN 3_____ Method: AV

Start Date: 10/09/97 End Date: 10/09/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
S0	1.00	1203		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
S0.2	1.00	1205		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
S1	1.00	1207		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
S2	1.00	1209		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
S5	1.00	1212		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
S10	1.00	1214		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1220		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICV	1.00	1222		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
ICB	1.00	1224		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
PBW	1.00	1224		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
CRA	1.00	1226		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
CSS	1.00	1228		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1231		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1233		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1235		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1237		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1239		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1242		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1244		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1246		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCV	1.00	1248		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
CCB	1.00	1250		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1253		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1255		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04LA-97-	1.00	1257		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
04LA-97-	1.00	1259		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
04LA-97-	1.00	1301		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
04LA-97-	1.00	1304		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
CCV	1.00	1306		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
CCB	1.00	1308		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14

ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

Instrument ID Number: LEEMAN 3_____ Method: AV

Start Date: 10/09/97 End Date: 10/09/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
S0	1.00	1203																									
S0.2	1.00	1205																									
S1	1.00	1207																									
S2	1.00	1209																									
S5	1.00	1212																									
S10	1.00	1214																									
ZZZZZZ	1.00	1220																									
ICV	1.00	1222																									
ICB	1.00	1224																									
PBW	1.00	1224																									
CRA	1.00	1226																									
CSS	1.00	1228																									
ZZZZZZ	1.00	1231																									
ZZZZZZ	1.00	1233																									
ZZZZZZ	1.00	1235																									
ZZZZZZ	1.00	1237																									
ZZZZZZ	1.00	1239																									
ZZZZZZ	1.00	1242																									
ZZZZZZ	1.00	1244																									
ZZZZZZ	1.00	1246																									
CCV	1.00	1248																									
CCB	1.00	1250																									
ZZZZZZ	1.00	1253																									
ZZZZZZ	1.00	1255																									
04LA-97-	1.00	1257																									
04LA-97-	1.00	1259																									
04LA-97-	1.00	1301																									
04LA-97-	1.00	1304																									
CCV	1.00	1306																									
CCB	1.00	1308																									

U.S. EPA - CLP

14

ANALYSIS RUN LOG

ɔ Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

nstrument ID Number: TJA 61E 3____ Method: P_

Start Date: 10/08/97 End Date: 10/08/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
100PPM_U	1.00	1015		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1030		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
ZZZZZZ	1.00	1034		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1038		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ICV	1.00	1046		X	X	X	X	X	–	X	X	X	X	X	X	X	X	X	–	X	X	X	X	X	X	X	X
ICB	1.00	1050		X	X	X	X	X	–	X	X	X	X	X	X	X	X	X	–	X	X	X	X	X	X	X	X
CRI	1.00	1054		X	X	X	X	X	–	X	X	X	X	X	X	X	X	X	–	X	X	X	X	X	X	X	X
ICSA	1.00	1107		X	X	X	X	X	–	X	X	X	X	X	X	X	X	X	–	X	X	X	X	X	X	X	X
ICSAB	1.00	1111		X	X	X	X	X	–	X	X	X	X	X	X	X	X	X	–	X	X	X	X	X	X	X	X
ZZZZZZ	1.00	1118																									
ZZZZZZ	1.00	1122		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1128		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1132		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1136		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	5.00	1140		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1144		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CCV	1.00	1148		X	X	X	X	X	–	X	X	X	X	X	X	X	X	X	–	X	X	X	X	X	X	X	X
CCB	1.00	1152		X	X	X	X	X	–	X	X	X	X	X	X	X	X	X	–	X	X	X	X	X	X	X	X
ZZZZZZ	1.00	1156																									
ZZZZZZ	1.00	1200		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1204		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1208		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1212		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1217		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1222		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1226		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1230		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ZZZZZZ	1.00	1234		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CCV	1.00	1238		X	X	X	X	X	–	X	X	X	X	X	X	X	X	X	–	X	X	X	X	X	X	X	X
CCB	1.00	1243		X	X	X	X	X	–	X	X	X	X	X	X	X	X	X	–	X	X	X	X	X	X	X	X
ZZZZZZ	1.00	1251																									
ZZZZZZ	1.00	1255		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
				–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

FORM XIV - IN

ILM03.0

U.S. EPA - CLP

14

ANALYSIS RUN LOG

ab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

Instrument ID Number: TJA 61E 3____ Method: P_

Start Date: 10/08/97 End Date: 10/08/97

EPA Sample No.	D/F	Time	% R	Analytes																								
				ZN																								
100PPM_U	1.00	1015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1030		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1034		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1038		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICV	1.00	1046		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICB	1.00	1050		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CRI	1.00	1054		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICSA	1.00	1107		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICSAB	1.00	1111		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1118		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1122		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZ	1.00	1128		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1132		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1136		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	5.00	1140		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1144		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCV	1.00	1148		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCB	1.00	1152		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1156		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1200		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1204		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1208		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1212		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1217		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1222		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1226		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1230		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1234		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCV	1.00	1238		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCB	1.00	1243		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1251		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1255		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

FORM XIV - IN

ILM03.0

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

Instrument ID Number: TJA 61E 3____ Method: P_

Start Date: 10/08/97 End Date: 10/08/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
ZZZZZZ	1.00	1259		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1303		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1307		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1312		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1316		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1320		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1324		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	2.00	1328		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCV	1.00	1332		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
CCB	1.00	1337		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
ZZZZZZ	2.00	1341		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	10.00	1345		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	2.00	1349		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	2.00	1353		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	2.00	1357		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	100.00	1402		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	10.00	1406		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	10.00	1410		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	10.00	1414		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCV	1.00	1418		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
CCB	1.00	1422		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
CCV	1.00	1501		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
CCB	1.00	1505		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
PBW	1.00	1509		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
LCSS	1.00	1514		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
04LA-97-	1.00	1518		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
04LA-97-	1.00	1524		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
04LA-97-	1.00	1528		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
04LA-97-	5.00	1533		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
04LA-97-	1.00	1537		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
ZZZZZZ	1.00	1541		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	100.00	1545		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

Instrument ID Number: TJA 61E 3____ Method: P_

Start Date: 10/08/97 End Date: 10/08/97

EPA Sample No.	D/F	Time	% R	Analytes: ZN
ZZZZZZ	1.00	1259		
ZZZZZZ	1.00	1303		
ZZZZZZ	1.00	1307		
ZZZZZZ	1.00	1312		
ZZZZZZ	1.00	1316		
ZZZZZZ	1.00	1320		
ZZZZZZ	1.00	1324		
ZZZZZZ	2.00	1328		
CCV	1.00	1332		X
CCB	1.00	1337		X
ZZZZZZ	2.00	1341		
ZZZZZZ	10.00	1345		
ZZZZZZ	2.00	1349		
ZZZZZZ	2.00	1353		
ZZZZZZ	2.00	1357		
ZZZZZZ	100.00	1402		
ZZZZZZ	10.00	1406		
ZZZZZZ	10.00	1410		
ZZZZZZ	10.00	1414		
CCV	1.00	1418		X
CCB	1.00	1422		X
CCV	1.00	1501		X
CCB	1.00	1505		X
PBW	1.00	1509		X
LCSS	1.00	1514		X
04LA-97-	1.00	1518		X
04LA-97-	1.00	1524		X
04LA-97-	1.00	1528		X
04LA-97-	5.00	1533		X
04LA-97-	1.00	1537		X
ZZZZZZ	1.00	1541		
ZZZZZZ	100.00	1545		

U.S. EPA - CLP

14
ANALYSIS RUN LOG

b Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

Instrument ID Number: TJA 61E 3____ Method: P_

Start Date: 10/08/97 End Date: 10/08/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
ZZZZZZ	5.00	1557		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCV	1.00	1601		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
CCB	1.00	1605		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
ZZZZZZ	1.00	1613		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1616		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1619		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1621		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1624		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1627		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1630		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CRI	1.00	1633		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
CSA	1.00	1637		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
CSAB	1.00	1640		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
CCV	1.00	1644		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
CCB	1.00	1649		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14

ANALYSIS RUN LOG

b Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3778R_

Instrument ID Number: TJA 61E 3____ Method: P_

Start Date: 10/08/97 End Date: 10/08/97

EPA Sample No.	D/F	Time	% R	Analytes: ZN
ZZZZZZ	5.00	1557		
CCV	1.00	1601		X
CCB	1.00	1605		X
ZZZZZZ	1.00	1613		
ZZZZZZ	1.00	1616		
ZZZZZZ	1.00	1619		
ZZZZZZ	1.00	1621		
ZZZZZZ	1.00	1624		
ZZZZZZ	1.00	1627		
ZZZZZZ	1.00	1630		
CRI	1.00	1633		X
ICSA	1.00	1637		X
ICSAB	1.00	1640		X
CCV	1.00	1644		X
CCB	1.00	1649		X

FORM XIV - IN ILM03.0

Tuesday, October 07, 1997

REQUEST NUMBER: 3780R

ANALYSIS TYPE: RADOTH

Los Alamos
NATIONAL LABORATORY

DATA ENTERED
110397 M

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/7/97
REPORT DUE: 10/10/97
TURN AROUND REQ'D: 1 day

These samples are on:

LANL Request Number: 3780R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
D2H		04LA-97-0480	11	W	10/6/97	
O18O16		04LA-97-0480	11	W	10/6/97	

Final Page of REQUEST NUMBER 3780R

RECRA LabNet

a division of Recra Environmental, Inc.

Virtual Laboratories Everywhere

20 October 1997

Mr. John Miglio
Los Alamos National Laboratory
TA-3, Building 271
DP. O1U MS-H865
Los Alamos, NM 87545

Ref: Subcontract No. 7791L0014-8M
Data Package for RFW Batch 9710L691
LANL Request No. 3780R

Dear Mr. Miglio:

Enclosed please find the data report for 1 water sample received 8 October 1997 for LANL Request #3780R. This samples was forwarded to Geochron Laboratories and analyzed for deuterium and oxygen ratios on a rush turnaround. The results were faxed 14 October.

Please do not hesitate to contact me at (610) 280-3000 with any question you may have regarding either the hard copy or electronic report.

Very truly yours,

Report Sent To: [illegible]

Recra LabNet Philadelphia

Approved By: _____

Date Sent: 10/23/97

Judith L. Stone
Senior Project Manager

Enclosure:

208 Welsh Pool Road • Lionville, Pennsylvania 19341 • (610) 280-3000

Tuesday, October 07, 1997

REQUEST NUMBER: 3780R

ANALYSIS TYPE: RADOTH

Los Alamos
NATIONAL LABORATORY

C1

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

Please analyze the enclosed samples according to the schedule indicated:

These samples are on:

SHIP DATE: 10/7/97
REPORT DUE: 10/10/97
TURN AROUND REQ'D: 1 day

LANL Request Number: 3780R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
D2H		04LA-97-0480	11	W	10/6/97	
O18O16		04LA-97-0480	11	W	10/6/97	

Final Page of REQUEST NUMBER 3780R

691

97

Tuesday, October 07, 1997

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 3780RC

REQUEST NUMBER: 3780R
ANALYSIS TYPE: RADOTH

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-97-0480	11	1 L amber glass	D2H
04LA-97-0480	11	1 L amber glass	O18O16

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 3780R Page 1

Relinquished By:		Date	Time
John Kemp	John Kemp	10/7/97	12:35
Jedey			

Received By:		Date	Time
Jedey			
J. Toder	J Toder	10/8/97	1000

Received for DISPOSAL By:		Date	Time

Remarks:

GEOCHRON LABORATORIES a division of
KRUEGER ENTERPRISES, INC.

711 CONCORD AVENUE ✦ CAMBRIDGE, MASSACHUSETTS 02138 ✦ U.S.A
TELEPHONE: (617) 876-3691 TELEFAX: (617) 661-0148

LANL
97106691

STABLE ISOTOPE RATIO ANALYSES — REPORT OF ANALYTICAL WORK

Submitted by: Judy Stone
RECRA
208 Welsh Pool Road
Lionville, PA 19341-1225

Date Received: 10/09/97
Date Reported: 10/14/97
Your Reference: Req. No. 3780R

Our Lab. Number	Your Sample Number	Description	δD*	$\delta^{18}O$*
HOR-95150	04LA-97-0480	Water	-73	-10.1

*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{sample}‰ = \left[\frac{R_{sample}}{R_{standard}} - 1 \right] \times 1000$$

Where:

D/H standard is SMOW
$^{18}O/^{16}O$ standard is SMOW

And:

$D/H_{standard}$ = 0.000316**
$^{18}O/^{16}O_{standard}$ = 0.0039948**

**Double atom ratio

GEOCHRON LABORATORIES a division of
KRUEGER ENTERPRISES, INC.

711 CONCORD AVENUE ◆ CAMBRIDGE, MASSACHUSETTS 02138 ◆ U.S.A
TELEPHONE: (617) 876-3691 TELEFAX: (617) 661-0148

LANL
9710L691

STABLE ISOTOPE RATIO ANALYSES

REPORT OF ANALYTICAL WORK

Submitted by: Judy Stone
RECRA
208 Welsh Pool Road
Lionville, PA 19341-1225

Date Received: 10/09/97
Date Reported: 10/14/97
Your Reference: Req. No. 3780R

Our Lab. Number	Your Sample Number	Description	δD*	$\delta^{18}O$*
HOR-95150	04LA-97-0480	Water	-73	-10.1

*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{sample}‰ = \left[\frac{R_{sample}}{R_{standard}} - 1 \right] \times 1000$$

Where:

D/H standard is SMOW
$^{18}O/^{16}O$ standard is SMOW

And:

$D/H_{standard}$ = 0.000316**
$^{18}O/^{16}O_{standard}$ = 0.0039948**

**Double atom ratio

DATA ENTERED
110397 LT

Wednesday, October 29, 1997

Los Alamos
NATIONAL LABORATORY

AMENDED

REQUEST NUMBER: 3781R
ANALYSIS TYPE: RAD

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/7/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 5 days

These samples are on:

LANL Request Number: 3781R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; RAD SCREENING FOR SAMPLE 04LA-97-0480 ONLY. AMENDED: DO TU ANALYSIS BY KPA METHOD, JV 10/29/97.

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
AM241		04LA-97-0480	05	W	10/6/97	
GROSSAB		04LA-97-0480	05	W	10/6/97	
GROSSG		04LA-97-0480	05	W	10/6/97	
GSCAN		04LA-97-0480	05	W	10/6/97	
ISOPU		04LA-97-0480	05	W	10/6/97	
ISOU		04LA-97-0480	05	W	10/6/97	
SR90		04LA-97-0480	05	W	10/6/97	
TU		04LA-97-0480	05	W	10/6/97	
H3		04LA-97-0480	07	W	10/6/97	
AM241		04LA-97-0481	02	W	10/6/97	
GROSSAB		04LA-97-0481	02	W	10/6/97	
GROSSG		04LA-97-0481	02	W	10/6/97	
GSCAN		04LA-97-0481	02	W	10/6/97	
ISOPU		04LA-97-0481	02	W	10/6/97	
ISOU		04LA-97-0481	02	W	10/6/97	
SR90		04LA-97-0481	02	W	10/6/97	
TU		04LA-97-0481	02	W	10/6/97	

Tuesday, October 07, 1997

REQUEST NUMBER: 3781R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

DATA ENTERED

110397 M

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/7/97
REPORT DUE: 10/10/97
TURN AROUND REQ'D: 1 day

These samples are on:

LANL Request Number: 3781R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; RAD SCREENING FOR SAMPLE 04LA-97-0480 ONLY.

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
AM241		04LA-97-0480	05	W	10/6/97	
GROSSAB		04LA-97-0480	05	W	10/6/97	
GROSSG		04LA-97-0480	05	W	10/6/97	
GSCAN		04LA-97-0480	05	W	10/6/97	
ISOPU		04LA-97-0480	05	W	10/6/97	
ISOU		04LA-97-0480	05	W	10/6/97	
SR90		04LA-97-0480	05	W	10/6/97	
H3		04LA-97-0480	07	W	10/6/97	
AM241		04LA-97-0481	02	W	10/6/97	
GROSSAB		04LA-97-0481	02	W	10/6/97	
GROSSG		04LA-97-0481	02	W	10/6/97	
GSCAN		04LA-97-0481	02	W	10/6/97	
ISOPU		04LA-97-0481	02	W	10/6/97	
ISOU		04LA-97-0481	02	W	10/6/97	
SR90		04LA-97-0481	02	W	10/6/97	

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3781R

Date File Saved: 10/13/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: GROSS AB

Samples under Request Number 3781R (PAI Work Order 97-10-054) were received on 10/08/97 and scheduled for gross alpha/beta analysis, which was completed on 10/10/97.

The analytical results for these samples are reported in units of pCi/liter.

This work order was prepared using PAI SOP702R11, and analyzed using PAI SOP724R5.

Gross alpha results are referenced to ^{241}Am. Gross beta results are referenced to ^{90}Sr/Y.

The MDA for sample 04LA-97-0480 (97-10-054-01) and its duplicate did not meet client requested detection limits. The sample activity far exceeds the reported MDA.

No problems were noted during the preparation and analysis of these samples. All quality control criteria were met.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Renee Gallegos
Radiochemistry Instrument Technician

10/13/97
Date

Radiochemistry Final Review

10/13/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Donald Gipple
Laboratory Manager

10/17/97
Date

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3781R

Date File Saved: 10/13/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Sr-90

Samples under Request Number 3781R (Work Order 97-10-054) were received on 10/08/97 and scheduled for strontium-90 analyses, which were completed on 10/13/97.

Total radiostrontium is reported as Sr-90. The presence of other radioisotopes of strontium may cause positive bias in the measured strontium concentration.

These samples consist of water and the results are reported in units of pCi/l.

This work order was prepared using PAI SOP707R3 and analyzed using PAI SOP724R5.

Due to insufficient sample neither a duplicate nor a matrix spike was prepared. A duplicate LCS was prepared instead.

No further anomalies were encountered during this analysis.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Renee Gallegos — 10/15/97
Radiochemistry Instrument Technician — Date

Radiochemistry Final Review — 10/15/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple — 12/17/97
Laboratory Manager — Date

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3781R

Date File Saved: 10/15/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOPU

The samples under Request Number 3781R (Work Order 97-10-054) were received on 10/08/97 and scheduled for isotopic plutonium analyses.

These samples were prepared according to Paragon Analytics, Inc. procedures PAI SOP776R2, PAI SOP778R3 and PAI SOP780R2.

These samples were analyzed by alpha spectrometry for isotopic plutonium according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 10/11/97. The analysis results for these samples are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{239}Pu activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is less than five times the EQL. Method blank results less than 5 times EQL are acceptable according to the LANL statement of work. Results should be compared to the method blank activity to determine the validity of the measurement.

No problems were observed in the preparation and analyses of the samples listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrumentation

Radiochemistry Final Review

10/16/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

10/17/97
Date

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3781R

Date File Saved: 10/15/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOU

The samples under Request Number 3781R (Work Order 97-10-054) were received on 10/08/97 and scheduled for isotopic uranium analyses.

These samples were prepared according to Paragon Analytics, Inc. procedures PAI SOP776R2, PAI SOP778R3 and PAI SOP780R2.

These samples were analyzed by alpha spectrometry for isotopic uranium according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 10/11/97. The analysis results for these samples are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{234}U, ^{235}U and ^{238}U activities are reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is less than five times the EQL. Method blank results less than 5 times EQL are acceptable according to the LANL statement of work. Results should be compared to the method blank activity to determine the validity of the measurement.

No problems were observed in the preparation and analyses of the samples listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrument Technician

10/16/97
Date

Radiochemistry Final Review

10/16/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

10/17/97
Date

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3781R

Date File Saved: 10/14/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

All samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gamma Spectroscopy

The samples under Request Number 3781R (Work Order 9710054) were received on 10/08/97 and scheduled for gamma spec. analyses, which were completed on 10/08/97.

The analysis results for these samples are reported in units of pCi/Liter. The samples were not filtered prior to analysis.

This work order was prepared using PAI SOP739R2 and analyzed using PAI SOP713R4.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Sample volumes were insufficient to allow preparation of a duplicate. A duplicate analysis of sample 04LA-97-0481 (97-10-054-02) was performed in lieu of a preparation duplicate.

Cadmium-109 and ^{237}Np are often misidentified when using the required library. The observed photopeak at 87 keV is attributed to the K_β x ray of Pb. Likewise, ^{211}Bi and ^{224}Ra are misidentified due to interference from ^{214}Pb at 351 keV and 241 keV, respectively. Due to interference, the GDR software did not attempt to quantify activity concentrations for some analyses. In such cases, zero values are reported in the hard copy reports, and an "NQ" qualifier is submitted in the electronic deliverable.

Quantification of ^{226}Ra at low levels based upon the 186 keV photopeak is unreliable due to interference from ^{235}U, which also has a photopeak at 186 keV. Low levels of ^{235}U, though undetectable by this method, can cause greatly exaggerated ^{226}Ra results. The ^{226}Ra activity reported should be considered qualitative. Activity concentration results above the 2σ total propagated uncertainty (TPU) for radionuclides identified as present by the analysis software for which spectral interference is suspected are given an "S" flag.

Activity concentrations above the 2σ TPU are reported in some instances where no supporting photopeaks are observed. These anomalous identifications result from the GDR software attempting to calculate net activity concentrations for analytes for which no peaks are observed. Such data have been flagged with an asterisk.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill
Radiochemistry Instrumentation

10-14-97
Date

Radiochemistry Final Review

10/15/97
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

10/17/97
Date

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3781R

Date File Saved: 10/15/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOAM

The samples under Request Number 3781R (Work Order 97-10-054) were received on 10/08/97 and scheduled for isotopic amercium analyses.

These samples were prepared according to Paragon Analytics, Inc. procedures PAI SOP776R2, PAI SOP778R3 and PAI SOP780R2.

These samples were analyzed by alpha spectrometry for isotopic amercium according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 10/15/97. The analysis results for these samples are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{241}Am activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is less than five times the EQL. Method blank results less than 5 times EQL are acceptable according to the LANL statement of work. Results should be compared to the method blank activity to determine the validity of the measurement.

No problems were observed in the preparation and analyses of the samples listed above. All method required quality control parameters were met.

Section 3 Certification Statement Note: No sample duplicate was analyzed due to insufficient sample. (*)

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

(*) The LCS + LCS Duplicate demonstrated good precision.
102% + 108% => 5.8% RPD
S. Fry
10/17/97

Lisa Duckworth
Radiochemistry Instrumentation

Daniel C Burn
Radiochemistry Final Review

10/16/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Steve Fry
for Don Gipple
Laboratory Manager

10/17/97
Date

Paragon Analytics, Inc.
Case Narrative File

Request Number: 3781R
Date File Saved: 10/14/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: H3

Samples under Request Number 3781R (PAI Work Order 97-10-054) were received on 10/08/97 and scheduled for tritium analysis, which was completed on 10/10/97.

The analysis results for this sample is reported in units of pCi/L.

This work order was prepared using PAI SOP700R3, and analyzed using PAI SOP704R4.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit

No anomalous situations were encountered during the preparation or analysis of these samples. All quality control criteria were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Chris McNerney — 10/14/97

Chris McNerney
Radiochemistry Instrument Technician

Date

Radiochemistry Final Review — 10/14/97

Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple — 10-17-97

Laboratory Manager

Date

Paragon Analytics, Inc.
Case Narrative File

Request Number: 3781R
Date File Saved: 10/16/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gross Gamma

The samples under Request Number 3781R (PAI Work Order 97-10-054) were received on 10/08/97 and scheduled for gross gamma analyses, which were completed on 10/14/97.

The analysis results for these samples are reported in units of pCi/Liter referenced to Cs-137.

These samples were prepared according to Paragon Analytics, Inc. procedure PAI SOP739R2.

The HPGe gamma photon detectors were calibrated using a standard of Cesium-137 in water. Counting efficiencies were calculated as the ratio of the net integrated count rate in a region of interest between 50 and 2000 keV to the known photon emission rate of the standard. Samples were analyzed in the same geometry and counts integrated in the same manner.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported. Each result should be compared to the result for the appropriate blank for determination of the validity of that measurement.

The duplicate error ratio (DER) for the analysis of sample 04L-97-0481 (97-10-054-02) and its duplicate sample (97-10-054-D1) was elevated above our warning limit. DER is defined as :

$$DER = \frac{|S - D|}{2 * \sqrt{\sigma_S^2 + \sigma_D^2}}$$

The warning limit for DER is 1.42. The DER for this analysis is 1.58. The results are acceptable according to PAI SOP 715 Rev.9.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill
Radiochemistry Instrumentation

10-16-97
Date

Radiochemistry Final Review

10/16/97
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

10/17/97
Date

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-8M

Request Number: 3781R

Date File Saved: 11/21/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Total Uranium by KPA

No problems were observed in the preparation and analysis of the samples listed above, except as narrated below. All method required quality control parameters were met.

Samples under Request Number 3781R (Work Order 97-10-054) were received on 10/08/97 and scheduled for KPA analysis. The KPA analysis was completed on 11/20/97.

Method required dilutions may have been performed to address matrix interferences. Where dilutions are required, the submitted sample result, uncertainty and reporting limit reflect the dilution performed. Results above the PAI reporting limit are reported without qualification. Results which fall between the PAI reporting limit and the KPA instrument detection limit are flagged "J" and are qualifed as estimated results due to additional uncertainty in the measurement at this concentration. Results less than the method detection limit are flagged "U" and are qualified as "below detection limit."

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

B. Pirasteh 11-21-97

Bahman Pirasteh
Radiochemistry Instrumentation

12/2/97

Radiochemistry Final Review — Date

12-10-97

for Don Gipple
Laboratory Manager — Date

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: **3781R** LAB NAME: **Paragon** LAB CODE_____

NAME OF VALIDATOR: **Antonia Tallarico** COMPANY: **LATA**

VALIDATION DATE: **23 December 97** EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- o INORGANICS
- X RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ô if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? " YES " NO
Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

This report contains only the total uranium results. Total uranium was analyzed by KPA.

Signature/1st validation: _____ 23 Dec 97

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

Wednesday, October 29, 1997

REQUEST NUMBER: 3781R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

AMENDED

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

97-10-054

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/7/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 5 days

These samples are on:

LANL Request Number: 3781R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; RAD SCREENING FOR SAMPLE 04LA-97-0480 ONLY. AMENDED: DO TU ANALYSIS BY KPA METHOD, JV 10/29/97.

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
AM241		04LA-97-0480	05	W	10/6/97	
GROSSAB		04LA-97-0480	05	W	10/6/97	
GROSSG		04LA-97-0480	05	W	10/6/97	
GSCAN		04LA-97-0480	05	W	10/6/97	
ISOPU		04LA-97-0480	05	W	10/6/97	
ISOU		04LA-97-0480	05	W	10/6/97	
SR90		04LA-97-0480	05	W	10/6/97	
TU		04LA-97-0480	05	W	10/6/97	
H3		04LA-97-0480	07	W	10/6/97	
AM241		04LA-97-0481	02	W	10/6/97	
GROSSAB		04LA-97-0481	02	W	10/6/97	
GROSSG		04LA-97-0481	02	W	10/6/97	
GSCAN		04LA-97-0481	02	W	10/6/97	
ISOPU		04LA-97-0481	02	W	10/6/97	
ISOU		04LA-97-0481	02	W	10/6/97	
SR90		04LA-97-0481	02	W	10/6/97	
TU		04LA-97-0481	02	W	10/6/97	

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-8M

Request Number: 3781R

Date File Saved: 11/21/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Total Uranium by KPA

No problems were observed in the preparation and analysis of the samples listed above, except as narrated below. All method required quality control parameters were met.

Samples under Request Number 3781R (Work Order 97-10-054) were received on 10/08/97 and scheduled for KPA analysis. The KPA analysis was completed on 11/20/97.

Method required dilutions may have been performed to address matrix interferences. Where dilutions are required, the submitted sample result, uncertainty and reporting limit reflect the dilution performed. Results above the PAI reporting limit are reported without qualification. Results which fall between the PAI reporting limit and the KPA instrument detection limit are flagged "J" and are qualifed as estimated results due to additional uncertainty in the measurement at this concentration. Results less than the method detection limit are flagged "U" and are qualified as "below detection limit."

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

B. Pirasteh 11-21-97

Bahman Pirasteh
Radiochemistry Instrumentation

12/2/97

Radiochemistry Final Review — Date

12-10-97

Don Gipple
Laboratory Manager — Date

TOTAL URANIUM BLANK SPIKE RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 11/18/97

Client Name: Los Alamos National Lab./ SMO Date Analyzed : 11/20/97

Client Project ID: 3781R

Lab Sample ID Series: 97-11-109 Sample Matrix : Water

Lab Sample ID	Spike Conc. (ug/L)	Rep't Conc. (ug/L)
97-11-109-S1	10.0 ± 1.5	9.3 ± 1.3

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

PAI sets control limits for KPA Uranium measurements as follows:
Blank Spike Control Limits = Known (μ) ± 0.15 * μ.

Matrix Spike Control Limits = Known (μ) + Native Concentrat
± 0.25 * (μ + Native Concentration).

PAI uses these control limits for all KPA Uranium measurements

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

Remarks:

Blank Spike for Work Orders 97-10-054 and 97-11-109.

TOTAL URANIUM MATRIX SPIKE RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 11/20/97

Client Name: Los Alamos National Lab./ SMO Date Analyzed : 11/20/97

Client Project ID: 3781R

Lab Sample ID Series: 97-10-054 Sample Matrix : Water

Lab Sample ID	Known Conc. (ug/L)	Rep't Conc. (ug/L)
97-10-054-M1	11.2 ± 2.8	10.4 ± 1.4

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

PAI sets control limits for KPA Uranium measurements as follows:
Blank Spike Control Limits = Known (μ) ± 0.15 * μ.

Matrix Spike Control Limits = Known (μ) + Native Concentration
± 0.25 * (μ + Native Concentration).

PAI uses these control limits for all KPA Uranium measurements

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

Remarks:

Sample 97-10-054-M1 is a matrix spike of 97-10-054-02.

TOTAL URANIUM ANALYSIS RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 11/18/97

Client Name: Los Alamos National Lab./ SMO Date Analyzed : 11/20/97

Client Project ID: 3781R

Lab Sample ID Series: 97-11-109 Sample Matrix : Water

Client Sample ID	Lab Sample ID	Total Uranium (ug/L)	Reporting Limit	Flag
Blank	11-109-B1	BDL	0.10	U

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

FLAGS = J - 'Estimated Value' - result between Method Detection Limit and Reporting Limit.
U - 'Not Detected' - result less than Method Detection Limit.

BDL = Below Detection Limit; see method for DL determination.

Remarks:

Blank for Work Orders 97-10-054 and 97-11-109.

BJP

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgment based on data use . It usually has an "M" with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analytes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likely because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1c Carrier recovery 10-40% and result > EQL.

1d Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

3b Spike recovery outside criterion but sample is not of same matrix as was matrix spike sample

4 Sample result > EQL but < 5X the amount found in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

6d LCS tracer/carrier recovery < 10 % and sample result is a non-detect.

7 For the set of duplicates, both results are > EQL or no EQL is available, but there is not a 3 σ agreement between the results - within an SDG.

8 One result > EQL and the difference > a factor of 1xEQL for water and 2xEQL for soil.

9a Result < MDA and MDA is < EQL.

9b Result > MDA but < EQL.

10a Result < both MDA and EQL.

10b Result < MDA but > EQL.

11 Result is less than three times the reported 1-sigma uncertainty.

17 A zero was added to the result field because the laboratory did not provide a value or a MDC.

RADIOCHEMISTRY

Lab Control Sample (LCS) **Present? X yes no** **1/SDG** **75-125% recovery** *Paragon used a blank spike as the LCS.*	**OK** See comment	**Obtain from lab. Q=A** **If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 75% and J+ for > 125%** **If the LCS sample tracer/ carrier recovery is < 10%, qualify the associated sample data as P for non-detects.**	 **R6a** **R6** **R6d**
Matrix Spike (MS) **1/SDG** **Present? X yes no** **75-125% recovery** **(Note: As opposed to other tests, the matrix spike test will qualify samples on the basis of their connection by SDG and not by analytical batch).**	**OK**	**Obtain from lab. Q=A** **If criterion not met, qualify all analytes associated with the MS with a J- for <75%** **and J+ for > 125%,** **if all samples in batch of same matrix. If there is variation of matrix, P for samples not of same matrix as spiked sample.**	 **R3a** **R3** **R3b**
Method blank **Present? X yes no** **1/SDG** **target analytes ≤5x the amount in the blank**	**OK**	**Obtain from lab. Q=A** **If the sample result > EQL or no EQL is available but <5x the amount found in the associated blank, it should be qualified as U. In making this comparison the differing aliquot size of the blank and sample being tested should be taken into account.**	 **R4**

A723 Dec 97

Duplicate Present? X yes no 1/SDG (Note: As opposed to other tests, the duplicate tests will qualify samples on the basis of their connection by SDG and not by analytical batch).	OK	Obtain from lab. Q=A If both results are above the EQL or no EQL is available, all results for same analyte in same SDG should be qualified as J if there is not 3σ agreement between results. If both results are < EQL no test should be done. If one result > EQL and difference > factor of 1X EQL for water and 2X EQL for soil, qualify with J.	 R7 R8
EQL Denote those samples where the result is less than the reported sample MDA or EQL. Confirm that the MDA of each reported analyte in each sample and blank is <EQL.	NA	When the MDA < the EQL or no EQL is available: Qualify as U those sample results < the MDA. Qualify as U those sample results > MDA but < EQL. When the MDA is >EQL: Qualify as U those sample and blank results < both the MDA and EQL. Qualify as U those sample and blank results < than the MDA but > EQL.	 R9a R9b R10a R10b
Detection with respect to the reported uncertainty This is a more conservative test of detection than simply considering the MDA or EQL since sample results > than both the EQL and MDA may still be qualified using this test.	NA	Qualify as U those results < three times the reported 1-sigma uncertainty. Equivalently qualify as U those results < 1.5 times the reported 2-sigma uncertainty or < the reported 3-sigma uncertainty.	R11

1723 Rev 97

Tracer/carrier recovery	**NA**		
Present? yes no		**Obtain from lab. Q=A**	
Tracer recovery for alpha spec analyses 330 %		**If tracer/carrier recovery < 10 %, qualify results as R**	**R10**
Carrier recovery for beta/gamma analyses 3 40%		**If tracer recovery is 10-30%, Q=J**	**R11a**
		if result > EQL and UJ if result < EQL	**R11b**
		If carrier recovery is 10-40%, Q=J	**R11c**
		if result > EQL and UJ if < EQL	**R11d**

A723 Dec 97

TOTAL URANIUM ANALYSIS RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 10/06/97

Client Name: Los Alamos National Lab./ SMO Date Analyzed : 11/20/97

Client Project ID: 3781R

Lab Sample ID Series: 97-10-054 Sample Matrix : Water

Client Sample ID	Lab Sample ID	Total Uranium (ug/L)	Reporting Limit	Flag
04LA-97-0480	10-054-01	5.45 ± 0.75	0.10	
04LA-97-0481	10-054-02	1.22 ± 0.17	0.10	
Duplicate	10-054-D1	5.22 ± 0.72	0.10	

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

FLAGS = J - 'Estimated Value' - result between Method Detection Limit and Reporting Limit.
U - 'Not Detected' - result less than Method Detection Limit.

Remarks:

Sample 97-10-054-D1 is a duplicate of 97-10-054-01.

M23 Dec 97

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: 3781R LAB NAME: **Paragon** LAB CODE_____

NAME OF VALIDATOR: **Antonia Tallarico** COMPANY: **LATA**

VALIDATION DATE: **27 October 97** EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- o INORGANICS
- X RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? - YES - NO
Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

No duplicate was analyzed for Iso-Pu and Iso-U. No accompaning explanation was in the case narrative. Steve Fry was contacted on 27 Oct. 97 and asked to fax a corrected case narrative. A corrected case narrative was recieved 28 Oct. 97. A copy has been included in the data package and a copy follows this sheet.

Signature/1st validation: _____ 31Oct97

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

PARAGON
ANALYTICS, INC.
AN EMPLOYEE OWNED SMALL BUSINESS

225 Commerce Drive Fort Collins, Colorado 80524 (800) 443-1511
Phone (970) 490-1511
Fax (970) 490-1522

Message

Please Direct To:

Company Name: LATA

Attention: Toni Tallarico

Date: 10-28-97

Number of Pages: 2

Fax Number: (505) 662-1757

Sent From: S. Fry

Message: Cy John Miglio

Hi Toni -
Our network is down, so I could only make a hand-edit.
Steve

Original to Follow ☐ Yes ☑ No

If you do not receive all the pages, please contact sender at 970 490 1511.

No problems were observed in the preparation and analyses of the samples listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth — 10/16/97
Radiochemistry Instrument Technician — Date

Radiochemistry Final Review — 10/16/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple — 10/17/97
Laboratory Manager — Date

10/28/97 Appendix to Iso U Narrative for RN 3781 R:

There was insufficient sample to perform a sample duplicate. An LCS Duplicate was analyzed to estimate batch precision.

Steven Fry, U.P. 10/28/97

Tuesday, October 07, 1997

REQUEST NUMBER: 3781R
ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

10-054

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/7/97
REPORT DUE: 10/10/97
TURN AROUND REQ'D: 1 day

These samples are on:

LANL Request Number: 3781R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature:

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
AM241		04LA-97-0480	05	W	10/6/97	
GROSSAB		04LA-97-0480	05	W	10/6/97	
GROSSG		04LA-97-0480	05	W	10/6/97	
GSCAN		04LA-97-0480	05	W	10/6/97	
ISOPU		04LA-97-0480	05	W	10/6/97	
ISOU		04LA-97-0480	05	W	10/6/97	
SR90		04LA-97-0480	05	W	10/6/97	
H3		04LA-97-0480	07	W	10/6/97	
AM241		04LA-97-0481	02	W	10/6/97	
GROSSAB		04LA-97-0481	02	W	10/6/97	
GROSSG		04LA-97-0481	02	W	10/6/97	
GSCAN		04LA-97-0481	02	W	10/6/97	
ISOPU		04LA-97-0481	02	W	10/6/97	
ISOU		04LA-97-0481	02	W	10/6/97	
SR90		04LA-97-0481	02	W	10/6/97	

ALPHA/BETA ANALYSIS RESULTS SUMMARY

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/08/97

Client Name: Los Alamos National Lab

Date Analyzed : 10/10/97

Client Project ID: Blank

Sample Matrix : Water

Lab Sample ID Series: 97-10-054

Count Duration: 600 Min.

Analyzed By : RG

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/l)	Gross Beta (pCi/l)
Blank	10-054-B1	0.04 ± 0.50	0.37 ± 0.86
Decision Level	10-054-B1	1.2	2.4

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

Reported Activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the approriate blank.

These samples were prepared using PAI SOP702FC and analyzed using PAI SOP705FC.

GROSS ALPHA/BETA BLANK SPIKE RESULTS

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/08/97

Client Name: Los Alamos National Lab

Date Analyzed : 10/10/97

Client Project ID : Blank Spike

Sample Matrix : Water

Lab Workorder Number : 97-10-054

Units : pCi/l

Alpha Recovery Data

Lab Sample ID	Alpha Spike Added	Alpha Reported	Percent Recovery	Flag
97-10-054-S1	670.5	814.9	121.5	Pass

Beta Recovery Data

Lab Sample ID	Beta Spike Added	Beta Reported	Percent Recovery	Flag
97-10-054-S1	428.9	478.5	111.6	Pass

PAI sets control limits for gross alpha/beta measurements based on EPA/EMSL Laboratory Intercomparison Control Limits.

Acceptance Range for Percent Recovery of blank spike samples is known ± 30% for gross alpha, known ± 30% for gross beta.

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3781R

Date File Saved: 10/13/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Sr-90

Samples under Request Number 3781R (Work Order 97-10-054) were received on 10/08/97 and scheduled for strontium-90 analyses, which were completed on 10/13/97.

Total radiostrontium is reported as Sr-90. The presence of other radioisotopes of strontium may cause positive bias in the measured strontium concentration.

These samples consist of water and the results are reported in units of pCi/l.

This work order was prepared using PAI SOP707R3 and analyzed using PAI SOP724R5.

Due to insufficient sample neither a duplicate nor a matrix spike was prepared. A duplicate LCS was prepared instead.

No further anomalies were encountered during this analysis.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Renee Gallegos
Radiochemistry Instrument Technician

10/15/97
Date

Radiochemistry Final Review

10/15/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

10/14/97
Date

Sr-90 LCS RESULTS

Method ASTM D5811-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/09/97

Client Name: Shared QC

Date Analyzed : 10/13/97

Client Project ID : Blank Spike

Sample Matrix : Water

Lab Workorder Number : 97-10-054

Count Duration: 150 Min.

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
97-10-054-S1	21.2 ± 5.73	19.0 ± 3.49	89.5%	Pass

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

PAI sets control limits for Sr-90 measurements based on Historical Data.

Control Limits = Known ± 27% for Sr-90.

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

Remarks:

Blank Spike for workorders 97-10-035 and 10-054.

Sr-90 LCS RESULTS

Method ASTM D5811-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/09/97

Client Name: Shared QC

Date Analyzed : 10/13/97

Client Project ID : Blank Spike

Sample Matrix : Water

Lab Workorder Number : 97-10-054

Count Duration: 150 Min.

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
97-10-054-S2	21.2 ± 5.73	22.6 ± 4.14	106%	Pass

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

PAI sets control limits for Sr-90 measurements based on Historical Data.

Control Limits = Known ± 27% for Sr-90.

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

Remarks:

Sample 97-10-054-S2 is a LCS duplicate.

Sr-90 ANALYSIS RESULTS SUMMARY

Method 905.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/09/97

Client Name: Shared QC

Date Analyzed : 10/13/97

Client Project ID: Blank

Sample Matrix : Water

Lab Sample ID Series: 97-10-054

Count Duration: 150 Min.

Analyzed by: RG

Client Sample ID	Lab Sample ID	Sr-90 (pCi/l)
Blank	97-10-054-B1	-0.04 ± 0.25
Blank	Decision Level	0.22

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

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP707FC and analyzed using PAI SOP724FC.

Remarks:

Blank for workorders 97-10-035 and 10-054.

RG

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3781R

Date File Saved: 10/15/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOPU

The samples under Request Number 3781R (Work Order 97-10-054) were received on 10/08/97 and scheduled for isotopic plutonium analyses.

These samples were prepared according to Paragon Analytics, Inc. procedures PAI SOP776R2, PAI SOP778R3 and PAI SOP780R2.

These samples were analyzed by alpha spectrometry for isotopic plutonium according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 10/11/97. The analysis results for these samples are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{239}Pu activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is less than five times the EQL. Method blank results less than 5 times EQL are acceptable according to the LANL statement of work. Results should be compared to the method blank activity to determine the validity of the measurement.

No problems were observed in the preparation and analyses of the samples listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrumentation

Radiochemistry Final Review

10/16/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

10/17/97
Date

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Tuesday, October 14, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3781R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID:

Lab ID: 9709102-4MB

Sample Matrix: WATER

Date Prepared: 09-Oct-97

Prep SOP: PAI SOP 778R3

Prep Batch: 143136

Date Collected: 09-Oct-97

Date Analyzed: 11-Oct-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 1000

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.0051 +/- 0.0071	0.028	pCi/L	
Pu-239	0.0128 +/- 0.0057	0.0077	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.76	pCi/L	63%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Tuesday, October 14, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3781R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID:

Lab ID: 9709102-4LCS

Sample Matrix: WATER

Date Prepared: 09-Oct-97

Prep SOP: PAI SOP 778R3

Prep Batch: 143136

Date Collected: 09-Oct-97

Date Analyzed: 11-Oct-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 1000

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Pu-238	0.043 +/- 0.011	0.023	N/A	pCi/L	N/A	N/A	
Pu-239	5.12 +/- 0.32	0.018	4.85	pCi/L	105%	+/- 25%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.96	pCi/L	67%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Tuesday, October 14, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3781R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID:

Lab ID: 9709102-5LCS

Sample Matrix: WATER

Date Prepared: 09-Oct-97

Prep SOP: PAI SOP 778R3

Prep Batch: 143136

Date Collected: 09-Oct-97

Date Analyzed: 11-Oct-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 1000

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Pu-238	0.0354 +/- 0.0095	0.0076	N/A	pCi/L	N/A	N/A	
Pu-239	4.90 +/- 0.31	0.019	4.85	pCi/L	101%	+/- 25%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.73	pCi/L	62%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3781R

Date File Saved: 10/15/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOU

The samples under Request Number 3781R (Work Order 97-10-054) were received on 10/08/97 and scheduled for isotopic uranium analyses.

These samples were prepared according to Paragon Analytics, Inc. procedures PAI SOP776R2, PAI SOP778R3 and PAI SOP780R2.

These samples were analyzed by alpha spectrometry for isotopic uranium according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 10/11/97. The analysis results for these samples are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{234}U, ^{235}U and ^{238}U activities are reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is less than five times the EQL. Method blank results less than 5 times EQL are acceptable according to the LANL statement of work. Results should be compared to the method blank activity to determine the validity of the measurement.

No problems were observed in the preparation and analyses of the samples listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrument Technician

10/16/97
Date

Radiochemistry Final Review

10/16/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

10/17/97
Date

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Tuesday, October 14, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3781R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID:

Lab ID: 9709102-4MB

Sample Matrix: WATER

Date Prepared: 09-Oct-97

Prep SOP: PAI SOP 778R3

Prep Batch: 143136

Date Collected: 09-Oct-97

Date Analyzed: 11-Oct-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 1000

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.069 +/- 0.011	0.015	pCi/L	
U-235	0.0192 +/- 0.0060	0.012	pCi/L	
U-238	0.056 +/- 0.011	0.023	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.41	7.61	pCi/L	90%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Tuesday, October 14, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3781R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID:

Lab ID: 9709102-4LCS

Sample Matrix: WATER

Date Prepared: 09-Oct-97

Prep SOP: PAI SOP 778R3

Prep Batch: 143136

Date Collected: 09-Oct-97

Date Analyzed: 11-Oct-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 1000

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
U-234	10.78 +/- 0.64	0.028	11.66	pCi/L	92%	+/- 25%	
U-235	0.518 +/- 0.043	0.017	N/A	pCi/L	N/A	N/A	
U-238	11.02 +/- 0.66	0.026	11.66	pCi/L	94%	+/- 25%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.41	7.19	pCi/L	85%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Tuesday, October 14, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3781R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID:

Lab ID: 9709102-5LCS

Sample Matrix: WATER

Date Prepared: 09-Oct-97

Prep SOP: PAI SOP 778R3

Prep Batch: 143136

Date Collected: 09-Oct-97

Date Analyzed: 11-Oct-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 1000

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
U-234	10.58 +/- 0.63	0.024	11.66	pCi/L	91%	+/- 25%	
U-235	0.472 +/- 0.039	0.023	N/A	pCi/L	N/A	N/A	
U-238	10.88 +/- 0.65	0.026	11.66	pCi/L	93%	+/- 25%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.41	7.6	pCi/L	90%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3781R

Date File Saved: 10/14/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

All samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gamma Spectroscopy

The samples under Request Number 3781R (Work Order 9710054) were received on 10/08/97 and scheduled for gamma spec. analyses, which were completed on 10/08/97.

The analysis results for these samples are reported in units of pCi/Liter. The samples were not filtered prior to analysis.

This work order was prepared using PAI SOP739R2 and analyzed using PAI SOP713R4.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Sample volumes were insufficient to allow preparation of a duplicate. A duplicate analysis of sample 04LA-97-0481 (97-10-054-02) was performed in lieu of a preparation duplicate.

Cadmium-109 and ^{237}Np are often misidentified when using the required library. The observed photopeak at 87 keV is attributed to the K_β x ray of Pb. Likewise, ^{211}Bi and ^{224}Ra are misidentified due to interference from ^{214}Pb at 351 keV and 241 keV, respectively. Due to interference, the GDR software did not attempt to quantify activity concentrations for some analyses. In such cases, zero values are reported in the hard copy reports, and an "NQ" qualifier is submitted in the electronic deliverable.

Quantification of ^{226}Ra at low levels based upon the 186 keV photopeak is unreliable due to interference from ^{235}U, which also has a photopeak at 186 keV. Low levels of ^{235}U, though undetectable by this method, can cause greatly exaggerated ^{226}Ra results. The ^{226}Ra activity reported should be considered qualitative. Activity concentration results above the 2σ total propagated uncertainty (TPU) for radionuclides identified as present by the analysis software for which spectral interference is suspected are given an "S" flag.

Activity concentrations above the 2σ TPU are reported in some instances where no supporting photopeaks are observed. These anomalous identifications result from the GDR software attempting to calculate net activity concentrations for analytes for which no peaks are observed. Such data have been flagged with an asterisk.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill — 10-14-97
Radiochemistry Instrumentation — Date

Radiochemistry Final Review — 10/15/97
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple — 10/17/97
Laboratory Manager — Date

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 08/20/96 10:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed : 10/08/97 19:41

Lab Sample ID: 97-10-054-S1

Sample Matrix : Water

Client Sample ID: Lab Control

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	14800	15200	97.4	Pass
Cd-109	186000	178000	105	Pass
Co-57	4960	4670	106	Pass
Cs-137	41200	41200	100	Pass
Co-60	43900	43500	101	Pass

ATI sets control limits for gamma spectroscopy as follows :
Control Limits = Known ± 15%

Data stored in file \gdr\prt\W10054S1.97P

MC

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/08/97 12:40

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 10/08/97 16:01

Lab Sample ID: 97-10-054-B1

Sample Matrix: Water

Client Sample ID: BLANK

Count Duration: 180 Min.

Nuclide	Activity (pCi/Liter)	% Uncertainty
Am-241	12.0	Decision Level
Np-237	11.3	Decision Level
Cd-109	59.5	Decision Level
Th-234	77.3	Decision Level
Co-57	1.32	Decision Level
Ce-144	13.9	Decision Level
Ce-139	1.17	Decision Level
U-235	2.69	Decision Level
Ra-226	44.3	Decision Level
Th-227	9.31	Decision Level
Pb-212	5.54	Decision Level
Ra-224	28.2	Decision Level
Se-75	1.66	Decision Level
Hg-203	1.32	Decision Level
Pa-231	46.0	Decision Level
Pa-233	2.68	Decision Level
Ra-223	27.2	Decision Level
Eu-152	9.00	Decision Level
Bi-211	10.1	Decision Level
Pb-214	5.43 27.15	Decision Level
Sn-113	1.72	Decision Level
Rn-219	18.7	Decision Level
Pb-211	42.1	Decision Level
Ann-Rad	3.55	Decision Level
Sr-85	2.54	Decision Level
Ba-140	7.88	Decision Level
Tl-208	3.53	Decision Level
Cs-134	2.47	Decision Level
Bi-214	7.58	Decision Level
Ru-106	21.9	Decision Level

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/08/97 12:40

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 10/08/97 16:01

Lab Sample ID: 97-10-054-B1

Sample Matrix: Water

Client Sample ID: BLANK

Count Duration: 180 Min.

Nuclide	Activity (pCi/Liter)	% Uncertainty
Cs-137	1.89	Decision Level
Mn-54	1.70	Decision Level
Y-88	4.64	Decision Level
Ac-228	8.30	Decision Level
Pa-234m	331	Decision Level
Zn-65	3.61	Decision Level
Co-60	1.75	Decision Level
Na-22	1.66	Decision Level
K-40	34.4	Decision Level
La-140	2.19	Decision Level
Bi-212	129	Decision Level

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

Decision Level Values calculated as recommended by ANSI N42.2
Reported sample activities should be compared to these Decision Levels

For reporting purposes, % uncertainty for samples with activity = 0.0 is set to 100 %.

Data is stored in file \gdr\prt\W10054B1.97P

MG

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/06/97 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 10/08/97 16:02

Lab Sample ID: 97-10-054-D1

Sample Matrix: Water

Client Sample ID: Duplicate

Count Duration: 180 Min.

Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)
Pb-212	7.85 ± 6.38	Pb-214	37.0 ± 9.22
Bi-214	39.0 ± 10.0	Am-241	8.56 ± 14.8
Np-237	5.80 ± 16.3	Cd-109	-21.0 ± 52.0
Th-234	-46.5 ± 96.9	Co-57	-0.426 ± 1.50
Ce-144	6.31 ± 11.9	Ce-139	-0.558 ± 1.80
U-235	1.44 ± 3.81	Ra-226	20.7 ± 62.4
Th-227	-9.55 ± 12.5	Ra-224	88.3 ± 5.58
Se-75	0.208 ± 2.56	Hg-203	-0.851 ± 2.11
Pa-231	-42.7 ± 68.1	Pa-233	-4.64 ± 4.09
Ra-223	-10.3 ± 42.5	Eu-152	0.000 ± 6.21
Bi-211	0.000 ± 0.000	Sn-113	1.07 ± 2.47
Rn-219	0.000 ± 22.8	Pb-211	0.946 ± 53.3
Ann-Rad	-12.4 ± 4.62	Sr-85	-1.95 ± 3.00
Ba-140	-2.64 ± 7.84	Tl-208	0.392 ± 3.19
Cs-134	-1.39 ± 1.95	Ru-106	13.3 ± 19.4
Cs-137	0.781 ± 2.45	Mn-54	-1.68 ± 2.34
Y-88	-2.48 ± 3.46	Ac-228	5.57 ± 10.7
Pa-234m	-112 ± 397	Zn-65	-0.356 ± 5.51
Co-60	0.125 ± 2.68	Na-22	0.620 ± 2.57
K-40	-48.9 ± 35.6	La-140	6.81 ± 8.65
Bi-212	-75.3 ± 103		

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

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

Remarks:

Sample 97-10-054-D1 is a duplicate of 97-10-054-01.

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3781R

Date File Saved: 10/15/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOAM

The samples under Request Number 3781R (Work Order 97-10-054) were received on 10/08/97 and scheduled for isotopic amercium analyses.

These samples were prepared according to Paragon Analytics, Inc. procedures PAI SOP776R2, PAI SOP778R3 and PAI SOP780R2.

These samples were analyzed by alpha spectrometry for isotopic amercium according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 10/15/97. The analysis results for these samples are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{241}Am activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is less than five times the EQL. Method blank results less than 5 times EQL are acceptable according to the LANL statement of work. Results should be compared to the method blank activity to determine the validity of the measurement.

No problems were observed in the preparation and analyses of the samples listed above. All method required quality control parameters were met.

Section 3 Certification Statement Note: No sample duplicate was analyzed due to insufficient sample. (*)

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

(*) The LCS + LCS Duplicate demonstrated good precision.
102% + 108% => 5.8% RPD
5.7%

Lisa Duckworth
Radiochemistry Instrumentation

Radiochemistry Final Review — 10/16/97 — Date — 10/17/97

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

10/17/97
Date

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Thursday, October 16, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: 3781R

Client Project Number:

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID:

Lab ID: 9709102-4MB

Sample Matrix: WATER

Date Prepared: 09-Oct-97

Prep SOP: PAI SOP 778R3

Prep Batch: 143136

Date Collected: 09-Oct-97

Date Analyzed: 15-Oct-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 400

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.021 +/- 0.011	0.016	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.68	pCi/L	75%	20-110%

Comments:

Abbreviations:

TPU - Total Propegated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Thursday, October 16, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: 3781R

Client Project Number:

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID:

Lab ID: 9709102-4LCS

Sample Matrix: WATER

Date Prepared: 09-Oct-97

Prep SOP: PAI SOP 778R3

Prep Batch: 143136

Date Collected: 09-Oct-97

Date Analyzed: 15-Oct-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Am-241	7.32 +/- 0.47	0.037	7.16	pCi/L	102%	+/- 17%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.84	pCi/L	78%	20-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Thursday, October 16, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: 3781R

Client Project Number:

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID:

Lab ID: 9709102-5LCS

Sample Matrix: WATER

Date Prepared: 09-Oct-97

Prep SOP: PAI SOP 778R3

Prep Batch: 143136

Date Collected: 09-Oct-97

Date Analyzed: 15-Oct-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Am-241	7.74 +/- 0.49	0.036	7.16	pCi/L	108%	+/- 17%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.91	pCi/L	80%	20-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

TRITIUM ANALYSIS RESULTS SUMMARY

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/08/97

Client Name: Allied Technology Group, Inc.

Date Analyzed: 10/09/97

Lab Sample ID Series: 97-09-226

Count Duration: 150 Min.

Client Project ID: Blank

Analyzed By : CJM

Client ID	PAI ID	Matrix	H-3 (pCi/l)	MDA
Blank	09-226-B1	Water	-70.59 ± 160	260

Reported Uncertainty is the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

These samples were prepared using PAI SOP700 and analyzed using PAI SOP704.

Remarks:

Blank shared for work orders 97-09-226, 97-09-266, and 97-10-054.

TRITIUM LCS RESULTS SUMMARY

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/08/97

Client Name: Allied Technology Group, Inc.

Date Analyzed: 10/10/97

Lab Sample ID Series: 97-09-226

Count Duration: 90 Min.

Client Project ID: LCS

Units : pCi/l

Client ID	PAI ID	Matrix	Known Activity	Reported Activity	Percent Recovery
LCS	09-226-S1	Water	7491.6	7006.6	94

PAI sets control limits for tritium measurements as follows :
Control Limits = Known ± 15% for Water, Known ± 25% for other matrices

Remarks:

LCS shared for work orders 97-09-226, 97-09-266, and 97-10-054.

TRITIUM MATRIX SPIKE ANALYSIS RESULTS SUMMARY

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/06/97

Client Name: LANL SMO

Date Analyzed : 10/10/97

Client Project ID: 3781R

Sample Matrix : Water

Lab Sample ID Series: 97-10-054

Count Duration: 150 Min.

Lab Sample ID	Spike Added	Native Activity	Reported Activity	Percent Recovery
97-10-054-M1	7491.6	< 260.4	7858.4	104.9

PAI sets control limits for Tritium measurements as follows :
Recovery Limits = 75 % to 125 % of Known, where Known =
(Known Spike Value + Native Activity Value)

Remarks:

Sample 97-10-054-M1 is a matrix spike of sample 97-10-054-01.

Duplicate **Present? yes no** **1/SDG** **(Note: As opposed to other tests, the duplicate tests will qualify samples on the basis of their connection by SDG and not by analytical batch).** *Acoording to the case narrative, for the Sr-90 analysis, due to insufficient sample neither a duplicate nor a matrix spike was prepared.* *The duplicate analysis for Iso-Pu and Iso-U is missing. No explanation for its exclusion was found in the original case narrative. A amended case narrative was faxed on 28 Oct. 97 indicating there was insufficient sample. Samples were qualified as A.* *According to the case narrative, due to insufficient sample volume, no duplicate was preparedfor the following analyses: γ spec. and Am-241. For γ spec. a duplicate count of the reported sample was performed. No A was applied to the γ spec. data.* *The duplicate does not meet the 3σ criteriea for gross γ and both results are qualified as J.*	**A,J** **See comment**	**Obtain from lab. Q=A** **If both results are above the EQL or no EQL is available, all results for same analyte in same SDG should be qualified as J if there is not 3σ agreement between results.** **If both results are < EQL no test should be done.** **If one result > EQL and difference > factor of 1X EQL for water and 2X EQL for soil, qualify with J.**	**R7** **R8**

M 31 Oct 97

EQL Denote those samples where the result is less than the reported sample MDA or EQL. Confirm that the MDA of each reported analyte in each sample and blank is <EQL. *A decision level result from the blank was used in place of the MDA for the following analyses: Gross α/β, Sr-90, and γ spec.*	U See comment	When the MDA < the EQL or no EQL is available: Qualify as U those sample results < the MDA. Qualify as U those sample results > MDA but < EQL. When the MDA is >EQL: Qualify as U those sample and blank results < both the MDA and EQL. Qualify as U those sample and blank results < than the MDA but > EQL.	 R9a R9b R10a R10b
Detection with respect to the reported uncertainty This is a more conservative test of detection than simply considering the MDA or EQL since sample results > than both the EQL and MDA may still be qualified using this test.	NA	Qualify as U those results < three times the reported 1-sigma uncertainty. Equivalently qualify as U those results < 1.5 times the reported 2-sigma uncertainty or < the reported 3-sigma uncertainty.	R11
Tracer/carrier recovery Present? X yes no Tracer recovery for alpha spec analyses 330 % Carrier recovery for beta/gamma analyses 3 40%	OK	Obtain from lab. Q=A If tracer/carrier recovery < 10 %, qualify results as R If tracer recovery is 10-30%, Q=J if result > EQL and UJ if result < EQL If carrier recovery is 10-40%, Q=J if result > EQL and UJ if < EQL	 R10 R11a R11b R11c R11d

M 31 Oct 97

ALPHA/BETA ANALYSIS RESULTS SUMMARY

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/06/97

Client Name: Los Alamos National Lab

Date Analyzed : 10/10/97

Client Project ID: 3781R

Sample Matrix : Water

Lab Sample ID Series: 97-10-054

Count Duration: 600 Min.

Analyzed By : RG

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/l) 1.2	Gross Beta (pCi/l) 2.4
04LA-97-0480	10-054-01	304 ± 56	351 ± 58
04LA-97-0481	10-054-02	(U,Ra) 0.57 ± 0.65	3.9 ± 1.0
Duplicate-01	10-054-D1	289 ± 52	337 ± 54

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

Reported Activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the approriate blank.

These samples were prepared using PAI SOP702FC and analyzed using PAI SOP705FC.

Remarks:

Sample 97-10-054-D1 is a duplicate of sample 97-10-054-01.

M 31 Oct 97

Sr-90 ANALYSIS RESULTS SUMMARY

Method 905.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/06/97

Client Name: Los Alamos National Lab

Date Analyzed : 10/13/97

Client Project ID: 3781R

Sample Matrix : Water

Lab Sample ID Series: 97-10-054

Count Duration: 150 Min.

Analyzed by: RG

0.22

Client Sample ID	Lab Sample ID	Sr-90 (pCi/l)
04LA-97-0480	97-10-054-01	0.47 ± 0.28
04LA-97-0481	97-10-054-02	0.11 ± 0.25

A, (U, R9a)

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

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP707FC and analyzed using PAI SOP724FC.

13 Oct 97

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Thursday, October 16, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: 3781R

Client Project Number:

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID: 04LA-97-0480
Lab ID: 9710054-1

Sample Matrix: WATER
Date Prepared: 09-Oct-97
Prep SOP: PAI SOP 778R3
Prep Batch: 143136

Date Collected: 06-Oct-97
Date Analyzed: 11-Oct-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.037 +/- 0.022	0.084	pCi/L	(U,R9a) A
Pu-239	0.031 +/- 0.015	0.050	pCi/L	↓

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3.03	pCi/L	69%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

A 31 Oct 97

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Thursday, October 16, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: 3781R

Client Project Number:

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID: 04LA-97-0481

Lab ID: 9710054-2

Sample Matrix: WATER

Date Prepared: 09-Oct-97

Prep SOP: PAI SOP 778R3

Prep Batch: 143136

Date Collected: 06-Oct-97

Date Analyzed: 11-Oct-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.039 +/- 0.024	0.093	pCi/L	(U, R9a) A
Pu-239	0.012 +/- 0.012	0.055	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.53	pCi/L	58%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

M 31 Oct 97

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Thursday, October 16, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: 3781R

Client Project Number:

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID: 04LA-97-0480
Lab ID: 9710054-1

Sample Matrix: WATER
Date Prepared: 09-Oct-97
Prep SOP: PAI SOP 778R3
Prep Batch: 143136

Date Collected: 06-Oct-97
Date Analyzed: 11-Oct-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 200

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	1.54 +/- 0.14	0.038	pCi/L	
U-235	0.043 +/- 0.018	0.038	pCi/L	~~(U,R9a)~~ (U,R9b)
U-238	1.36 +/- 0.13	0.057	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.41	8.18	pCi/L	97%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

1731 Oct 97

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Thursday, October 16, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: 3781R

Client Project Number:

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID: 04LA-97-0481

Lab ID: 9710054-2

Sample Matrix: WATER

Date Prepared: 09-Oct-97

Prep SOP: PAI SOP 778R3

Prep Batch: 143136

Date Collected: 06-Oct-97

Date Analyzed: 11-Oct-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 200

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.529 +/- 0.071	0.070	pCi/L	
U-235	0.014 +/- 0.014	0.064	pCi/L	(U, R9a)
U-238	0.628 +/- 0.078	0.060	pCi/L	

A

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.41	7.88	pCi/L	94%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

A 31 Oct 97

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 10/06/97 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 10/08/97 12:43

Lab Sample ID: 97-10-054-01

Sample Matrix: Water

Client Sample ID: 04LA-97-0480

Count Duration: 180 Min.

	Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)	
(U, R4)	Ra-226	81.1 ± 65.7 S	Pb-212	5.54 ± 5.76	(U, R4)
	Pb-214	37.6 ± 8.33	Ba-140	8.97 ± 8.80 *	
~~(U, R4)~~ M	Bi-214	43.0 ± 10.9	Na-22	2.45 ± 2.25 *	
(U, R9a)	Am-241	2.59 ± 16.3	Np-237	-14.9 ± 18.9	(U, R9a)
	Cd-109	27.1 ± 64.5	Th-234	-125 ± 108	
	Co-57	-1.64 ± 1.76	Ce-144	-3.20 ± 12.6	
	Ce-139	-2.82 ± 1.92	U-235	5.34 ± 4.02	(U, R4)
	Th-227	-14.6 ± 14.2	Ra-224	16.8 ± 1.06	(U, R9a)
	Se-75	-0.894 ± 2.54	Hg-203	0.252 ± 2.22	
	Pa-231	-41.7 ± 75.6	Pa-233	1.39 ± 4.03	
	Ra-223	-50.3 ± 43.9	Eu-152	-0.080 ± 5.91	
	Bi-211	0.000 ± 0.000	Sn-113	0.493 ± 2.66	
	Rn-219	-1.47 ± 25.5	Pb-211	10.2 ± 56.8	(U, R4)
	Ann-Rad	-8.63 ± 4.49	Sr-85	-2.41 ± 3.35	(U, R9a)
	Tl-208	-1.74 ± 3.39	Cs-134	0.824 ± 2.40	
	Ru-106	1.09 ± 20.7	Cs-137	-0.381 ± 2.42	
	Mn-54	-0.263 ± 2.23	Y-88	-1.13 ± 3.58	
	Ac-228	-0.479 ± 12.4	Pa-234m	215 ± 460	
	Zn-65	-0.330 ± 5.10	Co-60	0.142 ± 2.70	
	K-40	-83.8 ± 47.1	La-140	4.66 ± 7.30	(U, R4)
	Bi-212	-91.6 ± 104			

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank. Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

An asterisk (*) indicates that the reporting software anomalously reports a peak for this radionuclide. The result is an artifact of net reporting.

173 / Oct97 0000:0 MG

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 10/06/97 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 10/08/97 12:44

Lab Sample ID: 97-10-054-02

Sample Matrix: Water

Client Sample ID: 04LA-97-0481

Count Duration: 180 Min.

Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)
Co-57	1.70 ± 1.57 *	Pb-214	18.4 ± 8.00
Bi-211	25.0 ± 26.0	Pa-234m	408 ± 443
Am-241	-4.41 ± 14.1	Np-237	7.54 ± 15.7
Cd-109	-22.9 ± 51.2	Th-234	11.9 ± 95.4
Ce-144	2.83 ± 11.5	Ce-139	-0.896 ± 1.74
U-235	2.85 ± 3.83	Ra-226	30.8 ± 63.1
Th-227	-5.76 ± 12.5	Pb-212	3.85 ± 4.79
Ra-224	-62.2 ± 43.3	Se-75	-0.242 ± 2.40
Hg-203	-1.44 ± 2.06	Pa-231	-56.3 ± 65.5
Pa-233	-0.535 ± 3.97	Ra-223	-17.6 ± 43.4
Eu-152	2.79 ± 5.68	Sn-113	1.40 ± 2.38
Rn-219	1.28 ± 24.8	Pb-211	2.84 ± 53.1
Ann-Rad	-8.36 ± 4.73	Sr-85	-5.87 ± 3.13
Ba-140	-2.31 ± 8.15	Tl-208	-0.305 ± 3.00
Cs-134	1.08 ± 2.15	Bi-214	28.5 ± 8.60
Ru-106	-11.1 ± 19.2	Cs-137	-0.176 ± 2.07
Mn-54	-2.30 ± 2.53	Y-88	0.272 ± 3.31
Ac-228	-4.46 ± 8.91	Zn-65	2.21 ± 5.56
Co-60	-0.623 ± 2.57	Na-22	-1.35 ± 2.86
K-40	-77.3 ± 43.6	La-140	0.559 ± 9.10
Bi-212	26.1 ± 122		

(U, R4) (U, R9a) (U, R4) (U, R9a) (U, R4) (U, R9a)

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank. Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

An asterisk (*) indicates that the reporting software anomalously reports a peak for this radionuclide. The result is an artifact of net reporting.

M 31 Oct 97

MG

Paragon Analytics, Inc.
Case Narrative File

Request Number: 3781R
Date File Saved: 10/16/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0480	97-10-054-01
04LA-97-0481	97-10-054-02

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gross Gamma

The samples under Request Number 3781R (PAI Work Order 97-10-054) were received on 10/08/97 and scheduled for gross gamma analyses, which were completed on 10/14/97.

The analysis results for these samples are reported in units of pCi/Liter referenced to Cs-137.

These samples were prepared according to Paragon Analytics, Inc. procedure PAI SOP739R2.

The HPGe gamma photon detectors were calibrated using a standard of Cesium-137 in water. Counting efficiencies were calculated as the ratio of the net integrated count rate in a region of interest between 50 and 2000 keV to the known photon emission rate of the standard. Samples were analyzed in the same geometry and counts integrated in the same manner.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported. Each result should be compared to the result for the appropriate blank for determination of the validity of that measurement.

The duplicate error ratio (DER) for the analysis of sample 04L-97-0481 (97-10-054-02) and its duplicate sample (97-10-054-D1) was elevated above our warning limit. DER is defined as :

$$DER = \frac{|S - D|}{2 * \sqrt{\sigma_S^2 + \sigma_D^2}}$$

The warning limit for DER is 1.42. The DER for this analysis is 1.58. The results are acceptable according to PAI SOP 715 Rev.9.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill
Radiochemistry Instrumentation

10-16-97
Date

Radiochemistry Final Review

10/16/97
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

10/17/97
Date

Gross Gamma Results Summary

Blank Results

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	10/13/97
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-10-054	Units:	pCi/L

Client Sample ID	Lab Sample ID	Activity	Uncertainty	MDC
Blank	97-10-054-B1	5	26	44

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate.

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

Prepared by 10/16/97

Gross Gamma

Laboratory Control Sample Results

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	#######
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-10-054	Units	pCi/L

Sample ID	Reported Activity	Known Value	Percent Recovery	Flag
97-10-054-S1	8891	8715	102.0%	PASS

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

Prepared by 10/16/97

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgment based on data use . It usually has an "M" with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analytes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likely because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1c Carrier recovery 10-40% and result > EQL.

1d Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

3b Spike recovery outside criterion but sample is not of same matrix as was matrix spike sample

4 Sample result > EQL but < 5X the amount found in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

6d LCS tracer/carrier recovery < 10.% and sample result is a non-detect.

7 For the set of duplicates, both results are > EQL or no EQL is available, but there is not a 3 σ agreement between the results - within an SDG.

8 One result > EQL and the difference > a factor of 1xEQL for water and 2xEQL for soil.

9a Result < MDA and MDA is < EQL.

9b Result > MDA but < EQL.

10a Result < both MDA and EQL.

10b Result < MDA but > EQL.

11 Result is less than three times the reported 1-sigma uncertainty.

17 A zero was added to the result field because the laboratory did not provide a value or a MDC.

RADIOCHEMISTRY

Lab Control Sample (LCS) **Present? X yes no** **1/SDG** **75-125% recovery** *A blank spike result was reported instead of an LCS for the gross α/β.* *The Iso-Pu LCS contains Pu-239. The LCS for Iso -U contains U-234, and U-238. The LCS for γ spec. contains Am-241, Cd-109, Co-57, Cs-137, and Co-60.*	**OK** **See comment**	**Obtain from lab. Q=A** **If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 75% and J+ for > 125%** **If the LCS sample tracer/ carrier recovery is < 10%, qualify the associated sample data as P for non-detects.**	 **R6a** **R6** **R6d**
Matrix Spike (MS) **1/SDG** **Present? yes no** **75-125% recovery** **(Note: As opposed to other tests, the matrix spike test will qualify samples on the basis of their connection by SDG and not by analytical batch).** *Acoording to the case narrative, for the Sr-90 analysis, due to insufficient sampleneither a duplicate nor a matrix spike was prepared.*	**A** **See comment**	**Obtain from lab. Q=A** **If criterion not met, qualify all analytes associated with the MS with a J- for <75%** **and J+ for > 125%,** **if all samples in batch of same matrix. If there is variation of matrix, P for samples not of same matrix as spiked sample.**	 **R3a** **R3** **R3b**

M31 Oct 97

<u>Method blank</u> **Present? yes no** **1/SDG** **target analytes ≤5x the amount in the blank** *Five times the decision level in the blank was used to qualify the γ spec. results.*	**U** **See comment**	**Obtain from lab. Q=A** **If the sample result > EQL or no EQL is available but <5x the amount found in the associated blank, it should be qualified as <u>U</u>. In making this comparison the differing aliquot size of the blank and sample being tested should be taken into account.**	**R4**

1731 Oct 97

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Thursday, October 16, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: 3781R

Client Project Number:

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID: 04LA-97-0480
Lab ID: 9710054-1

Sample Matrix: WATER
Date Prepared: 09-Oct-97
Prep SOP: PAI SOP 778R3
Prep Batch: 143136

Date Collected: 06-Oct-97
Date Analyzed: 13-Oct-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.092 +/- 0.023	0.047	pCi/L	A, (U, R9b)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.99	pCi/L	81%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

M31 Oct 97

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Thursday, October 16, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: 3781R

Client Project Number:

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710054

Field ID: 04LA-97-0481	Sample Matrix: WATER	Date Collected: 06-Oct-97	Final Aliquot: 1
Lab ID: 9710054-2	Date Prepared: 09-Oct-97	Date Analyzed: 13-Oct-97	Aliquot Units: L
	Prep SOP: PAI SOP 778R3	Analytical SOP: PAI SOP 714R4	Report Basis: AS RECEIVED
	Prep Batch: 143136		Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.037 +/- 0.015	0.037	pCi/L	A, (U, R9b)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.87	pCi/L	79%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

M 31 Oct 97

TRITIUM ANALYSIS RESULTS SUMMARY

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/06/97

Client Name: LANL SMO

Date Analyzed: 10/10/97

Lab Sample ID Series: 97-10-054

Count Duration: 150 Min.

Client Project ID: 3781R

Analyzed By : CJM

Client ID	PAI ID	Matrix	H-3 (pCi/l)	MDA
04LA-97-0480	10-054-01	Water	160 ± 160	260
04LA-97-0480	10-054-D1	Water	110 ± 160	260

(U, Ra)

Reported Uncertainty is the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

These samples were prepared using PAI SOP700 and analyzed using PAI SOP704.

31 Oct 97

Gross Gamma Results Summary

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	10/13/97
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-10-054	Units:	pCi/L

Client Sample ID	Lab Sample ID	Collection Date	Activity	Uncertainty	MDC	
04LA-97-0480	97-10-054-01	10/6/97	212	23	31	(J, R7)
04LA-97-0481	97-10-054-02	10/6/97	188	30	45	
04LA-97-0481	97-10-054-D1	10/6/97	130	20	31	
Blank	97-10-054-B1	10/9/97	5	26	44	

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate.

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

97-10-054-D1 is a duplicate analysis of sample 97-10-054-02.

Prepared by 10/16/97

M 31 Oct 97

TOTAL URANIUM ANALYSIS RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 10/06/97

Client Name: Los Alamos National Lab./ SMO Date Analyzed : 11/20/97

Client Project ID: 3781R

Lab Sample ID Series: 97-10-054 Sample Matrix : Water

Client Sample ID	Lab Sample ID	Total Uranium (ug/L)	Reporting Limit	Flag
04LA-97-0480	10-054-01	5.45 ± 0.75	0.10	
04LA-97-0481	10-054-02	1.22 ± 0.17	0.10	
Duplicate	10-054-D1	5.22 ± 0.72	0.10	

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

FLAGS = J - 'Estimated Value' - result between Method Detection Limit and Reporting Limit.
U - 'Not Detected' - result less than Method Detection Limit.

Remarks:

Sample 97-10-054-D1 is a duplicate of 97-10-054-01.

TOTAL URANIUM ANALYSIS RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 11/18/97

Client Name: Los Alamos National Lab./ SMO Date Analyzed : 11/20/97

Client Project ID: 3781R

Lab Sample ID Series: 97-11-109 Sample Matrix : Water

Client Sample ID	Lab Sample ID	Total Uranium (ug/L)	Reporting Limit	Flag
Blank	11-109-B1	BDL	0.10	U

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

FLAGS = J - 'Estimated Value' - result between Method Detection Limit and Reporting Limit.
U - 'Not Detected' - result less than Method Detection Limit.

BDL = Below Detection Limit; see method for DL determination.

Remarks:

Blank for Work Orders 97-10-054 and 97-11-109.

BP

TOTAL URANIUM BLANK SPIKE RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 11/18/97

Client Name: Los Alamos National Lab./ SMO Date Analyzed : 11/20/97

Client Project ID: 3781R

Lab Sample ID Series: 97-11-109 Sample Matrix : Water

Lab Sample ID	Spike Conc. (ug/L)	Rep't Conc. (ug/L)
97-11-109-S1	10.0 ± 1.5	9.3 ± 1.3

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

PAI sets control limits for KPA Uranium measurements as follows:
Blank Spike Control Limits = Known (μ) ± 0.15 * μ.

Matrix Spike Control Limits = Known (μ) + Native Concentrati
± 0.25 * (μ + Native Concentration).

PAI uses these control limits for all KPA Uranium measurements

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

Remarks:

Blank Spike for Work Orders 97-10-054 and 97-11-109.

TOTAL URANIUM MATRIX SPIKE RESULTS SUMMARY

By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc. Date Collected: 11/20/97

Client Name: Los Alamos National Lab./ SMO Date Analyzed : 11/20/97

Client Project ID: 3781R

Lab Sample ID Series: 97-10-054 Sample Matrix : Water

Lab Sample ID	Known Conc. (ug/L)	Rep't Conc. (ug/L)
97-10-054-M1	11.2 ± 2.8	10.4 ± 1.4

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

PAI sets control limits for KPA Uranium measurements as follows:
Blank Spike Control Limits = Known (μ) ± 0.15 * μ.

Matrix Spike Control Limits = Known (μ) + Native Concentration ± 0.25 * (μ + Native Concentration).

PAI uses these control limits for all KPA Uranium measurements

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

Remarks:

Sample 97-10-054-M1 is a matrix spike of 97-10-054-02.

Paragon Analytics, Inc.

TOTAL RECOVERABLE METALS CASE NARRATIVE

Los Alamos National Laboratory SMO

3815R

Order Number - 9710175

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Inorganic Qualifiers
Section 4: Sample Results
Section 5: Summary Report Forms
Section 6: Supporting Raw Data

Appendix A: Digestion Bench Sheets

Section 1: Case Narrative

1.1 This report consists of 1 water sample.

Due to limitation of the reporting software:

a) Some mercury values appear as 0.0. When this occurs the actual value is hand entered.

b) For Mercury, the ICB is also used as the preparation blank, therefore the run chronology will show the same time for both.

c) Trace ICP elements which are calibrated daily with a multipoint calibration do not appear on the run log. The calibration standards can be located at the beginning of each raw data package for this instrument.

1.2 The sample was received cool and intact on 10/21/97. The client had not designated a sample for quality control. The lab designated PAI sample ID 9710175-1 as the quality control sample for this Order Number.

1.3 The sample had not been correctly preserved for the requested analyses. The sample was preserved with nitric acid to a pH below 2 upon receipt.

1.4 The sample was prepared for analysis based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0.

1.5 The sample was analyzed and reported based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0

1.6 All standards and solutions are NIST traceable and were used within their recommended shelf life.

1.7 The sample was prepared and analyzed within the established hold times.

All in house quality control procedures were followed, as described below.

1.8 General quality control procedures.

- A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in each digestion batch. There were not more than 20 samples in each digestion batch.
- The preparation (method) blank results associated with each batch were below the practical quantitation limits for the requested analytes.
- The laboratory control sample associated with each batch was within acceptance limits. This indicates complete digestion according to the method.
- All initial and continuing calibration blanks associated with each batch were below the practical quantitation limits for the requested analytes.
- All initial and continuing calibration verifications associated with each batch were within acceptance criteria for the requested analytes. This indicates a valid calibration and stable instrument conditions.
- The interference check samples, and high standard readbacks associated with Method 6010A analyses were within acceptance criteria.

1.9 Matrix specific quality control procedures.

- A matrix spike was digested and analyzed with each batch. All acceptance criteria for accuracy were met with the following exceptions.

Analyte	Sample ID
Aluminum	9710175-1S
Antimony	9710175-1S
Cadmium	9710175-1S
Chromium	9710175-1S
Copper	9710175-1S
Iron	9710175-1S
Manganese	9710175-1S
Mercury	9710175-1S
Nickel	9710175-1S
Silver	9710175-1S

Uranium	9710175-1S
Zinc	9710175-1S

The affected sample results are flagged for antimony, cadmium, mercury and uranium.

The concentration of aluminum, chromium, copper, iron, manganese, nickel, silver and zinc in the native sample was greater than 4 times the concentration of matrix spike added during the digestion. When sample concentration is that much greater than the spike added, spike recoveries may not be accurate. The Laboratory Control Sample indicates that the digestion and analysis were in control.

- A sample duplicate was digested and analyzed with each batch. All acceptance criteria for precision and accuracy were met.
- A serial dilution was analyzed with each ICP batch. All acceptance criteria were met with the following exception.

Analyte	Sample ID
Beryllium	9710175-1L

Associated sample results for these elements have been flagged in the report.

The high concentration(s) of aluminum, calcium, magnesium and iron in the sample most likely caused a slightly depressed signal for beryllium. When the aluminum, calcium, magnesium and iron are reduced in the five fold serial dilution the beryllium results are not depressed and the comparison of the two readings is slightly above the 10% acceptance limit.

1.10 This sample was diluted for many elements. Please refer to the run log for specific elements and dilutions.

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

Darryl Patrick — 10/27/97
Senior Inorganic Chemist — Date

SW — 10/27/97
Reviewer's Initials — Date

CERTIFICATION

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

Monday October 20, 1997

REQUEST NUMBER: 3815R

ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

97-12-175

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/20/97
REPORT DUE: 10/23/97
TURN AROUND REQ'D: 2 day

These samples are on:

LANL Request Number: 3815R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

0°

fax 10/23 hard 11/21
676

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
METTAL	+ B	04LA-97-0483	15	W	10/16/97	01
METTAL	+ U	04LA-97-0483	15	W	10/16/97	

Final Page of REQUEST NUMBER 3815R

000005

U.S. EPA - CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3815R_

SOW No.: ILM03.0

EPA Sample No.	Lab Sample ID
_04LA-97-0483_	_W9710175-1_____
_04LA-97-0483_	_W9710175-1D____
_04LA-97-0483_	_W9710175-1S____

Were ICP interelement corrections applied ? Yes/No YES

Were ICP background corrections applied ? Yes/No YES
If yes - were raw data generated before application of background corrections ? Yes/No NO_

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Steven Fry Name: Steven Fry

Date: 10-29-97 Title: V.P.

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum	25250.0	24761.26	98.1	50500.0	50134.31	99.3	50365.04	99.7	P
Antimony	250.0	257.01	102.8	500.0	490.56	98.1	499.61	99.9	P
Arsenic	250.0	244.84	97.9	500.0	476.81	95.4	490.50	98.1	P
Barium	250.0	244.78	97.9	500.0	470.98	94.2	477.23	95.4	P
Beryllium	250.0	248.50	99.4	500.0	487.98	97.6	495.13	99.0	P
Boron	2500.0	2733.15	109.3	5000.0	5120.16	102.4	5104.19	102.1	P
Cadmium	250.0	248.64	99.5	500.0	470.06	94.0	484.97	97.0	P
Calcium	25250.0	24532.02	97.2	50500.0	49286.63	97.6	50425.27	99.9	P
Chromium	250.0	244.89	98.0	500.0	492.74	98.5	500.77	100.2	P
Cobalt	250.0	236.74	94.7	500.0	473.28	94.7	482.01	96.4	P
Copper	250.0	231.88	92.8	500.0	483.21	96.6	486.13	97.2	P
Iron	10250.0	10348.29	101.0	20500.0	20759.28	101.3	21324.36	104.0	P
Lead	250.0	244.78	97.9	500.0	465.42	93.1	476.93	95.4	P
Magnesium	25250.0	25204.09	99.8	50500.0	50144.15	99.3	51281.15	101.5	P
Manganese	250.0	242.68	97.1	500.0	468.62	93.7	475.89	95.2	P
Mercury	2.0	2.01	100.5	2.0	2.20	110.0	2.10	105.0	AV
Nickel	250.0	239.65	95.9	500.0	478.64	95.7	490.91	98.2	P
Potassium	10000.0	10096.80	101.0	20000.0	19823.10	99.1	20155.96	100.8	P
Selenium	250.0	244.60	97.8	500.0	467.53	93.5	479.48	95.9	P
Silver	250.0	232.84	93.1	500.0	493.82	98.8	499.84	100.0	P
Sodium	10250.0	10350.29	101.0	20500.0	20169.42	98.4	20546.87	100.2	P
Thallium	250.0	239.37	95.7	500.0	471.48	94.3	488.96	97.8	P
Uranium	5000.0	5460.30	109.2	10000.0	10797.19	108.0	10484.60	104.8	P
Vanadium	250.0	246.94	98.8	500.0	482.52	96.5	488.86	97.8	P
Zinc	250.0	239.13	95.7	500.0	473.63	94.7	484.16	96.8	P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum_									NR
Antimony_									NR
Arsenic__									NR
Barium___									NR
Beryllium									NR
Boron____				5000.0	5137.67	102.8			P_
Cadmium__									NR
Calcium__									NR
Chromium_									NR
Cobalt___									NR
Copper___									NR
Iron____									NR
Lead____									NR
Magnesium									NR
Manganese									NR
Mercury__				2.0	2.13	106.5			AV
Nickel___									NR
Potassium									NR
Selenium_									NR
Silver___									NR
Sodium___									NR
Thallium_									NR
Uranium__									NR
Vanadium_									NR
Zinc____									NR

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2B
CRDL STANDARD FOR AA AND ICP

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

AA CRDL Standard Source: PLASMACHEM__

ICP CRDL Standard Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
					Initial		Final	
	True	Found	%R	True	Found	%R	Found	%R
Aluminum				400.0	392.00	98.0	417.94	104.5
Antimony				120.0	122.60	102.2	124.02	103.4
Arsenic				20.0	19.54	97.7	20.76	103.8
Barium				400.0	391.49	97.9	391.05	97.8
Beryllium				10.0	10.79	107.9	10.65	106.5
Boron								
Cadmium				10.0	10.21	102.1	9.89	98.9
Calcium				10000.0	9419.14	94.2	9481.36	94.8
Chromium				20.0	20.08	100.4	20.35	101.8
Cobalt				100.0	94.29	94.3	98.97	99.0
Copper				50.0	45.41	90.8	47.87	95.7
Iron				200.0	219.58	109.8	255.60	127.8
Lead				6.0	6.58	109.7	4.93	82.2
Magnesium				10000.0	9828.39	98.3	9824.79	98.2
Manganese				30.0	29.16	97.2	29.67	98.9
Mercury	0.2	0.19	95.0					
Nickel				80.0	76.83	96.0	81.06	101.3
Potassium				10000.0	9835.47	98.4	9906.28	99.1
Selenium				10.0	10.21	102.1	11.43	114.3
Silver				20.0	20.60	103.0	22.22	111.1
Sodium				10000.0	9741.99	97.4	9856.25	98.6
Thallium				20.0	18.93	94.6	24.31	121.6
Uranium				400.0	365.76	91.4	368.91	92.2
Vanadium				100.0	96.71	96.7	97.19	97.2
Zinc				40.0	39.03	97.6	40.44	101.1

U.S. EPA - CLP

2B
CRDL STANDARD FOR AA AND ICP

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

AA CRDL Standard Source: PLASMACHEM__

ICP CRDL Standard Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
	True	Found	%R	True	Initial Found	%R	Final Found	%R
Aluminum_								
Antimony_								
Arsenic__								
Barium___								
Beryllium								
Boron____				200.0	228.56	114.3	210.47	105.2
Cadmium__								
Calcium__								
Chromium_								
Cobalt___								
Copper___								
Iron____								
Lead____								
Magnesium								
Manganese								
Mercury__								
Nickel___								
Potassium								
Selenium_								
Silver___								
Sodium___								
Thallium_								
Uranium__								
Vanadium_								
Zinc____								

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	22.0	B	9.2	B	75.6	B			28.920	B	P
Antimony	3.4	U	3.4	U	3.4	U			3.400	U	P
Arsenic	2.8	U	2.8	U	2.8	U			2.800	U	P
Barium	0.9	B	0.1	U	0.1	U			-0.240	B	P
Beryllium	1.4	B	0.4	B	0.6	B			0.140	B	P
Boron	43.2	B	11.6	B	9.6	U	9.6	U	9.600	U	P
Cadmium	1.0	B	0.2	U	0.2	U			0.200	U	P
Calcium	118.6	B	122.2	B	168.3	B			131.440	B	P
Chromium	1.3	B	1.2	B	1.4	B			0.810	B	P
Cobalt	1.2	B	0.4	U	0.4	U			0.400	U	P
Copper	0.4	U	0.4	U	0.4	U			0.400	U	P
Iron	52.5	B	56.6	B	76.0	B			59.070	B	P
Lead	1.3	U	1.3	U	1.3	U			-1.380	B	P
Magnesium	-43.2	B	-40.5	B	14.9	B			-29.990	B	P
Manganese	0.8	B	0.1	U	0.1	U			-0.300	B	P
Mercury	0.04	U	0.04	U	0.04	U	0.04	U	0.040	U	AV
Nickel	1.3	B	0.4	U	0.4	B			0.400	U	P
Potassium	30.4	B	24.0	U	65.8	B			24.000	U	P
Selenium	2.6	U	2.6	U	2.6	U			2.600	U	P
Silver	1.0	B	0.7	U	0.7	U			0.700	U	P
Sodium	-10.1	B	-5.4	B	3.6	U			-22.760	B	P
Thallium	4.4	B	2.9	B	4.1	B			4.810	B	P
Uranium	64.0	U	64.0	U	64.0	U			64.000	U	P
Vanadium	1.1	B	0.5	U	0.5	U			0.500	U	P
Zinc	0.9	B	0.4	U	0.4	U			-0.550	B	P

U.S. EPA - CLP

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No: _____ SDG No.: 3815R_

ICP ID Number: TJA 61E 4___ ICS Source: HIGH PURITY_

Concentration Units: ug/L

Analyte	True Sol. A	True Sol. AB	Initial Found Sol. A	Initial Found Sol. AB	Initial Found %R	Final Found Sol. A	Final Found Sol. AB	Final Found %R
Aluminum	500000	500000	505758	499554.3	99.9	496928	496176.4	99.2
Antimony								
Arsenic								
Barium		500		462.4	92.5		461.3	92.3
Beryllium		500		470.4	94.1		470.3	94.1
Boron								
Cadmium		1000		880.7	88.1		883.4	88.3
Calcium	500000	500000	501990	496940.4	99.4	504063	498359.1	99.7
Chromium		500		471.8	94.4		472.7	94.5
Cobalt		500		426.6	85.3		445.0	89.0
Copper		500		464.4	92.9		487.5	97.5
Iron	200000	200000	203746	201966.6	101.0	205600	203338.7	101.7
Lead		1000		900.5	90.0		903.5	90.4
Magnesium	500000	500000	507840	504390.5	100.9	506541	502925.5	100.6
Manganese		500		455.4	91.1		452.8	90.6
Mercury								
Nickel		1000		847.9	84.8		896.3	89.6
Potassium								
Selenium								
Silver		1000		962.3	96.2		1014.6	101.5
Sodium								
Thallium								
Uranium								
Vanadium		500		467.4	93.5		467.3	93.5
Zinc		1000		847.6	84.8		876.2	87.6

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

04LA-97-0483

Lab Name: PARAGON_ANALYTICS_____ Contract:_____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

Matrix: __WATER_____ Level (low/med): _LOW____

% Solids for Sample: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum		1171256.1000		1072077.3000		2000.00	4958.9		P
Antimony	75-125	17.0000	U	17.0000	U	500.00	0.0	N	P
Arsenic	75-125	1972.5000		98.8500		2000.00	93.7		P
Barium	75-125	8213.7500		5791.9000		2000.00	121.1		P
Beryllium	75-125	109.2500		56.4000		50.00	105.7		P
Boron	75-125	1283.6000		361.0000	B	1000.00	92.3		P
Cadmium	75-125	2.0000	U	2.0000	U	50.00	0.0	N	P
Calcium									NR
Chromium		1343.4500		1058.7000		200.00	142.4		P
Cobalt	75-125	1592.2500		1070.9500		500.00	104.3		P
Copper		10829.3000		9975.8500		250.00	341.4		P
Iron		1782610.6000		1670799.5000		1000.00	11181.1		P
Lead	75-125	769.4000		250.2000		500.00	103.8		P
Magnesium									NR
Manganese		32174.5500		30082.7000		500.00	418.4		P
Mercury	75-125	0.6040		0.2900		1.00	31.4	N	AV
Nickel		5866.7500		5035.6500		500.00	166.2		P
Potassium									NR
Selenium	75-125	1924.4000		214.1000		2000.00	85.5		P
Silver		3836.4000		2988.1500		50.00	1696.5		P
Sodium									NR
Thallium	75-125	1850.5000		26.0000	U	2000.00	92.5		P
Uranium	75-125	16855.2000		4094.6000		10000.00	127.6	N	P
Vanadium	75-125	1506.1500		1121.6500		500.00	76.9		P
Zinc		2856.6000		2322.8500		500.00	106.8		P

Comments:
DIGESTED_SAMPLE_WAS_BIPHASIC,_ONE_PHASE_GREEN_AND_ONE_BROWN.

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

04LA-97-0483

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

Matrix (soil/water): WATER Level (low/med): _LOW__

% Solids for Sample: __0.0 % Solids for Duplicate: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		1072077.3000		1124327.2000		4.8		P
Antimony		17.0000	U	17.0000	U			P
Arsenic	50.0	98.8500		97.1000		1.8		P
Barium		5791.9000		6058.6000		4.5		P
Beryllium	25.0	56.4000		58.1000		3.0		P
Boron		361.0000	B	346.5000	B	4.1		P
Cadmium		2.0000	U	2.0000	U			P
Calcium		955178.8000		994830.0000		4.1		P
Chromium		1058.7000		1117.9000		5.4		P
Cobalt	250.0	1070.9500		1110.2000		3.6		P
Copper		9975.8500		10282.4500		3.0		P
Iron		1670799.5000		1734871.6000		3.8		P
Lead		250.2000		256.3000		2.4		P
Magnesium		971284.4500		1020866.8500		5.0		P
Manganese		30082.7000		31144.0500		3.5		P
Mercury	0.2	0.2900		0.3120		7.3		AV
Nickel		5035.6500		5266.1000		4.5		P
Potassium	25000.0	91262.3000		94463.3000		3.4		P
Selenium	50.0	214.1000		239.8000		11.3		P
Silver		2988.1500		3122.4500		4.4		P
Sodium		381898.2000		394327.2000		3.2		P
Thallium		26.0000	U	26.0000	U			P
Uranium	2000.0	4094.6000		4266.5000		4.1		P
Vanadium	250.0	1121.6500		1117.1000		0.4		P
Zinc		2322.8500		2394.0000		3.0		P

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

Solid LCS Source: _____

Aqueous LCS Source: PLASMACHEM__

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum_									
Antimony_									
Arsenic__									
Barium___									
Beryllium									
Boron____									
Cadmium__									
Calcium__									
Chromium_									
Cobalt___									
Copper___									
Iron_____									
Lead_____									
Magnesium									
Manganese									
Mercury__	1.0	1.02	102.0_						
Nickel___									
Potassium									
Selenium_									
Silver___									
Sodium___									
Thallium_									
Uranium__									
Vanadium_									
Zinc_____									

FORM VII - IN

ILM03.0

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

Solid LCS Source: _____

Aqueous LCS Source: PLASMACHEM__

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum	2000.0	1931.34	96.6						
Antimony	500.0	507.38	101.5						
Arsenic	2000.0	2005.86	100.3						
Barium	2000.0	1878.45	93.9						
Beryllium	50.0	50.18	100.4						
Boron	1000.0	936.16	93.6						
Cadmium	50.0	47.68	95.4						
Calcium	40000.0	40506.96	101.3						
Chromium	200.0	191.99	96.0						
Cobalt	500.0	469.72	93.9						
Copper	250.0	234.48	93.8						
Iron	1000.0	993.20	99.3						
Lead	500.0	478.97	95.8						
Magnesium	40000.0	41129.12	102.8						
Manganese	500.0	474.80	95.0						
Mercury									
Nickel	500.0	478.88	95.8						
Potassium	40000.0	38935.55	97.3						
Selenium	2000.0	2086.70	104.3						
Silver	50.0	41.90	83.8						
Sodium	40000.0	39952.69	99.9						
Thallium	2000.0	1956.27	97.8						
Uranium	10000.0	11941.57	119.4						
Vanadium	500.0	479.95	96.0						
Zinc	500.0	461.25	92.2						

FORM VII - IN

ILM03.0

U.S. EPA - CLP

9

ICP SERIAL DILUTION

EPA SAMPLE NO.

04LA-97-0483

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

Matrix (soil/water): WATER Level (low/med): LOW__

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	M
Aluminum	214415.46		208882.95		2.6		P
Antimony	3.40	U	17.00	U			P
Arsenic	19.77		17.90	B	9.5		P
Barium	1158.38		1195.40		3.2		P
Beryllium	11.28		12.60	B	11.7	E	P
Boron	36.10	B	48.00	U	100.0		P
Cadmium	0.20	U	1.00	U			P
Calcium	191035.76		191847.20		0.4		P
Chromium	211.74		219.00		3.4		P
Cobalt	214.19		227.25	B	6.1		P
Copper	1995.17		1964.65		1.5		P
Iron	167079.95		160669.05		3.8		P
Lead	25.02		23.35		6.7		P
Magnesium	194256.89		195396.00		0.6		P
Manganese	6016.54		6304.20		4.8		P
Mercury							NR
Nickel	1007.13		1092.20		8.4		P
Potassium	18252.46		17728.70	B	2.9		P
Selenium	21.41		27.40		28.0		P
Silver	597.63		588.30		1.6		P
Sodium	76379.64		78177.65		2.4		P
Thallium	2.60	U	13.00	U			P
Uranium	409.46		320.00	U	100.0		P
Vanadium	224.33		234.75	B	4.6		P
Zinc	464.57		498.90		7.4		P

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_
ICP ID Number: TJA61_4_____ Date: 10/15/97
Flame AA ID Number : _____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum			200		NR
Antimony			60		NR
Arsenic			10		NR
Barium			200		NR
Beryllium			5		NR
Boron	249.70		100	9.6	P
Cadmium			5		NR
Calcium			5000		NR
Chromium			10		NR
Cobalt			50		NR
Copper			25		NR
Iron			100		NR
Lead			3		NR
Magnesium			5000		NR
Manganese			15		NR
Mercury			0.2		NR
Nickel			40		NR
Potassium			5000		NR
Selenium			5		NR
Silver			10		NR
Sodium			5000		NR
Thallium			10		NR
Uranium			200		NR
Vanadium			50		NR
Zinc			20		NR

Comments:

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_
ICP ID Number: _____ Date: 10/15/97
Flame AA ID Number : LEEMAN_4____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum			200		NR
Antimony			60		NR
Arsenic			10		NR
Barium			200		NR
Beryllium			5		NR
Boron			100		NR
Cadmium			5		NR
Calcium			5000		NR
Chromium			10		NR
Cobalt			50		NR
Copper			25		NR
Iron			100		NR
Lead			3		NR
Magnesium			5000		NR
Manganese			15		NR
Mercury	253.70		0.2	0.04 ~~0.0~~	AV
Nickel			40	DP 10/27/97	NR
Potassium			5000		NR
Selenium			5		NR
Silver			10		NR
Sodium			5000		NR
Thallium			10		NR
Uranium			200		NR
Vanadium			50		NR
Zinc			20		NR

Comments:

FORM X - IN ILM03.0

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_
ICP ID Number: TJA_61E_4___ Date: 10/15/97
Flame AA ID Number : _____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum	308.22		200	6.2	P
Antimony	206.84		60	3.4	P
Arsenic	189.04		10	2.8	P
Barium	493.41		200	0.1	P
Beryllium	313.04		5	0.1	P
Boron			100		NR
Cadmium	226.50		5	0.2	P
Calcium	317.93		5000	1.5	P
Chromium	267.72		10	0.3	P
Cobalt	228.62		50	0.4	P
Copper	324.75		25	0.4	P
Iron	271.44		100	7.0	P
Lead	220.35		3	1.3	P
Magnesium	279.08		5000	3.7	P
Manganese	257.61		15	0.1	P
Mercury			0.2		NR
Nickel	231.60		40	0.4	P
Potassium	766.49		5000	24.0	P
Selenium	196.03		5	2.6	P
Silver	328.07		10	0.7	P
Sodium	588.99		5000	3.6	P
Thallium	190.86		10	2.6	P
Uranium	292.35		200	64.0	P
Vanadium	292.40		50	0.5	P
Zinc	206.20		20	0.4	P

Comments:

U.S. EPA - CLP

11A
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

ICP ID Number: TJA61 4_____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : Al	Ca	Fe	Mg	BA_
Aluminum	308.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony	217.60	0.0001730	0.0000000	-0.0000700	0.0000000	0.0000000
Arsenic	193.70	0.0032220	0.0000000	0.0002370	0.0000000	0.0000000
Barium	493.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron	249.70	0.0000000	0.0000000	-0.0001050	0.0000000	0.0000000
Cadmium	226.50	0.0000300	0.0000000	0.0002950	0.0000000	0.0000000
Calcium	315.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium	267.70	0.0000000	0.0000000	-0.0000410	0.0000000	0.0000000
Cobalt	228.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0001880
Copper	324.80	0.0000000	0.0000000	-0.0000450	0.0000000	0.0000000
Iron	259.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.40	0.0007590	0.0000000	0.0001130	0.0000000	0.0000000
Magnesium	383.20	0.0000000	0.0012260	-0.0007120	0.0000000	0.0000000
Manganese	257.60	0.0000000	0.0000000	0.0000170	0.0000000	0.0000000
Mercury						
Nickel	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.00	0.0000000	0.0000000	0.0003760	0.0000000	0.0000000
Silver	328.10	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium	589.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	377.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Uranium						
Vanadium	292.40	0.0000000	-0.0000300	0.0000500	0.0000000	0.0000000
Zinc	206.20	0.0000000	0.0000000	0.0000390	0.0000370	0.0000000

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

ICP ID Number: TJA61 4_____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : BE_	CD_	CO_	CR_	MO_
Aluminum	308.20	0.0000000	0.0000000	-0.0047560	0.0000000	0.0084920
Antimony	217.60	0.0019940	0.0000000	0.0000000	0.0000000	-0.0004360
Arsenic	193.70	0.0000000	0.0000000	0.0006940	0.0009930	0.0008130
Barium	493.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron	249.70	0.0000000	0.0000000	0.0031110	0.0001900	0.0005560
Cadmium	226.50	0.0000000	0.0000000	0.0001370	0.0000000	0.0001390
Calcium	315.90	0.0000000	0.0000000	0.0032140	0.0000000	0.0000000
Chromium	267.70	0.0000000	0.0002200	0.0000000	0.0000000	-0.0037690
Cobalt	228.60	0.0000000	0.0000000	0.0000000	0.0002450	-0.0019700
Copper	324.80	0.0000000	0.0000000	-0.0003080	0.0000000	0.0006200
Iron	259.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Magnesium	383.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.60	0.0000000	0.0000000	0.0000000	0.0000000	-0.0001510
Mercury						
Nickel	231.60	0.0000000	0.0000000	0.0004950	0.0000000	-0.0018550
Potassium	766.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.00	0.0000000	0.0000000	0.0009940	0.0000000	0.0000000
Silver	328.10	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium	589.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	377.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Uranium						
Vanadium	292.40	0.0000000	0.0000000	0.0000000	0.0000000	-0.0108000
Zinc	206.20	0.0000000	0.0000000	0.0000000	0.0022430	0.0005240

Comments:

U.S. EPA - CLP

11B

ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

ICP ID Number: TJA61 4_____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : NI_	PB_	SN_	TI_	TL_
Aluminum	308.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony	217.60	0.0011230	0.0009460	0.0000000	0.0000000	0.0000000
Arsenic	193.70	0.0009940	0.0000000	0.0000000	0.0000000	0.0000000
Barium	493.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron	249.70	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium	226.50	-0.0005820	0.0000000	0.0000000	0.0001910	0.0000000
Calcium	315.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium	267.70	0.0000000	0.0000000	0.0000000	0.0001660	0.0000000
Cobalt	228.60	0.0000000	0.0000000	-0.0014620	0.0017260	0.0000000
Copper	324.80	0.0000000	0.0000000	0.0000000	0.0004930	0.0000000
Iron	259.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Magnesium	383.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury						
Nickel	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0014850
Potassium	766.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Silver	328.10	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium	589.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	377.60	0.0162630	0.0000000	0.0000000	-0.1373560	0.0000000
Uranium						
Vanadium	292.40	0.0000000	0.0000000	0.0000000	0.0005070	0.0000000
Zinc	206.20	-0.0007590	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

ICP ID Number: TJA61 4_____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : V__	___	___	___	___
Aluminum_	308.20	-0.0198620				
Antimony_	217.60	0.0011570				
Arsenic__	193.70	0.0102320				
Barium___	493.40	0.0000000				
Beryllium	313.00	0.0018680				
Boron____	249.70	0.0000000				
Cadmium__	226.50	0.0000000				
Calcium__	315.90	0.0000000				
Chromium_	267.70	0.0014660				
Cobalt___	228.60	0.0000000				
Copper___	324.80	0.0000000				
Iron_____	259.90	0.0000000				
Lead_____	220.40	0.0000000				
Magnesium	383.20	0.0000000				
Manganese	257.60	-0.0001330				
Mercury__						
Nickel___	231.60	-0.0003500				
Potassium	766.50	0.0000000				
Selenium_	196.00	0.0000000				
Silver___	328.10	-0.0053240				
Sodium___	589.60	0.0000000				
Thallium_	377.60	0.0000000				
Uranium__						
Vanadium_	292.40	0.0000000				
Zinc_____	206.20	0.0000000				

Comments:

_____

_____

_____

U.S. EPA - CLP

11A
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

ICP ID Number: TJA 61E 4___ Date: 04/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : Al	Ca	Fe	Mg	BA_
Aluminum_	308.22	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony_	206.84	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Arsenic__	189.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Barium___	493.41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron____						
Cadmium__	226.50	0.0000000	0.0000000	0.0001030	0.0000000	0.0000000
Calcium__	317.93	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.72	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt___	228.62	0.0000000	0.0000000	0.0000000	0.0000000	-0.0003500
Copper___	324.75	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Iron_____	271.44	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead_____	220.35	0.0003970	0.0000000	0.0000630	0.0000000	0.0000000
Magnesium	279.08	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.61	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury__						
Nickel___	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.03	0.0000040	0.0000000	-0.0001270	0.0000000	0.0000000
Silver___	328.07	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	588.99	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	190.86	0.0000000	0.0000000	-0.0001380	0.0000000	0.0000000
Uranium__	292.35	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Vanadium_	292.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc_____	206.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

ICP ID Number: TJA 61E 4___ Date: 04/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : CO_	CR_	MN_	NI_	V__
Aluminum_	308.22	-0.0058000	0.0000000	0.0000000	-0.0013000	0.0270000
Antimony_	206.84	0.0000000	0.0010000	0.0000000	0.0000000	0.0000000
Arsenic__	189.04	0.0000000	-0.0029800	0.0000000	0.0000000	0.0000000
Barium___	493.41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.04	0.0000000	0.0000000	0.0000000	0.0000000	-0.0031300
Boron____						
Cadmium__	226.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Calcium__	317.93	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.72	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt___	228.62	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Copper___	324.75	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Iron_____	271.44	0.0723000	0.0000000	0.0000000	0.0000000	0.0150000
Lead_____	220.35	-0.0018800	0.0000000	0.0001820	0.0002430	0.0000000
Magnesium	279.08	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.61	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury__						
Nickel___	231.60	-0.0013000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.03	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Silver___	328.07	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	588.99	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	190.86	0.0010370	0.0000000	-0.0001340	0.0000000	0.0000000
Uranium__	292.35	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Vanadium_	292.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc_____	206.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

U.S. EPA - CLP

12
ICP Linear Ranges (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

ICP ID Number: TJA61 4_____ Date: 10/15/97

Analyte	Integ. Time (sec.)	Concentration (ug/L)	M
Aluminum	8.00	1000000.0	P
Antimony	8.00	10000.0	P
Arsenic	8.00	100000.0	P
Barium	8.00	50000.0	P
Beryllium	8.00	25000.0	P
Boron	8.00	100000.0	P
Cadmium	8.00	50000.0	P
Calcium	8.00	1000000.0	P
Chromium	8.00	100000.0	P
Cobalt	8.00	100000.0	P
Copper	8.00	100000.0	P
Iron	8.00	1000000.0	P
Lead	8.00	100000.0	P
Magnesium	8.00	1000000.0	P
Manganese	8.00	50000.0	P
Mercury			NR
Nickel	8.00	100000.0	P
Potassium	8.00	1000000.0	P
Selenium	8.00	100000.0	P
Silver	8.00	10000.0	P
Sodium	8.00	1000000.0	P
Thallium	8.00	100000.0	P
Uranium			NR
Vanadium	8.00	100000.0	P
Zinc	8.00	100000.0	P

Comments:

U.S. EPA - CLP

13
PREPARATION LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.:_____ SAS No.: _____ SDG No.:3815R_

Method: P_

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
04LA-97__	_10/22/97__		___100__
04LA-97__	_10/22/97__		___100__
04LA-97__	_10/22/97__		___100__
LCSW __	_10/22/97__		___100__
PBW __	_10/22/97__		___100__

FORM XIII - IN ILM03.0

U.S. EPA - CLP

12
ICP Linear Ranges (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

ICP ID Number: TJA 61E 4___ Date: 10/15/97

Analyte	Integ. Time (sec.)	Concentration (ug/L)	M
Aluminum	15.00	500000.0	P
Antimony	15.00	10000.0	P
Arsenic	15.00	10000.0	P
Barium	15.00	10000.0	P
Beryllium	15.00	10000.0	P
Boron			NR
Cadmium	15.00	10000.0	P
Calcium	15.00	500000.0	P
Chromium	15.00	10000.0	P
Cobalt	15.00	10000.0	P
Copper	15.00	10000.0	P
Iron	15.00	200000.0	P
Lead	15.00	10000.0	P
Magnesium	15.00	500000.0	P
Manganese	15.00	10000.0	P
Mercury			NR
Nickel	15.00	10000.0	P
Potassium	15.00	100000.0	P
Selenium	15.00	10000.0	P
Silver	15.00	2000.0	P
Sodium	15.00	100000.0	P
Thallium	15.00	10000.0	P
Uranium	15.00	250000.0	P
Vanadium	15.00	10000.0	P
Zinc	15.00	10000.0	P

Comments:

13

PREPARATION LOG

ab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.:_____ SAS No.: _____ SDG No.:3815R_

ethod: AV

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
04LA-97	10/23/97		20
04LA-97	10/23/97		20
04LA-97	10/23/97		20
LCSW	10/23/97		20
PBW	10/23/97		20

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3815R_

Instrument ID Number: TJA61 4_____ Method: P_

Start Date: 10/23/97 End Date: 10/23/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
STD-BLAN	1.00	1107							X																		
A1	1.00	1110																									
B1	1.00	1113							X																		
ZZZZZZ	1.00	1116																									
ZZZZZZ	1.00	1119																									
ICV	1.00	1122							X																		
ICB	1.00	1125							X																		
CRI	1.00	1128							X																		
ICSA	1.00	1131							X																		
ICSAB	1.00	1134							X																		
CCV	1.00	1138							X																		
CB	1.00	1141							X																		
PBW	1.00	1144							X																		
LCSW	1.00	1147							X																		
04LA-97-	10.00	1150							X																		
04LA-97-	10.00	1153							X																		
04LA-97-	10.00	1156							X																		
04LA-97-	50.00	1159							X																		
ZZZZZZ	1.00	1202																									
ZZZZZZ	1.00	1205																									
ZZZZZZ	1.00	1208																									
ZZZZZZ	5.00	1211																									
CCV	1.00	1214							X																		
CCB	1.00	1217							X																		
ZZZZZZ	1.00	1220																									
ZZZZZZ	1.00	1223																									
ZZZZZZ	1.00	1227																									
CRI	1.00	1230							X																		
ICSA	1.00	1233							X																		
ICSAB	1.00	1236							X																		
CCV	1.00	1239							X																		
CCB	1.00	1242							X																		

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3815R_

Instrument ID Number: TJA61 4_____ Method: P_

Start Date: 10/23/97 End Date: 10/23/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
STD-BLAN	1.00	1107																									
A1	1.00	1110																									
B1	1.00	1113																									
ZZZZZZ	1.00	1116																									
ZZZZZZ	1.00	1119																									
ICV	1.00	1122																									
ICB	1.00	1125																									
CRI	1.00	1128																									
ICSA	1.00	1131																									
ICSAB	1.00	1134																									
CCV	1.00	1138																									
CCB	1.00	1141																									
PBW	1.00	1144																									
LCSW	1.00	1147																									
04LA-97-	10.00	1150																									
04LA-97-	10.00	1153																									
04LA-97-	10.00	1156																									
04LA-97-	50.00	1159																									
ZZZZZZ	1.00	1202																									
ZZZZZZ	1.00	1205																									
ZZZZZZ	1.00	1208																									
ZZZZZZ	5.00	1211																									
CCV	1.00	1214																									
CCB	1.00	1217																									
ZZZZZZ	1.00	1220																									
ZZZZZZ	1.00	1223																									
ZZZZZZ	1.00	1227																									
CRI	1.00	1230																									
ICSA	1.00	1233																									
ICSAB	1.00	1236																									
CCV	1.00	1239																									
CCB	1.00	1242																									

U.S. EPA - CLP

14

ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3815R_

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 10/23/97 End Date: 10/23/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
S0	1.00	1153																	X								
S0.2	1.00	1155																	X								
S1	1.00	1158																	X								
S2	1.00	1200																	X								
S5	1.00	1202																	X								
S10	1.00	1205																	X								
ICV	1.00	1216																	X								
ZZZZZZ	1.00	1218																									
ICB	1.00	1221																	X								
PBW	1.00	1221																	X								
CRA	1.00	1223																	X								
LCSW	1.00	1225																	X								
ZZZZ	1.00	1227																									
ZZZZZZ	1.00	1230																									
ZZZZZZ	1.00	1232																									
ZZZZZZ	1.00	1234																									
ZZZZZZ	1.00	1236																									
ZZZZZZ	1.00	1239																									
ZZZZZZ	1.00	1241																									
CCV	1.00	1243																	X								
CCB	1.00	1245																	X								
ZZZZZZ	10.00	1247																									
ZZZZZZ	10.00	1250																									
ZZZZZZ	10.00	1252																									
CCV	1.00	1254																	X								
CCB	1.00	1256																	X								
04LA-97-	1.00	1309																	X								
04LA-97-	1.00	1311																	X								
04LA-97-	1.00	1313																	X								
CCV	1.00	1315																	X								
CCB	1.00	1317																	X								

U.S. EPA - CLP

14

ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3815R_

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 10/23/97 End Date: 10/23/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
S0	1.00	1153																									
S0.2	1.00	1155																									
S1	1.00	1158																									
S2	1.00	1200																									
S5	1.00	1202																									
S10	1.00	1205																									
ICV	1.00	1216																									
ZZZZZZ	1.00	1218																									
ICB	1.00	1221																									
PBW	1.00	1221																									
CRA	1.00	1223																									
LCSW	1.00	1225																									
ZZZZZZ	1.00	1227																									
ZZZZZZ	1.00	1230																									
ZZZZZZ	1.00	1232																									
ZZZZZZ	1.00	1234																									
ZZZZZZ	1.00	1236																									
ZZZZZZ	1.00	1239																									
ZZZZZZ	1.00	1241																									
CCV	1.00	1243																									
CCB	1.00	1245																									
ZZZZZZ	10.00	1247																									
ZZZZZZ	10.00	1250																									
ZZZZZZ	10.00	1252																									
CCV	1.00	1254																									
CCB	1.00	1256																									
04LA-97-	1.00	1309																									
04LA-97-	1.00	1311																									
04LA-97-	1.00	1313																									
CCV	1.00	1315																									
CCB	1.00	1317																									

14

ANALYSIS RUN LOG

ab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3815R_

:nstrument ID Number: TJA 61E 4____ Method: P_

Start Date: 10/23/97 End Date: 10/23/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
100PPM_U	1.00	1021		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
ZZZZZZ	1.00	1041		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1044		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1051		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1056		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICV	1.00	1100		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
ICB	1.00	1103		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
CRI	1.00	1107		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
ICSA	1.00	1114		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
ICSAB	1.00	1118		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
PBW	1.00	1127		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
LCSW	1.00	1130		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
ICLA-97-	5.00	1135		X	X	X	X	X	-	-	X	X	X	X	-	-	X	X	-	X	X	-	X	X	-	-	X
04LA-97-	5.00	1139		X	X	X	X	X	-	-	X	X	X	X	-	-	X	X	-	X	X	-	X	X	-	-	X
04LA-97-	25.00	1142		X	X	X	X	X	-	-	X	X	X	X	-	-	X	X	-	X	X	-	X	X	-	-	X
04LA-97-	5.00	1146		X	X	X	X	X	-	-	-	X	X	X	-	-	-	X	-	X	-	-	X	-	-	-	X
ZZZZZZ	1.00	1150		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCV	1.00	1205		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
CCB	1.00	1209		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
04LA-97-	10.00	1217		-	-	-	-	-	-	X	-	-	-	-	X	X	-	-	-	-	-	X	-	-	X	X	-
04LA-97-	10.00	1220		-	-	-	-	-	-	X	-	-	-	-	X	X	-	-	-	-	-	X	-	-	X	X	-
04LA-97-	50.00	1224		-	-	-	-	-	-	X	-	-	-	-	X	X	-	-	-	-	-	X	-	-	X	X	-
04LA-97-	10.00	1228		-	-	-	-	-	-	X	-	-	-	-	X	X	-	-	-	-	-	X	-	-	X	X	-
ZZZZZZ	5.00	1231		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	10.00	1237		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CRI	1.00	1242		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
ICSA	1.00	1250		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
ICSAB	1.00	1254		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
CCV	1.00	1257		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
CCB	1.00	1301		X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

U.S. EPA - CLP

14

ANALYSIS RUN LOG

ab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3815R_

nstrument ID Number: TJA 61E 4____ Method: P_

Start Date: 10/23/97 End Date: 10/23/97

EPA Sample No.	D/F	Time	% R	Analytes																								
				ZN																								
100PPM_U	1.00	1021		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1041		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1044		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1051		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1056		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICV	1.00	1100		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICB	1.00	1103		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CRI	1.00	1107		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICSA	1.00	1114		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICSAB	1.00	1118		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PBW	1.00	1127		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LCSW	1.00	1130		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LA-97-	5.00	1135		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04LA-97-	5.00	1139		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04LA-97-	25.00	1142		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04LA-97-	5.00	1146		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1150			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCV	1.00	1205		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCB	1.00	1209		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04LA-97-	10.00	1217		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04LA-97-	10.00	1220		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04LA-97-	50.00	1224		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04LA-97-	10.00	1228		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	5.00	1231		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZZZZZZ	10.00	1237		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CRI	1.00	1242		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICSA	1.00	1250		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICSAB	1.00	1254		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCV	1.00	1257		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCB	1.00	1301		X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

FORM XIV - IN

ILM03.0

Wednesday, October 29, 1997

REQUEST NUMBER: 3815R

ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

AMENDED

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

These samples are on:

SHIP DATE: 10/20/97
REPORT DUE: 11/11/97
TURN AROUND REQ'D: 15 days

LANL Request Number: 3815R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; AMENDED: ADDITIONAL ANALYTE REQUESTED, JV 10/29/97.

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
METTAL	+ B	04LA-97-0483	15	W	10/16/97	
METTAL	+ Mo	04LA-97-0483	15	W	10/16/97	
METTAL	+ U	04LA-97-0483	15	W	10/16/97	

Monday, October 20, 1997

DATA ENTERED
110397 MT

REQUEST NUMBER: 3815R
ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

These samples are on:

SHIP DATE: 10/20/97
REPORT DUE: 10/23/97
TURN AROUND REQ'D: 2 day

LANL Request Number: 3815R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
METTAL	+ B	04LA-97-0483	15	W	10/16/97	
METTAL	+ U	04LA-97-0483	15	W	10/16/97	

Final Page of REQUEST NUMBER 3815R

Paragon Analytics, Inc.

TOTAL RECOVERABLE MOLYBDENUM CASE NARRATIVE

Addendum to Previous TAL Metals Pkg. (*)

Los Alamos National Laboratory SMO

3815R

Order Number - 9710175

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Inorganic Qualifiers
Section 4: Sample Results
Section 5: Summary Report Forms

Appendix A: Digestion Bench Sheets

Section 1: Case Narrative

1.1 This report consists of 1 water sample.

1.2 The sample was received cool and intact on 10/21/97. The client had not designated a sample for quality control. The lab designated PAI sample ID 9710175-1 as the quality control sample for this Order Number.

1.3 The sample had not been correctly preserved for the requested analyses. The sample was preserved with nitric acid to a pH below 2 upon receipt.

1.4 The sample was prepared for analysis based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0.

1.5 The sample was analyzed and reported based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0

1.6 All standards and solutions are NIST traceable and were used within their recommended shelf life.

1.7 The sample was prepared and analyzed within the established hold times.

(*) See previous TAL Metals pkg for Raw Data.
J Fry 12/2/97

All in house quality control procedures were followed, as described below.

1.8 General quality control procedures.

- A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in this digestion batch. There were not more than 20 samples in this digestion batch.
- The preparation (method) blank results associated with this batch were below the practical quantitation limits for the requested analyte.
- The laboratory control sample associated with this batch was within acceptance limits. This indicates complete digestion according to the method.
- All initial and continuing calibration blanks associated with this batch were below the practical quantitation limits for the requested analyte.
- All initial and continuing calibration verifications associated with this batch were within acceptance criteria for the requested analyte. This indicates a valid calibration and stable instrument conditions.
- The interference check samples associated with CLP analyses were within acceptance criteria.

1.9 Matrix specific quality control procedures.

- A matrix spike was digested and analyzed with this batch. All acceptance criteria for accuracy were met.
- A sample duplicate was digested and analyzed with this batch. All acceptance criteria for precision and accuracy were met.
- A serial dilution was analyzed with this batch. All acceptance criteria were met.

1.10 This sample was analyzed at a 10 fold dilution due to its high metals content.

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

Darryl Patrick Senior Inorganic Chemist	12/1/97 Date
SW Reviewer's Initials	12/1/97 Date

CERTIFICATION

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

PARAGON
ANALYTICS, INC.
AN EMPLOYEE OWNED SMALL BUSINESS

225 Commerce Drive Fort Collins, Colorado 80524 (800) 443-1511

Message

Phone (970) 490-1511
Fax (970) 490-1522
Alt. Fax (970) 490-1349

cy: Joylene Valdez
505 665-9972

Hello Bart,

Attached is the Appended Case Narrative for Metals on Request No. 3815. The narrative confirms that there was only one liquid phase apparent in the sample, including a cloudy region of suspended solids.

As my voice mail message said, the prep tech identified the sample as having 2 phases, implying two liquid phases. The two phases were aqueous and suspended solids.

Thanks,

Steve Fry

To	Bart Van den Plas	Company	LATA - Los Alamos
Fax No.	(505) 662-1757	Date	1/14/98
From	Steve Fry	Total Pages	2

If you do not receive all the pages, please call us back as soon as possible

Paragon Analytics, Inc.

TOTAL RECOVERABLE METALS CASE NARRATIVE

APPENDED 1/14/98

Los Alamos National Laboratory SMO

3815R

Order Number - 9710175

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Inorganic Qualifiers
Section 4: Sample Results
Section 5: Summary Report Forms
Section 6: Supporting Raw Data

Appendix A: Digestion Bench Sheets

Section 1: *Appended Case Narrative (1/14/98)*

The sample appeared to contain significant amounts of suspended sediment. Upon sitting, the sediment settled, leaving a region of clear aqueous liquid on the top, with a dark brown cloudy aqueous region in the bottom part of the sample. The two regions mixed together easily with shaking.

After addition of the acids, in 10 minutes, the sample settled into two regions again. The top region (approximately 10%) was clear and green colored. The bottom region was brown and cloudy. The two regions were easily mixed together prior to digestion. As such, the sample was prepared and analyzed after mixing the two regions into a homogeneous solution.

This appearance of two regions was inappropriately listed as "2 phases" on the preparation bench sheet. There was no evidence of separate liquid phases, just the presence of suspended solids..

Steve Fry 1/14/98

Paragon Analytics, Inc.

TOTAL RECOVERABLE METALS CASE NARRATIVE

Los Alamos National Laboratory SMO

3815R

Order Number - 9710175

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Inorganic Qualifiers
Section 4: Sample Results
Section 5: Summary Report Forms
Section 6: Supporting Raw Data

Appendix A: Digestion Bench Sheets

Section 1: Case Narrative

1.1 This report consists of 1 water sample.

Due to limitation of the reporting software:

a) Some mercury values appear as 0.0. When this occurs the actual value is hand entered.

b) For Mercury, the ICB is also used as the preparation blank, therefore the run chronology will show the same time for both.

c) Trace ICP elements which are calibrated daily with a multipoint calibration do not appear on the run log. The calibration standards can be located at the beginning of each raw data package for this instrument.

1.2 The sample was received cool and intact on 10/21/97. The client had not designated a sample for quality control. The lab designated PAI sample ID 9710175-1 as the quality control sample for this Order Number.

1.3 The sample had not been correctly preserved for the requested analyses. The sample was preserved with nitric acid to a pH below 2 upon receipt.

1.4 The sample was prepared for analysis based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0.

1.5 The sample was analyzed and reported based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0

1.6 All standards and solutions are NIST traceable and were used within their recommended shelf life.

1.7 The sample was prepared and analyzed within the established hold times.

All in house quality control procedures were followed, as described below.

1.8 General quality control procedures.

- A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in each digestion batch. There were not more than 20 samples in each digestion batch.
- The preparation (method) blank results associated with each batch were below the practical quantitation limits for the requested analytes.
- The laboratory control sample associated with each batch was within acceptance limits. This indicates complete digestion according to the method.
- All initial and continuing calibration blanks associated with each batch were below the practical quantitation limits for the requested analytes.
- All initial and continuing calibration verifications associated with each batch were within acceptance criteria for the requested analytes. This indicates a valid calibration and stable instrument conditions.
- The interference check samples, and high standard readbacks associated with Method 6010A analyses were within acceptance criteria.

1.9 Matrix specific quality control procedures.

- A matrix spike was digested and analyzed with each batch. All acceptance criteria for accuracy were met with the following exceptions.

Analyte	Sample ID
Aluminum	9710175-1S
Antimony	9710175-1S
Cadmium	9710175-1S
Chromium	9710175-1S
Copper	9710175-1S
Iron	9710175-1S
Manganese	9710175-1S
Mercury	9710175-1S
Nickel	9710175-1S
Silver	9710175-1S

Uranium	9710175-1S
Zinc	9710175-1S

The affected sample results are flagged for antimony, cadmium, mercury and uranium.

The concentration of aluminum, chromium, copper, iron, manganese, nickel, silver and zinc in the native sample was greater than 4 times the concentration of matrix spike added during the digestion. When sample concentration is that much greater than the spike added, spike recoveries may not be accurate. The Laboratory Control Sample indicates that the digestion and analysis were in control.

- A sample duplicate was digested and analyzed with each batch. All acceptance criteria for precision and accuracy were met.
- A serial dilution was analyzed with each ICP batch. All acceptance criteria were met with the following exception.

Analyte	Sample ID
Beryllium	9710175-1L

Associated sample results for these elements have been flagged in the report.

The high concentration(s) of aluminum, calcium, magnesium and iron in the sample most likely caused a slightly depressed signal for beryllium. When the aluminum, calcium, magnesium and iron are reduced in the five fold serial dilution the beryllium results are not depressed and the comparison of the two readings is slightly above the 10% acceptance limit.

1.10 This sample was diluted for many elements. Please refer to the run log for specific elements and dilutions.

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

Darryl Patrick — 10/27/97
Darryl Patrick, Senior Inorganic Chemist — Date

SW — 10/27/97
Reviewer's Initials — Date

CERTIFICATION

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

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: 3815R LAB NAME Paragon LAB CODE_____

NAME OF CCS CHECKER_____ COMPANY_____

NAME OF VALIDATOR R. Sherman COMPANY LATA

CCS DATE_____ VALIDATION DATE 11/6/97 EDS ENTRY DATE_____

ANALYTICAL SUITE:
- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- x INORGANICS
- o RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? ¨ YES ¨ NO
Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

Uranium was validated using inorganic baseline criteria.
Boron is non-standard and was not validated

Signature/1st validation [signature] 11/6/97
Signature/2nd validation [signature] 2 NOV97
Qualifiers entered _____ Date_____

Gross Gamma Results Summary

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	11/5/97
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-10-228	Units:	pCi/L

Client Sample ID	Lab Sample ID	Collection Date	Activity	Uncertainty	MDC
04LA-97-0486	97-10-228-01	10/20/97	240	19	18 (U, B4)
04LA-97-0486	97-10-228-D1	10/20/97	221	18	17
Blank	97-10-230-B1	10/30/97	72	11	17

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate.

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

97-10-228-D1 is a duplicate of sample 97-10-228-01.

Prepared by 11/21/97

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3843R

Date File Saved: 11/22/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0486	97-10-228-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: GROSS AB

Samples under Request Number 3843R (PAI Work Order 97-10-228) were received on 10/24/97 and scheduled for gross alpha/beta analysis, which was completed on 11/20/97.

The analytical results for these samples are reported in units of pCi/L.

This work order was prepared using PAI SOP702R11, and analyzed using PAI SOP724R5.

Gross alpha results are referenced to ^{241}Am. Gross beta results are referenced to ^{90}Sr/Y.

Following an extended count, the requested MDA for gross alpha/beta for sample 04LA-97-0486 (PAI ID 97-10-228-01) was not achieved due to the presence of elevated levels of dissolved / suspended solids native to the sample. The requested method limits the amount of sample solids residue taken for analysis to 5 mg/cm^2. The sample activity exceeded the reported MDA for both the alpha and beta analyses.

Due to insufficient sample volume, a duplicate sample could not be prepared. The batch duplicate was prepared on a sample from request number 3882R. The duplicate error ratio (DER) for the alpha/ beta analysis of this sample and its duplicate sample were acceptable according to PAI SOP 715 Rev.9. DER is defined as :

$$DER = \frac{/S - D/}{2 * \sqrt{\sigma_S^2 + \sigma_D^2}}$$

The warning limit for DER is 1.42. This sample alpha DER = 0.317. This sample beta DER = 0.280

No further problems were noted during the preparation and analysis of these samples. All remaining quality control criteria were met.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Renee Gallegos — 11/22/97
Radiochemistry Instrument Technician — Date

Radiochemistry Final Review — 11/24/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Donald Gipple — Date
Laboratory Manager

GROSS ALPHA/BETA BLANK SPIKE RESULTS

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 11/13/97

Client Name: Shared QC

Date Analyzed : 11/20/97

Client Project ID : Blank Spike

Sample Matrix : Water

Lab Workorder Number : 97-10-257

Units : pCi/l

Alpha Recovery Data

Lab Sample ID	Alpha Spike Added	Alpha Reported	Percent Recovery	Flag
97-10-257-S1	210.0	221.1	105.3	Pass

Beta Recovery Data

Lab Sample ID	Beta Spike Added	Beta Reported	Percent Recovery	Flag
97-10-257-S1	273.3	257.7	94.3	Pass

PAI sets control limits for gross alpha/beta measurements based on EPA/EMSL Laboratory Intercomparison Control Limits.

Acceptance Range for Percent Recovery of blank spike samples is known ± 30%.

Remarks:

Blank Spike for workorders 97-10-257, 10-228, and 11-049.

ALPHA/BETA ANALYSIS RESULTS SUMMARY

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 11/13/97

Client Name: Shared QC

Date Analyzed : 11/20/97

Client Project ID: Blank

Sample Matrix : Water

Lab Sample ID Series: 97-10-257

Count Duration: 600 Min.

Analyzed By : RG

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/l)	Gross Beta (pCi/l)
Blank	10-257-B1	-0.20 ± 0.32	0.16 ± 0.75
Decision Level	10-257-B1	0.71	2.1

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

Reported Activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the approriate blank.

These samples were prepared using PAI SOP702FC and analyzed using PAI SOP705FC.

Remarks:

Blank for workorders 97-10-257, 10-228, and 11-049.

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3843R

Date File Saved: 11/23/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0486	97-10-228-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

All samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gamma Spectroscopy

The samples under Request Number 3843R (Work Order 9710228) were received on 10/24/97 and scheduled for gamma spec. analyses, which were completed on 11/05/97.

The analysis results for these samples are reported in units of pCi/Liter. The samples were filtered prior to analysis.

This work order was prepared using PAI SOP739R2 and analyzed using PAI SOP713R4.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Bismuth-214 was detected in the blank (97-10-230-B1) at a concentration in excess of the 2σ total propagated uncertainty (TPU). However, since the concentration detected is below the corresponding decision level, no sample results are compromised. Potassium-40 was also detected in the blank at a concentration in excess of the 2σ TPU and in excess of the corresponding decision level. However, since no ^{40}K was identified in the client samples, no quantifications are compromised.

Cadmium-109 and ^{237}Np are often misidentified when using the required library. The observed photopeak at 87 keV is attributed to the K_β x ray of Pb. Likewise, ^{211}Bi and ^{224}Ra are misidentified due to interference from ^{214}Pb at 351 keV and 241 keV, respectively. Due to interference, the GDR software did not attempt to quantify activity concentrations for some analyses. In such cases, zero values are reported in the hard copy reports, and an "NQ" qualifier is submitted in the electronic deliverable.

Quantification of ^{226}Ra at low levels based upon the 186 keV photopeak is unreliable due to interference from ^{235}U, which also has a photopeak at 186 keV. Low levels of ^{235}U, though undetectable by this method, can cause greatly exaggerated ^{226}Ra results. The ^{226}Ra activity reported should be considered qualitative. Activity concentration results above the 2σ TPU for radionuclides identified as present by the analysis software for which spectral interference is suspected are given an "S" flag.

Activity concentrations above the 2σ TPU are reported in some instances where no supporting photopeaks are observed. These anomalous identifications result from the GDR software attempting to calculate net activity concentrations for analytes for which no peaks are observed. Such data have been flagged with an asterisk.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill — 11-23-97
Radiochemistry Instrumentation — Date

Radiochemistry Final Review — 11/24/97
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Don Gipple — Date
Laboratory Manager

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 01/01/95 10:00

Client Name: SHARED QC

Date Analyzed : 11/03/97 16:26

Lab Sample ID: 97-10-148-S1

Sample Matrix : Water

Client Sample ID: Lab Control

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	108000	103000	105	Pass
Cd-109	1420000	1400000	104	Pass
Co-57	30900	32000	96.5	Pass
Cs-137	37700	36600	103	Pass
Co-60	58700	60100	97.6	Pass

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known ± 15%

Data stored in file \gdr\prt\W10148S1.97P

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/30/97 10:00

Client Name: LANL

Date Analyzed: 11/05/97 19:37

Lab Sample ID: 97-10-230-B1

Sample Matrix: Water

Client Sample ID: Blank

Count Duration: 800 Min.

Nuclide	Dec. Level (pCi/L)	Nuclide	Dec. Level (pCi/L)
Am-241	11.6	Np-237	9.22
Cd-109	53.0	Th-234	112
Co-57	0.728	Ce-144	9.50
Ce-139	0.936	U-235	3.78
Ra-226	127	Th-227	7.05
Pb-212	7.33	Ra-224	24.6
Se-75	1.45	Hg-203	1.51
Pa-231	66.1	Pa-233	3.12
Ra-223	23.0	Eu-152	3.96
Bi-211	8.97	Pb-214	6.49
Sn-113	1.85	Rn-219	26.8
Pb-211	46.4	Ann-Rad	4.75
Sr-85	2.02	Ba-140	17.8
Tl-208	3.40	Cs-134	1.56
Bi-214	14.9	Ru-106	32.6
Cs-137	2.10	Mn-54	1.53
Y-88	3.68	Ac-228	14.6
Pa-234m	674	Zn-65	3.76
Co-60	4.79	Na-22	3.41
K-40	63.4	La-140	28.8
Bi-212	59.7		

Decision Level Values calculated as recommended by ANSI N42.2
Reported sample activities should be compared to these Decision Levels

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/30/97 10:00

Client Name: LANL

Date Analyzed: 11/05/97 19:37

Lab Sample ID: 97-10-230-B1

Sample Matrix: Water

Client Sample ID: Blank

Count Duration: 800 Min.

Nuclide	Activity (pCi/Liter)			% Uncertainty
Am-241	1.32	±	12.5	947
Np-237	-16.9	±	11.3	66.4
Cd-109	22.8	±	36.8	162
Th-234	-38.3	±	136	356
Co-57	-0.343	±	0.885	258
Ce-144	3.71	±	7.04	190
Ce-139	-0.299	±	1.14	380
U-235	0.221	±	4.32	1960
Ra-226	91.2	±	43.6	47.8
Th-227	-9.81	±	8.59	87.6
Pb-212	2.78	±	5.54	199
Ra-224	-115	±	30.8	26.9
Se-75	-0.233	±	1.77	758
Hg-203	0.265	±	1.51	569
Pa-231	27.3	±	47.2	173
Pa-233	0.892	±	2.71	303
Ra-223	-8.46	±	28.0	331
Eu-152	0.410	±	4.32	1050
Bi-211	-36.2	±	11.1	30.8
Pb-214	-0.840	±	7.89	939
Sn-113	0.384	±	1.78	464
Rn-219	11.1	±	19.1	172
Pb-211	10.9	±	43.1	394
Ann-Rad	-21.1	±	5.93	28.1
Sr-85	-6.94	±	2.49	35.9
Ba-140	11.4	±	7.82	68.9
Tl-208	-0.417	±	4.13	991
Cs-134	-0.658	±	1.89	288
Bi-214	7.40	±	9.10	123
Ru-106	19.6	±	15.9	81.1

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/30/97 10:00

Client Name: LANL

Date Analyzed: 11/05/97 19:37

Lab Sample ID: 97-10-230-B1

Sample Matrix: Water

Client Sample ID: Blank

Count Duration: 800 Min.

Nuclide	Activity (pCi/Liter)	% Uncertainty
Cs-137	0.524 ± 1.92	367
Mn-54	-0.162 ± 1.86	1150
Y-88	2.01 ± 2.03	101
Ac-228	1.64 ± 15.7	954
Pa-234m	397 ± 338	85.2
Zn-65	0.453 ± 4.02	887
Co-60	3.21 ± 1.93	60.3
Na-22	1.68 ± 2.11	126
K-40	13.3 ± 61.0	460
La-140	0.723 ± 34.1	4720
Bi-212	-25.7 ± 72.5	282

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

Decision Level Values calculated as recommended by ANSI N42.2
Reported sample activities should be compared to these Decision Levels

Data is stored in file \gdr\prt\W10230B1.97P

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/20/97 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 11/05/97 19:33

Lab Sample ID: 97-10-228-D1

Sample Matrix: Water

Client Sample ID: Duplicate

Count Duration: 800 Min.

Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)
Pb-212	4.08 ± 6.41	Am-241	-5.40 ± 10.2
Np-237	0.666 ± 11.0	Cd-109	1.22 ± 36.8
Th-234	-260 ± 106	Co-57	-0.070 ± 1.12
Ce-144	1.82 ± 8.83	Ce-139	-0.087 ± 1.21
U-235	-1.17 ± 4.34	Ra-226	25.8 ± 71.6
Th-227	-0.228 ± 8.96	Ra-224	-68.4 ± 29.8
Se-75	1.01 ± 2.20	Hg-203	0.508 ± 2.09
Pa-231	11.0 ± 54.8	Pa-233	1.13 ± 3.32
Ra-223	-38.2 ± 33.3	Eu-152	-0.508 ± 4.77
Bi-211	8.49 ± 12.0	Pb-214	3.46 ± 7.87
Sn-113	0.863 ± 2.27	Rn-219	-16.0 ± 20.4
Pb-211	15.0 ± 44.4	Ann-Rad	-28.1 ± 7.08
Sr-85	-5.31 ± 2.59	Ba-140	6.49 ± 14.7
Tl-208	-1.67 ± 4.86	Cs-134	0.963 ± 2.10
Bi-214	2.10 ± 9.50	Ru-106	-8.22 ± 17.7
Cs-137	-1.02 ± 1.99	Mn-54	-0.260 ± 2.16
Y-88	-5.75 ± 4.93	Ac-228	4.71 ± 15.3
Pa-234m	233 ± 340	Zn-65	-0.157 ± 4.07
Co-60	0.749 ± 2.13	Na-22	0.341 ± 2.09
K-40	12.8 ± 59.8	La-140	-215 ± 2410
Bi-212	-3.17 ± 88.3		

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

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

Remarks:

Sample 97-10-228-D1 is a duplicate of 97-10-228-01.

MG

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgment based on data use . It usually has an "M" with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analytes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likely because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1c Carrier recovery 10-40% and result > EQL.

1d Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

3b Spike recovery outside criterion but sample is not of same matrix as was matrix spike sample

4 Sample result > EQL but < 5X the amount found in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

6d LCS tracer/carrier recovery < 10 % and sample result is a non-detect.

7 For the set of duplicates, both results are > EQL or no EQL is available, but there is not a 3 σ agreement between the results - within an SDG.

8 One result > EQL and the difference > a factor of 1xEQL for water and 2xEQL for soil.

9a Result < MDA and MDA is < EQL.

9b Result > MDA but < EQL.

10a Result < both MDA and EQL.

10b Result < MDA but > EQL.

11 Result is less than three times the reported 1-sigma uncertainty.

17 A zero was added to the result field because the laboratory did not provide a value or a MDC.

RADIOCHEMISTRY

Lab Control Sample (LCS) **Present? X yes no** **1/SDG** **75-125% recovery** *The Iso-U LCS contains U-234 and U-238. The Iso-Pu LCS contains Pu-239. The γ spec. LCS contains Am-241, Cd-109, Co-57, Cs-137, and Co-60.* *Paragon uses a blank spike as the LCS for the gross α/β analysis.*	**OK** **See comment**	**Obtain from lab. Q=A** **If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 75% and J+ for > 125%** **If the LCS sample tracer/ carrier recovery is < 10%, qualify the associated sample data as P for non-detects.**	 **R6a** **R6** **R6d**
Matrix Spike (MS) **1/SDG** **Present? yes X no** **75-125% recovery** **(Note: As opposed to other tests, the matrix spike test will qualify samples on the basis of their connection by SDG and not by analytical batch).** *As per the case narrative, due to limited sample volume neither a duplicate nor a matrix spike was prepared. A duplicate LCS was prepared and reported instead.*	**A** **See comment**	**Obtain from lab. Q=A** **If criterion not met, qualify all analytes associated with the MS with a J- for <75%** **and J+ for > 125%,** **if all samples in batch of same matrix. If there is variation of matrix, P for samples not of same matrix as spiked sample.**	 **R3a** **R3** **R3b**

1723 Rev 97

Method blank **Present? X yes no** **1/SDG** **target analytes ≤5x the amount in the blank** *The gross γ result is less than five times the amount found in the blank. The blank result is between the MDA and the required detection limit.*	**U** **See comment**	**Obtain from lab. Q=A** **If the sample result > EQL or no EQL is available but <5x the amount found in the associated blank, it should be qualified as U. In making this comparison the differing aliquot size of the blank and sample being tested should be taken into account.**	**R4**
Duplicate **Present? yes no** **1/SDG** **(Note: As opposed to other tests, the duplicate tests will qualify samples on the basis of their connection by SDG and not by analytical batch).** *As per the case narrative, due to limited sample volume neither a duplicate nor a matrix spike was prepared. A duplicate LCS was prepared and reported instead.* *According to the case narrative, the gross α/β duplicate was analyzed on a sample from request 3882R. Results for the duplicate were not summarized. The sample result for this request is qualified as A.*	**A** **See comment**	**Obtain from lab. Q=A** **If both results are above the EQL or no EQL is available, all results for same analyte in same SDG should be qualified as J if there is not 3σ agreement between results.** **If both results are < EQL no test should be done.** **If one result > EQL and difference > factor of 1X EQL for water and 2X EQL for soil, qualify with J.**	**R7** **R8**

1723Dec97

EQL **Denote those samples where the result is less than the reported sample MDA or EQL.** **Confirm that the MDA of each reported analyte in each sample and blank is <EQL.** *The decision level values from the blank were used in place of the MDA for the γ spec., gross α/β, and Sr-90 analyses.*	**U** **See comment**	**When the MDA < the EQL or no EQL is available:** **Qualify as U those sample results < the MDA.** **Qualify as U those sample results > MDA but < EQL.** **When the MDA is >EQL:** **Qualify as U those sample and blank results < both the MDA and EQL.** **Qualify as U those sample and blank results < than the MDA but > EQL.**	 **R9a** **R9b** **R10a** **R10b**
Detection with respect to the reported uncertainty **This is a more conservative test of detection than simply considering the MDA or EQL since sample results > than both the EQL and MDA may still be qualified using this test.**	**NA**	**Qualify as U those results < three times the reported 1-sigma uncertainty. Equivalently qualify as U those results < 1.5 times the reported 2-sigma uncertainty or < the reported 3-sigma uncertainty.**	**R11**
Tracer/carrier recovery **Present? X yes no** **Tracer recovery for alpha spec analyses 330 %** **Carrier recovery for beta/gamma analyses 3 40%**	**OK**	**Obtain from lab. Q=A** **If tracer/carrier recovery < 10 %, qualify results as R** **If tracer recovery is 10-30%, Q=J** **if result > EQL and UJ if result < EQL** **If carrier recovery is 10-40%, Q=J** **if result > EQL and UJ if < EQL**	 **R10** **R11a** **R11b** **R11c** **R11d**

A723 Dec 97

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, December 08, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: None

Client Project Number: 3843R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710228

Field ID: 04LA-97-0486
Lab ID: 9710228-1

Sample Matrix: WATER
Date Prepared: 10-Nov-97
Prep SOP: PAI SOP 780R2
Prep Batch: 143144

Date Collected: 20-Oct-97
Date Analyzed: 04-Dec-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.122 +/- 0.033	0.084	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	2.97	pCi/L	60%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

1723 Dec 97

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Thursday, December 11, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3843R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710228

Field ID: 04LA-97-0486
Lab ID: 9710228-1

Sample Matrix: WATER
Date Prepared: 10-Nov-97
Prep SOP: PAI SOP 780R2
Prep Batch: 143144

Date Collected: 20-Oct-97
Date Analyzed: 18-Nov-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.010 +/- 0.014	0.060	pCi/L	U, R9a)
Pu-239	0.017 +/- 0.014	0.025	pCi/L	↓

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.15	pCi/L	49%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

M 23 Dec 97

Sr-90 ANALYSIS RESULTS SUMMARY

Method ASTM D5811-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/20/97

Client Name: Los Alamos National Lab

Date Analyzed : 12/06/97

Client Project ID: 3843R

Sample Matrix : Water

Lab Sample ID Series: 97-10-228

Count Duration: 180 Min.

Analyzed by: RG

Client Sample ID	Lab Sample ID	Sr-90 (pCi/l) .15
04LA-97-0486	97-10-228-01	0.04 ± 0.30

(U, R9a), A

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

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP707FC and analyzed using PAI SOP724FC.

A 23 Dec 97

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Thursday, November 20, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: None

Client Project Number: 3843R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710228

Field ID: 04LA-97-0486
Lab ID: 9710228-1

Sample Matrix: WATER
Date Prepared: 10-Nov-97
Prep SOP: PAI SOP 780R2
Prep Batch: 143144

Date Collected: 20-Oct-97
Date Analyzed: 19-Nov-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 200

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	6.84 +/- 0.48	0.063	pCi/L	
U-235	0.337 +/- 0.062	0.032	pCi/L	
U-238	4.98 +/- 0.37	0.090	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.40	6.4	pCi/L	76%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

1723 Dec 97

ALPHA/BETA ANALYSIS RESULTS SUMMARY

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/20/97

Client Name: Los Alamos National Lab

Date Analyzed : 11/20/97

Client Project ID: 3843R

Sample Matrix : Water

Lab Sample ID Series: 97-10-228

Count Duration: 600 Min.

Analyzed By : CJM

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/liter) .7	Gross Beta (pCi/liter) 2.1
04LA-97-0486	97-10-228-01	A 63.0 ± 8.8	67.1 ± 8.2 A

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

These samples were prepared using PAI SOP702FC and analyzed using PAI SOP705FC.

M 23 Dec 97

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 10/20/97 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 11/05/97 19:27

Lab Sample ID: 97-10-228-01

Sample Matrix: Water

Client Sample ID: 04LA-97-0486

Count Duration: 800 Min.

Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)	
Cd-109	27.2 ± 34.4	Ra-226	114 ± 47.0 S	(U,R9a)
Bi-211	17.7 ± 30.4	Ru-106	17.8 ± 17.9	
Pa-234m	431 ± 364	Am-241	2.90 ± 9.80	
Np-237	-4.37 ± 10.2	Th-234	-62.6 ± 112	
Co-57	-0.529 ± 1.04	Ce-144	3.48 ± 7.82	
Ce-139	-1.56 ± 1.39	U-235	-0.444 ± 4.55	
Th-227	-3.14 ± 9.73	Pb-212	4.43 ± 5.70	
Ra-224	-107 ± 32.8	Se-75	0.371 ± 2.13	
Hg-203	0.951 ± 1.99	Pa-231	31.9 ± 55.9	
Pa-233	0.928 ± 3.06	Ra-223	-43.3 ± 31.8	
Eu-152	-0.855 ± 4.66	Pb-214	9.77 ± 9.23	
Sn-113	-2.20 ± 2.10	Rn-219	-9.56 ± 18.9	(U,R9a)
Pb-211	12.5 ± 43.1	Ann-Rad	-20.6 ± 6.54	
Sr-85	-4.68 ± 2.99	Ba-140	6.22 ± 15.6	
Tl-208	0.118 ± 4.73	Cs-134	0.646 ± 1.97	
Bi-214	9.24 ± 9.83	Cs-137	-1.44 ± 1.89	
Mn-54	-0.138 ± 2.21	Y-88	-3.28 ± 6.17	
Ac-228	0.773 ± 17.0	Zn-65	3.56 ± 4.67	
Co-60	-0.118 ± 2.20	Na-22	1.35 ± 2.19	(U,R9a)
K-40	-36.4 ± 59.7	La-140	600 ± 2300	
Bi-212	43.0 ± 90.8			

(U,R4)
(U,R9a)

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

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

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

A123Dec97

MLO

Paragon Analytics, Incorporated

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 9710229
Client Name: Los Alamos National Laboratory SMO
Client Project Name: 3846R
Client Project Number: NONE
Client PO Number:

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
04LA-97-0487	9710229-1		Water	10/20/97	

Thursday, October 23, 1997

Los Alamos
NATIONAL LABORATORY

DATA ENTERED
110397M

REQUEST NUMBER: 3846R
ANALYSIS TYPE: INORG

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/23/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 2 day

These samples are on:

LANL Request Number: 3846R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
TCN		04LA-97-0487	05	W	10/20/97	
METTAL	+ B	04LA-97-0487	09	W	10/20/97	
METTAL	+ U	04LA-97-0487	09	W	10/20/97	

Final Page of REQUEST NUMBER 3846R

Paragon Analytics, Inc.

INORGANICS CASE NARRATIVE

Los Alamos National Laboratory SMO

3846R

Order Number - 9710229

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Sample Results
Section 4: QC and Summary Report Forms
Section 5: Supporting Raw Data/Benchsheets

Section 1: Case Narrative

1. This report consists of data for 1 water sample analyzed for total cyanide.
2. The sample was received cool and intact on 10/24/97.
3. The sample has been correctly preserved for the requested analyses.
4. The sample was analyzed using procedures based on the following methods from the USEPA:

Analyte	Method
Total Cyanide	9010

5. All standards and solutions were used within their recommended shelf life.
6. The sample was prepared and analyzed within the established hold times for all analyses.
7. Sample results which are below the reporting limit are reported as "ND" on the enclosed report.

All in house quality control procedures were followed, as described below.

8. General quality control procedures.

- A method blank, a laboratory control sample (LCS), a matrix spike and a matrix spike duplicate (MSD) or a matrix duplicate were prepared and analyzed for each analysis batch.
- The method blank results were within acceptance limits for all analyses.
- The laboratory control sample (LCS) results were within acceptance limits for all analyses.
- The MS/MSD results were within acceptance limits.
- For total cyanide the recovery for the high distillation check sample was outside the in house guidelines of 90-110%. However, cyanide was not detected in sample "04LA-97-0487".

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

Reporter's Initials	10-31-97 Date
Reviewer's Initials	11-3-97 Date

CERTIFICATION

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

11-10-97
Date

Paragon Analytics, Inc.

TOTAL METALS CASE NARRATIVE

Los Alamos National Laboratory SMO

3846R

Order Number - 9710229

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Inorganic Qualifiers
Section 4: Sample Results
Section 5: Summary Report Forms
Section 6: Supporting Raw Data

Appendix A: Digestion Bench Sheets

Section 1: Case Narrative

1.1 This report consists of 1 water sample.

Due to limitation of the reporting software:

a) Some mercury values appear as 0.0. When this occurs the actual value is hand entered.

b) For Mercury, the ICB is also used as the preparation blank, therefore the run chronology will show the same time for both.

c) Trace ICP elements which are calibrated daily with a multipoint calibration do not appear on the run log. The calibration standards can be located at the beginning of each raw data package for this instrument.

1.2 The sample was received cool and intact on 10/24/97. The client had not designated a sample for quality control. The lab designated PAI sample ID 9710229-1 as the quality control sample for this Order Number.

1.3 The sample had been correctly preserved for the requested analyses.

1.4 The sample was prepared for analysis based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0.

1.5 The sample was analyzed and reported based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0

1.6 All standards and solutions are NIST traceable and were used within their recommended shelf life.

1.7 The sample was prepared and analyzed within the established hold times.

All in house quality control procedures were followed, as described below.

1.8 General quality control procedures.

- A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in each digestion batch. There were not more than 20 samples in each digestion batch.
- The preparation (method) blank results associated with each batch were below the practical quantitation limits for the requested analytes.
- The laboratory control sample associated with each batch was within acceptance limits. This indicates complete digestion according to the method.
- All initial and continuing calibration blanks associated with each batch were below the practical quantitation limits for the requested analytes.
- All initial and continuing calibration verifications associated with each batch were within acceptance criteria for the requested analytes. This indicates a valid calibration and stable instrument conditions.
- The interference check samples associated with CLP analyses were within acceptance criteria.

1.9 Matrix specific quality control procedures.

- A mat. x spike was digested and analyzed with each batch. All acceptance criteria for accuracy were met.
- A sample duplicate was digested and analyzed with each batch. All acceptance criteria for precision were met.
- A serial dilution was analyzed with each ICP batch. All acceptance criteria were met with the following exceptions.

Analyte	Sample ID
Aluminum	9710229-1L
Barium	9710229-1L
Magnesium	9710229-1L

Associated sample results for these elements have been flagged in the report.

Aluminum, barium and magnesium results in the diluted sample did not agree within 10% with the undiluted sample results. Results for these elements are flagged with an

"E" indicating a potential matrix effect. The concentrations of barium and magnesium in the diluted and undiluted samples were below the CRDL. These relatively low concentrations may have contributed to the greater than 10% difference between the two sets of results.

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

Darryl Patrick Senior Inorganic Chemist	11/9/97 Date
KH Reviewer's Initials	11/9/97 Date

CERTIFICATION

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

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: 3846R LAB NAME Paragon LAB CODE_____

NAME OF CCS CHECKER_____ COMPANY_____

NAME OF VALIDATOR R. Sherman COMPANY LATA

CCS DATE_____ VALIDATION DATE 11/18/97 EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- x INORGANICS
- o RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? ¨ YES ¨ NO
Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

Boron is non-standard and not validated.
Uranium was analyzed by ICP and validated using inorganic baseline criteria.

Signature/1st validation Ruth D. Sherman 11/18/97
Signature/2nd validation _____
Qualifiers entered _____ Date_____

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgement based on data use . It usually has an "M"with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analyltes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likley because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

5 Sample result < EQL and < 5X (10X as above) the concentration of the analyte in the blank, which indicates the detected result was indistinguishable from blank contamination and the detected result was changed to non-detected at the EQL.

5a Sample result > EQL and > 5X (10X as above) the concentration of the analyte in the blank, which indicates the reported result is not likely to be related to the contamination in the associated blank.

6 Recovery of surrogates or analyte in the LCS > upper limit, which indicates a potential high bias in the results and a potential for false positive results.

6a Recovery of surrogates or analyte in the LCS < lower limit, which indicates a potential low bias in the results.

6d Result is a non-detect and the recovery of surrogates or the analyte in the LCS is < the lower limit, which indicates a potential for false negative results.

7 % RSD or %D exceeds specification - apply to a positive resultresult, which indicates potential quantitation problems in the analyses and the potential for false positive results.

8 % RSD or %D exceeds the specification - apply to a non-detect, which indicates potential quantitation problems in the analyses and the potential false negative results.

9. Holding time is exceeded. An evaluation of the data of interest with respect to holding time exceedance impact (technically) is recommended. Factors to consider include sample preservation, sample storage practices, use of the data, levels of contamination found in the sample, and the physical, chemical, and biological stability of the target analytes in the sample matrix.

10. Duplicate RPD > advisory 20% limit.

INORGANICS (I)

3 Spike recovery > upper limit (125%) and the results > the EDL.

3a Spike recovery < lower limit (75%) and the results are > the EDL.

3d Spike recovery < 30 % and results < EDL.

3e Spike recovery 30-74% and sample results < EDL.

4 Using the worse case blank, the sample results > the EDL but < 5X the concentration of the related analyte in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

7 ICS recovery > 120% and results > EDL.

7a ICS recovery 50-79% .

7b ICS recovery < 50% and result < EDL.

8a For ICV and CCV, recovery is lower than specification

8b For ICV and CCV, recovery is higher than specification

8c For ICV and CCV, results are positive, but < MDL and recovery is lower than the specification.

8d For ICV and CCV, recovery is extremely low and detection may be impaired.

8e For ICV and CCV, recovery is abnormally high - apply to results > MDL.

9 Holding time for Hg has been exceeded. Positive results may be biased low and non-detects may potential be false negatives.

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1 Carrier recovery 10-40% and result > EQL.

1 Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

INORGANICS

Calibration	NA		
Present? x yes no		Obtain from lab. Q=A	
Initial calibration verification			
Present? x yes no	OK		
Continuing calibration verification			
Present? x yes no	OK	Obtain form lab. Q=A	

11/12/97

Blanks (Applies to each) Present? x yes no **Initial & continuing calibration blanks** Analyze at each wavelength Beginning and end of each run ICB and CCB analyzed at a frequency of 10% or 2 hours If blank results > EDL reanalyze previous 10 samples **Preparation blank** One per batch ≤ EDL, or if concentration of analyte < 10X EDL, repeat all samples in batch. *Cr and Tl detected in blanks and sample.* *All analytes detected in blanks except Sb, As, Cd, Co, Se, Ag, U, and V.*	U	Obtain from lab. Q=A Use "worse" case blank. Sample results > EDL but < 5 X amount found in the blank should be qualified as U.	I4

RJS
11/18/97

ICP Interference check sample Present? x yes no Solution contains Ag, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, V, & Zn Analyze at beginning of each run Each wavelength used for samples ICS results must be ± 20%of true value	OK	Obtain from lab. Q=A If the ICS recovery is >120% and the results are >EDL, qualify data as J+ If recovery is 50-79%, qualify data as J- If ICS recovery is < 50% and results are < EDL, qualify results as R, PM	 I7 I7a I7b
Spike sample analysis Present? x yes no One per run, per matrix, concentration, SDG % recovery: 75-125% (unless conc. > 4X spike conc.)	OK	Obtain from lab. Q=A If spike recovery > 125% and results < EDL, OK If spike recovery < 75% and results are >EDL, qualify results as J- if same matrix, P if not. If spike recovery > 125% and results are >EDL, qualify data as J+ if same matrix, P if not. If spike recovery 30-74% and sample results < EDL, qualify as UJ if same matrix, P if not. If spike recovery results < 30% and results < EDL, qualify as R, PM.	 I3a I3 I3e I3d

ADS
11/13/97

Duplicate Present? x yes no One per batch of sample of like matrix for each SDG RPD : ≤ 20% (advisory) If either the sample or duplicate value is less than 5 X EDL, there is a control limit of ± EDL	OK	Obtain from lab. Q=A Q=P because of nature of LANL samples.	
Laboratory Control Sample (LCS) Aqueous LCS per batch/SDG % recovery : 80-120% (except Ag & Sb)	OK	If criterion not met, qualify each analyte associated with the LCS in the same batch as J- for < 80% and J+ for > 120%	I6a I6
Holding time Analyze water samples for Hg within 28 days of sample collection Analyze water samples for CN within 14 days of sample collection	OK	Compare analysis date with date of sample collection on the Analysis Request. Q=PM	

11/13/97

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-97-0487

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Matrix (soil/water): WATER Lab Sample ID: W9710229-1

Level (low/med): LOW__ Date Received: 10/24/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	1600		E	P	
7440-36-0	Antimony_	7.1	B		P	
7440-38-2	Arsenic__	2.8	U		P	
7440-39-3	Barium___	6.4	B	E	P	
7440-41-7	Beryllium	0.06	U		P	
7440-42-8	Boron____	67.8	B		P	
7440-43-9	Cadmium__	0.20	U		P	
7440-70-2	Calcium__	1920	B		P	
7440-47-3	Chromium_	5.2	B		P	U, I4
7440-48-4	Cobalt___	0.40	U		P	
7440-50-8	Copper___	15.7	B		P	
7439-89-6	Iron_____	921			P	
7439-92-1	Lead_____	6.5	U		P	
7439-95-4	Magnesium	924	B	E	P	
7439-96-5	Manganese	19.8			P	
7439-97-6	Mercury__	0.08	B		AV	
7440-02-0	Nickel___	7.8	B		P	
7440-09-7	Potassium	3970	B		P	
7782-49-2	Selenium_	39.3			P	
7440-22-4	Silver___	0.70	U		P	
7440-23-5	Sodium___	76500			P	
7440-28-0	Thallium_	5.6	B		P	U, I4
7440-61-1	Uranium__	435			P	
7440-62-2	Vanadium_	3.4	B		P	
7440-66-6_	Zinc_____	12.7	B		P	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: N/A___

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN ILM03.0

RJS 1/27/98

TOTAL CYANIDE

Method 9010

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID: 3846R
Client Project No:
Lab Workorder Number: 9710229

Date Collected: 10/20/97
Date Analyzed: 10/29/97
Sample Matrix: Water

Client ID	Lab Sample ID	Total Cyanide Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.01
04LA-97-0487	9710229-1	ND	0.01

ND = Not Detected

JJS 11/12/97

Total CN in Water Calculations and Quality Control Results

Date analyzed: October 29, 1997
Time analyzed: 8:00-4:00

std (ug/L)	Abs (578nm)	calc soln conc (ug/L)
0	0.000	-4.3
20	0.041	19.8
40	0.078	41.6
100	0.180	101.6
200	0.353	203.4
300	0.519	301.0
400	0.682	396.9

Regression Output:

Constant		-4.2893
Std Err of Y Est		3.0159
R Squared		0.9997
No. of Observations		7
Degrees of Freedom		5
X Coefficient(s)	588.2489	
Std Err of Coef.	4.7172	

ID:	sample aliq (mL)	trap vol (mL)	aliq for color dev (mL)	Abs (578nm)	calc soln conc (ug/L)	sample conc mg/L	Rep Limit mg/L	ICV/CCV recovery %
ICV			10	0.193	109.2			109
ICB			10	0.001	-3.7			
M Blank	50	50	10	0.006	-0.8	-0.00	0.01	
LCS-1	50	50	10	0.589	342.2	0.342	0.01	
DC Low	50	50	10	0.185	104.5	0.105	0.01	
DC High	50	50	10	0.581	337.5	0.34	0.01	
9710143-1	50	50	10	0.006	-0.8	-0.001	0.01	
9710143-1 MS	50	50	10	0.184	103.9	0.104	0.01	
9710143-1 MSD	50	50	10	0.199	112.8	0.11	0.01	
9710206-1	50	50	10	0.005	-1.3	-0.00	0.01	
9710227-1	50	50	10	0.007	-0.2	-0.00	0.01	
CCV	50	50	10	0.179	101.0	0.101	0.01	101
CCB	50	50	10	0.001	-3.7	-0.004	0.01	
9710229-1	50	50	10	0.003	-2.5	-0.003	0.01	
9710229-1 Dup	50	50	10	0.007	-0.2	-0.000	0.01	
9710229-1 MS	50	50	10	0.190	107.5	0.1	0.01	
9710236-1	5	50	10	0.005	-1.3	-0.01	0.1	
9710236-2	50	50	10	0.007	-0.2	-0.00	0.01	
9710236-2	5	50	10	0.005	-1.3	-0.01	0.1	
CCV	50	50	10	0.179	101.0	0.10	0.01	101
CCB	50	50	10	0.002	-3.1	-0.00	0.01	

Total CN in Water Quality Control Results

Date analyzed: October 29, 1997

BLANK SUMMARY

ID	blank CN conc (mg/L)	accept. limit (mg/L)
M Blank	-0.001	< 0.01

LCS SUMMARY

ID	true CN conc (mg/L)	CN conc found (mg/L)	recovery %	recovery accept. limit
LCS-1	0.300	0.342	114	85-115 %

MATRIX SPIKE SUMMARY

ID	spike added CN conc (mg/L)	sample CN conc (mg/L)	spiked sample CN conc (mg/L)	recovery %	recovery accept. limit	RPD %	RPD accept. limit
9710143-1 MS	0.100	-0.001	0.104	105	63-126%		
9710143-1 MSD	0.100	-0.001	0.113	114	63-126%	8	0-30%
9710229-1 MS	0.100	-0.003	0.107	110	63-126%		

ND = Not Detected

DISTILLATION CHECK SUMMARY

ID	true CN conc (mg/L)	CN conc found (mg/L)	recovery %	recovery accept. limit
DC Low	0.100	0.105	105	90-110 %
DC High	0.300	0.337	112	90-110 %

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	-78.1	B	-72.4	B	-75.7	B			14.220	B	P
Antimony	3.4	U	3.4	U	3.4	U			3.400	U	P
Arsenic	2.8	U	2.8	U	2.8	U			2.800	U	P
Barium	0.4	B	0.5	B	0.5	B			0.370	B	P
Beryllium	0.1	U	0.4	B	0.4	B			0.060	U	P
Boron	15.0	B	12.1	B	9.6	U	9.6	U	9.600	U	P
Cadmium	0.2	U	0.2	U	0.2	U			0.200	U	P
Calcium	33.1	B	48.2	B	63.8	B			126.550	B	P
Chromium	1.9	B	1.8	B	1.8	B			1.450	B	P
Cobalt	0.4	U	0.4	U	0.4	U			0.400	U	P
Copper	-0.7	B	-0.9	B	0.4	U			0.400	U	P
Iron	33.0	B	46.7	B	37.0	B			61.700	B	P
Lead	1.3	U	-1.4	B	1.3	U			-2.180	B	P
Magnesium	-9.0	B	6.3	B	25.7	B			84.320	B	P
Manganese	0.3	B	0.6	B	0.4	B			0.230	B	P
Mercury	0.04	U	0.04	U	0.04	U	0.04	U	0.040	U	AV
Nickel	0.4	U	0.4	U	0.4	B			0.450	B	P
Potassium	36.3	B	53.3	B	49.1	B			24.000	U	P
Selenium	2.6	U	2.6	U	2.6	U			2.600	U	P
Silver	0.7	U	0.7	U	0.7	U			0.700	U	P
Sodium	-4.7	B	9.8	B	3.6	U			-8.170	B	P
Thallium	2.6	U	2.6	U	3.9	B			3.140	B	P
Uranium	64.0	U	64.0	U	64.0	U			64.000	U	P
Vanadium	0.5	U	0.5	U	0.5	U			0.500	U	P
Zinc	0.4	U	0.4	U	0.4	U			0.530	B	P

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum											NR
Antimony											NR
Arsenic											NR
Barium											NR
Beryllium											NR
Boron			9.6	U							P
Cadmium											NR
Calcium											NR
Chromium											NR
Cobalt											NR
Copper											NR
Iron											NR
Lead											NR
Magnesium											NR
Manganese											NR
Mercury			0.04	U	0.04	B					AV
Nickel											NR
Potassium											NR
Selenium											NR
Silver											NR
Sodium											NR
Thallium											NR
Uranium											NR
Vanadium											NR
Zinc											NR

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

04LA-97-0487

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: 3846R

Matrix: WATER Level (low/med): LOW

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum	75-125	3425.1500		1595.9200		2000.00	91.5		P
Antimony	75-125	502.3200		7.1300	B	500.00	99.0		P
Arsenic	75-125	1959.5600		2.8000	U	2000.00	98.0		P
Barium	75-125	1847.1200		6.3500	B	2000.00	92.0		P
Beryllium	75-125	48.7700		0.0600	U	50.00	97.5		P
Boron	75-125	1016.9400		67.8300	B	1000.00	94.9		P
Cadmium	75-125	44.0400		0.2000	U	50.00	88.1		P
Calcium									NR
Chromium	75-125	184.5300		5.2500	B	200.00	89.6		P
Cobalt	75-125	479.0200		0.4000	U	500.00	95.8		P
Copper	75-125	263.6800		15.7100	B	250.00	99.2		P
Iron	75-125	1805.7500		921.2200		1000.00	88.5		P
ad	75-125	441.4000		6.5000	U	500.00	88.3		P
Magnesium									NR
Manganese	75-125	478.1300		19.7600		500.00	91.7		P
Mercury	75-125	1.0900		0.0810	B	1.00	100.9		AV
Nickel	75-125	490.8900		7.8500	B	500.00	96.6		P
Potassium									NR
Selenium	75-125	2063.9100		39.2800		2000.00	101.2		P
Silver	75-125	42.5700		0.7000	U	50.00	85.1		P
Sodium									NR
Thallium	75-125	2025.1200		5.6400	B	2000.00	101.0		P
Uranium	75-125	11248.5800		435.4000		10000.00	108.1		P
Vanadium	75-125	461.8200		3.4500	B	500.00	91.7		P
Zinc	75-125	472.1500		12.6900	B	500.00	91.9		P

Comments:

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

04LA-97-0487

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Matrix (soil/water): WATER Level (low/med): _LOW__

% Solids for Sample: __0.0 % Solids for Duplicate: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		1595.9200		1615.3200		1.2		P
Antimony		7.1300	B	4.8400	B	38.3		P
Arsenic		2.8000	U	2.8000	U			P
Barium		6.3500	B	5.9400	B	6.7		P
Beryllium		0.0600	U	0.0600	U			P
Boron		67.8300	B	70.6200	B	4.0		P
Cadmium		0.2000	U	0.2000	U			P
Calcium		1917.0300	B	1893.9800	B	1.2		P
Chromium		5.2500	B	5.0600	B	3.7		P
Cobalt		0.4000	U	0.4000	U			P
Copper		15.7100	B	16.2500	B	3.4		P
Iron		921.2200		922.2200		0.1		P
Lead		6.5000	U	6.5000	U			P
Magnesium		924.2100	B	908.2900	B	1.7		P
Manganese	15.0	19.7600		19.5900		0.9		P
Mercury		0.0810	B	0.0730	B	10.4		AV
Nickel		7.8500	B	7.5900	B	3.4		P
Potassium		3970.7100	B	3933.6900	B	0.9		P
Selenium		39.2800		38.8100		1.2		P
Silver		0.7000	U	0.7000	U			P
Sodium	25000.0	76511.9000		76736.6500		0.3		P
Thallium		5.6400	B	3.3500	B	50.9		P
Uranium	200.0	435.4000		456.8400		4.8		P
Vanadium		3.4500	B	3.1800	B	8.1		P
Zinc		12.6900	B	13.5000	B	6.2		P

Thursday, October 23, 1997

REQUEST NUMBER: 3846R

ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

9710-229

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/23/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 2 day

These samples are on:

LANL Request Number: 3846R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Jaylene Valdez MS H865 5056659968
Signature: Jaylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
TCN		04LA-97-0487	05	W	10/20/97	
METTAL	+ B	04LA-97-0487	09	W	10/20/97	
METTAL	+ U	04LA-97-0487	09	W	10/20/97	

Final Page of REQUEST NUMBER 3846R

U.S. EPA - CLP

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum	25250.0	25690.32	101.7	50500.0	48909.45	96.9	49669.49	98.4	P
Antimony	250.0	250.63	100.3	500.0	481.12	96.2	475.32	95.1	P
Arsenic	250.0	243.80	97.5	500.0	472.46	94.5	464.68	92.9	P
Barium	250.0	237.49	95.0	500.0	458.34	91.7	473.70	94.7	P
Beryllium	250.0	250.72	100.3	500.0	474.84	95.0	471.27	94.3	P
Boron	2500.0	2609.13	104.4	5000.0	5125.71	102.5	5202.03	104.0	P
Cadmium	250.0	242.34	96.9	500.0	457.99	91.6	465.64	93.1	P
Calcium	25250.0	25088.41	99.4	50500.0	48137.39	95.3	47529.46	94.1	P
Chromium	250.0	245.95	98.4	500.0	469.05	93.8	471.57	94.3	P
Cobalt	250.0	249.86	99.9	500.0	461.78	92.4	465.27	93.1	P
Copper	250.0	246.45	98.6	500.0	477.09	95.4	478.51	95.7	P
Iron	10250.0	10392.06	101.4	20500.0	20026.80	97.7	19695.78	96.1	P
Lead	250.0	242.10	96.8	500.0	456.42	91.3	470.96	94.2	P
Magnesium	25250.0	25646.90	101.6	50500.0	48544.55	96.1	48683.60	96.4	P
Manganese	250.0	240.59	96.2	500.0	455.62	91.1	454.56	90.9	P
Mercury	2.5	2.46	98.4	2.0	2.00	100.0	2.00	100.0	AV
Nickel	250.0	246.32	98.5	500.0	466.01	93.2	453.26	90.7	P
Potassium	10000.0	10047.97	100.5	20000.0	19415.72	97.1	19276.98	96.4	P
Selenium	250.0	241.85	96.7	500.0	463.96	92.8	457.93	91.6	P
Silver	250.0	238.59	95.4	500.0	462.17	92.4	460.74	92.1	P
Sodium	10250.0	10326.62	100.7	20500.0	20252.48	98.8	20131.02	98.2	P
Thallium	250.0	251.27	100.5	500.0	495.32	99.1	481.49	96.3	P
Uranium	5000.0	5290.10	105.8	10000.0	10315.38	103.2	10105.82	101.1	P
Vanadium	250.0	248.95	99.6	500.0	472.28	94.5	472.14	94.4	P
Zinc	250.0	248.81	99.5	500.0	456.69	91.3	462.08	92.4	P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Boron				5000.0	5191.06	103.8	5225.49	104.5	P
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead									NR
Magnesium									NR
Manganese									NR
Mercury				2.0	1.89	94.5	2.09	104.5	AV
Nickel									NR
Potassium									NR
Selenium									NR
Silver									NR
Sodium									NR
Thallium									NR
Uranium									NR
Vanadium									NR
Zinc									NR

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum_									NR
Antimony_									NR
Arsenic__									NR
Barium___									NR
Beryllium									NR
Boron____									NR
Cadmium__									NR
Calcium__									NR
Chromium_									NR
Cobalt___									NR
Copper___									NR
Iron____									NR
Lead____									NR
Magnesium									NR
Manganese									NR
Mercury__				2.0	2.02	101.0			AV
Nickel___									NR
Potassium									NR
Selenium_									NR
Silver___									NR
Sodium___									NR
Thallium_									NR
Uranium__									NR
Vanadium_									NR
Zinc____									NR

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2B
CRDL STANDARD FOR AA AND ICP

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

AA CRDL Standard Source: PLASMACHEM__

ICP CRDL Standard Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
					Initial		Final	
	True	Found	%R	True	Found	%R	Found	%R
Aluminum				400.0	311.75	77.9	277.52	69.4
Antimony				120.0	118.58	98.8	113.30	94.4
Arsenic				20.0	18.66	93.3	20.30	101.5
Barium				400.0	385.01	96.3	369.25	92.3
Beryllium				10.0	10.20	102.0	9.98	99.8
Boron								
Cadmium				10.0	9.53	95.3	8.90	89.0
Calcium				10000.0	9538.42	95.4	8979.11	89.8
Chromium				20.0	20.62	103.1	19.23	96.2
Cobalt				100.0	98.68	98.7	92.28	92.3
Copper				50.0	47.65	95.3	44.14	88.3
Iron				200.0	193.65	96.8	184.83	92.4
Lead				6.0	4.21	70.2	4.61	76.8
Magnesium				10000.0	9859.70	98.6	9178.93	91.8
Manganese				30.0	28.42	94.7	26.67	88.9
Mercury	0.2	0.25	125.0					
Nickel				80.0	77.68	97.1	74.00	92.5
Potassium				10000.0	9780.81	97.8	9402.09	94.0
Selenium				10.0	11.27	112.7	10.76	107.6
Silver				20.0	20.10	100.5	19.18	95.9
Sodium				10000.0	9670.97	96.7	9334.49	93.3
Thallium				20.0	22.14	110.7	21.62	108.1
Uranium				400.0	391.17	97.8	347.13	86.8
Vanadium				100.0	96.12	96.1	90.06	90.1
Zinc				40.0	37.94	94.8	34.73	86.8

U.S. EPA - CLP

2B
CRDL STANDARD FOR AA AND ICP

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

AA CRDL Standard Source: _____

ICP CRDL Standard Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
					Initial		Final	
	True	Found	%R	True	Found	%R	Found	%R
Aluminum_								
Antimony_								
Arsenic__								
Barium___								
Beryllium								
Boron____				200.0	213.16	106.6	207.32	103.7
Cadmium__								
Calcium__								
Chromium_								
Cobalt___								
Copper___								
Iron_____								
Lead_____								
Magnesium								
Manganese								
Mercury__								
Nickel___								
Potassium								
Selenium_								
Silver___								
Sodium___								
Thallium_								
Uranium__								
Vanadium_								
Zinc_____								

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	-78.1	B	-72.4	B	-75.7	B			14.220	B	P
Antimony	3.4	U	3.4	U	3.4	U			3.400	U	P
Arsenic	2.8	U	2.8	U	2.8	U			2.800	U	P
Barium	0.4	B	0.5	B	0.5	B			0.370	B	P
Beryllium	0.1	U	0.4	B	0.4	B			0.060	U	P
Boron	15.0	B	12.1	B	9.6	U	9.6	U	9.600	U	P
Cadmium	0.2	U	0.2	U	0.2	U			0.200	U	P
Calcium	33.1	B	48.2	B	63.8	B			126.550	B	P
Chromium	1.9	B	1.8	B	1.8	B			1.450	B	P
Cobalt	0.4	U	0.4	U	0.4	U			0.400	U	P
Copper	-0.7	B	-0.9	B	0.4	U			0.400	U	P
Iron	33.0	B	46.7	B	37.0	B			61.700	B	P
Lead	1.3	U	-1.4	B	1.3	U			-2.180	B	P
Magnesium	-9.0	B	6.3	B	25.7	B			84.320	B	P
Manganese	0.3	B	0.6	B	0.4	B			0.230	B	P
Mercury	0.04	U	0.04	U	0.04	U	0.04	U	0.040	U	AV
Nickel	0.4	U	0.4	U	0.4	B			0.450	B	P
Potassium	36.3	B	53.3	B	49.1	B			24.000	U	P
Selenium	2.6	U	2.6	U	2.6	U			2.600	U	P
Silver	0.7	U	0.7	U	0.7	U			0.700	U	P
Sodium	-4.7	B	9.8	B	3.6	U			-8.170	B	P
Thallium	2.6	U	2.6	U	3.9	B			3.140	B	P
Uranium	64.0	U	64.0	U	64.0	U			64.000	U	P
Vanadium	0.5	U	0.5	U	0.5	U			0.500	U	P
Zinc	0.4	U	0.4	U	0.4	U			0.530	B	P

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum											NR
Antimony											NR
Arsenic											NR
Barium											NR
Beryllium											NR
Boron			9.6	U							P
Cadmium											NR
Calcium											NR
Chromium											NR
Cobalt											NR
Copper											NR
Iron											NR
Lead											NR
Magnesium											NR
Manganese											NR
Mercury			0.04	U	0.04	B					AV
Nickel											NR
Potassium											NR
Selenium											NR
Silver											NR
Sodium											NR
Thallium											NR
Uranium											NR
Vanadium											NR
Zinc											NR

U.S. EPA - CLP

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No: _____ SDG No.: 3846R_

ICP ID Number: TJA 61E 4___ ICS Source: HIGH PURITY_

Concentration Units: ug/L

Analyte	True Sol. A	True Sol. AB	Initial Found Sol. A	Initial Found Sol. AB	Initial Found %R	Final Found Sol. A	Final Found Sol. AB	Final Found %R
Aluminum	500000	500000	501464	497824.0	99.6	498749	491284.2	98.3
Antimony								
Arsenic								
Barium		500		467.1	93.4		447.2	89.4
Beryllium		500		475.1	95.0		458.3	91.7
Boron								
Cadmium		1000		889.0	88.9		835.4	83.5
Calcium	500000	500000	497432	490537.6	98.1	480497	469266.4	93.9
Chromium		500		469.1	93.8		456.9	91.4
Cobalt		500		455.9	91.2		441.8	88.4
Copper		500		506.3	101.3		494.7	98.9
Iron	200000	200000	199049	196699.3	98.3	190780	187399.6	93.7
Lead		1000		910.7	91.1		869.0	86.9
Magnesium	500000	500000	503084	498113.5	99.6	491529	482762.2	96.6
Manganese		500		457.9	91.6		442.8	88.6
Mercury								
Nickel		1000		901.4	90.1		855.8	85.6
Potassium								
Selenium								
Silver		1000		1072.7	107.3		1046.9	104.7
Sodium								
Thallium								
Uranium								
Vanadium		500		476.1	95.2		461.9	92.4
Zinc		1000		900.4	90.0		868.0	86.8

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

04LA-97-0487

Lab Name: PARAGON_ANALYTICS_____ Contract:_____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Matrix: __WATER_____ Level (low/med): _LOW____

% Solids for Sample: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum	75-125	3425.1500		1595.9200		2000.00	91.5		P
Antimony	75-125	502.3200		7.1300	B	500.00	99.0		P
Arsenic	75-125	1959.5600		2.8000	U	2000.00	98.0		P
Barium	75-125	1847.1200		6.3500	B	2000.00	92.0		P
Beryllium	75-125	48.7700		0.0600	U	50.00	97.5		P
Boron	75-125	1016.9400		67.8300	B	1000.00	94.9		P
Cadmium	75-125	44.0400		0.2000	U	50.00	88.1		P
Calcium									NR
Chromium	75-125	184.5300		5.2500	B	200.00	89.6		P
Cobalt	75-125	479.0200		0.4000	U	500.00	95.8		P
Copper	75-125	263.6800		15.7100	B	250.00	99.2		P
Iron	75-125	1805.7500		921.2200		1000.00	88.5		P
Lead	75-125	441.4000		6.5000	U	500.00	88.3		P
Magnesium									NR
Manganese	75-125	478.1300		19.7600		500.00	91.7		P
Mercury	75-125	1.0900		0.0810	B	1.00	100.9		AV
Nickel	75-125	490.8900		7.8500	B	500.00	96.6		P
Potassium									NR
Selenium	75-125	2063.9100		39.2800		2000.00	101.2		P
Silver	75-125	42.5700		0.7000	U	50.00	85.1		P
Sodium									NR
Thallium	75-125	2025.1200		5.6400	B	2000.00	101.0		P
Uranium	75-125	11248.5800		435.4000		10000.00	108.1		P
Vanadium	75-125	461.8200		3.4500	B	500.00	91.7		P
Zinc	75-125	472.1500		12.6900	B	500.00	91.9		P

Comments:

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

04LA-97-0487

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Matrix (soil/water): WATER Level (low/med): _LOW__

% Solids for Sample: __0.0 % Solids for Duplicate: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		1595.9200		1615.3200		1.2		P
Antimony		7.1300	B	4.8400	B	38.3		P
Arsenic		2.8000	U	2.8000	U			P
Barium		6.3500	B	5.9400	B	6.7		P
Beryllium		0.0600	U	0.0600	U			P
Boron		67.8300	B	70.6200	B	4.0		P
Cadmium		0.2000	U	0.2000	U			P
Calcium		1917.0300	B	1893.9800	B	1.2		P
Chromium		5.2500	B	5.0600	B	3.7		P
Cobalt		0.4000	U	0.4000	U			P
Copper		15.7100	B	16.2500	B	3.4		P
Iron		921.2200		922.2200		0.1		P
Lead		6.5000	U	6.5000	U			P
Magnesium		924.2100	B	908.2900	B	1.7		P
Manganese	15.0	19.7600		19.5900		0.9		P
Mercury		0.0810	B	0.0730	B	10.4		AV
Nickel		7.8500	B	7.5900	B	3.4		P
Potassium		3970.7100	B	3933.6900	B	0.9		P
Selenium		39.2800		38.8100		1.2		P
Silver		0.7000	U	0.7000	U			P
Sodium	25000.0	76511.9000		76736.6500		0.3		P
Thallium		5.6400	B	3.3500	B	50.9		P
Uranium	200.0	435.4000		456.8400		4.8		P
Vanadium		3.4500	B	3.1800	B	8.1		P
Zinc		12.6900	B	13.5000	B	6.2		P

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Solid LCS Source: _____

Aqueous LCS Source: PLASMACHEM__

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum	2000.0	1913.90	95.7						
Antimony	500.0	500.59	100.1						
Arsenic	2000.0	1978.34	98.9						
Barium	2000.0	1854.61	92.7						
Beryllium	50.0	49.37	98.7						
Boron	1000.0	930.36	93.0						
Cadmium	50.0	45.37	90.7						
Calcium	40000.0	39596.84	99.0						
Chromium	200.0	185.08	92.5						
Cobalt	500.0	487.41	97.5						
Copper	250.0	245.03	98.0						
Iron	1000.0	951.02	95.1						
Lead	500.0	474.17	94.8						
Magnesium	40000.0	39977.82	99.9						
Manganese	500.0	466.54	93.3						
Mercury									
Nickel	500.0	491.10	98.2						
Potassium	40000.0	37739.10	94.3						
Selenium	2000.0	2035.72	101.8						
Silver	50.0	42.48	85.0						
Sodium	40000.0	40224.29	100.6						
Thallium	2000.0	2027.60	101.4						
Uranium	10000.0	10987.32	109.9						
Vanadium	500.0	473.88	94.8						
Zinc	500.0	476.27	95.3						

FORM VII - IN

ILM03.0

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Solid LCS Source: _____

Aqueous LCS Source: PLASMACHEM__

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Boron									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead									
Magnesium									
Manganese									
Mercury	1.0	1.05	105.0						
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Uranium									
Vanadium									
Zinc									

FORM VII - IN

ILM03.0

U.S. EPA - CLP

9

ICP SERIAL DILUTION

EPA SAMPLE NO.

04LA-97-0487

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: 3846R_

Matrix (soil/water): WATER Level (low/med): LOW

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	M
Aluminum	1595.92		1095.40		31.4	E	P
Antimony	7.13	B	17.00	U	100.0		P
Arsenic	2.80	U	14.00	U			P
Barium	6.35	B	7.15	B	12.6	E	P
Beryllium	0.06	U	0.30	U			P
Boron	67.83	B	48.00	U	100.0		P
Cadmium	0.20	U	1.00	U			P
Calcium	1917.03	B	1960.05	B	2.2		P
Chromium	5.25	B	13.10	B	149.5		P
Cobalt	0.40	U	2.00	U			P
Copper	15.71	B	14.15	B	9.9		P
Iron	921.22		958.15		4.0		P
Lead	1.30	U	6.50	U			P
Magnesium	924.21	B	821.60	B	11.1	E	P
Manganese	19.76		20.00	B	1.2		P
Mercury							NR
Nickel	7.85	B	6.75	B	14.0		P
Potassium	3970.71	B	3891.55	B	2.0		P
Selenium	39.28		45.70		16.3		P
Silver	0.70	U	3.50	U			P
Sodium	15302.38		15148.00	B	1.0		P
Thallium	5.64	B	13.00	U	100.0		P
Uranium	435.40		347.05	B	20.3		P
Vanadium	3.45	B	2.50	U	100.0		P
Zinc	12.69	B	11.80	B	7.0		P

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_
ICP ID Number: TJA_61E_4___ Date: 10/15/97
Flame AA ID Number : _____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum	308.22		200	6.2	P
Antimony	206.84		60	3.4	P
Arsenic	189.04		10	2.8	P
Barium	493.41		200	0.1	P
Beryllium	313.04		5	0.1	P
Boron			100		NR
Cadmium	226.50		5	0.2	P
Calcium	317.93		5000	1.5	P
Chromium	267.72		10	0.3	P
Cobalt	228.62		50	0.4	P
Copper	324.75		25	0.4	P
Iron	271.44		100	7.0	P
Lead	220.35		3	1.3	P
Magnesium	279.08		5000	3.7	P
Manganese	257.61		15	0.1	P
Mercury			0.2		NR
Nickel	231.60		40	0.4	P
Potassium	766.49		5000	24.0	P
Selenium	196.03		5	2.6	P
Silver	328.07		10	0.7	P
Sodium	588.99		5000	3.6	P
Thallium	190.86		10	2.6	P
Uranium	292.35		200	64.0	P
Vanadium	292.40		50	0.5	P
Zinc	206.20		20	0.4	P

Comments:

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_
ICP ID Number: TJA61_4_____ Date: 10/15/97
Flame AA ID Number : _____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum_			200		NR
Antimony_			60		NR
Arsenic__			10		NR
Barium___			200		NR
Beryllium			5		NR
Boron____	249.70		100	9.6	P
Cadmium__			5		NR
Calcium__			5000		NR
Chromium_			10		NR
Cobalt___			50		NR
Copper___			25		NR
Iron_____			100		NR
Lead_____			3		NR
Magnesium			5000		NR
Manganese			15		NR
Mercury__			0.2		NR
Nickel___			40		NR
Potassium			5000		NR
Selenium_			5		NR
Silver___			10		NR
Sodium___			5000		NR
Thallium_			10		NR
Uranium__			200		NR
Vanadium_			50		NR
Zinc_____			20		NR

Comments:

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_
ICP ID Number: _____ Date: 10/15/97
Flame AA ID Number : LEEMAN_4____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum			200		NR
Antimony			60		NR
Arsenic			10		NR
Barium			200		NR
Beryllium			5		NR
Boron			100		NR
Cadmium			5		NR
Calcium			5000		NR
Chromium			10		NR
Cobalt			50		NR
Copper			25		NR
Iron			100		NR
Lead			3		NR
Magnesium			5000		NR
Manganese			15		NR
Mercury	253.70		0.2	0.04 ~~0.0~~	AV
Nickel			40	NP 11/2/97	NR
Potassium			5000		NR
Selenium			5		NR
Silver			10		NR
Sodium			5000		NR
Thallium			10		NR
Uranium			200		NR
Vanadium			50		NR
Zinc			20		NR

Comments:

FORM X - IN ILM03.0

U.S. EPA - CLP

11A
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

ICP ID Number: TJA 61E 4___ Date: 04/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : Al	Ca	Fe	Mg	BA_
Aluminum_	308.22	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony_	206.84	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Arsenic__	189.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Barium___	493.41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron____						
Cadmium__	226.50	0.0000000	0.0000000	0.0001030	0.0000000	0.0000000
Calcium__	317.93	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.72	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt___	228.62	0.0000000	0.0000000	0.0000000	0.0000000	-0.0003500
Copper___	324.75	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Iron_____	271.44	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead_____	220.35	0.0003970	0.0000000	0.0000630	0.0000000	0.0000000
Magnesium	279.08	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.61	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury__						
Nickel___	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.03	0.0000040	0.0000000	-0.0001270	0.0000000	0.0000000
Silver___	328.07	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	588.99	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	190.86	0.0000000	0.0000000	-0.0001380	0.0000000	0.0000000
Uranium__	292.35	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Vanadium_	292.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc_____	206.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

ICP ID Number: TJA 61E 4___ Date: 04/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : CO_	CR_	MN_	NI_	V__
Aluminum_	308.22	-0.0058000	0.0000000	0.0000000	-0.0013000	0.0270000
Antimony_	206.84	0.0000000	0.0010000	0.0000000	0.0000000	0.0000000
Arsenic__	189.04	0.0000000	-0.0029800	0.0000000	0.0000000	0.0000000
Barium___	493.41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.04	0.0000000	0.0000000	0.0000000	0.0000000	-0.0031300
Boron____						
Cadmium__	226.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Calcium__	317.93	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.72	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt___	228.62	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Copper___	324.75	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Iron_____	271.44	0.0723000	0.0000000	0.0000000	0.0000000	0.0150000
Lead_____	220.35	-0.0018800	0.0000000	0.0001820	0.0002430	0.0000000
Magnesium	279.08	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.61	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury__						
Nickel___	231.60	-0.0013000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.03	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Silver___	328.07	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	588.99	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	190.86	0.0010370	0.0000000	-0.0001340	0.0000000	0.0000000
Uranium__	292.35	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Vanadium_	292.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc_____	206.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

U.S. EPA - CLP

11A
ICP Interelement Correction Factors (Annually)

b Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

CP ID Number: TJA61 4_____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : Al	Ca	Fe	Mg	BA_
Aluminum_	308.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony_	217.60	0.0001730	0.0000000	-0.0000700	0.0000000	0.0000000
Arsenic__	193.70	0.0032220	0.0000000	0.0002370	0.0000000	0.0000000
Barium___	493.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron____	249.70	0.0000000	0.0000000	-0.0001050	0.0000000	0.0000000
Cadmium__	226.50	0.0000300	0.0000000	0.0002950	0.0000000	0.0000000
Calcium__	315.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.70	0.0000000	0.0000000	-0.0000410	0.0000000	0.0000000
Cobalt___	228.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0001880
Copper___	324.80	0.0000000	0.0000000	-0.0000450	0.0000000	0.0000000
Iron_____	259.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead_____	220.40	0.0007590	0.0000000	0.0001130	0.0000000	0.0000000
gnesium	383.20	0.0000000	0.0012260	-0.0007120	0.0000000	0.0000000
Manganese	257.60	0.0000000	0.0000000	0.0000170	0.0000000	0.0000000
Mercury__						
Nickel___	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.00	0.0000000	0.0000000	0.0003760	0.0000000	0.0000000
Silver___	328.10	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	589.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	377.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Uranium__						
Vanadium_	292.40	0.0000000	-0.0000300	0.0000500	0.0000000	0.0000000
Zinc_____	206.20	0.0000000	0.0000000	0.0000390	0.0000370	0.0000000

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

ICP ID Number: TJA61 4_____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : BE_	CD_	CO_	CR_	MO_
Aluminum	308.20	0.0000000	0.0000000	-0.0047560	0.0000000	0.0084920
Antimony	217.60	0.0019940	0.0000000	0.0000000	0.0000000	-0.0004360
Arsenic	193.70	0.0000000	0.0000000	0.0006940	0.0009930	0.0008130
Barium	493.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron	249.70	0.0000000	0.0000000	0.0031110	0.0001900	0.0005560
Cadmium	226.50	0.0000000	0.0000000	0.0001370	0.0000000	0.0001390
Calcium	315.90	0.0000000	0.0000000	0.0032140	0.0000000	0.0000000
Chromium	267.70	0.0000000	0.0002200	0.0000000	0.0000000	-0.0037690
Cobalt	228.60	0.0000000	0.0000000	0.0000000	0.0002450	-0.0019700
Copper	324.80	0.0000000	0.0000000	-0.0003080	0.0000000	0.0006200
Iron	259.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Magnesium	383.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.60	0.0000000	0.0000000	0.0000000	0.0000000	-0.0001510
Mercury						
Nickel	231.60	0.0000000	0.0000000	0.0004950	0.0000000	-0.0018550
Potassium	766.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.00	0.0000000	0.0000000	0.0009940	0.0000000	0.0000000
Silver	328.10	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium	589.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	377.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Uranium						
Vanadium	292.40	0.0000000	0.0000000	0.0000000	0.0000000	-0.0108000
Zinc	206.20	0.0000000	0.0000000	0.0000000	0.0022430	0.0005240

Comments:

U.S. EPA - CLP

12
ICP Linear Ranges (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

ICP ID Number: TJA 61E 4___ Date: 10/15/97

Analyte	Integ. Time (sec.)	Concentration (ug/L)	M
Aluminum	15.00	500000.0	P
Antimony	15.00	10000.0	P
Arsenic	15.00	10000.0	P
Barium	15.00	10000.0	P
Beryllium	15.00	10000.0	P
Boron			NR
Cadmium	15.00	10000.0	P
Calcium	15.00	500000.0	P
Chromium	15.00	10000.0	P
Cobalt	15.00	10000.0	P
Copper	15.00	10000.0	P
Iron	15.00	200000.0	P
Lead	15.00	10000.0	P
Magnesium	15.00	500000.0	P
Manganese	15.00	10000.0	P
Mercury			NR
Nickel	15.00	10000.0	P
Potassium	15.00	100000.0	P
Selenium	15.00	10000.0	P
Silver	15.00	2000.0	P
Sodium	15.00	100000.0	P
Thallium	15.00	10000.0	P
Uranium	15.00	250000.0	P
Vanadium	15.00	10000.0	P
Zinc	15.00	10000.0	P

Comments:

U.S. EPA - CLP

12
ICP Linear Ranges (Quarterly)

ab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3846R_

:CP ID Number: TJA61 4_____ Date: 10/15/97

Analyte	Integ. Time (sec.)	Concentration (ug/L)	M
Aluminum	8.00	1000000.0	P
Antimony	8.00	10000.0	P
Arsenic	8.00	100000.0	P
Barium	8.00	50000.0	P
Beryllium	8.00	25000.0	P
Boron	8.00	100000.0	P
Cadmium	8.00	50000.0	P
Calcium	8.00	1000000.0	P
Chromium	8.00	100000.0	P
Cobalt	8.00	100000.0	P
Copper	8.00	100000.0	P
Iron	8.00	1000000.0	P
Lead	8.00	100000.0	P
Magnesium	8.00	1000000.0	P
Manganese	8.00	50000.0	P
Mercury			NR
Nickel	8.00	100000.0	P
Potassium	8.00	1000000.0	P
Selenium	8.00	100000.0	P
Silver	8.00	10000.0	P
Sodium	8.00	1000000.0	P
Thallium	8.00	100000.0	P
Uranium			NR
Vanadium	8.00	100000.0	P
Zinc	8.00	100000.0	P

Comments:

U.S. EPA - CLP

13
PREPARATION LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.:_____ SAS No.: _____ SDG No.:3846R_

Method: P_

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
04LA-97__	_10/24/97__	_____	___100__
04LA-97__	_10/24/97__	_____	___100__
04LA-97__	_10/24/97__	_____	___100__
LCSW __	_10/24/97__	_____	___100__
PBW __	_10/24/97__	_____	___100__

FORM XIII - IN ILM03.0

U.S. EPA - CLP

13
PREPARATION LOG

ab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.:_____ SAS No.: _____ SDG No.:3846R_

ethod: AV

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
04LA-97	10/27/97		20
04LA-97	10/27/97		20
04LA-97	10/27/97		20
LCSW	10/27/97		20
PBW	10/27/97		20

U.S. EPA - CLP

14
ANALYSIS RUN LOG

ab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3846R_

nstrument ID Number: TJA 61E 4____ Method: P_

Start Date: 10/27/97 End Date: 10/27/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
100PPM_U	1.00	1005		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	X	_
ZZZZZZ__	1.00	1016		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ZZZZZZ__	1.00	1020		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ZZZZZZ__	1.00	1024		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
ICV_____	1.00	1032		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
ICB_____	1.00	1038		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
CRI_____	1.00	1044		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
ICSA____	1.00	1053		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
ICSAB___	1.00	1057		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
PBW_____	1.00	1102		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
LCSW____	1.00	1105		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
04LA-97-	1.00	1110		X	X	X	X	X	_	X	X	X	X	X	X	_	X	X	_	X	X	X	X	_	X	X	X
04LA-97-	1.00	1114		X	X	X	X	X	_	X	X	X	X	X	X	_	X	X	_	X	X	X	X	_	X	X	X
04LA-97-	5.00	1118		X	X	X	X	X	_	X	X	X	X	X	X	_	X	X	_	X	X	X	X	_	X	X	X
04LA-97-	1.00	1122		X	X	X	X	X	_	X	_	X	X	X	X	_	_	X	_	X	_	X	X	_	X	X	X
ZZZZZZ__	5.00	1127																									
CCV_____	1.00	1131		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
CCB_____	1.00	1134		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
04LA-97-	5.00	1143		_	_	_	_	_	_	_	_	_	_	_	_	X	_	_	_	_	_	_	_	X	_	_	_
04LA-97-	5.00	1147		_	_	_	_	_	_	_	_	_	_	_	_	X	_	_	_	_	_	_	_	X	_	_	_
04LA-97-	25.00	1150		_	_	_	_	_	_	_	_	_	_	_	_	X	_	_	_	_	_	_	_	X	_	_	_
04LA-97-	5.00	1154		_	_	_	_	_	_	_	_	_	_	_	_	X	_	_	_	_	_	_	_	_	_	_	_
CRI_____	1.00	1158		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
ICSA____	1.00	1207		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
ICSAB___	1.00	1211		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
CCV_____	1.00	1217		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
CCB_____	1.00	1221		X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X
				_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
				_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
				_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
				_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
				_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
				_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_

U.S. EPA - CLP

14
ANALYSIS RUN LOG

ab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3846R_

:nstrument ID Number: TJA 61E 4____ Method: P_

Start Date: 10/27/97 End Date: 10/27/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
100PPM_U	1.00	1005																									
ZZZZZZ__	1.00	1016																									
ZZZZZZ__	1.00	1020																									
ZZZZZZ__	1.00	1024																									
ICV_____	1.00	1032		X																							
ICB_____	1.00	1038		X																							
CRI_____	1.00	1044		X																							
ICSA____	1.00	1053		X																							
ICSAB___	1.00	1057		X																							
PBW_____	1.00	1102		X																							
LCSW____	1.00	1105		X																							
04LA-97-	1.00	1110		X																							
04LA-97-	1.00	1114		X																							
04LA-97-	5.00	1118		X																							
04LA-97-	1.00	1122		X																							
ZZZZZZ__	5.00	1127																									
CCV_____	1.00	1131		X																							
CCB_____	1.00	1134		X																							
04LA-97-	5.00	1143																									
04LA-97-	5.00	1147																									
04LA-97-	25.00	1150																									
04LA-97-	5.00	1154																									
CRI_____	1.00	1158		X																							
ICSA____	1.00	1207		X																							
ICSAB___	1.00	1211		X																							
CCV_____	1.00	1217		X																							
CCB_____	1.00	1221		X																							

U.S. EPA - CLP

14

ANALYSIS RUN LOG

ab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3846R_

Instrument ID Number: TJA61 4_____ Method: P_

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
STD-BLAN	1.00	0931							X																		
A1	1.00	0934																									
B1	1.00	0937							X																		
ZZZZZZ	1.00	0940																									
ZZZZZZ	1.00	0943																									
ZZZZZZ	1.00	0946																									
ICV	1.00	0954							X																		
ICB	1.00	0957							X																		
CRI	1.00	1000							X																		
ICSA	1.00	1003							X																		
ICSAB	1.00	1006							X																		
CCV	1.00	1009							X																		
CCB	1.00	1012							X																		
PBW	1.00	1016							X																		
LCSW	1.00	1019							X																		
ZZZZZZ	1.00	1022																									
ZZZZZZ	2.00	1032																									
04LA-97-	1.00	1035							X																		
04LA-97-	1.00	1038							X																		
04LA-97-	1.00	1041							X																		
04LA-97-	5.00	1044							X																		
ZZZZZZ	1.00	1047																									
ZZZZZZ	1.00	1050																									
CCV	1.00	1053							X																		
CCB	1.00	1057							X																		
ZZZZZZ	1.00	1100																									
ZZZZZZ	1.00	1103																									
ZZZZZZ	1.00	1106																									
ZZZZZZ	1.00	1109																									
ZZZZZZ	1.00	1112																									
ZZZZZZ	1.00	1115																									
ZZZZZZ	1.00	1118																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

ab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3846R_

:nstrument ID Number: TJA61 4_____ Method: P_

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
STD-BLAN	1.00	0931																									
A1	1.00	0934																									
B1	1.00	0937																									
ZZZZZZ	1.00	0940																									
ZZZZZZ	1.00	0943																									
ZZZZZZ	1.00	0946																									
ICV	1.00	0954																									
ICB	1.00	0957																									
CRI	1.00	1000																									
ICSA	1.00	1003																									
ICSAB	1.00	1006																									
CCV	1.00	1009																									
CB	1.00	1012																									
PBW	1.00	1016																									
LCSW	1.00	1019																									
ZZZZZZ	1.00	1022																									
ZZZZZZ	2.00	1032																									
04LA-97-	1.00	1035																									
04LA-97-	1.00	1038																									
04LA-97-	1.00	1041																									
04LA-97-	5.00	1044																									
ZZZZZZ	1.00	1047																									
ZZZZZZ	1.00	1050																									
CCV	1.00	1053																									
CCB	1.00	1057																									
ZZZZZZ	1.00	1100																									
ZZZZZZ	1.00	1103																									
ZZZZZZ	1.00	1106																									
ZZZZZZ	1.00	1109																									
ZZZZZZ	1.00	1112																									
ZZZZZZ	1.00	1115																									
ZZZZZZ	1.00	1118																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

ab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3846R_

nstrument ID Number: TJA61 4_____ Method: P_

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																						
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
ZZZZZZ	1.00	1121																									
ZZZZZZ	1.00	1124																									
ZZZZZZ	1.00	1127																									
CCV	1.00	1130							X																		
CCB	1.00	1133							X																		
ZZZZZZ	1.00	1136																									
ZZZZZZ	5.00	1139																									
ZZZZZZ	1.00	1143																									
ZZZZZZ	1.00	1146																									
ZZZZZZ	1.00	1149																									
CRI	1.00	1152							X																		
CSA	1.00	1155							X																		
CSAB	1.00	1158							X																		
CCV	1.00	1201							X																		
CCB	1.00	1204							X																		

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3846R_

Instrument ID Number: TJA61 4_____ Method: P_

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
ZZZZZZ	1.00	1121																									
ZZZZZZ	1.00	1124																									
ZZZZZZ	1.00	1127																									
CCV	1.00	1130																									
CCB	1.00	1133																									
ZZZZZZ	1.00	1136																									
ZZZZZZ	5.00	1139																									
ZZZZZZ	1.00	1143																									
ZZZZZZ	1.00	1146																									
ZZZZZZ	1.00	1149																									
CRI	1.00	1152																									
ICSA	1.00	1155																									
ICSAB	1.00	1158																									
CCV	1.00	1201																									
CCB	1.00	1204																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3846R_

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
S0	1.00	1133																	X								
S0.2	1.00	1135																	X								
S1	1.00	1138																	X								
S2	1.00	1140																	X								
S5	1.00	1142																	X								
S10	1.00	1145																	X								
ZZZZZZ	1.00	1149																									
ICV	1.00	1151																	X								
ICB	1.00	1153																	X								
PBW	1.00	1153																	X								
CRA	1.00	1155																	X								
LCSW	1.00	1158																	X								
ZZZZZZ	1.00	1200																									
ZZZZZZ	1.00	1202																									
ZZZZZZ	1.00	1204																									
ZZZZZZ	1.00	1206																									
ZZZZZZ	1.00	1209																									
ZZZZZZ	1.00	1211																									
ZZZZZZ	1.00	1213																									
ZZZZZZ	1.00	1215																									
CCV	1.00	1218																	X								
CCB	1.00	1220																	X								
ZZZZZZ	1.00	1222																									
ZZZZZZ	1.00	1224																									
ZZZZZZ	1.00	1226																									
ZZZZZZ	1.00	1229																									
ZZZZZZ	1.00	1231																									
ZZZZZZ	1.00	1233																									
ZZZZZZ	1.00	1235																									
ZZZZZZ	1.00	1237																									
ZZZZZZ	1.00	1240																									
ZZZZZZ	1.00	1242																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3846R_

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
S0	1.00	1133																									
S0.2	1.00	1135																									
S1	1.00	1138																									
S2	1.00	1140																									
S5	1.00	1142																									
S10	1.00	1145																									
ZZZZZZ	1.00	1149																									
ICV	1.00	1151																									
ICB	1.00	1153																									
PBW	1.00	1153																									
CRA	1.00	1155																									
ICSW	1.00	1158																									
ZZZZZZ	1.00	1200																									
ZZZZZZ	1.00	1202																									
ZZZZZZ	1.00	1204																									
ZZZZZZ	1.00	1206																									
ZZZZZZ	1.00	1209																									
ZZZZZZ	1.00	1211																									
ZZZZZZ	1.00	1213																									
ZZZZZZ	1.00	1215																									
CCV	1.00	1218																									
CCB	1.00	1220																									
ZZZZZZ	1.00	1222																									
ZZZZZZ	1.00	1224																									
ZZZZZZ	1.00	1226																									
ZZZZZZ	1.00	1229																									
ZZZZZZ	1.00	1231																									
ZZZZZZ	1.00	1233																									
ZZZZZZ	1.00	1235																									
ZZZZZZ	1.00	1237																									
ZZZZZZ	1.00	1240																									
ZZZZZZ	1.00	1242																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3846R_

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
CCV	1.00	1244																	X								
CCB	1.00	1246																	X								
ZZZZZZ	1.00	1248																									
ZZZZZZ	1.00	1251																									
ZZZZZZ	1.00	1253																									
ZZZZZZ	1.00	1255																									
ZZZZZZ	1.00	1257																									
ZZZZZZ	1.00	1300																									
ZZZZZZ	1.00	1302																									
ZZZZZZ	1.00	1304																									
ZZZZZZ	1.00	1306																									
ZZZZZZ	1.00	1308																									
CCV	1.00	1311																	X								
CCB	1.00	1313																	X								
ZZZZZZ	1.00	1315																									
ZZZZZZ	1.00	1317																									
ZZZZZZ	1.00	1319																									
ZZZZZZ	1.00	1322																									
ZZZZZZ	1.00	1324																									
ZZZZZZ	1.00	1326																									
ZZZZZZ	1.00	1328																									
ZZZZZZ	1.00	1331																									
ZZZZZZ	1.00	1333																									
ZZZZZZ	1.00	1335																									
CCV	1.00	1337																	X								
CCB	1.00	1339																	X								
ZZZZZZ	1.00	1342																									
ZZZZZZ	1.00	1344																									
ZZZZZZ	1.00	1346																									
ZZZZZZ	1.00	1348																									
ZZZZZZ	1.00	1350																									
04LA-97-	1.00	1353																	X								

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14
ANALYSIS RUN LOG

ab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3846R_

:nstrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
CCV	1.00	1244																									
CCB	1.00	1246																									
ZZZZZZ	1.00	1248																									
ZZZZZZ	1.00	1251																									
ZZZZZZ	1.00	1253																									
ZZZZZZ	1.00	1255																									
ZZZZZZ	1.00	1257																									
ZZZZZZ	1.00	1300																									
ZZZZZZ	1.00	1302																									
ZZZZZZ	1.00	1304																									
ZZZZZZ	1.00	1306																									
ZZZZZZ	1.00	1308																									
CCV	1.00	1311																									
CCB	1.00	1313																									
ZZZZZZ	1.00	1315																									
ZZZZZZ	1.00	1317																									
ZZZZZZ	1.00	1319																									
ZZZZZZ	1.00	1322																									
ZZZZZZ	1.00	1324																									
ZZZZZZ	1.00	1326																									
ZZZZZZ	1.00	1328																									
ZZZZZZ	1.00	1331																									
ZZZZZZ	1.00	1333																									
ZZZZZZ	1.00	1335																									
CCV	1.00	1337																									
CCB	1.00	1339																									
ZZZZZZ	1.00	1342																									
ZZZZZZ	1.00	1344																									
ZZZZZZ	1.00	1346																									
ZZZZZZ	1.00	1348																									
ZZZZZZ	1.00	1350																									
04LA-97-	1.00	1353																									

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3846R_

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
04LA-97-	1.00	1355		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
04LA-97-	1.00	1357		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
ZZZZZZ	1.00	1359		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCV	1.00	1402		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
CCB	1.00	1404		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14
ANALYSIS RUN LOG

ab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3846R_

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
04LA-97-	1.00	1355																									
04LA-97-	1.00	1357																									
ZZZZZZ	1.00	1359																									
CCV	1.00	1402																									
CCB	1.00	1404																									

FORM XIV - IN ILM03.0

Thursday, October 23, 1997

DATA ENTERED
110397

REQUEST NUMBER: 3847R
ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/23/97
REPORT DUE: 11/23/97
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 3847R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
AM241		04LA-97-0487	02	W	10/20/97	
GROSSAB		04LA-97-0487	02	W	10/20/97	
GROSSG		04LA-97-0487	02	W	10/20/97	
GSCAN		04LA-97-0487	02	W	10/20/97	
ISOPU		04LA-97-0487	02	W	10/20/97	
ISOU		04LA-97-0487	02	W	10/20/97	
SR90		04LA-97-0487	04	W	10/20/97	

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3847R

Date File Saved: 11/20/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0487	97-10-230-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOU

The sample under Request Number 3847R (Work Order 97-10-230) was received on 10/24/97 and scheduled for isotopic uranium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 11/19/97. The analysis results for this sample are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{234}U activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is below the requested MDC . Results should be compared to the method blank activity to determine the validity of the measurement.

No further anomalous situation were observed in the preparation and analyses of the samples listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrument Technician

11/21/97
Date

Radiochemistry Final Review

11/21/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple
Laboratory Manager

Date

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3847R

Date File Saved: 12/04/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0487	9710230-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOAM

The sample under Request Number 3847R (Work Order 9710230) was received on 10/24/97 and scheduled for isotopic americium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 11/25/97. The analysis results for this sample are reported in units of pCi/liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

No problems were observed in the preparation and analyses of the samples listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrumentation

Veronica Crump
Radiochemistry Final Review

12/8/17
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gippie
Laboratory Manager

Date

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3847R

Date File Saved: 11/23/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0487	97-10-230-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

All samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gamma Spectroscopy

The samples under Request Number 3847R (Work Order 9710230) were received on 10/24/97 and scheduled for gamma spec. analyses, which were completed on 11/05/97.

The analysis results for these samples are reported in units of pCi/Liter. The samples were filtered prior to analysis.

This work order was prepared using PAI SOP739R2 and analyzed using PAI SOP713R4.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Bismuth-214 was detected in the blank (97-10-230-B1) at a concentration in excess of the 2σ total propagated uncertainty (TPU). However, since the concentration detected is below the corresponding decision level, no sample results are compromised. Potassium-40 was also detected in the blank at a concentration in excess of the 2σ TPU and in excess of the corresponding decision level. However, since no ^{40}K was positively identified in the client samples, no quantifications are compromised.

Cadmium-109 and ^{237}Np are often misidentified when using the required library. The observed photopeak at 87 keV is attributed to the K_β x ray of Pb. Likewise, ^{211}Bi and ^{224}Ra are misidentified due to interference from ^{214}Pb at 351 keV and 241 keV, respectively. Due to interference, the GDR software did not attempt to quantify activity concentrations for some analyses. In such cases, zero values are reported in the hard copy reports, and an "NQ" qualifier is submitted in the electronic deliverable.

Quantification of ^{226}Ra at low levels based upon the 186 keV photopeak is unreliable due to interference from ^{235}U, which also has a photopeak at 186 keV. Low levels of ^{235}U, though undetectable by this method, can cause greatly exaggerated ^{226}Ra results. The ^{226}Ra activity reported should be considered qualitative. Activity concentration results above the 2σ TPU for radionuclides identified as present by the analysis software for which spectral interference is suspected are given an "S" flag.

Activity concentrations above the 2σ TPU are reported in some instances where no supporting photopeaks are observed. These anomalous identifications result from the GDR software attempting to calculate net activity concentrations for analytes for which no peaks are observed. Such data have been flagged with an asterisk.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill Radiochemistry Instrumentation	11-23-97 Date
Radiochemistry Final Review	11/24/97 Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Don Gipple Laboratory Manager	Date

Paragon Analytics, Inc.
Case Narrative File

Request Number: 3847R
Date File Saved: 11/21/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0487	97-10-230-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gross Gamma

The samples under Request Number 3847R (PAI Work Order 97-10-230) were received on 10/24/97 and scheduled for gross gamma analyses, which were completed on 11/06/97.

The analysis results for these samples are reported in units of pCi/Liter referenced to Cs-137.

These samples were prepared according to Paragon Analytics, Inc. procedure PAI SOP73[illegible]2.

The HPGe gamma photon detectors were calibrated using a standard of Cesium-137 in water. Counting efficiencies were calculated as the ratio of the net integrated count rate in a region of interest between 50 and 2000 keV to the known photon emission rate of the standard. Samples were analyzed in the same geometry and counts integrated in the same manner.

Efficiency calibration for detector GS06 was not performed prior to the analyses. Efficiency calibration was performed on 11/18/97, with the calculated efficiency applied retroactively to the analysis of the laboratory control sample (LCS 97-10-230-S1). Daily efficiency checks adequately demonstrate stability of detector efficiency between analysis and calibration.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported. Each result should be compared to the result for the appropriate blank for determination of the validity of that measurement.

Gross gamma activity was detected in the blank at a concentration in excess of the minimum detectable concentration (MDC). However, the blank activity is well below that reported for the client samples and is also below the required quantification limit of 100 pCi/Liter. As the sample was depleted for other analyses, no reanalysis is possible, and these results are submitted.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill — 11-21-97
Radiochemistry Instrumentation — Date

Radiochemistry Final Review — 11/24/97
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple — Date
Laboratory Manager

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3847R

Date File Saved: 11/19/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sar
04LA-97-0487	97-10-

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOPU

The sample under Request Number 3847R (Work Order 97-10-230) 10/24/97 and scheduled for isotopic plutonium analyses.

This sample was prepared according to Paragon Analytics, Inc. proc SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry for isotopic pluto Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses 11/20/97. The analysis results for this sample are reported in units c

Reported sample activities are NET activities; that is, they have not censored based on an *a priori* detection limit.

^{238}Pu activity is reported in the associated method blank above the r concentration value. The measured blank activity is below the requ should be compared to the method blank activity to determine the va measurement.

No problems were observed in the preparation and analyses of the s All method required quality control parameters were met.

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3847R

Date File Saved: 11/26/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0487	97-10-230-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Sr-90

Samples under Request Number 3847R (Work Order 97-10-230) were received on 10/24/97 and scheduled for strontium-90 analyses, which were completed on 11/21/97.

Total radiostrontium is reported as Sr-90. The presence of other radioisotopes of strontium may cause positive bias in the measured strontium concentration.

These samples consist of water and the results are reported in units of pCi/L.

This work order was prepared using PAI SOP717R3 and analyzed using PAI SOP724R5.

Due to limited sample volume neither a duplicate or matrix spike was prepared. A duplicate LCS was prepared and reported instead.

No anomalies were encountered during this analysis.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Renee Gallegos — 11/26/97

Renee Gallegos
Radiochemistry Instrument Technician — Date

Radiochemistry Final Review — Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple
Laboratory Manager — Date

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3847R

Date File Saved: 11/12/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0487	97-10-230-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: GROSS AB

Samples under Request Number 3847R (PAI Work Order 97-10-230) were received on 10/24/97 and scheduled for gross alpha/beta analysis, which was completed on 11/6/97.

The analytical results for these samples are reported in units of pCi/L.

This work order was prepared using PAI SOP702R11, and analyzed using PAI SOP724R5.

Gross alpha results are referenced to ^{241}Am. Gross beta results are referenced to ^{90}Sr/Y.

The results of the blank (97-10-082-B1) for analytical batch 10082abw.xls showed activity which is less than the required MDC. All of the associated sample results are either less than the required MDC or greater than five times the blank activity. Per PAI QAP section 9.7.1 the results are reported without qualification.

No further problems were noted during the preparation and analysis of these samples. All remaining quality control criteria were met.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Renee Gallegos
Radiochemistry Instrument Technician

11/12/97
Date

Radiochemistry Final Review

11/12/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Donald Gipple
Laboratory Manager

Date

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: **3847R** LAB NAME: **Paragon** LAB CODE_____

NAME OF VALIDATOR: **Antonia Tallarico** COMPANY: **LATA**

VALIDATION DATE: **18 December 97** EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- o INORGANICS
- X RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? " YES " NO

Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

_____

_____

_____

Signature/1st validation: _____ 18Dec97

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3847R

Date File Saved: 11/26/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0487	97-10-230-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Sr-90

Samples under Request Number 3847R (Work Order 97-10-230) were received on 10/24/97 and scheduled for strontium-90 analyses, which were completed on 11/21/97.

Total radiostrontium is reported as Sr-90. The presence of other radioisotopes of strontium may cause positive bias in the measured strontium concentration.

These samples consist of water and the results are reported in units of pCi/L.

This work order was prepared using PAI SOP717R3 and analyzed using PAI SOP724R5.

Due to limited sample volume neither a duplicate or matrix spike was prepared. A duplicate LCS was prepared and reported instead.

No anomalies were encountered during this analysis.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Renee Gallegos — 11/26/97

Renee Gallegos
Radiochemistry Instrument Technician

Date

Radiochemistry Final Review — 12/1/97

Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple
Laboratory Manager

Date

Thursday, October 23, 1997

REQUEST NUMBER: 3847R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

9710230

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/23/97
REPORT DUE: 11/23/97
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 3847R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
AM241		04LA-97-0487	02	W	10/20/97	
GROSSAB		04LA-97-0487	02	W	10/20/97	
GROSSG		04LA-97-0487	02	W	10/20/97	
GSCAN		04LA-97-0487	02	W	10/20/97	
ISOPU		04LA-97-0487	02	W	10/20/97	
ISOU		04LA-97-0487	02	W	10/20/97	
SR90		04LA-97-0487	04	W	10/20/97	

Final Page of REQUEST NUMBER 3847R

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3847R

Date File Saved: 11/20/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0487	97-10-230-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOU

The sample under Request Number 3847R (Work Order 97-10-230) was received on 10/24/97 and scheduled for isotopic uranium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 11/19/97. The analysis results for this sample are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{234}U activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is below the requested MDC . Results should be compared to the method blank activity to determine the validity of the measurement.

No further anomalous situation were observed in the preparation and analyses of the samples listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth — Date: 11/21/97
Radiochemistry Instrument Technician

Radiochemistry Final Review — Date: 11/21/97

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple — Date
Laboratory Manager

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Thursday, November 20, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3847R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710230

Field ID:
Lab ID: 9709122-S1LCS1

Sample Matrix: WATER
Date Prepared: 10-Nov-97
Prep SOP: PAI SOP 780R2
Prep Batch: 143144

Date Collected: 10-Nov-97
Date Analyzed: 19-Nov-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 200

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
U-234	11.25 +/- 0.72	0.067	11.66	pCi/L	96%	+/- 25%	
U-235	0.510 +/- 0.070	0.067	N/A	pCi/L	N/A	N/A	
U-238	11.89 +/- 0.76	0.052	11.66	pCi/L	102%	+/- 25%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.40	8.31	pCi/L	99%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analyses not within control limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Thursday, November 20, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: None

Client Project Number: 3847R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710230

Field ID:

Lab ID: 9709122-B1MB1

Sample Matrix: WATER

Date Prepared: 10-Nov-97

Prep SOP: PAI SOP 780R2

Prep Batch: 143144

Date Collected: 10-Nov-97

Date Analyzed: 19-Nov-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 200

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.056 +/- 0.022	0.055	pCi/L	
U-235	0.020 +/- 0.013	0.046	pCi/L	
U-238	0.036 +/- 0.017	0.046	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.40	8.03	pCi/L	96%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Thursday, November 20, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3847R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710230

		Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID:	04LA-97-0487				
Lab ID:	9710230-1	11/10/97	11/18/97	143144	1
DUP ID:	9710230-1DUP1	11/10/97	11/18/97	143144	1

Sample Matrix: WATER
Date Collected: 20-Oct-97
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: AS RECEIVED

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
U-234	3.19 +/- 0.25	3.60 +/- 0.28	pCi/L	0.54	< 1.42	
U-235	0.102 +/- 0.031	0.110 +/- 0.034	pCi/L	0.08	< 1.42	
U-238	2.22 +/- 0.19	2.09 +/- 0.19	pCi/L	0.25	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.40	6.39	pCi/L	76%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Monday, December 08, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3847R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710230

Field ID:
Lab ID: 9709122-S1LCS1

Sample Matrix: WATER
Date Prepared: 10-Nov-97
Prep SOP: PAI SOP 780R2
Prep Batch: 143144

Date Collected: 10-Nov-97
Date Analyzed: 25-Nov-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Am-241	7.51 +/- 0.48	0.050	7.16	pCi/L	105%	+/- 25%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.78	pCi/L	77%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Monday, December 08, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: None

Client Project Number: 3847R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710230

Field ID:

Lab ID: 9709122-B1MB1

Sample Matrix: WATER

Date Prepared: 10-Nov-97

Prep SOP: PAI SOP 780R2

Prep Batch: 143144

Date Collected: 10-Nov-97

Date Analyzed: 24-Nov-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 1000

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.014 +/- 0.015	0.053	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	2.83	pCi/L	58%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Monday, December 08, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3847R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710230

		Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID:	04LA-97-0487				
Lab ID:	9710230-1	11/10/97	11/25/97	143144	1
DUP ID:	9710230-1DUP1	11/10/97	11/25/97	143144	1

Sample Matrix: WATER
Date Collected: 20-Oct-97
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: AS RECEIVED

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
Am-241	0.012 +/- 0.014	0.012 +/- 0.017	pCi/L	0.01	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	2.89	pCi/L	59%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3847R

Date File Saved: 11/23/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0487	97-10-230-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

All samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gamma Spectroscopy

The samples under Request Number 3847R (Work Order 9710230) were received on 10/24/97 and scheduled for gamma spec. analyses, which were completed on 11/05/97.

The analysis results for these samples are reported in units of pCi/Liter. The samples were filtered prior to analysis.

This work order was prepared using PAI SOP739R2 and analyzed using PAI SOP713R4.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Bismuth-214 was detected in the blank (97-10-230-B1) at a concentration in excess of the 2σ total propagated uncertainty (TPU). However, since the concentration detected is below the corresponding decision level, no sample results are compromised. Potassium-40 was also detected in the blank at a concentration in excess of the 2σ TPU and in excess of the corresponding decision level. However, since no ^{40}K was positively identified in the client samples, no quantifications are compromised.

Cadmium-109 and ^{237}Np are often misidentified when using the required library. The observed photopeak at 87 keV is attributed to the K_β x ray of Pb. Likewise, ^{211}Bi and ^{224}Ra are misidentified due to interference from ^{214}Pb at 351 keV and 241 keV, respectively. Due to interference, the GDR software did not attempt to quantify activity concentrations for some analyses. In such cases, zero values are reported in the hard copy reports, and an "NQ" qualifier is submitted in the electronic deliverable.

Quantification of ^{226}Ra at low levels based upon the 186 keV photopeak is unreliable due to interference from ^{235}U, which also has a photopeak at 186 keV. Low levels of ^{235}U, though undetectable by this method, can cause greatly exaggerated ^{226}Ra results. The ^{226}Ra activity reported should be considered qualitative. Activity concentration results above the 2σ TPU for radionuclides identified as present by the analysis software for which spectral interference is suspected are given an "S" flag.

Activity concentrations above the 2σ TPU are reported in some instances where no supporting photopeaks are observed. These anomalous identifications result from the GDR software attempting to calculate net activity concentrations for analytes for which no peaks are observed. Such data have been flagged with an asterisk.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill — 11-23-97
Radiochemistry Instrumentation — Date

Radiochemistry Final Review — 11/24/97
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Don Gipple — Date
Laboratory Manager

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 01/01/95 10:00

Client Name: SHARED QC

Date Analyzed : 11/03/97 16:26

Lab Sample ID: 97-10-148-S1

Sample Matrix : Water

Client Sample ID: Lab Control

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	108000	103000	105	Pass
Cd-109	1420000	1400000	104	Pass
Co-57	30900	32000	96.5	Pass
Cs-137	37700	36600	103	Pass
Co-60	58700	60100	97.6	Pass

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known ± 15%

Data stored in file \gdr\prt\W10148S1.97P

MO

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/30/97 10:00

Client Name: LANL

Date Analyzed: 11/05/97 19:37

Lab Sample ID: 97-10-230-B1

Sample Matrix: Water

Client Sample ID: Blank

Count Duration: 800 Min.

Nuclide	Dec. Level (pCi/L)	Nuclide	Dec. Level (pCi/L)
Am-241	11.6	Np-237	9.22
Cd-109	53.0	Th-234	112
Co-57	0.728 *	Ce-144	9.50
Ce-139	0.936	U-235	3.78
Ra-226	127	Th-227	7.05
Pb-212	7.33	Ra-224	24.6
Se-75	1.45	Hg-203	1.51
Pa-231	66.1	Pa-233	3.12
Ra-223	23.0	Eu-152	3.96
Bi-211	8.97	Pb-214	6.49
Sn-113	1.85	Rn-219	26.8
Pb-211	46.4	Ann-Rad	4.75
Sr-85	2.02	Ba-140	17.8
Tl-208	3.40	Cs-134	1.56
Bi-214	14.9	Ru-106	32.6
Cs-137	2.10	Mn-54	1.53
Y-88	3.68	Ac-228	14.6
Pa-234m	674	Zn-65	3.76
Co-60	4.79	Na-22	3.41
K-40	63.4	La-140	28.8
Bi-212	59.7		

Decision Level Values calculated as recommended by ANSI N42.2
Reported sample activities should be compared to these Decision Levels

MO

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/30/97 10:00

Client Name: LANL

Date Analyzed: 11/05/97 19:37

Lab Sample ID: 97-10-230-B1

Sample Matrix: Water

Client Sample ID: Blank

Count Duration: 800 Min.

Nuclide	Activity (pCi/Liter)			% Uncertainty
Am-241	1.32	±	12.5	947
Np-237	-16.9	±	11.3	66.4
Cd-109	22.8	±	36.8	162
Th-234	-38.3	±	136	356
Co-57	-0.343	±	0.885	258
Ce-144	3.71	±	7.04	190
Ce-139	-0.299	±	1.14	380
U-235	0.221	±	4.32	1960
Ra-226	91.2	±	43.6	47.8
Th-227	-9.81	±	8.59	87.6
Pb-212	2.78	±	5.54	199
Ra-224	-115	±	30.8	26.9
Se-75	-0.233	±	1.77	758
Hg-203	0.265	±	1.51	569
Pa-231	27.3	±	47.2	173
Pa-233	0.892	±	2.71	303
Ra-223	-8.46	±	28.0	331
Eu-152	0.410	±	4.32	1050
Bi-211	-36.2	±	11.1	30.8
Pb-214	-0.840	±	7.89	939
Sn-113	0.384	±	1.78	464
Rn-219	11.1	±	19.1	172
Pb-211	10.9	±	43.1	394
Ann-Rad	-21.1	±	5.93	28.1
Sr-85	-6.94	±	2.49	35.9
Ba-140	11.4	±	7.82	68.9
Tl-208	-0.417	±	4.13	991
Cs-134	-0.658	±	1.89	288
Bi-214	7.40	±	9.10	123
Ru-106	19.6	±	15.9	81.1

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/30/97 10:00

Client Name: LANL

Date Analyzed: 11/05/97 19:37

Lab Sample ID: 97-10-230-B1

Sample Matrix: Water

Client Sample ID: Blank

Count Duration: 800 Min.

Nuclide	Activity (pCi/Liter)	% Uncertainty
Cs-137	0.524 ± 1.92	367
Mn-54	-0.162 ± 1.86	1150
Y-88	2.01 ± 2.03	101
Ac-228	1.64 ± 15.7	954
Pa-234m	397 ± 338	85.2
Zn-65	0.453 ± 4.02	887
Co-60	3.21 ± 1.93	60.3
Na-22	1.68 ± 2.11	126
K-40	13.3 ± 61.0	460
La-140	0.723 ± 34.1	4720
Bi-212	-25.7 ± 72.5	282

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

Decision Level Values calculated as recommended by ANSI N42.2
Reported sample activities should be compared to these Decision Levels

Data is stored in file \gdr\prt\W10230B1.97P

M6

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 10/20/97 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 11/05/97 19:27

Lab Sample ID: 97-10-230-D1

Sample Matrix: Water

Client Sample ID: Dup of 01

Count Duration: 800 Min.

Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)
Hg-203	1.99 ± 2.18	Ann-Rad	3.60 ± 6.91
Ru-106	17.3 ± 20.6	Pa-234m	586 ± 377 *
K-40	62.9 ± 69.9	Bi-212	89.3 ± 79.6 *
Am-241	5.18 ± 10.9	Np-237	-5.55 ± 11.5
Cd-109	-5.48 ± 38.3	Th-234	-153 ± 126
Co-57	-0.075 ± 1.15	Ce-144	-3.37 ± 8.89
Ce-139	-1.34 ± 1.54	U-235	-1.91 ± 4.63
Ra-226	-15.3 ± 76.5	Th-227	-28.6 ± 11.5
Pb-212	1.76 ± 5.96	Ra-224	-50.1 ± 36.3
Se-75	0.050 ± 2.36	Pa-231	-23.3 ± 59.5
Pa-233	-0.496 ± 3.56	Ra-223	17.8 ± 35.7
Eu-152	0.966 ± 5.08	Bi-211	0.151 ± 11.8
Pb-214	3.93 ± 8.80	Sn-113	0.520 ± 2.33
Rn-219	-10.3 ± 21.0	Pb-211	-26.2 ± 47.2
Sr-85	-3.79 ± 3.56	Ba-140	-4.50 ± 17.8
Tl-208	0.159 ± 4.88	Cs-134	0.382 ± 2.18
Bi-214	1.70 ± 11.5	Cs-137	0.291 ± 2.32
Mn-54	1.37 ± 2.13	Y-88	2.11 ± 2.78
Ac-228	2.17 ± 16.8	Zn-65	-3.12 ± 4.99
Co-60	1.04 ± 2.17	Na-22	1.03 ± 2.20
La-140	-1430 ± 2530		

(U, Ra) (U, Ra) (U, Ra)

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank. Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

An asterisk (*) indicates that the reporting software anomalously reports a peak for this radionuclide. The result is an artifact of net reporting.

M6

Gross Gamma

Laboratory Control Sample Results

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	11/6/97
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-10-176	Units	pCi/L

Sample ID	Reported Activity	Known Value	Percent Recovery	Flag
97-10-230-S1	8694	8702	99.9%	PASS

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

Prepared by 11/21/97

Gross Gamma Results Summary

Blank Results

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	11/5/97
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-10-176	Units:	pCi/L

Client Sample ID	Lab Sample ID	Activity	Uncertainty	MDC
Blank	97-10-230-B1	72	11	17

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate.

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

Prepared by 11/21/97

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3847R

Date File Saved: 11/19/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0487	97-10-230-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOPU

The sample under Request Number 3847R (Work Order 97-10-230) was received on 10/24/97 and scheduled for isotopic plutonium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry for isotopic plutonium according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 11/20/97. The analysis results for this sample are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{238}Pu activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is below the requested MDC . Results should be compared to the method blank activity to determine the validity of the measurement.

No problems were observed in the preparation and analyses of the sample listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrumentation

Radiochemistry Final Review

11/24/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple
Laboratory Manager

Date

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Friday, November 21, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: None

Client Project Number: 3847R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710230

Field ID:

Lab ID: 9709122-S1LCS1

Sample Matrix: WATER

Date Prepared: 10-Nov-97

Prep SOP: PAI SOP 780R2

Prep Batch: 143114

Date Collected: 10-Nov-97

Date Analyzed: 18-Nov-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Pu-238	0.036 +/- 0.015	0.018	N/A	pCi/L	N/A	N/A	
Pu-239	4.63 +/- 0.32	0.043	4.85	pCi/L	95%	+/- 25%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.88	pCi/L	66%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analyses not within control limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Friday, November 21, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3847R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710230

Field ID:
Lab ID: 9709122-B1MB1

Sample Matrix: WATER
Date Prepared: 10-Nov-97
Prep SOP: PAI SOP 780R2
Prep Batch: 143114

Date Collected: 10-Nov-97
Date Analyzed: 18-Nov-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 400

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.052 +/- 0.021	0.051	pCi/L	
Pu-239	-0.003 +/- 0.012	0.043	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.46	pCi/L	56%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Friday, November 21, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: None

Client Project Number: 3847R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710230

		Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID:	04LA-97-0487				
Lab ID:	9710230-1	11/10/97	11/20/97	143114	1
DUP ID:	9710230-1DUP1	11/10/97	11/20/97	143114	1

Sample Matrix: WATER
Date Collected: 20-Oct-97
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: AS RECEIVED

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
Pu-238	0.0218 +/- 0.0082	0.063 +/- 0.016	pCi/L	1.12	< 1.42	
Pu-239	0.0062 +/- 0.0086	0.025 +/- 0.012	pCi/L	0.65	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	1.67	pCi/L	38%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Sr-90 LCS RESULTS

Method ASTM D5918-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 11/06/97

Client Name: Shared QC

Date Analyzed : 11/21/97

Client Project ID : Blank Spike

Sample Matrix : Water

Lab Workorder Number : 97-10-083

Count Duration: 240 Min.

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
97-10-083-S2	13.7 ± 3.70	13.3 ± 2.43	97.3%	Pass

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

PAI sets control limits for Sr-90 measurements based on Historical Data.

Control Limits = Known ± 27% for Sr-90.

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

Remarks:

Sample 97-10-083-S2 is a LCS duplicate. LCS for workorders 97-10-083, 10-127, 10-120, 10-230, and 10-176.

RG

Sr-90 LCS RESULTS

Method ASTM D5918-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 11/06/97

Client Name: Shared QC

Date Analyzed : 11/21/97

Client Project ID : Blank Spike

Sample Matrix : Water

Lab Workorder Number : 97-10-083

Count Duration: 240 Min.

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
97-10-083-S1	13.7 ± 3.70	11.3 ± 2.07	82.5%	Pass

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

PAI sets control limits for Sr-90 measurements based on Historical Data.

Control Limits = Known ± 27% for Sr-90.

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

Remarks:

Blank spike for workorders 97-10-083, 10-120, 10-127, 10-230, and 10-176.

RG

Sr-90 ANALYSIS RESULTS SUMMARY

Method ASTM D5811-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 11/06/97

Client Name: Shared QC

Date Analyzed : 11/21/97

Client Project ID: Blank

Sample Matrix : Water

Lab Sample ID Series: 97-10-083

Count Duration: 240 Min.

Analyzed by: RG

Client Sample ID	Lab Sample ID	Sr-90 (pCi/l)
Blank	97-10-083-B1	0.01 ± 0.14
Blank	Decision Level	0.16

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

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP707FC and analyzed using PAI SOP724FC.

Remarks:

Blank for workorders 97-10-083, 10-120, 10-127, 10-230, and 10-176.

GROSS ALPHA/BETA BLANK SPIKE RESULTS

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc. Date Collected: 10/27/97

Client Name: Shared QC Date Analyzed : 11/05/97

Client Project ID : Blank Spike Sample Matrix : Water

Lab Workorder Number : 97-10-082 Units : pCi/l

Alpha Recovery Data

Lab Sample ID	Alpha Spike Added	Alpha Reported	Percent Recovery	Flag
97-10-082-S1	667.6	588.4	88.1	Pass

Beta Recovery Data

Lab Sample ID	Beta Spike Added	Beta Reported	Percent Recovery	Flag
97-10-082-S1	426.0	353.8	83.1	Pass

PAI sets control limits for gross alpha/beta measurements based on EPA/EMSL Laboratory Intercomparison Control Limits.

Acceptance Range for Percent Recovery of blank spike samples is known ± 30%.

Remarks:

Blank Spike for workorders 97-10-082, 10-083, 10-103, 10-120, 10-127, 10-146, 10-176, and 10-230.

ALPHA/BETA ANALYSIS RESULTS SUMMARY

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/27/97

Client Name: Shared QC

Date Analyzed : 11/05/97

Client Project ID: Blank

Sample Matrix : Water

Lab Sample ID Series: 97-10-082

Count Duration: 600 Min.

Analyzed By : RG

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/l)	Gross Beta (pCi/l)
Blank	10-082-B1	0.79 ± 0.43	-0.46 ± 0.87
Decision Level	10-082-B1	1.1	2.4

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

Reported Activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the approriate blank.

These samples were prepared using PAI SOP702FC and analyzed using PAI SOP705FC.

Remarks:

Blank for workorders 97-10-082, 10-083, 10-103, 10-120, 10-127, 10-146, 10-176, and 10-230.

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgment based on data use . It usually has an "M" with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analytes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likely because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1c Carrier recovery 10-40% and result > EQL.

1d Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

3b Spike recovery outside criterion but sample is not of same matrix as was matrix spike sample

4 Sample result > EQL but < 5X the amount found in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

6d LCS tracer/carrier recovery < 10 % and sample result is a non-detect.

7 For the set of duplicates, both results are > EQL or no EQL is available, but there is not a 3 σ agreement between the results - within an SDG.

8 One result > EQL and the difference > a factor of 1xEQL for water and 2xEQL for soil.

9a Result < MDA and MDA is < EQL.

9b Result > MDA but < EQL.

10a Result < both MDA and EQL.

10b Result < MDA but > EQL.

11 Result is less than three times the reported 1-sigma uncertainty.

17 A zero was added to the result field because the laboratory did not provide a value or a MDC.

RADIOCHEMISTRY

Lab Control Sample (LCS) **Present? X yes no** **1/SDG** **75-125% recovery** *The Iso-U LCS contains U-234 and U-238. The Iso-Pu LCS contains Pu-239. The γ spec. LCS contains Am-241, Cd-109, Co-57, Cs-137, and Co-60.* *Paragon uses a blank spike as the LCS for the gross α/β analysis.*	**OK** See comment	**Obtain from lab. Q=A** **If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 75% and J+ for > 125%** **If the LCS sample tracer/ carrier recovery is < 10%, qualify the associated sample data as P for non-detects.**	 **R6a** **R6** **R6d**
Matrix Spike (MS) **1/SDG** **Present? yes X no** **75-125% recovery** **(Note: As opposed to other tests, the matrix spike test will qualify samples on the basis of their connection by SDG and not by analytical batch).** *Due to insufficient sample volume, a matrix spike was not performed on the Sr-90 analysis. A duplicate LCS was included. The sample result is qualified as A.*	**A** See comment	**Obtain from lab. Q=A** **If criterion not met, qualify all analytes associated with the MS with a J- for <75%** **and J+ for > 125%,** **if all samples in batch of same matrix. If there is variation of matrix, P for samples not of same matrix as spiked sample.**	 **R3a** **R3** **R3b**

M 18 Dec 97

Method blank **Present? X yes no** **1/SDG** **target analytes ≤5x the amount in the blank**	**U**	**Obtain from lab. Q=A** **If the sample result > EQL or no EQL is available but <5x the amount found in the associated blank, it should be qualified as U. In making this comparison the differing aliquot size of the blank and sample being tested should be taken into account.**	**R4**
Duplicate **Present? X yes no** **1/SDG** **(Note: As opposed to other tests, the duplicate tests will qualify samples on the basis of their connection by SDG and not by analytical batch).** *Due to insufficient sample volume, a duplicate was not performed on the Sr-90 analysis. A duplicate LCS was included. The sample result was qualified as A.*	**A** **See comment**	**Obtain from lab. Q=A** **If both results are above the EQL or no EQL is available, all results for same analyte in same SDG should be qualified as J if there is not 3σ agreement between results.** **If both results are < EQL no test should be done.** **If one result > EQL and difference > factor of 1X EQL for water and 2X EQL for soil, qualify with J.**	**R7** **R8**

MB 18 Dec 97

EQL **Denote those samples where the result is less than the reported sample MDA or EQL.** **Confirm that the MDA of each reported analyte in each sample and blank is <EQL.** *The decision level result from the blank was used in place of the MDA for the γ spec., gross α/β, and Sr-90 analyses.*	**U** **See comment**	**When the MDA < the EQL or no EQL is available:** **Qualify as U those sample results < the MDA.** **Qualify as U those sample results > MDA but < EQL.** **When the MDA is >EQL:** **Qualify as U those sample and blank results < both the MDA and EQL.** **Qualify as U those sample and blank results < than the MDA but > EQL.**	 **R9a** **R9b** **R10a** **R10b**
Detection with respect to the reported uncertainty **This is a more conservative test of detection than simply considering the MDA or EQL since sample results > than both the EQL and MDA may still be qualified using this test.**	**NA**	**Qualify as U those results < three times the reported 1-sigma uncertainty. Equivalently qualify as U those results < 1.5 times the reported 2-sigma uncertainty or < the reported 3-sigma uncertainty.**	**R11**
Tracer/carrier recovery **Present? X yes no** **Tracer recovery for alpha spec analyses 330 %** **Carrier recovery for beta/gamma analyses 3 40%**	**OK**	**Obtain from lab. Q=A** **If tracer/carrier recovery < 10 %, qualify results as R** **If tracer recovery is 10-30%, Q=J** **if result > EQL and UJ if result < EQL** **If carrier recovery is 10-40%, Q=J** **if result > EQL and UJ if < EQL**	 **R10** **R11a** **R11b** **R11c** **R11d**

MB Dec 97

ALPHA/BETA ANALYSIS RESULTS SUMMARY

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/20/97

Client Name: Los Alamos National Lab

Date Analyzed : 11/05/97

Client Project ID: 3847R

Sample Matrix : Water

Lab Sample ID Series: 97-10-230

Count Duration: 600 Min.

Analyzed By : RG

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/l)	Gross Beta (pCi/l)
04LA-97-0487	10-230-01	5.8 ± 1.2	6.1 ± 1.5
Duplicate-01	10-230-D1	7.0 ± 1.4	5.8 ± 1.5

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

Reported Activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the approriate blank.

These samples were prepared using PAI SOP702FC and analyzed using PAI SOP705FC.

Remarks:

Sample 97-10-230-D1 is a duplicate of sample 97-10-230-01.

M18 Dec 97

Sr-90 ANALYSIS RESULTS SUMMARY

Method ASTM D5811-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/20/97

Client Name: Los Alamos National Lab

Date Analyzed : 11/21/97

Client Project ID: 3847R -

Sample Matrix : Water

Lab Sample ID Series: 97-10-230

Count Duration: 240 Min.

Analyzed by: RG

0.16

Client Sample ID	Lab Sample ID	Sr-90 (pCi/l)
04LA-97-0487	97-10-230-01	0.01 ± 0.14

(U, R9a), A

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

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP707FC and analyzed using PAI SOP724FC.

M 18 Dec 97

RG

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Friday, November 21, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: None

Client Project Number: 3847R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710230

Field ID: 04LA-97-0487	Sample Matrix: WATER	Date Collected: 20-Oct-97	Final Aliquot: 1
Lab ID: 9710230-1	Date Prepared: 10-Nov-97	Date Analyzed: 20-Nov-97	Aliquot Units: L
	Prep SOP: PAI SOP 780R2	Analytical SOP: PAI SOP 714R4	Report Basis: AS RECEIVED
	Prep Batch: 143114		Count Time (min.): 1000

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.0218 +/- 0.0082	0.0094	pCi/L	(U, R9b)
Pu-239	0.0062 +/- 0.0086	0.034	pCi/L	(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.22	pCi/L	51%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

M 18 Dec 97

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, December 08, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: None

Client Project Number: 3847R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710230

Field ID: 04LA-97-0487

Lab ID: 9710230-1

Sample Matrix: WATER

Date Prepared: 10-Nov-97

Prep SOP: PAI SOP 780R2

Prep Batch: 143144

Date Collected: 20-Oct-97

Date Analyzed: 25-Nov-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.012 +/- 0.014	0.061	pCi/L	(U, R9a)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.38	pCi/L	69%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

M18 Dec 97

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Thursday, November 20, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: None

Client Project Number: 3847R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710230

Field ID: 04LA-97-0487

Lab ID: 9710230-1

Sample Matrix: WATER

Date Prepared: 10-Nov-97

Prep SOP: PAI SOP 780R2

Prep Batch: 143144

Date Collected: 20-Oct-97

Date Analyzed: 18-Nov-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 200

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	3.19 +/- 0.25	0.086	pCi/L	(
U-235	0.102 +/- 0.031	0.059	pCi/L	
U-238	2.22 +/- 0.19	0.064	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.40	6.78	pCi/L	81%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

M 18 Dec 97

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics Inc.

Date Collected: 10/20/97 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 11/05/97 19:25

Lab Sample ID: 97-10-230-01

Sample Matrix: Water

Client Sample ID: 04LA-97-0487

Count Duration: 800 Min.

	Nuclide	Activity (pCi/L)		Nuclide	Activity (pCi/L)	
(U, R9a)	Ra-226	84.9 ± 53.7	S	Tl-208	4.65 ± 2.76	*
(U, R4)	Cs-137	2.60 ± 2.55	*	Pa-234m	531 ± 511	*
	K-40	73.2 ± 90.6		Am-241	-10.2 ± 10.7	
(U, R9a)	Np-237	-0.757 ± 11.9		Cd-109	-20.3 ± 38.5	
	Th-234	-226 ± 134		Co-57	-0.276 ± 1.37	
	Ce-144	2.14 ± 10.6		Ce-139	-1.24 ± 1.51	
	U-235	-3.35 ± 5.14		Th-227	7.28 ± 10.7	
	Pb-212	0.884 ± 6.51		Ra-224	-89.2 ± 35.3	
	Se-75	-0.605 ± 2.34		Hg-203	0.327 ± 2.50	
	Pa-231	3.12 ± 68.9		Pa-233	0.399 ± 4.12	
	Ra-223	-23.0 ± 40.8		Eu-152	-2.20 ± 6.06	
	Bi-211	-13.2 ± 29.9		Pb-214	-1.03 ± 10.5	
	Sn-113	0.871 ± 2.83		Rn-219	3.91 ± 25.5	
	Pb-211	6.04 ± 56.7		Ann-Rad	-25.2 ± 7.72	
	Sr-85	-1.37 ± 4.28		Ba-140	10.7 ± 19.6	
	Cs-134	0.063 ± 2.64		Bi-214	-3.41 ± 12.7	
	Ru-106	1.95 ± 22.7		Mn-54	-1.10 ± 2.76	
	Y-88	0.758 ± 4.05		Ac-228	-0.568 ± 20.1	
	Zn-65	1.06 ± 6.64		Co-60	-0.394 ± 3.03	
	Na-22	-1.97 ± 3.47		La-140	1060 ± 3240	
	Bi-212	29.1 ± 119				

(U, R9a)

(U, R9a)

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank. Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

An S flag denotes potential spectral interference. Cd-109, Bi-211, Ra-224, and Np-237 are single peak determinations subject to interference from Pb-214. Ra-226 is susceptible to interference from U-235.

An asterisk (*) indicates that the reporting software anomalously reports a peak for this radionuclide. The result is an artifact of net reporting.

M6

M18Dec97

Gross Gamma Results Summary

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	11/5/97
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-10-230	Units:	pCi/L

Client Sample ID	Lab Sample ID	Collection Date	Activity	Uncertainty	MDC
04LA-97-0487	97-10-230-01	10/20/97	251	20	20
04LA-97-0487	97-10-230-D1	10/20/97	265	20	18
Blank	97-10-230-B1	10/30/97	72	11	17

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate.

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

97-10-230-D1 is a duplicate of sample 97-10-230-01.

Prepared by 11/21/97

A118 Dec 97

DATA ENTERED

Monday, December 22, 1997

010798 pt

REQUEST NUMBER: 4017R

ANALYSIS TYPE: OTHER

Los Alamos
NATIONAL LABORATORY

ATTN: Sue Zeller
HUFFMAN LABORATORIES
4630 INDIANA
GOLDEN, CO 80430

Please analyze the enclosed samples according to the schedule indicated:

These samples are on:

SHIP DATE: 12/22/97
REPORT DUE: 1/22/98
TURN AROUND REQ'D: 30 days

LANL Request Number: 4017R
Per Agreement Number:
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP; PO# G5004 JK

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
HUMACID		04LA-97-0628	01	W	12/20/97	

Final Page of REQUEST NUMBER 4017R

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgement based on data use . It usually has an "M"with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analyltes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likley because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

5 Sample result < EQL and < 5X (10X as above) the concentration of the analyte in the blank, which indicates the detected result was indistinguishable from blank contamination and the detected result was changed to non-detected at the EQL.

5a Sample result > EQL and > 5X (10X as above) the concentration of the analyte in the blank, which indicates the reported result is not likely to be related to the contamination in the associated blank.

6 Recovery of surrogates or analyte in the LCS > upper limit, which indicates a potential high bias in the results and a potential for false positive results.

6a Recovery of surrogates or analyte in the LCS < lower limit, which indicates a potential low bias in the results.

6d Result is a non-detect and the recovery of surrogates or the analyte in the LCS is < the lower limit, which indicates a potential for false negative results.

7 % RSD or %D exceeds specification - apply to a positive resultresult, which indicates potential quantitation problems in the analyses and the potential for false positive results.

8 % RSD or %D exceeds the specification - apply to a non-detect, which indicates potential quantitation problems in the analyses and the potential false negative results.

9. Holding time is exceeded. An evaluation of the data of interest with respect to holding time exceedance impact (technically) is recommended. Factors to consider include sample preservation, sample storage practices, use of the data, levels of contamination found in the sample, and the physical, chemical, and biological stability of the target analytes in the sample matrix.

10. Duplicate RPD > advisory 20% limit.

INORGANICS (I)

3 Spike recovery > upper limit (125%) and the results > the EDL.

3a Spike recovery < lower limit (75%) and the results are > the EDL.

3d Spike recovery < 30 % and results < EDL.

3e Spike recovery 30-74% and sample results < EDL.

4 Using the worse case blank, the sample results > the EDL but < 5X the concentration of the related analyte in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

7 ICS recovery > 120% and results > EDL.

7a ICS recovery 50-79% .

7b ICS recovery < 50% and result < EDL.

8a For ICV and CCV, recovery is lower than specification

8b For ICV and CCV, recovery is higher than specification

8c For ICV and CCV, results are positive, but < MDL and recovery is lower than the specification.

8d For ICV and CCV, recovery is extremely low and detection may be impaired.

8e For ICV and CCV, recovery is abnormally high - apply to results > MDL.

9 Holding time for Hg has been exceeded. Positive results may be biased low and non-detects may potential be false negatives.

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1 Carrier recovery 10-40% and result > EQL.

1 Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

INORGANICS

Calibration **Present? x yes no** **Initial calibration verification** **Present? x yes no** **Continuing calibration verification** **Present? x yes no**	**NA** **OK** **OK**	**Obtain from lab. Q=A** **Obtain form lab. Q=A**	

RJS
11/6/97

Blanks (Applies to each) Present? x yes no **Initial & continuing calibration blanks** Analyze at each wavelength Beginning and end of each run ICB and CCB analyzed at a frequency of 10% or 2 hours If blank results > EDL reanalyze previous 10 samples **Preparation blank** One per batch ≤ EDL, or if concentration of analyte < 10X EDL, repeat all samples in batch *Be was detected in all blanks and in the sample.* *All other analytes were detected in the blanks, except Sb, As, Cu, Pb, Hg, Se, Na, and U*	U	Obtain from lab. Q=A Use "worse" case blank. Sample results > EDL but < 5 X amount found in the blank should be qualified as U.	I4

RJS
11/6/97

ICP Interference check sample Present? x yes no Solution contains Ag, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, V, & Zn Analyze at beginning of each run Each wavelength used for samples ICS results must be ± 20%of true value	OK	Obtain from lab. Q=A If the ICS recovery is >120% and the results are >EDL, qualify data as J+ If recovery is 50-79%, qualify data as J- If ICS recovery is < 50% and results are < EDL, qualify results as R, PM	 I7 I7a I7b
Spike sample analysis Present? x yes no One per run, per matrix, concentration, SDG % recovery: 75-125% (unless conc. > 4X spike conc.) *Spike recovery:* *Sb 0%* *Cd 0* *Hg 31.4* *U 127.6*	RPM J- J+	Obtain from lab. Q=A If spike recovery > 125% and results < EDL, OK If spike recovery < 75% and results are >EDL, qualify results as J- if same matrix, P if not. If spike recovery > 125% and results are >EDL, qualify data as J+ if same matrix, P if not. If spike recovery 30-74% and sample results < EDL, qualify as UJ if same matrix, P if not. If spike recovery results < 30% and results < EDL, qualify as R, PM.	 I3a I3 I3e I3d

RDS
11/6/97

Duplicate Present? x yes no One per batch of sample of like matrix for each SDG RPD : ≤ 20% (advisory) If either the sample or duplicate value is less than 5 X EDL, there is a control limit of ± EDL	OK	Obtain from lab. Q=A Q=P because of nature of LANL samples.	
Laboratory Control Sample (LCS) Aqueous LCS per batch/SDG % recovery : 80-120% (except Ag & Sb)	OK	If criterion not met, qualify each analyte associated with the LCS in the same batch as J- for < 80% and J+ for > 120%	I6a I6
Holding time Analyze water samples for Hg within 28 days of sample collection Analyze water samples for CN within 14 days of sample collection	OK	Compare analysis date with date of sample collection on the Analysis Request. Q=PM	

JGS
11/6/97

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-97-0483

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

Matrix (soil/water): WATER Lab Sample ID: W9710175-1

Level (low/med): LOW__ Date Received: 10/21/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	1070000			P	
7440-36-0	Antimony_	17.0	U	N	P	RPM, I3d
7440-38-2	Arsenic__	98.8			P	
7440-39-3	Barium___	5790			P	
7440-41-7	Beryllium	56.4		E	P	V, I4
7440-42-8	Boron____	361	B		P	
7440-43-9	Cadmium__	2.0	U	N	P	RPM, I3d
7440-70-2	Calcium__	955000			P	
7440-47-3	Chromium_	1060			P	
7440-48-4	Cobalt___	1070			P	
7440-50-8	Copper___	9980			P	
7439-89-6	Iron_____	1670000			P	
7439-92-1	Lead_____	250			P	
7439-95-4	Magnesium	971000			P	
7439-96-5	Manganese	30100			P	
7439-97-6	Mercury__	0.29		N	AV	J-, I3a
7440-02-0	Nickel___	5040			P	
7440-09-7	Potassium	91300			P	
7782-49-2	Selenium_	214			P	
7440-22-4	Silver___	2990			P	
7440-23-5	Sodium___	382000			P	
7440-28-0	Thallium_	26.0	U		P	
7440-61-1	Uranium__	4090		N	P	J+, I3
7440-62-2	Vanadium_	1120			P	
7440-66-6_	Zinc_____	2320			P	

Color Before: BROWN____ Clarity Before: CLOUDY Texture: N/A___

Color After: GRN/BRN__ Clarity After: CLOUDY Artifacts: _____

Comments:

DIGESTED_SAMPLE_WAS_BIPHASIC,_ONE_PHASE_GREEN_AND_ONE_BROWN.

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	22.0	B	9.2	B	75.6	B			28.920	B	P
Antimony	3.4	U	3.4	U	3.4	U			3.400	U	P
Arsenic	2.8	U	2.8	U	2.8	U			2.800	U	P
Barium	0.9	B	0.1	U	0.1	U			-0.240	B	P
Beryllium	1.4	B	0.4	B	0.6	B			0.140	B	P
Boron	43.2	B	11.6	B	9.6	U	9.6	U	9.600	U	P
Cadmium	1.0	B	0.2	U	0.2	U			0.200	U	P
Calcium	118.6	B	122.2	B	168.3	B			131.440	B	P
Chromium	1.3	B	1.2	B	1.4	B			0.810	B	P
Cobalt	1.2	B	0.4	U	0.4	U			0.400	U	P
Copper	0.4	U	0.4	U	0.4	U			0.400	U	P
Iron	52.5	B	56.6	B	76.0	B			59.070	B	P
Lead	1.3	U	1.3	U	1.3	U			-1.380	B	P
Magnesium	-43.2	B	-40.5	B	14.9	B			-29.990	B	P
Manganese	0.8	B	0.1	U	0.1	U			-0.300	B	P
Mercury	0.04	U	0.04	U	0.04	U	0.04	U	0.040	U	AV
Nickel	1.3	B	0.4	U	0.4	B			0.400	U	P
Potassium	30.4	B	24.0	U	65.8	B			24.000	U	P
Selenium	2.6	U	2.6	U	2.6	U			2.600	U	P
Silver	1.0	B	0.7	U	0.7	U			0.700	U	P
Sodium	-10.1	B	-5.4	B	3.6	U			-22.760	B	P
Thallium	4.4	B	2.9	B	4.1	B			4.810	B	P
Uranium	64.0	U	64.0	U	64.0	U			64.000	U	P
Vanadium	1.1	B	0.5	U	0.5	U			0.500	U	P
Zinc	0.9	B	0.4	U	0.4	U			-0.550	B	P

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

04LA-97-0483

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: 3815R

Matrix: WATER Level (low/med): LOW

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum		1171256.1000		1072077.3000		2000.00	4958.9		P
Antimony	75-125	17.0000	U	17.0000	U	500.00	0.0	N	P
Arsenic	75-125	1972.5000		98.8500		2000.00	93.7		P
Barium	75-125	8213.7500		5791.9000		2000.00	121.1		P
Beryllium	75-125	109.2500		56.4000		50.00	105.7		P
Boron	75-125	1283.6000		361.0000	B	1000.00	92.3		P
Cadmium	75-125	2.0000	U	2.0000	U	50.00	0.0	N	P
Calcium									NR
Chromium		1343.4500		1058.7000		200.00	142.4		P
Cobalt	75-125	1592.2500		1070.9500		500.00	104.3		P
Copper		10829.3000		9975.8500		250.00	341.4		P
Iron		1782610.6000		1670799.5000		1000.00	11181.1		P
Lead	75-125	769.4000		250.2000		500.00	103.8		P
Magnesium									NR
Manganese		32174.5500		30082.7000		500.00	418.4		P
Mercury	75-125	0.6040		0.2900		1.00	31.4	N	AV
Nickel		5866.7500		5035.6500		500.00	166.2		P
Potassium									NR
Selenium	75-125	1924.4000		214.1000		2000.00	85.5		P
Silver		3836.4000		2988.1500		50.00	1696.5		P
Sodium									NR
Thallium	75-125	1850.5000		26.0000	U	2000.00	92.5		P
Uranium	75-125	16855.2000		4094.6000		10000.00	127.6	N	P
Vanadium	75-125	1506.1500		1121.6500		500.00	76.9		P
Zinc		2856.6000		2322.8500		500.00	106.8		P

Comments:
DIGESTED_SAMPLE_WAS_BIPHASIC,_ONE_PHASE_GREEN_AND_ONE_BROWN.

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

04LA-97-0483

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3815R_

Matrix (soil/water): WATER Level (low/med): _LOW__

% Solids for Sample: __0.0 % Solids for Duplicate: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum_		1072077.3000		1124327.2000		4.8		P
Antimony_		17.0000	U	17.0000	U			P
Arsenic__	50.0	98.8500		97.1000		1.8		P
Barium___		5791.9000		6058.6000		4.5		P
Beryllium	25.0	56.4000		58.1000		3.0		P
Boron____		361.0000	B	346.5000	B	4.1		P
Cadmium__		2.0000	U	2.0000	U			P
Calcium__		955178.8000		994830.0000		4.1		P
Chromium_		1058.7000		1117.9000		5.4		P
Cobalt___	250.0	1070.9500		1110.2000		3.6		P
Copper___		9975.8500		10282.4500		3.0		P
Iron_____		1670799.5000		1734871.6000		3.8		P
Lead_____		250.2000		256.3000		2.4		P
Magnesium		971284.4500		1020866.8500		5.0		P
Manganese		30082.7000		31144.0500		3.5		P
Mercury__	0.2	0.2900		0.3120		7.3		AV
Nickel___		5035.6500		5266.1000		4.5		P
Potassium	25000.0	91262.3000		94463.3000		3.4		P
Selenium_	50.0	214.1000		239.8000		11.3		P
Silver___		2988.1500		3122.4500		4.4		P
Sodium___		381898.2000		394327.2000		3.2		P
Thallium_		26.0000	U	26.0000	U			P
Uranium__	2000.0	4094.6000		4266.5000		4.1		P
Vanadium_	250.0	1121.6500		1117.1000		0.4		P
Zinc_____		2322.8500		2394.0000		3.0		P

Tuesday, October 21, 1997

DATA ENTERED
110397 M

REQUEST NUMBER: 3816R
ANALYSIS TYPE: RADOTH

Los Alamos
NATIONAL LABORATORY

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/21/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 5 day

These samples are on:

LANL Request Number: 3816R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
D2H		04LA-97-0483	11	W	10/16/97	
O18O16		04LA-97-0483	11	W	10/16/97	

Final Page of REQUEST NUMBER 3816R

Monday, October 20, 1997

REQUEST NUMBER: 3816R

ANALYSIS TYPE: RADOTH

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/20/97
REPORT DUE: 10/23/97
TURN AROUND REQ'D: 2 day

These samples are on:

LANL Request Number: 3816R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
D2H		04LA-97-0483	11	W	10/16/97	
O18O16		04LA-97-0483	11	W	10/16/97	

RECRA
LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

6 November 1997

Mr. John Miglio
Los Alamos National Laboratory
TA-3, Building 271
DP. O1U MS-H865
Los Alamos, NM 87545

Ref: Subcontract No. 7791L0014-8M
Data Package for RFW Batch 9710L899
LANL Request No. 3816R

Dear Mr. Miglio:

Enclosed please find the data package for 1 water sample received 22 October 1997 for LANL Request #3816R. This sample was analyzed for stable isotope ratios on a 5 day turnaround. The results were faxed 31 October.

Please do not hesitate to contact me at (610) 280-3000 with any question you may have regarding either the hard copy or electronic report.

Very truly yours,

Recra LabNet Philadelphia

Judith L. Stone
Senior Project Manager

FIELD COPY

Enclosure:

Report Sent To: Robert A. Trujillo
Approved By:
Date Sent: 11/12/97

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610)-280-3000 • Fax (610) 280-3041

RECRA LabNet Use Only

9710L899

Custody Transfer Record/Lab Work Request

RECRA LabNet

Client LANL - BCQ#381CR
Est. Final Proj. Sampling Date
Project # 02744-064-001-9999-00
Project Contact/Phone #
RECRA Project Manager J.S.
QC SPEC Del CLP TAT 5 DAY
Date Rec'd 10-22-97 Date Due 10-27-97
Account # LANL-LOSAL

Refrigerator #						3											
#/Type Container	Liquid					1GL											
	Solid																
Volume	Liquid					20											
	Solid																
Preservatives						—											
ANALYSES REQUESTED →		ORGANIC							INORG								
		VOA	BNA	Pest/PCB	Herb				Metal	CN							
						RECRA LabNet Use Only											
						ISUB											
						✓											

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected
001	194LA-97-0483 11			W	10/6/97	—

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Special Instructions:
RSA-CLIENT INFO
BMSC-Comp

DATE/REVISIONS:
1. SUBBED TO GEOCHRON LABS
2.
3.
4.
5.
6.

5.9°C

RECRA LabNet Use Only

Samples were:
1) Shipped ✓ or Hand Delivered
Airbill # 355-9778145
2) Ambient or Chilled
3) Received in Good Condition (Y) or N
4) Labels Indicate Properly Preserved (Y) or N
5) Received Within Holding Times (Y) or N

COC Tape was:
1) Present on Outer Package (Y) or N
2) Unbroken on Outer Package (Y) or N
3) Present on Sample (Y) or N
4) Unbroken on Sample (Y) or N
COC Record Present Upon Sample Rec't (Y) or N

Discrepancies Between Samples Lables and COC Record? (Y) or N
NOTES: BOTTLE SIZE ≈ 20 ml

Relinquished by	Received by	Date	Time
FEDEX	[illegible]	10/22/97	1000

Relinquished by	Received by	Date	Time

ORIGINAL
REWRITTEN

Tuesday, October 21, 1997

REQUEST NUMBER: 3816R

ANALYSIS TYPE: RADOTH

Los Alamos
NATIONAL LABORATORY

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/21/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 5 day

These samples are on:

LANL Request Number: 3816R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
D2H		04LA-97-0483	11	W	10/16/97	
O18O16		04LA-97-0483	11	W	10/16/97	

Final Page of REQUEST NUMBER 3816R

Tuesday, October 21, 1997

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 3816RC

REQUEST NUMBER: 3816R
ANALYSIS TYPE: RADOTH

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-97-048	3 11	1 L amber glass	D2H
04LA-97-048	3 11	1 L amber glass	018016

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 3816R Page 1

Relinquished By:		Date	Time
John Kemp (PRINTED NAME)	John Kemp (SIGNATURE)	10/21/97	3:00
FED EX (PRINTED NAME)	(SIGNATURE)	10/22/97	1000
PRINTED NAME	SIGNATURE		

Received By:		Date	Time
PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE	10/22/97	1000
PRINTED NAME	SIGNATURE		

Received for DISPOSAL By:		Date	Time
PRINTED NAME	SIGNATURE		

Remarks:

Tuesday, October 21, 1997

REQUEST NUMBER: 3816R
ANALYSIS TYPE: RADOTH

Los Alamos
NATIONAL LABORATORY

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/21/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 5 day

These samples are on:

LANL Request Number: 3816R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4265600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
D2H		04LA-97-0483	11	W	10/16/97	
O18O16		04LA-97-0483	11	W	10/16/97	

Final Page of REQUEST NUMBER 3816R

GEOCHRON LABORATORIES a division of
KRUEGER ENTERPRISES, INC.

711 CONCORD AVENUE ◆ CAMBRIDGE, MASSACHUSETTS 02138 ◆ U.S.A
TELEPHONE: (617) 876-3691 TELEFAX: (617) 661-0148

LANL 97IOL899
Request # 3816R

STABLE ISOTOPE RATIO ANALYSES — REPORT OF ANALYTICAL WORK

Submitted by: Judy Stone
RECRA
208 Welsh Pool Road
Lionville, PA 19341-1225

Date Received: 10/23/97
Date Reported: 10/31/97
Your Reference: Req. No. 3816R

Our Lab. Number	Your Sample Number	Description	δD*			$\delta^{18}O$*		
HOR-95239	04LA-97-0483	Water	-77	-77	**	-11.0	-11.0	**

** Duplicate analyses on separate aliquots of original sample.

*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{sample}‰ = \left[\frac{R_{sample}}{R_{standard}} - 1 \right] \times 1000$$

Where:

D/H standard is SMOW
$^{18}O/^{16}O$ standard is SMOW

And:

$D/H_{standard}$ = 0.000316**
$^{18}O/^{16}O_{standard}$ = 0.0039948**

**Double atom ratio

GEOCHRON LABORATORIES a division of
KRUEGER ENTERPRISES, INC.

711 CONCORD AVENUE ◆ CAMBRIDGE, MASSACHUSETTS 02138 ◆ U.S.A
TELEPHONE: (617) 876-3691 TELEFAX: (617) 661-0148

STABLE ISOTOPE RATIO ANALYSES

REPORT OF ANALYTICAL WORK

Submitted by: Judy Stone
RECRA
208 Welsh Pool Road
Lionville, PA 19341-1225

Date Received: 10/23/97
Date Reported: 10/31/97
Your Reference: Req. No. 3816R

Our Lab. Number	Your Sample Number	Description	δD*			$\delta^{18}O$*		
HOR-95239	04LA-97-0483	Water	-77	-77	**	-11.0	-11.0	**

** Duplicate analyses on separate aliquots of original sample.

*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{sample}‰ = \left[\frac{R_{sample}}{R_{standard}} - 1 \right] \times 1000$$

Where:

D/H standard is SMOW
$^{18}O/^{16}O$ standard is SMOW

And:

$D/H_{standard}$ = 0.000316**
$^{18}O/^{16}O_{standard}$ = 0.0039948**

**Double atom ratio

Monday, October 20, 1997

DATA ENTERED
110397M

Los Alamos
NATIONAL LABORATORY

REQUEST NUMBER: 3817R
ANALYSIS TYPE: RAD

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/20/97
REPORT DUE: 11/20/97
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 3817R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
AM241		04LA-97-0483	05	W	10/16/97	
GROSSAB		04LA-97-0483	05	W	10/16/97	
GROSSG		04LA-97-0483	05	W	10/16/97	
GSCAN		04LA-97-0483	05	W	10/16/97	
ISOPU		04LA-97-0483	05	W	10/16/97	
ISOU		04LA-97-0483	05	W	10/16/97	
SR90		04LA-97-0483	13	W	10/16/97	

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3817R

Date File Saved: 12/08/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0483	9710176-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOAM

The sample under Request Number 3817R (Work Order 9710176) was received on 10/21/97 and scheduled for isotopic americium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 12/04/97. The analysis results for this samples are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

The requested MDC was not met for sample 04LA-97-0483 (PAI ID 9710176-1). The chemical yield is low but meets acceptable criteria. The low chemical yield (32%) is the reason for the high MDC. However the requested MDC was met for the sample duplicate. In addition the sample and duplicate meet acceptable DER criteria.

No further problems were observed in the preparation and analyses of the sample listed above. All remaining method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrumentation

Radiochemistry Final Review

12/9/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple
Laboratory Manager

12/10/97
Date

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3817R

Date File Saved: 11/19/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0483	97-10-176-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOPU

The sample under Request Number 3817R (Work Order 97-10-176) was received on 10/21/97 and scheduled for isotopic plutonium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry for isotopic plutonium according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 11/18/97. The analysis results for this sample are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{238}Pu activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is below the requested MDC . Results should be compared to the method blank activity to determine the validity of the measurement.

Sample 04LA-97-0483 and the duplicate 97-10-176-D1 fail to meet the clients chemical yield criteria. In addition the requested MDC was not met for ^{239}Pu in sample 04LA-97-

0483. It was noted during the prep of the samples that it took an inordinate amount of time to flow through the column. A QASS was written and the project manager was immediately informed of the problem. The duplicate passes acceptable DER criteria and confirms the low recovery of the sample. As a result a matrix problem is suspected. No re-extraction is planned because improvement is not expected.

No further problems were observed in the preparation and analyses of the samples listed above. All other method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrumentation

Radiochemistry Final Review — Date: 11/21/97

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

Date: 12-10-97

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3817R

Date File Saved: 11/26/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0483	97-10-176-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Sr-90

Samples under Request Number 3817R (Work Order 97-10-176) were received on 10/21/97 and scheduled for strontium-90 analyses, which were completed on 11/21/97.

Total radiostrontium is reported as Sr-90. The presence of other radioisotopes of strontium may cause positive bias in the measured strontium concentration.

These samples consist of water and the results are reported in units of pCi/L.

This work order was prepared using PAI SOP717R3 and analyzed using PAI SOP724R5.

Due to limited sample volume neither a duplicate or matrix spike was prepared. A duplicate LCS was prepared and reported instead.

A low chemical yield (21%) was determined by ICP measurement for sample 04LA-97-0483 (PAI ID 97-10-176-01) due to elevated levels of Pb, Ca, and Ba. Pb, Ca, and Ba are known interferences with the Strontium method of separation.

No anomalies were encountered during this analysis.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Renee Gallegos — 11/26/97
Renee Gallegos
Radiochemistry Instrument Technician
Date

12/1/97
Radiochemistry Final Review
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager
Date

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3817R

Date File Saved: 11/20/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0483	97-10-176-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOU

The sample under Request Number 3817R (Work Order 97-10-176) was received on 10/21/97 and scheduled for isotopic uranium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 11/19/97. The analysis results for this sample are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{234}U activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is below the requested MDC . Results should be compared to the method blank activity to determine the validity of the measurement.

The sample duplicate for sample 04LA-97-0483 (PAI ID 97-10-176-D1) fails to meet the clients chemical yield criteria. It was noted during the prep of the samples that it took an

inordinate amount of time to flow through the column. A QASS was written and the project manager was immediately informed of the problem. The duplicate passes acceptable DER criteria. A matrix problem is suspected and no re-extraction is planned because improvement is not expected.

No further anomalous situation were observed in the preparation and analyses of the sample listed above. All remaining method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth — Date: 11/21/97
Radiochemistry Instrument Technician

Radiochemistry Final Review — Date: 11/21/97

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple — Date: 12/10/97
Laboratory Manager

Paragon Analytics, Inc.
Case Narrative File

Request Number: 3817R
Date File Saved: 11/19/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0483	97-10-176-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gross Gamma

The samples under Request Number 3817R (PAI Work Order 97-10-176) were received on 10/21/97 and scheduled for gross gamma analyses, which were completed on 11/06/97.

The analysis results for these samples are reported in units of pCi/Liter referenced to Cs-137.

These samples were prepared according to Paragon Analytics, Inc. procedure PAI SOP739R2.

The HPGe gamma photon detectors were calibrated using a standard of Cesium-137 in water. Counting efficiencies were calculated as the ratio of the net integrated count rate in a region of interest between 50 and 2000 keV to the known photon emission rate of the standard. Samples were analyzed in the same geometry and counts integrated in the same manner.

Efficiency calibration for detector GS06 was not performed prior to the analyses. Efficiency calibration was performed on 11/18/97, with efficiencies applied retroactively to the analyses of sample 97-10-176-01 (97-10-176-01) and the laboratory control sample (LCS 97-10-230-S1). Daily efficiency checks adequately demonstrate stability of detector efficiency between analysis and calibration.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported. Each result should be compared to the result for the appropriate blank for determination of the validity of that measurement.

The duplicate error ratio (DER) for the analysis of sample 04LA-97-0483 (97-10-176-01) and its duplicate (97-10-176-D1) was elevated above our warning limit. DER is defined as :

$$DER = \frac{|S - D|}{2 * \sqrt{\sigma_S^2 + \sigma_D^2}}$$

The warning limit for DER is 1.42. The DER for this analysis is 1.70. The results are acceptable according to PAI SOP 715 Rev.9.

Gross gamma activity was detected in the blank at a concentration in excess of the minimum detectable concentration (MDC). However, the blank activity is well below that reported for the client samples and is also below the required quantification limit of 100 pCi/Liter. As the sample was depleted for other analyses, no reanalysis is possible, and these results are submitted.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill
Radiochemistry Instrumentation

11-19-97
Date

Radiochemistry Final Review

11/20/97
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

12/10/97
Date

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3817R

Date File Saved: 11/12/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0483	97-10-176-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: GROSS AB

Samples under Request Number 3817R (PAI Work Order 97-10-176) were received on 10/21/97 and scheduled for gross alpha/beta analysis, which was completed on 11/6/97.

The analytical results for these samples are reported in units of pCi/L.

This work order was prepared using PAI SOP702R11, and analyzed using PAI SOP724R5.

Gross alpha results are referenced to ^{241}Am. Gross beta results are referenced to ^{90}Sr/Y.

The requested MDA for gross alpha/beta for sample 04LA-97-0483 (PAI ID 97-10-176-01) was not achieved. The sample activity far exceeded the reported MDA.

The results of the blank (97-10-082-B1) for analytical batch 10082abw.xls showed activity which is less than the required MDC. All of the associated sample results are either less than the required MDC or greater than five times the blank activity. Per PAI QAP section 9.7.1 the results are reported without qualification.

No further problems were noted during the preparation and analysis of these samples. All remaining quality control criteria were met.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Renee Gallegos
Radiochemistry Instrument Technician

11/12/97
Date

Radiochemistry Final Review

11/12/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

for Donald Gipple
Laboratory Manager

12/10/97
Date

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3817R

Date File Saved: 11/18/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0483	97-10-176-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

All samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gamma Spectroscopy

The samples under Request Number 3817R (Work Order 9710176) were received on 10/21/97 and scheduled for gamma spec. analyses, which were completed on 11/05/97.

The analysis results for these samples are reported in units of pCi/Liter. The samples were filtered prior to analysis.

This work order was prepared using PAI SOP739R2 and analyzed using PAI SOP713R4.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Bismuth-214 was detected in the blank (97-10-230-B1) at a concentration in excess of the 2σ total propagated uncertainty (TPU). However, since the concentration detected is below the corresponding decision level, no sample results are compromised. Potassium-40 was also detected in the blank at a concentration in excess of the 2σ TPU and in excess of the corresponding decision level. The ^{40}K result reported for the duplicate (97-10-176-D1) is therefore of questionable validity.

Cadmium-109 and ^{237}Np are often misidentified when using the required library. The observed photopeak at 87 keV is attributed to the K_β x ray of Pb. Likewise, ^{211}Bi and ^{224}Ra are misidentified due to interference from ^{214}Pb at 351 keV and 241 keV, respectively. Due to interference, the GDR software did not attempt to quantify activity concentrations for some analyses. In such cases, zero values are reported in the hard copy reports, and an "NQ" qualifier is submitted in the electronic deliverable.

Quantification of ^{226}Ra at low levels based upon the 186 keV photopeak is unreliable due to interference from ^{235}U, which also has a photopeak at 186 keV. Low levels of ^{235}U, though undetectable by this method, can cause greatly exaggerated ^{226}Ra results. The ^{226}Ra activity reported should be considered qualitative. Activity concentration results above the 2σ TPU for radionuclides identified as present by the analysis software for which spectral interference is suspected are given an "S" flag.

Activity concentrations above the 2σ TPU are reported in some instances where no supporting photopeaks are observed. These anomalous identifications result from the GDR software attempting to calculate net activity concentrations for analytes for which no peaks are observed. Such data have been flagged with an asterisk.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill — 11-18-97
Radiochemistry Instrumentation — Date

Daniel C Burns — 11/18/97
Radiochemistry Final Review — Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple — 12/10/97
Laboratory Manager — Date

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: **3817R** LAB NAME: **Paragon** LAB CODE_____

NAME OF VALIDATOR: **Antonia Tallarico** COMPANY: **LATA**

VALIDATION DATE: **19 December 97** EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- o INORGANICS
- X RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? - YES - NO

Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

_____

_____

_____

Signature/1st validation: _____ 19 Dec 97

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

Monday, October 20, 1997

REQUEST NUMBER: 3817R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

97.10.176

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/20/97
REPORT DUE: 11/20/97
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 3817R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
AM241		04LA-97-0483	05	W	10/16/97	
GROSSAB		04LA-97-0483	05	W	10/16/97	
GROSSG		04LA-97-0483	05	W	10/16/97	
GSCAN		04LA-97-0483	05	W	10/16/97	
ISOPU		04LA-97-0483	05	W	10/16/97	
ISOU		04LA-97-0483	05	W	10/16/97	
SR90		04LA-97-0483	13	W	10/16/97	

01

Final Page of REQUEST NUMBER 3817R

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3817R

Date File Saved: 12/08/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0483	9710176-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOAM

The sample under Request Number 3817R (Work Order 9710176) was received on 10/21/97 and scheduled for isotopic americium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 12/04/97. The analysis results for this samples are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

The requested MDC was not met for sample 04LA-97-0483 (PAI ID 9710176-1). The chemical yield is low but meets acceptable criteria. The low chemical yield (32%) is the reason for the high MDC. However the requested MDC was met for the sample duplicate. In addition the sample and duplicate meet acceptable DER criteria.

No further problems were observed in the preparation and analyses of the sample listed above. All remaining method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrumentation

Radiochemistry Final Review

12/9/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple
Laboratory Manager

12/10/97
Date

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Monday, December 08, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3817R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710176

Field ID:

Lab ID: 9709122-S1LCS1

Sample Matrix: WATER

Date Prepared: 10-Nov-97

Prep SOP: PAI SOP 780R2

Prep Batch: 143144

Date Collected: 10-Nov-97

Date Analyzed: 25-Nov-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Am-241	7.51 +/- 0.48	0.050	7.16	pCi/L	105%	+/- 25%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.78	pCi/L	77%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analyses not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Monday, December 08, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3817R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710176

Field ID:

Lab ID: 9709122-B1MB1

Sample Matrix: WATER

Date Prepared: 10-Nov-97

Prep SOP: PAI SOP 780R2

Prep Batch: 143144

Date Collected: 10-Nov-97

Date Analyzed: 24-Nov-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 1000

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.014 +/- 0.015	0.053	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	2.83	pCi/L	58%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Monday, December 08, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3817R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710176

		Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID:	04LA-97-0483				
Lab ID:	9710176-1	11/10/97	12/4/97	143144	1
DUP ID:	9710176-1DUP1	11/10/97	12/4/97	143144	1

Sample Matrix: WATER
Date Collected: 16-Oct-97
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: AS RECEIVED

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
Am-241	0.106 +/- 0.047	0.083 +/- 0.026	pCi/L	0.22	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	2.87	pCi/L	58%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3817R

Date File Saved: 11/19/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0483	97-10-176-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOPU

The sample under Request Number 3817R (Work Order 97-10-176) was received on 10/21/97 and scheduled for isotopic plutonium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry for isotopic plutonium according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 11/18/97. The analysis results for this sample are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{238}Pu activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is below the requested MDC . Results should be compared to the method blank activity to determine the validity of the measurement.

Sample 04LA-97-0483 and the duplicate 97-10-176-D1 fail to meet the clients chemical yield criteria. In addition the requested MDC was not met for ^{239}Pu in sample 04LA-97-

0483. It was noted during the prep of the samples that it took an inordinate amount of time to flow through the column. A QASS was written and the project manager was immediatel informed of the problem. The duplicate passes acceptable DER criteria and confirms the low recovery of the sample. As a result a matrix problem is suspected. No re-extraction is planned because improvement is not expected.

No further problems were observed in the preparation and analyses of the samples listed above. All other method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrumentation

Radiochemistry Final Review — Date: 11/21/97

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

Date: 12-10-97

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Wednesday, November 19, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3817R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710176

Field ID:

Lab ID: 9709122-S1LCS1

Sample Matrix: WATER

Date Prepared: 10-Nov-97

Prep SOP: PAI SOP 780R2

Prep Batch: 143114

Date Collected: 10-Nov-97

Date Analyzed: 18-Nov-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Pu-238	0.036 +/- 0.015	0.018	N/A	pCi/L	N/A	N/A	
Pu-239	4.63 +/- 0.32	0.043	4.85	pCi/L	95%	+/- 25%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.88	pCi/L	66%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Wednesday, November 19, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3817R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710176

Field ID:

Lab ID: 9709122-B1MB1

Sample Matrix: WATER

Date Prepared: 10-Nov-97

Prep SOP: PAI SOP 780R2

Prep Batch: 143114

Date Collected: 10-Nov-97

Date Analyzed: 18-Nov-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 400

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.052 +/- 0.021	0.051	pCi/L	
Pu-239	-0.003 +/- 0.012	0.043	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.46	pCi/L	56%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Wednesday, November 19, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3817R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710176

	Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID: 04LA-97-0483				
Lab ID: 9710176-1	11/10/97	11/18/97	143114	1
DUP ID: 9710176-1DUP1	11/10/97	11/18/97	143114	1

Sample Matrix: WATER
Date Collected: 16-Oct-97
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: AS RECEIVED

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
Pu-238	0.76 +/- 0.13	1.22 +/- 0.16	pCi/L	1.11	< 1.42	
Pu-239	0.011 +/- 0.031	0.133 +/- 0.049	pCi/L	1.04	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	1.01	pCi/L	23%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3817R

Date File Saved: 11/26/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0483	97-10-176-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Sr-90

Samples under Request Number 3817R (Work Order 97-10-176) were received on 10/21/97 and scheduled for strontium-90 analyses, which were completed on 11/21/97.

Total radiostrontium is reported as Sr-90. The presence of other radioisotopes of strontium may cause positive bias in the measured strontium concentration.

These samples consist of water and the results are reported in units of pCi/L.

This work order was prepared using PAI SOP717R3 and analyzed using PAI SOP724R5.

Due to limited sample volume neither a duplicate or matrix spike was prepared. A duplicate LCS was prepared and reported instead.

A low chemical yield (21%) was determined by ICP measurement for sample 04LA-97-0483 (PAI ID 97-10-176-01) due to elevated levels of Pb, Ca, and Ba. Pb, Ca, and Ba are known interferences with the Strontium method of separation.

No anomalies were encountered during this analysis.

Reported sample activities are NET activities; that is, they have not been truncated or censored based o an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for ea measurement have been reported, and Decision Level values for each analyte are reported with th process blank. Each result should be compared to the appropriate decision level for determination of th validity of that measurement.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verifie by the Laboratory Manager's or designee's signature in the hard copy report.

Renee Gallegos
Radiochemistry Instrument Technician

11/26/97
Date

Radiochemistry Final Review

12/1/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple
Laboratory Manager

12
Date

Sr-90 LCS RESULTS

Method ASTM D5918-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 11/06/97

Client Name: Shared QC

Date Analyzed : 11/21/97

Client Project ID : Blank Spike

Sample Matrix : Water

Lab Workorder Number : 97-10-083

Count Duration: 240 Min.

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
97-10-083-S1	13.7 ± 3.70	11.3 ± 2.07	82.5%	Pass

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

PAI sets control limits for Sr-90 measurements based on Historical Data.

Control Limits = Known ± 27% for Sr-90.

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

Remarks:

Blank spike for workorders 97-10-083, 10-120, 10-127, 10-230, and 10-176.

Sr-90 LCS RESULTS

Method ASTM D5918-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 11/06/97

Client Name: Shared QC

Date Analyzed : 11/21/97

Client Project ID : Blank Spike

Sample Matrix : Water

Lab Workorder Number : 97-10-083

Count Duration: 240 Min.

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
97-10-083-S2	13.7 ± 3.70	13.3 ± 2.43	97.3%	Pass

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

PAI sets control limits for Sr-90 measurements based on Historical Data.

Control Limits = Known ± 27% for Sr-90.

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

Remarks:

Sample 97-10-083-S2 is a LCS duplicate. LCS for workorders 97-10-083, 10-127, 10-120, 10-230, and 10-176.

RG

Sr-90 ANALYSIS RESULTS SUMMARY

Method ASTM D5811-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 11/06/97

Client Name: Shared QC

Date Analyzed : 11/21/97

Client Project ID: Blank

Sample Matrix : Water

Lab Sample ID Series: 97-10-083

Count Duration: 240 Min.

Analyzed by: RG

Client Sample ID	Lab Sample ID	Sr-90 (pCi/l)
Blank	97-10-083-B1	0.01 ± 0.14
Blank	Decision Level	0.16

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

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP707FC and analyzed using PAI SOP724FC.

Remarks:

Blank for workorders 97-10-083, 10-120, 10-127, 10-230, and 10-176.

Chemical Recovery Data for Sr-90 in water Instrument ID CP-1

ICP analysis date: 11/13/97 analyst:
ICP analysis time: 12:20:15 Benchsheet Spreadsheet

Sample ID	Vi initial sample vol (mL)	final dilution volume (mL)	A acid added (mL)	S carrier vol (mL)	Ci ICP initial Sr conc (ug/mL)	Ri init Sr aliquot (mL)	Cf ICP eluate Sr conc (ug/mL)	Rf eluate aliquot (mL)	Vf eluate final vol (mL)	Mi (ug)	Mf (ug)	chem recov %	Vc vol for calc (mL)	Sample ID
97-10-083-S1	1000	1000	0	1	0.9539	10.0	0.919	0.0999	10.0	945	920	97.3	980	97-10-083-S1
97-10-083-S2	1000	1000	0	1	0.9847	10.0	0.9253	0.0999	10.0	976	926	94.9	980	97-10-083-S2
97-10-083-B1	1000	1000	0	1	0.9442	10.0	0.9723	0.0999	10.0	936	973	104.0	980	97-10-083-B1
97-10-083-01	995	995	0	1	0.9986	10.0	0.9182	0.0999	10.0	985	919	93.3	975	97-10-083-01
97-10-083-02	995	995	0	1	0.9926	10.0	0.9947	0.0999	10.0	979	996	101.7	975	97-10-083-02
97-10-083-D1	1000	1000	0	1	0.9872	10.0	0.9919	0.0999	10.0	978	993	101.5	980	97-10-083-D1
97-10-120-01	1000	1000	0	1	1.714	10.0	1.616	0.0999	10.0	1699	1618	95.2	980	97-10-120-01
97-10-127-01	1020	1020	0	1	1.406	10.0	1.357	0.0999	10.0	1421	1358	95.6	1000	97-10-127-01
97-10-127-03	985	985	0	1	1.014	10.0	0.9113	0.0999	10.0	990	912	92.2	965	97-10-127-03
97-10-127-05	1005	1005	0	1	1.316	10.0	1.214	0.0999	10.0	1311	1215	92.7	985	97-10-127-05
97-10-127-06	1040	1040	0	1	1.329	10.0	1.287	0.0999	10.0	1370	1288	94.0	1020	97-10-127-06
97-10-127-09	1040	1040	0	1	1.314	10.0	1.317	0.0999	10.0	1355	1318	97.3	1020	97-10-127-09
97-10-127-12	980	980	0	1	0.8409	10.0	0.3057	0.0999	10.0	817	306	37.5	960	97-10-127-12
97-10-127-D1	1020	1020	0	1	1.408	10.0	1.344	0.0999	10.0	1423	1345	94.5	1000	97-10-127-D1
97-10-230-01	1000	1000	0	1	1.076	10.0	1.037	0.0999	10.0	1066	1038	97.3	980	97-10-230-01
97-10-176-01	1005	1005	0	1	4.98	10.0	1.032	0.0999	10.0	4960	1033	20.8	985	97-10-176-01
			0	1		10.0		0.0999	10.0	0	0	#DIV/0!	0	
			0	1		10.0		0.0999	10.0	0	0	#DIV/0!	0	
			0	1		10.0		0.0999	10.0	0	0	#DIV/0!	0	
			0	1		10.0		0.0999	10.0	0	0	#DIV/0!	0	
			0	1		10.0		0.0999	10.0	0	0	#DIV/0!	0	
			0	1		10.0		0.0999	10.0	0	0	#DIV/0!	0	
			0	1		10.0		0.0999	10.0	0	0	#DIV/0!	0	
			0	1		10.0		0.0999	10.0	0	0	#DIV/0!	0	
			0	1		10.0		0.0999	10.0	0	0	#DIV/0!	0	
			0	1		10.0		0.0999	10.0	0	0	#DIV/0!	0	
			0	1		10.0		0.0999	10.0	0	0	#DIV/0!	0	
			0	1		10.0		0.0999	10.0	0	0	#DIV/0!	0	
			0	1		10.0		0.0999	10.0	0	0	#DIV/0!	0	

#12 Mo overrange ~1%
Sr @ 8 ppm
Pb 0.6 ppm

#1 Cu overrange
Al 240
Ba 3
Pb 0.1
Fe 413
K 4.4

000017

11/13/97.....3:00 PM

Na 230

R/BENCH-SH/10083SRW.XLS

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3817R

Date File Saved: 11/20/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0483	97-10-176-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOU

The sample under Request Number 3817R (Work Order 97-10-176) was received on 10/21/97 and scheduled for isotopic uranium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 11/19/97. The analysis results for this sample are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{234}U activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is below the requested MDC . Results should be compared to the method blank activity to determine the validity of the measurement.

The sample duplicate for sample 04LA-97-0483 (PAI ID 97-10-176-D1) fails to meet the clients chemical yield criteria. It was noted during the prep of the samples that it took an

inordinate amount of time to flow through the column. A QASS was written and the project manager was immediately informed of the problem. The duplicate passes acceptable DEF criteria. A matrix problem is suspected and no re-extraction is planned because improvement is not expected.

No further anomalous situation were observed in the preparation and analyses of the sample listed above. All remaining method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth — Date: 11/21/97
Radiochemistry Instrument Technician

Radiochemistry Final Review — Date: 11/21/97

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

for Don Gipple — Date: 12/10/97
Laboratory Manager

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Thursday, November 20, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3817R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710176

Field ID:

Lab ID: 9709122-S1LCS1

Sample Matrix: WATER

Date Prepared: 10-Nov-97

Prep SOP: PAI SOP 780R2

Prep Batch: 143144

Date Collected: 10-Nov-97

Date Analyzed: 19-Nov-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 200

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
U-234	11.25 +/- 0.72	0.067	11.66	pCi/L	96%	+/- 25%	
U-235	0.510 +/- 0.070	0.067	N/A	pCi/L	N/A	N/A	
U-238	11.89 +/- 0.76	0.052	11.66	pCi/L	102%	+/- 25%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.40	8.31	pCi/L	99%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Thursday, November 20, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3817R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710176

Field ID:

Lab ID: 9709122-B1MB1

Sample Matrix: WATER

Date Prepared: 10-Nov-97

Prep SOP: PAI SOP 780R2

Prep Batch: 143144

Date Collected: 10-Nov-97

Date Analyzed: 19-Nov-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 200

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.056 +/- 0.022	0.055	pCi/L	
U-235	0.020 +/- 0.013	0.046	pCi/L	
U-238	0.036 +/- 0.017	0.046	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.40	8.03	pCi/L	96%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analyses not within control limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Thursday, November 20, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3817R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710176

	Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID: 04LA-97-0483				
Lab ID: 9710176-1	11/10/97	11/18/97	143144	1
DUP ID: 9710176-1DUP1	11/10/97	11/18/97	143144	1

Sample Matrix: WATER
Date Collected: 16-Oct-97
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: AS RECEIVED

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
U-234	7.94 +/- 0.57	8.64 +/- 0.77	pCi/L	0.37	< 1.42	
U-235	0.361 +/- 0.074	0.37 +/- 0.12	pCi/L	0.04	< 1.42	
U-238	6.60 +/- 0.49	6.70 +/- 0.65	pCi/L	0.07	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.40	1.63	pCi/L	19%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Gross Gamma

Laboratory Control Sample Results

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	11/6/97
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-10-176	Units	pCi/L

Sample ID	Reported Activity	Known Value	Percent Recovery	Flag
97-10-230-S1	8694	8702	99.9%	PASS

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

Prepared by 11/19/97

Gross Gamma Results Summary

Blank Results

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	11/5/97
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-10-176	Units:	pCi/L

Client Sample ID	Lab Sample ID	Activity	Uncertainty	MDC
Blank	97-10-230-B1	72	11	17

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate.

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

Prepared by 11/19/97

Gross Gamma Results Summary

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	11/5/97
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-10-176	Units:	pCi/L

Client Sample ID	Lab Sample ID	Collection Date	Activity	Uncertainty	MDC	
04LA-97-0483	97-10-176-01	10/16/97	266	20	18	U, R
04LA-97-0483	97-10-176-D1	10/16/97	222	16	12	
Blank	97-10-230-B1	10/30/97	72	11	17	

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate.

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

97-10-176-D1 is a duplicate of sample 97-10-176-01.

Prepared by 11/19/97

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3817R

Date File Saved: 11/12/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0483	97-10-176-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: GROSS AB

Samples under Request Number 3817R (PAI Work Order 97-10-176) were received on 10/21/97 and scheduled for gross alpha/beta analysis, which was completed on 11/6/97.

The analytical results for these samples are reported in units of pCi/L.

This work order was prepared using PAI SOP702R11, and analyzed using PAI SOP724R5.

Gross alpha results are referenced to ^{241}Am. Gross beta results are referenced to ^{90}Sr/Y.

The requested MDA for gross alpha/beta for sample 04LA-97-0483 (PAI ID 97-10-176-01) was not achieved. The sample activity far exceeded the reported MDA.

The results of the blank (97-10-082-B1) for analytical batch 10082abw.xls showed activity which is less than the required MDC. All of the associated sample results are either less than the required MDC or greater than five times the blank activity. Per PAI QAP section 9.7.1 the results are reported without qualification.

No further problems were noted during the preparation and analysis of these samples. All remaining quality control criteria were met.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Renee Gallegos
Radiochemistry Instrument Technician

11/12/97
Date

Radiochemistry Final Review

11/12/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

for Donald Gipple
Laboratory Manager

12/10/97
Date

GROSS ALPHA/BETA BLANK SPIKE RESULTS

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/27/97

Client Name: Shared QC

Date Analyzed : 11/05/97

Client Project ID : Blank Spike

Sample Matrix : Water

Lab Workorder Number : 97-10-082

Units : pCi/l

Alpha Recovery Data

Lab Sample ID	Alpha Spike Added	Alpha Reported	Percent Recovery	Flag
97-10-082-S1	667.6	588.4	88.1	Pass

Beta Recovery Data

Lab Sample ID	Beta Spike Added	Beta Reported	Percent Recovery	Flag
97-10-082-S1	426.0	353.8	83.1	Pass

PAI sets control limits for gross alpha/beta measurements based on EPA/EMSL Laboratory Intercomparison Control Limits.

Acceptance Range for Percent Recovery of blank spike samples is known ± 30%.

Remarks:

Blank Spike for workorders 97-10-082, 10-083, 10-103, 10-120, 10-127, 10-146, 10-176, and 10-230.

ALPHA/BETA ANALYSIS RESULTS SUMMARY

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/27/97

Client Name: Shared QC

Date Analyzed : 11/05/97

Client Project ID: Blank

Sample Matrix : Water

Lab Sample ID Series: 97-10-082

Count Duration: 600 Min.

Analyzed By : RG

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/l)	Gross Beta (pCi/l)
Blank	10-082-B1	0.79 ± 0.43	-0.46 ± 0.87
Decision Level	10-082-B1	1.1	2.4

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

Reported Activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the approriate blank.

These samples were prepared using PAI SOP702FC and analyzed using PAI SOP705FC.

Remarks:

Blank for workorders 97-10-082, 10-083, 10-103, 10-120, 10-127, 10-146, 10-176, and 10-230.

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3817R

Date File Saved: 11/18/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0483	97-10-176-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

All samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gamma Spectroscopy

The samples under Request Number 3817R (Work Order 9710176) were received on 10/21/97 and scheduled for gamma spec. analyses, which were completed on 11/05/97.

The analysis results for these samples are reported in units of pCi/Liter. The samples were filtered prior to analysis.

This work order was prepared using PAI SOP739R2 and analyzed using PAI SOP713R4.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Bismuth-214 was detected in the blank (97-10-230-B1) at a concentration in excess of the 2σ total propagated uncertainty (TPU). However, since the concentration detected is below the corresponding decision level, no sample results are compromised. Potassium-40 was also detected in the blank at a concentration in excess of the 2σ TPU and in excess of the corresponding decision level. The ^{40}K result reported for the duplicate (97-10-176-D1) is therefore of questionable validity.

Cadmium-109 and ^{237}Np are often misidentified when using the required library. The observed photopeak at 87 keV is attributed to the K_β x ray of Pb. Likewise, ^{211}Bi and ^{224}Ra are misidentified due to interference from ^{214}Pb at 351 keV and 241 keV, respectively. Due to interference, the GDR software did not attempt to quantify activity concentrations for some analyses. In such cases, zero values are reported in the hard copy reports, and an "NQ" qualifier is submitted in the electronic deliverable.

Quantification of ^{226}Ra at low levels based upon the 186 keV photopeak is unreliable due to interference from ^{235}U, which also has a photopeak at 186 keV. Low levels of ^{235}U, though undetectable by this method, can cause greatly exaggerated ^{226}Ra results. The ^{226}Ra activity reported should be considered qualitative. Activity concentration results above the 2σ TPU for radionuclides identified as present by the analysis software for which spectral interference is suspected are given an "S" flag.

Activity concentrations above the 2σ TPU are reported in some instances where no supporting photopeaks are observed. These anomalous identifications result from the GDR software attempting to calculate net activity concentrations for analytes for which no peaks are observed. Such data have been flagged with an asterisk.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill
Radiochemistry Instrumentation

11-18-97
Date

Radiochemistry Final Review

11/18/97
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple
Laboratory Manager

12/10/97
Date

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 01/01/95 10:00

Client Name: SHARED QC

Date Analyzed : 11/03/97 16:26

Lab Sample ID: 97-10-148-S1

Sample Matrix : Water

Client Sample ID: Lab Control

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	108000	103000	105	Pass
Cd-109	1420000	1400000	104	Pass
Co-57	30900	32000	96.5	Pass
Cs-137	37700	36600	103	Pass
Co-60	58700	60100	97.6	Pass

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known ± 15%

Data stored in file \gdr\prt\W10148S1.97P

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/30/97 10:00

Client Name: LANL

Date Analyzed: 11/05/97 19:37

Lab Sample ID: 97-10-230-B1

Sample Matrix: Water

Client Sample ID: Blank

Count Duration: 800 Min.

Nuclide	Dec. Level (pCi/L)	Nuclide	Dec. Level (pCi/L)
Am-241	11.6	Np-237	9.22
Cd-109	53.0	Th-234	112
Co-57	0.728	Ce-144	9.50
Ce-139	0.936	U-235	3.78
Ra-226	127	Th-227	7.05
Pb-212	7.33	Ra-224	24.6
Se-75	1.45	Hg-203	1.51
Pa-231	66.1	Pa-233	3.12
Ra-223	23.0	Eu-152	3.96
Bi-211	8.97	Pb-214	6.49
Sn-113	1.85	Rn-219	26.8
Pb-211	46.4	Ann-Rad	4.75
Sr-85	2.02	Ba-140	17.8
Tl-208	3.40	Cs-134	1.56
Bi-214	14.9	Ru-106	32.6
Cs-137	2.10	Mn-54	1.53
Y-88	3.68	Ac-228	14.6
Pa-234m	674	Zn-65	3.76
Co-60	4.79	Na-22	3.41
K-40	63.4	La-140	28.8
Bi-212	59.7		

Decision Level Values calculated as recommended by ANSI N42.2
Reported sample activities should be compared to these Decision Levels

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/30/97 10:00

Client Name: LANL

Date Analyzed: 11/05/97 19:37

Lab Sample ID: 97-10-230-B1

Sample Matrix: Water

Client Sample ID: Blank

Count Duration: 800 Min.

Nuclide	Activity (pCi/Liter)			% Uncertainty
Am-241	1.32	±	12.5	947
Np-237	-16.9	±	11.3	66.4
Cd-109	22.8	±	36.8	162
Th-234	-38.3	±	136	356
Co-57	-0.343	±	0.885	258
Ce-144	3.71	±	7.04	190
Ce-139	-0.299	±	1.14	380
U-235	0.221	±	4.32	1960
Ra-226	91.2	±	43.6	47.8
Th-227	-9.81	±	8.59	87.6
Pb-212	2.78	±	5.54	199
Ra-224	-115	±	30.8	26.9
Se-75	-0.233	±	1.77	758
Hg-203	0.265	±	1.51	569
Pa-231	27.3	±	47.2	173
Pa-233	0.892	±	2.71	303
Ra-223	-8.46	±	28.0	331
Eu-152	0.410	±	4.32	1050
Bi-211	-36.2	±	11.1	30.8
Pb-214	-0.840	±	7.89	939
Sn-113	0.384	±	1.78	464
Rn-219	11.1	±	19.1	172
Pb-211	10.9	±	43.1	394
Ann-Rad	-21.1	±	5.93	28.1
Sr-85	-6.94	±	2.49	35.9
Ba-140	11.4	±	7.82	68.9
Tl-208	-0.417	±	4.13	991
Cs-134	-0.658	±	1.89	288
Bi-214	7.40	±	9.10	123
Ru-106	19.6	±	15.9	81.1

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/30/97 10:00

Client Name: LANL

Date Analyzed: 11/05/97 19:37

Lab Sample ID: 97-10-230-B1

Sample Matrix: Water

Client Sample ID: Blank

Count Duration: 800 Min.

Nuclide	Activity (pCi/Liter)	% Uncertainty
Cs-137	0.524 ± 1.92	367
Mn-54	-0.162 ± 1.86	1150
Y-88	2.01 ± 2.03	101
Ac-228	1.64 ± 15.7	954
Pa-234m	397 ± 338	85.2
Zn-65	0.453 ± 4.02	887
Co-60	3.21 ± 1.93	60.3
Na-22	1.68 ± 2.11	126
K-40	13.3 ± 61.0	460
La-140	0.723 ± 34.1	4720
Bi-212	-25.7 ± 72.5	282

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

Decision Level Values calculated as recommended by ANSI N42.2
Reported sample activities should be compared to these Decision Levels

Data is stored in file \gdr\prt\W10230B1.97P

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/30/97 10:00

Client Name: LANL

Date Analyzed: 11/05/97 19:37

Lab Sample ID: 97-10-230-B1

Sample Matrix: Water

Client Sample ID: Blank

Count Duration: 800 Min.

Nuclide	Activity (pCi/Liter)	% Uncertainty
Am-241	< 11.6	BDL
Np-237	< 9.22	BDL
Cd-109	< 53.0	BDL
Th-234	< 112	BDL
Co-57	< 0.728	BDL
Ce-144	< 9.50	BDL
Ce-139	< 0.936	BDL
U-235	< 3.78	BDL
Ra-226	< 127	BDL
Th-227	< 7.05	BDL
Pb-212	< 7.33	BDL
Ra-224	< 24.6	BDL
Se-75	< 1.45	BDL
Hg-203	< 1.51	BDL
Pa-231	< 66.1	BDL
Pa-233	< 3.12	BDL
Ra-223	< 23.0	BDL
Eu-152	< 3.96	BDL
Bi-211	< 8.97	BDL
Pb-214	< 6.49	BDL
Sn-113	< 1.85	BDL
Rn-219	< 26.8	BDL
Pb-211	< 46.4	BDL
Ann-Rad	< 4.75	BDL
Sr-85	< 2.02	BDL
Ba-140	< 17.8	BDL
Tl-208	< 3.40	BDL
Cs-134	< 1.56	BDL
Bi-214	< 14.9	BDL
Ru-106	< 32.6	BDL

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/30/97 10:00

Client Name: LANL

Date Analyzed: 11/05/97 19:37

Lab Sample ID: 97-10-230-B1

Sample Matrix: Water

Client Sample ID: Blank

Count Duration: 800 Min.

Nuclide	Activity (pCi/Liter)	% Uncertainty
Cs-137	< 2.10	BDL
Mn-54	< 1.53	BDL
Y-88	< 3.68	BDL
Ac-228	< 14.6	BDL
Pa-234m	< 674	BDL
Zn-65	< 3.76	BDL
Co-60	< 4.79	BDL
Na-22	< 3.41	BDL
K-40	< 63.4	BDL
La-140	< 28.8	BDL
Bi-212	< 59.7	BDL

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

BDL = Below Detection Limit; see method for DL determination

Data is stored in file \gdr\prt\W10230B1.97P

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/16/97 12:00

Client Name: LANL

Date Analyzed: 11/05/97 19:37

Lab Sample ID: 97-10-176-D1

Sample Matrix: Water

Client Sample ID: Duplicate

Count Duration: 800 Min.

Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)
Np-237	16.0 ± 11.5	Cd-109	55.8 ± 40.2
Pb-212	5.76 ± 3.69	Hg-203	0.973 ± 1.19
Ac-228	15.8 ± 6.37	Sn-113	1.04 ± 1.22
Tl-208	2.46 ± 2.78	Zn-65	2.69 ± 2.48
K-40	89.9 ± 40.9	Am-241	-1.45 ± 4.11
Th-234	-178 ± 77.5	Co-57	-0.216 ± 0.706
Ce-144	-0.094 ± 6.50	Ce-139	-0.987 ± 0.882
U-235	0.541 ± 2.93	Ra-226	-1.89 ± 48.3
Th-227	-24.0 ± 6.29	Ra-224	-137 ± 24.1
Se-75	-0.185 ± 1.22	Pa-231	16.5 ± 30.3
Pa-233	0.219 ± 1.77	Ra-223	-19.5 ± 17.8
Eu-152	-0.534 ± 2.54	Bi-211	-8.68 ± 9.74
Pb-214	0.340 ± 5.69	Rn-219	-1.37 ± 10.6
Pb-211	-4.72 ± 23.1	Ann-Rad	-16.4 ± 3.30
Sr-85	-6.61 ± 1.84	Ba-140	7.81 ± 10.0
Cs-134	0.013 ± 1.11	Bi-214	-9.85 ± 6.74
Ru-106	-0.416 ± 9.99	Cs-137	-0.675 ± 1.00
Mn-54	-0.651 ± 1.12	Y-88	-1.69 ± 2.83
Pa-234m	-41.3 ± 368	Co-60	-0.137 ± 1.10
Na-22	0.103 ± 1.11	La-140	258 ± 1360
Bi-212	36.4 ± 42.3		

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

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

Remarks:

Sample 97-10-176-D1 is a duplicate of 97-10-176-01.

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgment based on data use . It usually has an "M" with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analytes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likely because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1c Carrier recovery 10-40% and result > EQL.

1d Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

3b Spike recovery outside criterion but sample is not of same matrix as was matrix spike sample

4 Sample result > EQL but < 5X the amount found in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

6d LCS tracer/carrier recovery < 10 % and sample result is a non-detect.

7 For the set of duplicates, both results are > EQL or no EQL is available, but there is not a 3 σ agreement between the results - within an SDG.

8 One result > EQL and the difference > a factor of 1xEQL for water and 2xEQL for soil.

9a Result < MDA and MDA is < EQL.

9b Result > MDA but < EQL.

10a Result < both MDA and EQL.

10b Result < MDA but > EQL.

11 Result is less than three times the reported 1-sigma uncertainty.

17 A zero was added to the result field because the laboratory did not provide a value or a MDC.

RADIOCHEMISTRY

Lab Control Sample (LCS) **Present? X yes no** **1/SDG** **75-125% recovery** *The Iso-U LCS contains U-234 and U-238. The Iso-Pu LCS contains Pu-239. The γ spec. LCS contains Am-241, Cd-109, Co-57, Cs-137, and Co-60.* *Paragon uses a blank spike as the LCS for the gross α/β analysis.*	**OK** See comment	**Obtain from lab. Q=A** **If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 75% and J+ for > 125%** **If the LCS sample tracer/ carrier recovery is < 10%, qualify the associated sample data as P for non-detects.**	 **R6a** **R6** **R6d**
Matrix Spike (MS) **1/SDG** **Present? yes X no** **75-125% recovery** **(Note: As opposed to other tests, the matrix spike test will qualify samples on the basis of their connection by SDG and not by analytical batch).** *As per the case narrative, due to limited sample volume neither a duplicate nor a matrix spike was prepared. A duplicate LCS was prepared and reported instead.*	**A** See comment	**Obtain from lab. Q=A** **If criterion not met, qualify all analytes associated with the MS with a J- for <75%** **and J+ for > 125%,** **if all samples in batch of same matrix. If there is variation of matrix, P for samples not of same matrix as spiked sample.**	 **R3a** **R3** **R3b**

MJ 19 Dec 97

Method blank **Present? X yes no** **1/SDG** **target analytes ≤5x the amount in the blank**	**OK**	**Obtain from lab. Q=A** **If the sample result > EQL or no EQL is available but <5x the amount found in the associated blank, it should be qualified as U. In making this comparison the differing aliquot size of the blank and sample being tested should be taken into account.**	**R4**
Duplicate **Present? yes no** **1/SDG** **(Note: As opposed to other tests, the duplicate tests will qualify samples on the basis of their connection by SDG and not by analytical batch).** *For Pu-239, the duplicate sample result is > the EQL while the sample is < the EQL. There is a factor of > 1X the EQL between the sample and duplicate and, therefore, the sample is qualified as J.* *For gross γ analysis there is not a 3σ agreement between the sample and duplicate.* *As per the case narrative, due to limited sample volume neither a duplicate nor a matrix spike was prepared. A duplicate LCS was prepared and reported instead.*	**J, A** **See comment**	**Obtain from lab. Q=A** **If both results are above the EQL or no EQL is available, all results for same analyte in same SDG should be qualified as J if there is not 3σ agreement between results.** **If both results are < EQL no test should be done.** **If one result > EQL and difference > factor of 1X EQL for water and 2X EQL for soil, qualify with J.**	**R7** **R8**

M19 Dec 97

EQL **Denote those samples where the result is less than the reported sample MDA or EQL.** **Confirm that the MDA of each reported analyte in each sample and blank is <EQL.** *The decision level values from the blank were used in place of the MDA for the γ spec., gross α/β, and Sr-90 analyses.*	**U** **See comment**	**When the MDA < the EQL or no EQL is available:** **Qualify as U those sample results < the MDA.** **Qualify as U those sample results > MDA but < EQL.** **When the MDA is >EQL:** **Qualify as U those sample and blank results < both the MDA and EQL.** **Qualify as U those sample and blank results < than the MDA but > EQL.**	 R9a R9b R10a R10b
Detection with respect to the reported uncertainty **This is a more conservative test of detection than simply considering the MDA or EQL since sample results > than both the EQL and MDA may still be qualified using this test.**	**NA**	**Qualify as U those results < three times the reported 1-sigma uncertainty. Equivalently qualify as U those results < 1.5 times the reported 2-sigma uncertainty or < the reported 3-sigma uncertainty.**	 R11

A119 Dec 97

Tracer/carrier recovery **Present? yes no**	**UJ, J** **See comment**	**Obtain from lab. Q=A**	
Tracer recovery for alpha spec analyses 330 %		**If tracer/carrier recovery < 10 %, qualify results as R**	**R10**
Carrier recovery for beta/gamma analyses 3 40%		**If tracer recovery is 10-30%, Q=J**	**R11a**
		if result > EQL and UJ if result < EQL	**R11b**
The tracer recovery for the Iso-Pu sample is 21% and the sample duplicate is 23%. The Pu-238 result is qualified as J and the Pu-239 result is qualified as UJ.		**If carrier recovery is 10-40%, Q=J**	**R11c**
		if result > EQL and UJ if < EQL	**R11d**
The tracer recovery for the Iso-U analysis of the duplicate was 19%. No action taken.			
The carrier recovery for the Sr-90 sample is 20.%. The result is qualified as UJ.			

MDec97

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Monday, December 08, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3817R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710176

Field ID: 04LA-97-0483

Lab ID: 9710176-1

Sample Matrix: WATER

Date Prepared: 10-Nov-97

Prep SOP: PAI SOP 780R2

Prep Batch: 143144

Date Collected: 16-Oct-97

Date Analyzed: 04-Dec-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.106 +/- 0.047	0.16	pCi/L	(U, RIO b)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	1.61	pCi/L	33%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analyses not within control limits.

M 19 Dec 97

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Wednesday, November 19, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3817R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710176

Field ID: 04LA-97-0483
Lab ID: 9710176-1

Sample Matrix: WATER
Date Prepared: 10-Nov-97
Prep SOP: PAI SOP 780R2
Prep Batch: 143114

Date Collected: 16-Oct-97
Date Analyzed: 18-Nov-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.76 +/- 0.13	0.23	pCi/L	(J, R11a)
Pu-239	0.011 +/- 0.031	0.11	pCi/L	(U, R11b), (J, R8), (U, R10

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	0.904	pCi/L	21%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

M 19 Dec 97

Sr-90 ANALYSIS RESULTS SUMMARY

Method ASTM D5811-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/16/97

Client Name: Los Alamos National Lab

Date Analyzed : 11/21/97

Client Project ID: 3817R

Sample Matrix : Water

Lab Sample ID Series: 97-10-176

Count Duration: 240 Min.

Analyzed by: RG

Client Sample ID	Lab Sample ID	Sr-90 (pCi/l)	
04LA-97-0483	97-10-176-01	0.52 ± 0.64	(U4, R11c),(U, R9a), A

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

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP707FC and analyzed using PAI SOP724FC.

M19Dec97

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Reported on: Thursday, November 20, 1997

Client Name: Los Alamos National Laboratory

Client Project Name:

Client Project Number: 3817R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710176

Field ID: 04LA-97-0483

Lab ID: 9710176-1

Sample Matrix: WATER

Date Prepared: 10-Nov-97

Prep SOP: PAI SOP 780R2

Prep Batch: 143144

Date Collected: 16-Oct-97

Date Analyzed: 18-Nov-97

Analytical SOP: PAI SOP 714R4

Final Aliquot: 1

Aliquot Units: L

Report Basis: AS RECEIVED

Count Time (min.): 200

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	7.94 +/- 0.57	0.096	pCi/L	
U-235	0.361 +/- 0.074	0.074	pCi/L	
U-238	6.60 +/- 0.49	0.11	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.40	4.17	pCi/L	50%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

1719 Dec 97

ALPHA/BETA ANALYSIS RESULTS SUMMARY

Method 900.0/9310 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/16/97

Client Name: Los Alamos National Lab

Date Analyzed : 11/05/97

Client Project ID: 3817R

Sample Matrix : Water

Lab Sample ID Series: 97-10-176

Count Duration: 600 Min.

Analyzed By : RG

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/l)	Gross Beta (pCi/l)
04LA-97-0483	10-176-01	479 ± 98	730 ± 120
Duplicate-01	10-176-D1	440 ± 88	670 ± 120

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

Reported Activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the approriate blank.

These samples were prepared using PAI SOP702FC and analyzed using PAI SOP705FC.

Remarks:

Sample 97-10-176-D1 is a duplicate of sample 97-10-176-01.

17 19 Nov 97

RG

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/16/97 12:00

Client Name: Los Alamos Natl Lab/SMO

Date Analyzed: 11/05/97 19:33

Lab Sample ID: 97-10-176-01

Sample Matrix: Water

Client Sample ID: 04LA-97-0483

Count Duration: 800 Min.

	Nuclide	Activity (pCi/L)	Nuclide	Activity (pCi/L)	
(U,R9a)	Ra-226	92.8 ± 57.3	Pa-233	5.01 ± 3.82	
	Bi-211	19.0 ± 32.6	K-40	65.3 ± 82.3	(U,R4)
(J,R9a)	Am-241	0.063 ± 11.2	Np-237	-5.28 ± 13.2	(U,R9a)
	Cd-109	-8.70 ± 43.6	Th-234	-44.1 ± 124	
	Co-57	0.517 ± 1.30	Ce-144	-4.19 ± 10.0	
	Ce-139	-0.986 ± 1.47	U-235	-2.81 ± 5.11	
	Th-227	-23.9 ± 12.9	Pb-212	5.31 ± 7.55	
	Ra-224	-71.1 ± 41.0	Se-75	0.386 ± 2.65	
	Hg-203	1.49 ± 2.60	Pa-231	-14.3 ± 67.5	
	Ra-223	11.4 ± 40.2	Eu-152	3.88 ± 5.83	
	Pb-214	5.43 ± 9.93	Sn-113	1.46 ± 2.77	
	Rn-219	16.7 ± 23.4	Pb-211	-28.5 ± 53.7	
	Ann-Rad	-21.8 ± 7.14	Sr-85	-11.4 ± 4.10	
	Ba-140	4.05 ± 22.7	Tl-208	-0.241 ± 5.65	
	Cs-134	0.164 ± 2.57	Bi-214	1.82 ± 11.2	
	Ru-106	10.8 ± 22.8	Cs-137	1.39 ± 2.44	
	Mn-54	0.918 ± 2.56	Y-88	-1.90 ± 6.55	
	Ac-228	14.6 ± 19.8	Pa-234m	314 ± 460	
	Zn-65	-2.48 ± 6.10	Co-60	1.74 ± 2.62	
	Na-22	-4.30 ± 3.22	La-140	-326 ± 4040	
	Bi-212	8.63 ± 105			

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

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

11/19 Dec 97

Thursday, October 23, 1997

DATA ENTERED

110397 M

REQUEST NUMBER: 3840R

ANALYSIS TYPE: ORG

Los Alamos
NATIONAL LABORATORY

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/23/97
REPORT DUE: 11/23/97
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 3840R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
PESTPCB		04LA-97-0486	01	W	10/20/97	
PAH		04LA-97-0486	02	W	10/20/97	
TOC		04LA-97-0486	03	W	10/20/97	
VOAGCMS		04LA-97-0486	18	W	10/20/97	
VOAGCMS		04LA-97-0486	19	W	10/20/97	

RECRA LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

Recra LabNet Philadelphia
Analytical Report

Client : LANL-REQ#3840R
RFW# : 9710L955
Subcontract : 7791L0014-9S

W.O.# : 02744-064-001-9999-00
Date Received : 10-24-97

PESTICIDE/PCB

1. The set of samples consisted of one (1) water sample collected on 10-21-97.

2. The sample and its associated QC samples were extracted on 10-27-97 and analyzed based on SW846, 3rd Edition, procedures on 11-01,02-97. The extraction procedure used was based on Method 3520 and the extracts were analyzed based on Method 8081.

3. The cooler temperature upon receipt has been recorded on the chain-of-custody.

4. All required holding times for extraction and analysis were met. There was insufficient sample for re-extraction.

5. The method blank was below the reporting limits for all target compounds.

6. Two (2) of six (6) surrogate recoveries were outside acceptance criteria. A copy of the Sample Discrepancy Report (SDR) has been enclosed.

7. Two (2) of six (6) blank spike recoveries were outside acceptance criteria. A copy of the Sample Discrepancy Report (SDR) has been enclosed.

8. All initial calibrations associated with this data set were within acceptance criteria.

9. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria.

10. I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this QC Report.

for Bruce C Hollenbeck

J. Michael Taylor
Vice President and Laboratory Manager
Lionville Analytical Laboratory

12-9-97
Date

jeh\pcb\10-955.pp

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 328 pages.

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610)-280-3000 • Fax (610) 280-3041

RECRA LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

Recra LabNet Philadelphia
Analytical Report

Client : LANL-REQ#3840R
RFW# : 9710L955
Subcontract # : 7791L0014-9S

W.O# : 02744-064-001-9999-00
Date Received : 10-24-97

POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC

1. One (1) water sample was collected on 10-20-97.

2. The sample and its associated QC samples were prepared on 10-28-97 and analyzed according to the criteria set forth in EPA Method 8310 for Polynuclear Aromatic Hydrocarbon target compounds on 11-04-97.

3. The cooler temperature upon receipt has been recorded on the chain-of-custody.

4. The preparation hold time was exceeded for this sample set. A copy of the Sample Discrepancy Report (SDR) has been enclosed.

5. All initial calibrations associated with this data set were within acceptance criteria.

6. Continuing calibration criteria were exceeded (response increased) for indeno(1,2,3-cd)pyrene for the continuing calibration verification standard analyzed during the run sequence of 10-28-97. All samples analyzed after one of these standards did not exhibit any presence of these analytes. A copy of the Sample Discrepancy Report (SDR) has been enclosed in the data package.

7. One (1) of four (4) obtainable surrogate recoveries was outside acceptance criteria. A copy of the Sample Discrepancy Report (SDR) has been enclosed.

8. All blank spike recoveries were within acceptance criteria.

9. I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this QC Report.

for Bruce C. Potter (with leave)
J. Michael Taylor
Vice President and Laboratory Manager
Lionville Analytical Laboratory

12-9-97
Date

jeh\gc\10-955.pah

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 111 pages (including page 005A).

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610)-280-3000 • Fax (610) 280-3041

RECRA
LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

Recra LabNet Philadelphia
Analytical Report

Client : LANL–REQ#3840R
RFW# : 9710L955
Subcontract# : 7791L0014–9S

W.O.# : 02744–064–001–9999–00
Date Received: 10–24–97

INORGANIC CASE NARRATIVE

1. This narrative covers the analysis of 1 water sample.

2. The sample was prepared and analyzed in accordance with the method checked on the attached glossary.

3. Sample holding time as required by the method and/or contract was met.

4. The cooler temperature was recorded on the chain–of–custody.

5. The method blank was within method criteria.

6. The Laboratory Control Samples (LCS) were within the laboratory control limits. The duplicate LCS was within the 20% Relative Percent Difference (RPD) control limit.

7. I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this QC Report.

Bruce C. Miller unit leader — 12-2-97

for J. Michael Taylor
Vice President and Laboratory Manager
Lionville Analytical Laboratory

Date

njp&pef\i10–955

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 21 pages.

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610)-280-3000 • Fax (610) 280-3041

RECRA
LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

Recra LabNet Philadelphia
Analytical Report

Client : LANL-REQ#3840R
RFW # : 9710L955
Subcontract #: 7791L0014-9S

W.O. #: 02744-064-001-9999-00
Date Received: 10-24-97

GC/MS VOLATILE

One (1) water sample was collected on 10-20-97.

The sample and its associated QC samples were analyzed according to criteria set forth in SW 846 Method 8260A for Client Specified Volatile target compounds on 11-02-97.

The following is a summary of the QC results accompanying these sample results and a description of any problems encountered during their analyses:

1. The cooler temperature upon receipt has been recorded on the chain-of-custody.

2. The required holding time for analysis was met.

3. Non-target compounds were detected in sample 04LA-97-0486 18/19.

4. All surrogate recoveries were within EPA QC limits.

5. All matrix spike recoveries were within EPA QC limits.

6. All blank spike recoveries were within EPA QC limits.

7. The method blank contained the common contaminants Methylene Chloride and Acetone at levels less than 5x the CRQL and the target compounds Bromomethane and 2-Butanone at levels less than the CRQL.

8. All internal standard area and retention time criteria were met.

9. These water analyses were performed with the method enhancement of a 40°C heated purge to standardize the purge temperature and improve overall purging efficiency.

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 120 pages.

10. As of May 24, 1997, WESTON Lionville Laboratory became Recra LabNet Philadelphia. Some forms may still reference WESTON Lionville Laboratory.

11. I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this QC Report.

for J. Michael Taylor
Vice President and Laboratory Manager
Lionville Analytical Laboratory

11 24 07
Date

mmz/voa/10-955v.cn

006 11/24/07

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: 3840R LAB NAME _____ LAB CODE_____

NAME OF CCS CHECKER_____ COMPANY_____

NAME OF VALIDATOR R. Sherman COMPANY LATA

CCS DATE_____ VALIDATION DATE 12/18/97 EDS ENTRY DATE_____

ANALYTICAL SUITE:

- x VOLATILES
- o SEMIVOLATILES
- x PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- o INORGANICS
- o RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? ¨ YES ¨ NO
Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

_____
_____
_____

Signature/1st validation Ruth Sherman 12/18/97
Signature/2nd validation _____
Qualifiers entered _____ Date_____

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgement based on data use . It usually has an "M"with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analyltes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likley because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

VOLATILES **(V)**

0 The internal standard retention time has shifted by more than ±30 seconds, which could affect compound identification and cause false positives or negatives.

1 The internal standard area count for the quantitating internal standard is outside the - 50, + 100 % window in relation to the previous continuing calibration, which could affect the accuracy of the quantitation of the associated analytes and the correct quantiitatiion of surrogate recoveries.

1a Non-detected results, and the area count for the quantitating internal standard is < 50 % of the area count for the previous continuing calibration, which greatly increases the potential for false negative results.

2 Very low or abrupt drop-off of quantitating internal standard, which indicates an increased potential for false negative results and possibly other problems with sample quantitation.

3 SMC (surrogate) % recovery > upper limit, which indicates a potential high bias in the results and a potential for false positive results.

3a SMC % recovery < lower limit but > 10%, which indicates a potential low bias in the results.

3b SMC recovery < 10%, which indicates an increased potential for a low bias in the results.

3c Indicates that the quantitation limit is approximated for non-detects because of SMC recovery < lower limit but > 10%, which also indicates an increased potential for false negative results.

3d SMC % recovery < 10% and result is a non-detect, which indicates a greatly increased potential for false negative results.

4 Sample result > EQL and < 5X (10X for acetone, methylene chloride, and 2-butanone) the concentration of the related analyte in the blank, which indicates the reported detection is considered to be indistinguishable from blank contamination.

5 Sample result < EQL and < 5X (10X as above) the concentration of the analyte in the blank, which indicates the detected result was indistinguishable from blank contamination and the detected result was changed to non-detected at the EQL.

5a Sample result > EQL and > 5X (10X as above) the concentration of the analyte in the blank, which indicates the reported result is not likely to be related to the contamination in the associated blank.

6 Response factor for the analytes is <0.05, indicating a sensitivity problem that could prohibit detection if present at low concentrations.

7 % RSD or % D exceeds the specification which may affect quantitation, which indicates potential quantitation problems in the analyses.

8 Instrument Performance Check has ion ratios our of specification, which may affect compound identification.

9. Holding time is exceeded. An evaluation of the data of interest with respect to holding time exceedance impact (technically) is recommended. Factors to consider include sample preservation, sample storage practices, use of the data, levels of contamination found in the sample, and the physical, chemical, and biological stability of the target analytes in the sample matrix.

10. The result is higher than the high point of the calibration (or outside the linear range). This usually results in a negative bias in the reported concentratiion.

SEMIVOLATILES (SV)

0 The internal standard retention time has shifted by more than ±30 seconds, which could affect compound identification and cause false positives or negatives.

1 The internal standard area count for the quantitating internal standard is outside the - 50, + 100 % window in relation to the previous continuing calibration, which could affect the accuracy of the quantiitation of the associated analytes and the correct quantitation of surrogate recoveries.

1a Non-detected results, and the area count for the quantitating internal standard is < 50 % of the area count

6 Response factor for the analytes is <0.05, indicating a sensitivity problem that could prohibit detection if present at low concentrations

7 % RSD or % D exceeds the specification which may affect quantitation, which indicates potential quantitation problems in the analyses.

8. Instrument Performance Check has "important" ion(s) or ion ratios out of specification, which may affect compound identification.

9. Holding time is exceeded. An evaluation of the data of interest with respect to holding time exceedance impact (technically) is recommended. Factors to consider include sample preservation, sample storage practices, use of the data, levels of contamination found in the sample, and the physical, chemical, and biological stability of the target analytes in the sample matrix.

10 The result is higher than the high point of the calibration (or outside the linear range). This usually results in a negative bias in the reported concentratiion.

ORGANOCHLORINE PESTICIDES/AROCLORS (P)

3 Surrogate % recovery > upper limit, which indicates a potential high bias in the results and a potential for false positive results.

3a Surrogate % recovery is > 10% but < the lower limit, which indicates a potential low bias in the results.

3b Surrogate % recovery < 10%, which indicates an increased potential low bias in the results..

3c Result is non-detect and the surrogate % recovery > 10 % but < lower limit, which indicates a potential for false negative results.

3d Result is a non-detect and the surrogate recovery < 10%, which indicates a greatly increased potential for false negative results.

4 Sample result > EQL and < 5X the concentration of the related analyte in the blank, which indicates the reported detection is considered to be indistinguishable from blank contamination.

5 Sample result < EQL and < 5X (10X as above) the concentration of the analyte in the blank, which indicates the detected result was indistinguishable from blank contamination and the detected result was changed to non-detected at the EQL.

5a Sample result > EQL and > 5X (10X as above) the concentration of the analyte in the blank, which indicates the reported result is not likely to be related to the contamination in the associated blank.

6 % RSD or % D exceeds the specification - apply to a positive result, which indicates potential quantitation problems in the analyses and the potential for false positive results.

7 % RSD or %D exceeds the specification - apply to a non-detect, which indicates potential quantitation problems in the analyses and the potential false negative results.

8. Analyte concentration exceeds linear range and sample not diluted to within that range. This usually results in a negative bias in the reported concentratiion.

9. Holding time is exceeded. An evaluation of the data of interest with respect to holding time exceedance impact (technically) is recommended. Factors to consider include sample preservation, sample storage practices, use of the data, levels of contamination found in the sample, and the physical, chemical, and biological stability of the target analytes in the sample matrix.

10. Breakdown criteria have been exceeded, indicating poor instrument performance which can result in a low bias in the reported results and potential false negative results for labile compounds and potential false positive results for breakdown procucts.

11. Surrogate retention time has shifted by > 0.05 minutes, possibly affecting analyte identification and causing false positives or negatives.

HIGH EXPLOSIVES (H)

4 Sample result > EQL and < 5X the concentration of the related analyte in the blank, which indicates the reported detection is considered to be indistinguishable from blank contamination.

ORGANOCHLORINE PESTICIDES/AROCLORS

Initial calibration: Present? x yes no **Daily calibration verification** Present? x yes no	 NA NA	 Obtain from lab. Q=A Obtain from lab. Q=A	
Surrogates: Present? x yes no % recovery Tetrachloro-m-xylene 50-160 Decachlorbiphenyl50-160 % Recovery DCB 8% TCX 2%	 RPM	 Obtain from lab. Q=A If either surrogate's % recovery is more than upper limit, detected target compounds are are qualified with J+. If either surrogate's % recovery is ≥ 10% but ≤ lower limit, qualify detected compounds with J- and non-detected target analytes as UJ. If either surrogate's % recovery <10%, qualify detected compounds as J- and non-detects as R, PM. Enter % recovery in FIMAD table	 P3 P3a P3c P3b P3d
Retention Time Windows Present? x yes no Surrogates' retention time should not shift by ± 0.05 minutes.	 OK	 Obtain from lab. Q=A If either of the surrogate's RT shifts >± 0.05 minutes, qualify the results as PM. (An examination of chromatographic peaks will be required to determine if target analytes are present).	

12/12/97

Method blanks **Present? x yes no** **Separate for each method, matrix, and/or analytical batch** **Target analytes < EQL**	**OK**	**Obtain from lab. Q=A** **If target compound found in blank but not in sample, no qualifier.** **Sample result > EQL and < 5 X multiple of blank, elevate EQL to sample result and qualify as U.** **Sample result < EQL and < 5X multiple of blank, elevate sample results to EQL and qualify as U.** **Sample result > 5X multiple, OK**	 **P4** **P5**
Breakdown criteria **Present? x yes no** **≤ 20% for either 4,4'-DDT or endrin or 30% for combined breakdown.**	**OK**	**Obtain from lab. Q=A** **Q=P**	
Holding time **Extraction within 14 days of sample collection for soil and 7 days for water** **Analyses within 40 days of extraction**	**OK**	**Compare date of extraction with sampling date on Analytical Request and date of analysis with date of extraction. Q=PM**	

JDS
12/18/97

1D
PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

04LA-97-0486 01

Lab Name: Recra.LabNet Work Order: 02744064001

Client: LANL-REQ#3840R

Matrix: WATER Lab Sample ID: 9710L955-001

Sample wt/vol: 950 (g/mL) ML Lab File ID: 11019709.09

Level: (low/med) LOW Date Received: 10/24/97

% Moisture: not dec. _____ dec. Date Extracted: 10/27/97

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 11/01/97

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
319-84-6	Alpha-BHC	0.052	U
319-85-7	Beta-BHC	0.052	U
319-86-8	Delta-BHC	0.052	U
58-89-9	gamma-BHC (Lindane)	0.052	U
76-44-8	Heptachlor	0.052	U
309-00-2	Aldrin	0.052	U
1024-57-3	Heptachlor epoxide	0.052	U
959-98-8	Endosulfan I	0.052	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.52	U
53494-70-5	Endrin ketone	0.10	U
7421934	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.052	U
5103-74-2	gamma-Chlordane	0.052	U
8001-35-2	Toxaphene	5.2	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.1	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

RPM, P3d

FORM 1 PEST 12/88 Rev.

12-04-97

12/18/97

1D
PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

PBLKCU

Lab Name: Recra.LabNet Work Order: 02744064001

Client: LANL-REQ#3840R

Matrix: WATER Lab Sample ID: 97LE2012-MB1

Sample wt/vol: 1000 (g/mL) ML Lab File ID: 11019709.19

Level: (low/med) LOW Date Received: 10/27/97

% Moisture: not dec. _____ dec. Date Extracted: 10/27/97

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 11/02/97

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
319-84-6	Alpha-BHC	0.050	U
319-85-7	Beta-BHC	0.050	U
319-86-8	Delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421934	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

FORM 1 PEST 12/88 Rev.

gw 12-04-97

2E

WATER PESTICIDE SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#3840R

RFW Lot No.: 9710L955

	CLIENT SAMPLE NO.	S1 (DCB) #	OTHER TCX
01	04LA-97-0486 01	8 *	2 *
02	PBLKCULE2012-MB1	95	32
03	PBLKCULE2012-MB1 BS	89	28

	ADVISORY QC LIMITS
S1 (DCB) = Decachlorobiphenyl	(22-126)
S2 (TCX) = Tetrachloro-m-xylene	(27-129)

Column to be used to flag recovery values
* Values outside of QC limits
D Surrogates diluted out

JW 12-04-97

3E

WATER PESTICIDE MATRIX SPIKE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#3840R RFW Lot No.: 9710L955

MATRIX Spike - Sample No.: PBLKCULE2012-MB1 Level:(low/med) LOW

COMPOUND	SPIKE ADDED UG/L	SAMPLE CONCENTRATION UG/L	MS CONCENTRATION UG/L	MS % REC #	QC LIMITS REC
gamma-BHC (Lindane)	0.200	0	0.160	80	56 -127
Heptachlor	0.200	0	0.0800	40 *	50 -129
Aldrin	0.200	0	0.0700	35 *	48 -133
Dieldrin	0.500	0	0.430	86	57 -131
Endrin	0.500	0	0.420	84	46 -150
4,4'-DDT	0.500	0	0.430	86	38 -138

Column to be used to flag recovery value with an asterisk
* Values outside of QC limits

Spike Recovery: 2 out of 6 outside limits

COMMENTS:

JW 12-04-97

1D
PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

PBLKCUMS

Lab Name: Recra.LabNet Work Order: 02744064001

Client: LANL-REQ#3840R

Matrix: WATER Lab Sample ID: 97LE2012-MB1 BS

Sample wt/vol: 1000 (g/mL) ML Lab File ID: 11019709.20

Level: (low/med) LOW Date Received: 10/27/97

% Moisture: not dec. _____ dec. Date Extracted: 10/27/97

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 11/02/97

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
319-84-6	Alpha-BHC	0.050	U
319-85-7	Beta-BHC	0.050	U
319-86-8	Delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)		SP
76-44-8	Heptachlor		SP
309-00-2	Aldrin		SP
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin		SP
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin		SP
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT		SP
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421934	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

SP: SPIKE COMPOUND FORM 1 PEST 12/88 Rev.

D-0497

VOLATILES

Instrument Performance Check Present? x yes no	NA	Obtain from lab. Q=A	
Initial calibration: Present? x yes no Continuing Calibration Present? x yes no	OK OK	Obtain from lab. Q=A Analytes not meeting RRF or % RSD criteria should be circled on Initial Calibration Form Obtain from lab. Q=A Analytes not meeting RRF or % D criteria should be circled on Continuing Calibration Form	
Internal Standards Present? x yes no Required IS: chlorobenzene-d5 1,4-difluorobenzene 1,4-dichlorbenzene -d4 RT must be < ± 30 sec. from previous continuing calibraition Response area must not vary by > factor of 2 (+100, -50) from previous continuing calibration	 OK	Check manually during baseline validation. Obtain from lab. Q=A If RT varies by > 30 seconds, qualify with PM, in which case focused validation checks the chromato-graphic profile for false + or -. If an IS area count is outside the -50 +100 % criterion, qualify positive results quantified by the IS with J,PM Non-detects quantified by the IS as UJ if area count < 50 % Very low or abrupt drop-off, R Enter % variation in FIMAD table	 V1 V1a V2

12/18/97

System Monitoring Compounds (SMC) or surrogates **Present? x yes no** **% recovery Water** **Toluene-d8 88-110%** **BFB 86-115%** **Dibromofluoromethane 86-118%** **% recovery Soil** **Toluene-d8 81-117%** **BFB 74-121** **Dibromofluoromethane 80-120**	**OK**	**Obtain from lab. Q=A** **If SMC % recovery > upper limit, detected target compounds are qualified with J+.** **For non-detects, not qualified** **If SMC has % recovery < lower limit but 3 10%, qualify detected compounds with J-** **For detected compounds, same J- qualifier if recovery of SMC < 10%** **For non-detects, the quantitation limit is qualified as approximated, UJ, when SMC is ≥10%** **For non-detected analytes, if SMC recovery <10%, reject R, PM** **Do not qualify results for diluted samples based on SMC/ Surrogate recoveries** **Enter % recovery in FIMAD table**	 **V3** **V3a** **V3b** **V3c** **V3d**

Method Blanks **Present? x yes no** **Separate blank for each method, matrix and/or 12 hour batch** **Target compounds must be ≤ EQL except acetone, methylene chloride, and 2-butanone which can be present at ≤ 5 X EQL.** ***Acetone and methylene chloride detected in blank and sample.***	**U**	**Obtain from lab. Q=A** **If target compound found in blank but not in sample, no qualifier.** **Sample result > EQL and < 5 X (< 10x for noted exceptions) multiple of blank, elevate EQL to sample result and qualify as U.** **Sample result < EQL and < 5X (< 10x for noted exceptions) multiple of blank, elevate sample results to EQL and qualify as U.** **Sample result > 5X multiple, OK**	**V4** **V5**
Holding time **Analysis within 14 days of sample collection for soil and 7 days for water.** ***Analysis date exceeds criteria by 6 days***	**PM**	**Compare date of analysis with sampling date on Analytical Request** **Q=PM if not met**	
TICs (if requested) **Present x yes no**	**Tics requested and present**		

1A

VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

04LA-97-0486 18/19

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9710L955-004

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x110208

Level: (low/med) LOW Date Received: 10/24/97

% Moisture: not dec. _____ Date Analyzed: 11/02/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND			
75-71-8	Dichlorodifluoromethane	10	U	
74-87-3	Chloromethane	10	U	
75-01-4	Vinyl Chloride	10	U	
74-83-9	Bromomethane	10	U	
75-00-3	Chloroethane	10	U	
75-69-4	Trichlorofluoromethane	5	U	
75-35-4	1,1-Dichloroethene	5	U	
76-13-1	Trichlorotrifluoroethane	5	U	
67-64-1	Acetone	24	B	U, V4
74-88-4	Iodomethane	5	U	
75-15-0	Carbon Disulfide	5	U	
75-09-2	Methylene Chloride	9	B	U, V4
156-60-5	Trans-1,2-dichloroethene	5	U	
75-34-3	1,1-Dichloroethane	5	U	
78-93-3	2-Butanone	20	U	
159-59-2	Cis-1,2-dichloroethene	5	U	
590-20-7	2,2-Dichloropropane	5	U	
74-97-5	Bromochloromethane	5	U	
67-66-3	Chloroform	5	U	
71-55-6	1,1,1-Trichloroethane	5	U	
56-23-5	Carbon Tetrachloride	5	U	
563-58-6	1,1-dichloropropene	5	U	
71-43-2	Benzene	5	U	
107-06-2	1,2-Dichloroethane	5	U	
79-01-6	Trichloroethene	5	U	
78-87-5	1,2-Dichloropropane	5	U	
74-95-3	Dibromomethane	5	U	
75-27-4	Bromodichloromethane	5	U	
10061-01-5	cis-1,3-Dichloropropene	5	U	
108-10-1	4-Methyl-2-pentanone	20	U	
108-88-3	Toluene	5	U	
10061-02-6	Trans-1,3-Dichloropropene	5	U	
79-00-5	1,1,2-Trichloroethane	5	U	
127-18-4	Tetrachloroethene	5	U	

12/18/97

1B
VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

04LA-97-0486 18/19

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9710L955-004

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x110208

Level: (low/med) LOW Date Received: 10/24/97

% Moisture: not dec. _____ Date Analyzed: 11/02/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
142-28-9	1,3-Dichloropropane	5	U
591-78-6	2-Hexanone	20	U
124-48-1	Dibromochloromethane	5	U
106-93-4	1,2-Dibromoethane	5	U
108-90-7	Chlorobenzene	5	U
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
98-82-8	Isopropylbenzene	5	U
108-86-1	Bromobenzene	5	U
96-18-4	1,2,3-Trichloropropane	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
103-65-1	N-propylbenzene	5	U
95-49-8	2-Chlorotoluene	5	U
106-43-4	4-Chlorotoluene	5	U
108-67-8	1,3,5-Trimethylbenzene	5	U
98-06-6	Tert-butylbenzene	5	U
95-63-6	1,2,4-Trimethylbenzene	5	U
135-98-8	Sec-butylbenzene	5	U
541-73-1	1,3-Dichlorobenzene	5	U
106-46-7	1,4-Dichlorobenzene	5	U
99-87-6	4-Isopropyltoluene	5	U
95-50-1	1,2-Dichlorobenzene	5	U
104-51-8	N-butylbenzene	5	U
96-12-8	1,2-Dibromo-3-chloropropane	10	U

FORM 1 V-2 1/87 Rev.

JQC
11/18/97

1E

VOLATILE ORGANICS ANALYSIS SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

04LA-97-0486 18/19

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9710L955-004

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x110208

Level: (low/med) LOW Date Received: 10/24/97

% Moisture: not dec. _____ Date Analyzed: 11/02/97

Column: (pack/cap) CAP Dilution Factor: 1.00

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	11.170	10	J

FORM 1 VOA-TIC 1/87 Rev.

RJS
12/18/97

1A
VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLKHR

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 97LVX279-MB1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x110205

Level: (low/med) LOW Date Received: 11/02/97

% Moisture: not dec. _____ Date Analyzed: 11/02/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
75-71-8	Dichlorodifluoromethane	10	U
74-87-3	Chloromethane	10	U
75-01-4	Vinyl Chloride	10	U
74-83-9	Bromomethane	1	J
75-00-3	Chloroethane	10	U
75-69-4	Trichlorofluoromethane	5	U
75-35-4	1,1-Dichloroethene	5	U
76-13-1	Trichlorotrifluoroethane	5	U
67-64-1	Acetone	18	J
74-88-4	Iodomethane	5	U
75-15-0	Carbon Disulfide	5	U
75-09-2	Methylene Chloride	20	
156-60-5	Trans-1,2-dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
78-93-3	2-Butanone	3	J
159-59-2	Cis-1,2-dichloroethene	5	U
590-20-7	2,2-Dichloropropane	5	U
74-97-5	Bromochloromethane	5	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
563-58-6	1,1-dichloropropene	5	U
71-43-2	Benzene	5	U
107-06-2	1,2-Dichloroethane	5	U
79-01-6	Trichloroethene	5	U
78-87-5	1,2-Dichloropropane	5	U
74-95-3	Dibromomethane	5	U
75-27-4	Bromodichloromethane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
108-10-1	4-Methyl-2-pentanone	20	U
108-88-3	Toluene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	5	U

1B

VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLKHR

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 97LVX279-MB1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x110205

Level: (low/med) LOW Date Received: 11/02/97

% Moisture: not dec. _____ Date Analyzed: 11/02/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
142-28-9	1,3-Dichloropropane	5	U
591-78-6	2-Hexanone	20	U
124-48-1	Dibromochloromethane	5	U
106-93-4	1,2-Dibromoethane	5	U
108-90-7	Chlorobenzene	5	U
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
98-82-8	Isopropylbenzene	5	U
108-86-1	Bromobenzene	5	U
96-18-4	1,2,3-Trichloropropane	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
103-65-1	N-propylbenzene	5	U
95-49-8	2-Chlorotoluene	5	U
106-43-4	4-Chlorotoluene	5	U
108-67-8	1,3,5-Trimethylbenzene	5	U
98-06-6	Tert-butylbenzene	5	U
95-63-6	1,2,4-Trimethylbenzene	5	U
135-98-8	Sec-butylbenzene	5	U
541-73-1	1,3-Dichlorobenzene	5	U
106-46-7	1,4-Dichlorobenzene	5	U
99-87-6	4-Isopropyltoluene	5	U
95-50-1	1,2-Dichlorobenzene	5	U
104-51-8	N-butylbenzene	5	U
96-12-8	1,2-Dibromo-3-chloropropane	10	U

FORM 1 V-2 1/87 Rev.

1E

VOLATILE ORGANICS ANALYSIS SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKHR

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 97LVX279-MB1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x110205

Level: (low/med) LOW Date Received: 11/02/97

% Moisture: not dec. _____ Date Analyzed: 11/02/97

Column: (pack/cap) CAP Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				

2A
WATER VOLATILE SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

	EPA SAMPLE NO.	S1 (DCE)#	S2 (TOL)#	S3 (BFB)#	OTHER	TOT OUT
01	04LA-97-0486 18/19	90	92	93		0
02	04LA-97-0486 18/19MS	90	91	92		0
03	04LA-97-0486 18/19MSD	94	95	97		0
04	VBLKHR	90	89	93		0
05	VBLKHR BS	88	90	92		0

	QC LIMITS
S1 (DCE) = 1,2-Dichloroethane-d4	(76-114)
S2 (TOL) = Toluene-d8	(88-110)
S3 (BFB) = Bromofluorobenzene	(86-115)

Column to be used to flag recovery values
* Values outside of contract required QC limits
D Surrogates diluted out

8A

VOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L955

Lab File ID (Standard): X110203 Date Analyzed: 11/02/97

Instrument ID: 5970X Time Analyzed: 1302

GC Column: DB-624 ID: 0.53 (mm) Heated Purge: (Y/N) Y

		IS1 AREA #	RT	IS2(CBZ) AREA #	RT	IS3(DCB) AREA #	RT
	12 HOUR STD	1011593	15.97	825177	20.24	536422	23.0
	UPPER LIMIT	2023186	16.47	1650354	20.74	1072844	23.5
	LOWER LIMIT	505796	15.47	412588	19.74	268211	22.5
	EPA SAMPLE NO.						
01	VBLKHR	1040752	15.96	880425	20.24	565869	23.05
02	VBLKHRBS	995223	15.97	842452	20.25	550019	23.05
03	04LA-97-0486 18/19	998866	15.96	840031	20.25	550353	23.05
04	04LA-97-0486 18/19M	997593	15.96	845095	20.24	556159	23.05
05	04LA-97-0486 18/19M	918855	15.97	768363	20.25	506674	23.05
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 = Fluorobenzene
IS2 (CBZ) = Chlorobenzene-d5
IS3 (DCB) = 1,4-Dichlorobenzene-d4

UPPER LIMIT = +100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk.

3A

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

MATRIX Spike - EPA Sample No.: 04LA-97-0486 18/19 Level:(low/med) LOW

COMPOUND	SPIKE ADDED UG/L	SAMPLE CONCENTRATION UG/L	MS CONCENTRATION UG/L	MS % REC #	QC LIMITS REC
1,1-Dichloroethene	50.0	0	45.3	91	61 -145
Benzene	50.0	0	44.8	90	76 -127
Trichloroethene	50.0	0	35.5	71	71 -120
Toluene	50.0	0	43.0	86	76 -125
Chlorobenzene	50.0	0	45.8	92	75 -130

COMPOUND	SPIKE ADDED UG/L	MSD CONCENTRATION UG/L	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC
1,1-Dichloroethene	50.0	46.1	92	1	14	61 -145
Benzene	50.0	46.3	93	3	11	76 -127
Trichloroethene	50.0	36.7	73	2	14	71 -120
Toluene	50.0	44.8	90	4	13	76 -125
Chlorobenzene	50.0	47.4	95	3	13	75 -130

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

COMMENTS:

WATER VOLATILE MATRIX SPIKE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

MATRIX Spike - EPA Sample No.: VBLKHR Level:(low/med) LOW

COMPOUND	SPIKE ADDED UG/L	SAMPLE CONCENTRATION UG/L	MS CONCENTRATION UG/L	MS % REC #	QC LIMITS REC
1,1-Dichloroethene	50.0	0	44.7	89	61 -145
Benzene	50.0	0	46.6	93	76 -127
Trichloroethene	50.0	0	36.7	73	71 -120
Toluene	50.0	0	44.2	88	76 -125
Chlorobenzene	50.0	0	47.1	94	75 -130

Column to be used to flag recovery value with an asterisk
* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits

COMMENTS:

1A
VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLKHRMS

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 97LVX279-MB1 BS

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x110207

Level: (low/med) LOW Date Received: 11/02/97

% Moisture: not dec. _____ Date Analyzed: 11/02/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
75-71-8	Dichlorodifluoromethane	10	U
74-87-3	Chloromethane	10	U
75-01-4	Vinyl Chloride	10	U
74-83-9	Bromomethane	10	U
75-00-3	Chloroethane	10	U
75-69-4	Trichlorofluoromethane	5	U
75-35-4	1,1-Dichloroethene		SP
76-13-1	Trichlorotrifluoroethane	5	U
67-64-1	Acetone	9	BJ
74-88-4	Iodomethane	5	U
75-15-0	Carbon Disulfide	5	U
75-09-2	Methylene Chloride	19	B
156-60-5	Trans-1,2-dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
78-93-3	2-Butanone	20	U
159-59-2	Cis-1,2-dichloroethene	5	U
590-20-7	2,2-Dichloropropane	5	U
74-97-5	Bromochloromethane	5	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
563-58-6	1,1-dichloropropene	5	U
71-43-2	Benzene		SP
107-06-2	1,2-Dichloroethane	5	U
79-01-6	Trichloroethene		SP
78-87-5	1,2-Dichloropropane	5	U
74-95-3	Dibromomethane	5	U
75-27-4	Bromodichloromethane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
108-10-1	4-Methyl-2-pentanone	20	U
108-88-3	Toluene		SP
10061-02-6	Trans-1,3-Dichloropropene	5	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	5	U

SP: SPIKE COMPOUND

1B
VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLKHRMS

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 97LVX279-MB1 BS

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x110207

Level: (low/med) LOW Date Received: 11/02/97

% Moisture: not dec. _____ Date Analyzed: 11/02/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
142-28-9	1,3-Dichloropropane	5	U
591-78-6	2-Hexanone	20	U
124-48-1	Dibromochloromethane	5	U
106-93-4	1,2-Dibromoethane	5	U
108-90-7	Chlorobenzene		SP
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
98-82-8	Isopropylbenzene	5	U
108-86-1	Bromobenzene	5	U
96-18-4	1,2,3-Trichloropropane	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
103-65-1	N-propylbenzene	5	U
95-49-8	2-Chlorotoluene	5	U
106-43-4	4-Chlorotoluene	5	U
108-67-8	1,3,5-Trimethylbenzene	5	U
98-06-6	Tert-butylbenzene	5	U
95-63-6	1,2,4-Trimethylbenzene	5	U
135-98-8	Sec-butylbenzene	5	U
541-73-1	1,3-Dichlorobenzene	5	U
106-46-7	1,4-Dichlorobenzene	5	U
99-87-6	4-Isopropyltoluene	5	U
95-50-1	1,2-Dichlorobenzene	5	U
104-51-8	N-butylbenzene	5	U
96-12-8	1,2-Dibromo-3-chloropropane	10	U

SP: SPIKE COMPOUND

FORM 1 V-2

1/87 Rev.

1A
VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

04LA-97-0486 18/19MS

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9710L955-004 MS

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x110209

Level: (low/med) LOW Date Received: 10/24/97

% Moisture: not dec. _____ Date Analyzed: 11/02/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
75-71-8	Dichlorodifluoromethane	10	U
74-87-3	Chloromethane	10	U
75-01-4	Vinyl Chloride	10	U
74-83-9	Bromomethane	10	U
75-00-3	Chloroethane	10	U
75-69-4	Trichlorofluoromethane	5	U
75-35-4	1,1-Dichloroethene		SP
76-13-1	Trichlorotrifluoroethane	5	U
67-64-1	Acetone	22	B
74-88-4	Iodomethane	5	U
75-15-0	Carbon Disulfide	5	U
75-09-2	Methylene Chloride	9	B
156-60-5	Trans-1,2-dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
78-93-3	2-Butanone	20	U
159-59-2	Cis-1,2-dichloroethene	5	U
590-20-7	2,2-Dichloropropane	5	U
74-97-5	Bromochloromethane	5	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
563-58-6	1,1-dichloropropene	5	U
71-43-2	Benzene		SP
107-06-2	1,2-Dichloroethane	5	U
79-01-6	Trichloroethene		SP
78-87-5	1,2-Dichloropropane	5	U
74-95-3	Dibromomethane	5	U
75-27-4	Bromodichloromethane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
108-10-1	4-Methyl-2-pentanone	20	U
108-88-3	Toluene		SP
10061-02-6	Trans-1,3-Dichloropropene	5	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	5	U

SP: SPIKE COMPOUND FORM 1 V-1 1/87 Rev.

1B
VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

04LA-97-0486 18/19MS

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9710L955-004 MS

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x110209

Level: (low/med) LOW Date Received: 10/24/97

% Moisture: not dec. _____ Date Analyzed: 11/02/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
142-28-9	1,3-Dichloropropane	5	U
591-78-6	2-Hexanone	20	U
124-48-1	Dibromochloromethane	5	U
106-93-4	1,2-Dibromoethane	5	U
108-90-7	Chlorobenzene		SP
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
98-82-8	Isopropylbenzene	5	U
108-86-1	Bromobenzene	5	U
96-18-4	1,2,3-Trichloropropane	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
103-65-1	N-propylbenzene	5	U
95-49-8	2-Chlorotoluene	5	U
106-43-4	4-Chlorotoluene	5	U
108-67-8	1,3,5-Trimethylbenzene	5	U
98-06-6	Tert-butylbenzene	5	U
95-63-6	1,2,4-Trimethylbenzene	5	U
135-98-8	Sec-butylbenzene	5	U
541-73-1	1,3-Dichlorobenzene	5	U
106-46-7	1,4-Dichlorobenzene	5	U
99-87-6	4-Isopropyltoluene	5	U
95-50-1	1,2-Dichlorobenzene	5	U
104-51-8	N-butylbenzene	5	U
96-12-8	1,2-Dibromo-3-chloropropane	10	U

SP: SPIKE COMPOUND

FORM 1 V-2

1/87 Rev.

1A
VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

04LA-97-0486 18/19MSD

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9710L955-004 MSD

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x110210

Level: (low/med) LOW Date Received: 10/24/97

% Moisture: not dec. _____ Date Analyzed: 11/02/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
75-71-8	Dichlorodifluoromethane	10	U
74-87-3	Chloromethane	10	U
75-01-4	Vinyl Chloride	10	U
74-83-9	Bromomethane	10	U
75-00-3	Chloroethane	10	U
75-69-4	Trichlorofluoromethane	5	U
75-35-4	1,1-Dichloroethene		SP
76-13-1	Trichlorotrifluoroethane	5	U
67-64-1	Acetone	22	B
74-88-4	Iodomethane	5	U
75-15-0	Carbon Disulfide	5	U
75-09-2	Methylene Chloride	9	B
156-60-5	Trans-1,2-dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
78-93-3	2-Butanone	20	U
159-59-2	Cis-1,2-dichloroethene	5	U
590-20-7	2,2-Dichloropropane	5	U
74-97-5	Bromochloromethane	5	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
563-58-6	1,1-dichloropropene	5	U
71-43-2	Benzene		SP
107-06-2	1,2-Dichloroethane	5	U
79-01-6	Trichloroethene		SP
78-87-5	1,2-Dichloropropane	5	U
74-95-3	Dibromomethane	5	U
75-27-4	Bromodichloromethane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
108-10-1	4-Methyl-2-pentanone	20	U
108-88-3	Toluene		SP
10061-02-6	Trans-1,3-Dichloropropene	5	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	5	U

SP: SPIKE COMPOUND

FORM 1 V-1

1/87 Rev.

1B
VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

04LA-97-0486 18/19MSD

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9710L955-004 MSD

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x110210

Level: (low/med) LOW Date Received: 10/24/97

% Moisture: not dec. _____ Date Analyzed: 11/02/97

Column: (pack/cap) CAP Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		
142-28-9	1,3-Dichloropropane	5	U
591-78-6	2-Hexanone	20	U
124-48-1	Dibromochloromethane	5	U
106-93-4	1,2-Dibromoethane	5	U
108-90-7	Chlorobenzene		SP
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
98-82-8	Isopropylbenzene	5	U
108-86-1	Bromobenzene	5	U
96-18-4	1,2,3-Trichloropropane	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
103-65-1	N-propylbenzene	5	U
95-49-8	2-Chlorotoluene	5	U
106-43-4	4-Chlorotoluene	5	U
108-67-8	1,3,5-Trimethylbenzene	5	U
98-06-6	Tert-butylbenzene	5	U
95-63-6	1,2,4-Trimethylbenzene	5	U
135-98-8	Sec-butylbenzene	5	U
541-73-1	1,3-Dichlorobenzene	5	U
106-46-7	1,4-Dichlorobenzene	5	U
99-87-6	4-Isopropyltoluene	5	U
95-50-1	1,2-Dichlorobenzene	5	U
104-51-8	N-butylbenzene	5	U
96-12-8	1,2-Dibromo-3-chloropropane	10	U

SP: SPIKE COMPOUND

FORM 1 V-2

1/87 Rev.

Thursday, October 23, 1997

REQUEST NUMBER: 3840R
ANALYSIS TYPE: ORG

Los Alamos
NATIONAL LABORATORY

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/23/97
REPORT DUE: 11/23/97
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 3840R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
PESTPCB		04LA-97-0486	01	W	10/20/97	
PAH		04LA-97-0486	02	W	10/20/97	
TOC		04LA-97-0486	03	W	10/20/97	
VOAGCMS		04LA-97-0486	18	W	10/20/97	
VOAGCMS		04LA-97-0486	19	W	10/20/97	

Final Page of REQUEST NUMBER 3840R

2A

WATER VOLATILE SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

	EPA SAMPLE NO.	S1 (DCE) #	S2 (TOL) #	S3 (BFB) #	OTHER	TOT OUT
01	04LA-97-0486 18/19	90	92	93		0
02	04LA-97-0486 18/19MS	90	91	92		0
03	04LA-97-0486 18/19MSD	94	95	97		0
04	VBLKHR	90	89	93		0
05	VBLKHR BS	88	90	92		0

	QC LIMITS
S1 (DCE) = 1,2-Dichloroethane-d4	(76-114)
S2 (TOL) = Toluene-d8	(88-110)
S3 (BFB) = Bromofluorobenzene	(86-115)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

3A

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

MATRIX Spike - EPA Sample No.: 04LA-97-0486, 18/19 Level:(low/med) LOW

COMPOUND	SPIKE ADDED UG/L	SAMPLE CONCENTRATION UG/L	MS CONCENTRATION UG/L	MS % REC #	QC LIMITS REC
1,1-Dichloroethene	50.0	0	45.3	91	61 -145
Benzene	50.0	0	44.8	90	76 -127
Trichloroethene	50.0	0	35.5	71	71 -120
Toluene	50.0	0	43.0	86	76 -125
Chlorobenzene	50.0	0	45.8	92	75 -130

COMPOUND	SPIKE ADDED UG/L	MSD CONCENTRATION UG/L	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC
1,1-Dichloroethene	50.0	46.1	92	1	14	61 -145
Benzene	50.0	46.3	93	3	11	76 -127
Trichloroethene	50.0	36.7	73	2	14	71 -120
Toluene	50.0	44.8	90	4	13	76 -125
Chlorobenzene	50.0	47.4	95	3	13	75 -130

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

COMMENTS:

WATER VOLATILE MATRIX SPIKE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

MATRIX Spike - EPA Sample No.: VBLKHR Level:(low/med) LOW

COMPOUND	SPIKE ADDED UG/L	SAMPLE CONCENTRATION UG/L	MS CONCENTRATION UG/L	MS % REC #	QC LIMITS REC
1,1-Dichloroethene	50.0	0	44.7	89	61 -145
Benzene	50.0	0	46:6	93	76 -127
Trichloroethene	50.0	0	36.7	73	71 -120
Toluene	50.0	0	44.2	88	76 -125
Chlorobenzene	50.0	0	47.1	94	75 -130

Column to be used to flag recovery value with an asterisk
* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits

COMMENTS:

4A
VOLATILE METHOD BLANK SUMMARY

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L955

Lab File ID: X110205 Lab Sample ID: 97LVX279-MB1

Date Analyzed: 11/02/97 Time Analyzed: 1419

Matrix: (soil/water) WATER Level:(low/med) LOW

Instrument ID: 5970X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	VBLKHRBS	97LVX279-MB1S	X110207	1534
02	04LA-97-0486 18/19	9710L955-004	X110208	1611
03	04LA-97-0486 18/19M	9710L955-004S	X110209	1649
04	04LA-97-0486 18/19M	9710L955-004T	X110210	1726
05				
06				
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

COMMENTS:

5A
VOLATILE ORGANIC GC/MS TUNING AND MASS CALIBRATION - BROMOFLUOROBENZENE (BFB)

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L955

Lab File ID: X102501 BFB Injection Date: 10/25/97

Instrument ID: 5970X BFB Injection Time: 1305

GC Column: DB 624 ID: 0.53 (mm) Heated Purge: (Y/N) Y

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15.0 - 40.0% of mass 95	18.6	
75	30.0 - 60.0% of mass 95	47.8	
95	Base Peak, 100% relative abundance	100.0	
96	5.0 - 9.0% of mass 95	8.0	
173	Less than 2.0% of mass 174	0.0	(0.0)1
174	50.0 - 100.0% of mass 95	80.4	
175	5.0 - 9.0% of mass 174	6.6	(8.3)1
176	95.0 - 100.9% of mass 174	80.8	(100.5)1
177	5.0 - 9.0% of mass 176	5.6	(7.0)2

1-Value is % of mass 174 2-Value is % of mass 176

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD050	VSTD050	X102504	10/25/97	1512
02	VSTD010	VSTD010	X102505	10/25/97	1644
03	VSTD020	VSTD020	X102506	10/25/97	1729
04	VSTD200	VSTD200	X102507	10/25/97	1809
05	VSTD100	VSTD100	X102508	10/25/97	1847
06	VSTD005	VSTD005	X102509	10/25/97	1924
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

5A

VOLATILE ORGANIC GC/MS TUNING AND MASS CALIBRATION - BROMOFLUOROBENZENE (BFB)

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L955

Lab File ID: X110201 BFB Injection Date: 11/02/97

Instrument ID: 5970X BFB Injection Time: 1206

GC Column: DB 624 ID: 0.53 (mm) Heated Purge: (Y/N) Y

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	18.6
75	30.0 - 60.0% of mass 95	48.8
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.2
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	50.0 - 100.0% of mass 95	83.5
175	5.0 - 9.0% of mass 174	6.9 (8.3)1
176	95.0 - 100.9% of mass 174	83.9 (100.5)1
177	5.0 - 9.0% of mass 176	6.6 (7.8)2

1-Value is % of mass 174 2-Value is % of mass 176

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD50	VSTD50	X110203	11/02/97	1302
02	VBLKHR	97LVX279-MB1	X110205	11/02/97	1419
03	VBLKHRBS	97LVX279-MB1S	X110207	11/02/97	1534
04	04LA-97-0486 18/19	9710L955-004	X110208	11/02/97	1611
05	04LA-97-0486 18/19M	9710L955-004S	X110209	11/02/97	1649
06	04LA-97-0486 18/19M	9710L955-004T	X110210	11/02/97	1726
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

8A
VOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L955

Lab File ID (Standard): X110203 Date Analyzed: 11/02/97

Instrument ID: 5970X Time Analyzed: 1302

GC Column: DB-624 ID: 0.53 (mm) Heated Purge: (Y/N) Y

		IS1 AREA #	RT	IS2(CBZ) AREA #	RT	IS3(DCB) AREA #	RT
	12 HOUR STD	1011593	15.97	825177	20.24	536422	23.0
	UPPER LIMIT	2023186	16.47	1650354	20.74	1072844	23.5
	LOWER LIMIT	505796	15.47	412588	19.74	268211	22.5
	EPA SAMPLE NO.						
01	VBLKHR	1040752	15.96	880425	20.24	565869	23.05
02	VBLKHRBS	995223	15.97	842452	20.25	550019	23.05
03	04LA-97-0486 18/19	998866	15.96	840031	20.25	550353	23.05
04	04LA-97-0486 18/19M	997593	15.96	845095	20.24	556159	23.05
05	04LA-97-0486 18/19M	918855	15.97	768363	20.25	506674	23.05
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 = Fluorobenzene
IS2 (CBZ) = Chlorobenzene-d5
IS3 (DCB) = 1,4-Dichlorobenzene-d4

UPPER LIMIT = +100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk.

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L955

Instrument ID: 5970X Calibration Date(s): 10/25/97

Heated Purge: (Y/N) Y GC Column: DB-624 ID: 0.53 (mm)

= Min RRF for SPCC Max %RSD for CCC(*) = 30.0%

LAB FILE ID: RRF10 =x102505.d RRF20 =x102506.d
RRF50 =x102504.d RRF100=x102508.d RRF200=x102507.d

COMPOUND		RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	% RSD
Dichlorodifluoromethane		0.397	0.519	0.516	0.485	0.507	0.485	10.5
Chloromethane	#	0.280	0.269	0.269	0.284	0.254	0.271	4.3#
Vinyl Chloride	*	0.239	0.263	0.260	0.263	0.268	0.259	4.3*
Bromomethane		0.340	0.324	0.281	0.292	0.307	0.309	7.7
Chloroethane		0.167	0.177	0.172	0.170	0.174	0.172	2.0
Trichlorofluoromethane		0.483	0.510	0.486	0.518	0.513	0.502	3.2
1,1-Dichloroethene	*	0.153	0.158	0.149	0.153	0.153	0.153	2.0*
Methylene Chloride		0.513	0.386	0.407	0.349	0.328	0.397	18.2
Acetone		0.107	0.082	0.093	0.072	0.071	0.085	18.0
trans-1,2-Dichloroethene		0.407	0.385	0.374	0.380	0.366	0.382	4.1
1,1-Dichloroethane	#	0.644	0.609	0.580	0.608	0.590	0.606	4.0#
cis-1,2-Dichloroethene		0.431	0.402	0.385	0.389	0.370	0.395	5.8
2,2-Dichloropropane		0.587	0.557	0.531	0.530	0.516	0.544	5.2
2-Butanone		0.137	0.172	0.188	0.177	0.177	0.170	11.4
Bromochloromethane		0.345	0.326	0.294	0.312	0.288	0.313	7.5
Chloroform	*	0.837	0.777	0.734	0.753	0.712	0.763	6.3*
1,1,1-Trichloroethane		0.678	0.640	0.612	0.617	0.584	0.626	5.6
Carbon Tetrachloride		0.522	0.550	0.526	0.490	0.523	0.522	4.1
1,1-Dichloropropene		0.182	0.171	0.163	0.165	0.149	0.166	7.3
Benzene		0.932	0.876	0.822	0.828	0.758	0.843	7.7
1,2-Dichloroethane		0.464	0.436	0.407	0.414	0.387	0.422	7.0
Trichloroethene		0.747	0.681	0.664	0.598	0.597	0.657	9.6
1,2-Dichloropropane	*	0.407	0.391	0.365	0.386	0.364	0.383	4.8*
Dibromomethane		0.583	0.543	0.515	0.529	0.490	0.532	6.5
Bromodichloromethane		0.857	0.813	0.778	0.788	0.738	0.795	5.6
cis-1,3-Dichloropropene		0.798	0.749	0.720	0.760	0.737	0.753	3.9
Toluene	*	0.829	0.766	0.728	0.731	0.677	0.746	7.5*
4-Methyl-2-Pentanone		0.631	0.537	0.559	0.545	0.541	0.563	7.0
trans-1,3-Dichloropropene		0.706	0.648	0.632	0.666	0.634	0.657	4.7
1,1,2-Trichloroethane		0.587	0.538	0.507	0.512	0.489	0.527	7.2
Tetrachloroethene		0.687	0.638	0.596	0.603	0.546	0.614	8.5
1,3-Dichloropropane		0.830	0.748	0.709	0.714	0.642	0.729	9.4
2-Hexanone		0.421	0.340	0.376	0.372	0.376	0.377	7.7
Dibromochloromethane		0.941	0.911	0.896	0.936	0.872	0.911	3.1
1,2-Dibromoethane		0.934	0.856	0.832	0.822	0.754	0.840	7.7
Chlorobenzene	#	1.175	1.064	1.017	1.045	0.974	1.055	7.1#
1,1,1,2-Tetrachloroethane		0.619	0.567	0.556	0.553	0.505	0.560	7.2
Ethylbenzene	*	0.510	0.449	0.424	0.419	0.370	0.434	11.7*

FORM VI VOA MAC-SW846HP

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L955

Instrument ID: 5970X Calibration Date(s): 10/25/97

Heated Purge: (Y/N) Y GC Column: DB-624 ID: 0.53 (mm)

= Min RRF for SPCC Max %RSD for CCC(*) = 30.0%

LAB FILE ID: RRF10 =x102505.d RRF20 =x102506.d
RRF50 =x102504.d RRF100=x102508.d RRF200=x102507.d

COMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	% RSD
1,3- and 1,4-Xylene	1.196	1.097	1.022	1.003	0.858	1.035	12.1
Styrene	1.083	0.977	0.926	0.905	0.798	0.938	11.1
Bromoform #	0.803	0.760	0.784	0.790	0.728	0.773	3.8
Isopropylbenzene	1.583	1.419	1.326	1.301	1.157	1.357	11.6
Bromobenzene	2.191	1.964	1.898	1.899	1.827	1.956	7.2
1,2,3-Trichloropropane	0.411	0.362	0.370	0.364	0.355	0.372	6.0
1,1,2,2-Tetrachloroethane #	0.712	0.721	0.636	1.008	0.797	0.775	18.4
N-Propylbenzene	0.692	0.626	0.604	0.635	0.611	0.634	5.5
2-Chlorotoluene	0.692	0.628	0.614	0.631	0.613	0.636	5.1
4-Chlorotoluene	0.789	0.687	0.661	0.650	0.610	0.679	9.9
1,3,5-Trimethylbenzene	2.031	1.877	1.756	1.782	1.699	1.829	7.1
Tert-Butylbenzene	0.545	0.492	0.479	0.487	0.474	0.495	5.8
1,2,4-Trimethylbenzene	2.093	1.876	1.826	1.878	1.800	1.895	6.1
Sec-Butylbenzene	0.616	0.546	0.530	0.547	0.530	0.554	6.4
1,3-Dichlorobenzene	1.423	1.276	1.287	1.336	1.241	1.313	5.4
1,4-Dichlorobenzene	1.804	1.604	1.502	1.538	1.477	1.585	8.3
4-Isopropyltoluene	2.390	2.217	2.187	2.174	1.992	2.192	6.4
1,2-Dichlorobenzene	1.599	1.408	1.357	1.407	1.349	1.424	7.1
N-Butylbenzene	0.655	0.593	0.587	0.588	0.565	0.598	5.6
1,2-Dibromo-3-chloropropane	0.437	0.388	0.450	0.480	0.519	0.455	10.7
Carbon Disulfide	0.402	0.381	0.381	0.390	0.380	0.387	2.4
Freon-113	0.244	0.220	0.216	0.213	0.208	0.220	6.5
Iodomethane	0.232	0.347	0.305	0.354	0.345	0.317	16.2
1,2-Dichloroethane-d4	0.412	0.399	0.370	0.379	0.336	0.379	7.7
Toluene-d8	1.182	1.124	1.053	1.085	0.957	1.080	7.8
4-Bromofluorobenzene	1.375	1.278	1.242	1.292	1.192	1.276	5.3

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L955

Instrument ID: 5970X Calibration Date: 11/02/97 Time: 1302

Lab File ID: X110203 Init. Calib. Date(s): 10/25/97

Heated Purge: (Y/N) Y GC Column: DB-624 ID: 0.53 (mm)

= Min RRF50 for SPCC Max %Drift for CCC(*) = 20.0%

COMPOUND		RRF50	SPIKED AMOUNT	OBSRVD AMOUNT	%Drift
Dichlorodifluoromethane		0.460	50.0	47.4	5.2
Chloromethane	#	0.267	50.0	49.2	1.6#
Vinyl Chloride	*	0.261	50.0	50.5	1.0*
Bromomethane		0.291	50.0	47.0	6.0
Chloroethane		0.174	50.0	50.5	1.0
Trichlorofluoromethane		0.514	50.0	51.2	2.4
1,1-Dichloroethene	*	0.147	50.0	47.9	4.2*
Methylene Chloride		0.457	50.0	57.6	15.2
Acetone		0.082	50.0	48.4	3.2
trans-1,2-Dichloroethene		0.377	50.0	49.4	1.2
1,1-Dichloroethane	#	0.585	50.0	48.2	3.6#
cis-1,2-Dichloroethene		0.392	50.0	49.6	0.8
2,2-Dichloropropane		0.524	50.0	48.1	3.8
2-Butanone		0.163	50.0	48.0	4.0
Bromochloromethane		0.310	50.0	49.4	1.2
Chloroform	*	0.742	50.0	48.6	2.8*
1,1,1-Trichloroethane		0.612	50.0	48.8	2.4
Carbon Tetrachloride		0.508	50.0	48.7	2.6
1,1-Dichloropropene		0.162	50.0	48.8	2.4
Benzene		0.836	50.0	49.6	0.8
1,2-Dichloroethane		0.399	50.0	47.4	5.2
Trichloroethene		0.642	50.0	48.8	2.4
1,2-Dichloropropane	*	0.376	50.0	49.2	1.6*
Dibromomethane		0.526	50.0	49.4	1.2
Bromodichloromethane		0.787	50.0	49.5	1.0
cis-1,3-Dichloropropene		0.721	50.0	47.9	4.2
Toluene	*	0.727	50.0	48.7	2.6*
4-Methyl-2-Pentanone		0.501	50.0	44.5	11.0
trans-1,3-Dichloropropene		0.616	50.0	46.9	6.2
1,1,2-Trichloroethane		0.509	50.0	48.3	3.4
Tetrachloroethene		0.581	50.0	47.3	5.4
1,3-Dichloropropane		0.700	50.0	48.0	4.0
2-Hexanone		0.315	50.0	41.8	16.4
Dibromochloromethane		0.897	50.0	49.2	1.6
1,2-Dibromoethane		0.813	50.0	48.4	3.2
Chlorobenzene	#	1.009	50.0	47.8	4.4#
1,1,1,2-Tetrachloroethane		0.546	50.0	48.7	2.6
Ethylbenzene	*	0.420	50.0	48.4	3.2*

7A
VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L955

Instrument ID: 5970X Calibration Date: 11/02/97 Time: 1302

Lab File ID: X110203 Init. Calib. Date(s): 10/25/97

Heated Purge: (Y/N) Y GC Column: DB-624 ID: 0.53 (mm)

= Min RRF50 for SPCC Max %Drift for CCC(*) = 20.0%

COMPOUND	RRF50	SPIKED AMOUNT	OBSRVD AMOUNT	%Drift
1,3- and 1,4-Xylene	1.019	50.0	49.2	1.6
Styrene	0.914	50.0	48.7	2.6
Bromoform #	0.780	50.0	50.4	0.8#
Isopropylbenzene	1.324	50.0	48.8	2.4
Bromobenzene	1.876	50.0	48.0	4.0
1,2,3-Trichloropropane	0.350	50.0	47.0	6.0
1,1,2,2-Tetrachloroethane #	0.740	50.0	47.8	4.4#
N-Propylbenzene	0.608	50.0	48.0	4.0
2-Chlorotoluene	0.615	50.0	48.4	3.2
4-Chlorotoluene	0.653	50.0	48.0	4.0
1,3,5-Trimethylbenzene	1.788	50.0	48.9	2.2
Tert-Butylbenzene	0.479	50.0	48.4	3.2
1,2,4-Trimethylbenzene	1.804	50.0	47.6	4.8
Sec-Butylbenzene	0.535	50.0	48.3	3.4
1,3-Dichlorobenzene	1.283	50.0	48.9	2.2
1,4-Dichlorobenzene	1.283	50.0	40.5	19.0
4-Isopropyltoluene	2.156	50.0	49.2	1.6
1,2-Dichlorobenzene	1.359	50.0	47.7	4.6
N-Butylbenzene	0.567	50.0	47.5	5.0
1,2-Dibromo-3-chloropropane	0.408	50.0	44.8	10.4
Carbon Disulfide	0.377	50.0	48.7	2.6
Freon-113	0.208	50.0	47.3	5.4
Iodomethane	0.354	50.0	55.8	11.6
1,2-Dichloroethane-d4	0.351	50.0	46.3	7.4
Toluene-d8	1.003	50.0	46.4	7.2
4-Bromofluorobenzene	1.186	50.0	46.5	7.0

7AD
VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L955

Instrument ID: 5970X Calibration Date: 11/02/97 Time: 1302

Lab File ID: X110203 Init. Calib. Date(s): 10/25/97

Heated Purge: (Y/N) Y GC Column: DB-624 ID: 0.53 (mm)

= Min RRF50 for SPCC Max %D for CCC(*) = 20.0%

COMPOUND		$\overline{RRF}$	RRF50	%D
Dichlorodifluoromethane		0.485	0.460	5.2
Chloromethane	#	0.271	0.267	1.5#
Vinyl Chloride	*	0.259	0.261	0.8*
Bromomethane		0.309	0.291	5.8
Chloroethane		0.172	0.174	1.2
Trichlorofluoromethane		0.502	0.514	2.4
1,1-Dichloroethene	*	0.153	0.147	3.9*
Methylene Chloride		0.397	0.457	15.1
Acetone		0.085	0.082	3.5
trans-1,2-Dichloroethene		0.382	0.377	1.3
1,1-Dichloroethane	#	0.606	0.585	3.5#
cis-1,2-Dichloroethene		0.395	0.392	0.8
2,2-Dichloropropane		0.544	0.524	3.7
2-Butanone		0.170	0.163	4.1
Bromochloromethane		0.313	0.310	1.0
Chloroform	*	0.763	0.742	2.8*
1,1,1-Trichloroethane		0.626	0.612	2.2
Carbon Tetrachloride		0.522	0.508	2.7
1,1-Dichloropropene		0.166	0.162	2.4
Benzene		0.843	0.836	0.8
1,2-Dichloroethane		0.422	0.399	5.4
Trichloroethene		0.657	0.642	2.3
1,2-Dichloropropane	*	0.383	0.376	1.8*
Dibromomethane		0.532	0.526	1.1
Bromodichloromethane		0.795	0.787	1.0
cis-1,3-Dichloropropene		0.753	0.721	4.2
Toluene	*	0.746	0.727	2.5*
4-Methyl-2-Pentanone		0.563	0.501	11.0
trans-1,3-Dichloropropene		0.657	0.616	6.2
1,1,2-Trichloroethane		0.527	0.509	3.4
Tetrachloroethene		0.614	0.581	5.4
1,3-Dichloropropane		0.729	0.700	4.0
2-Hexanone		0.377	0.315	16.4
Dibromochloromethane		0.911	0.897	1.5
1,2-Dibromoethane		0.840	0.813	3.2
Chlorobenzene	#	1.055	1.009	4.4#
1,1,1,2-Tetrachloroethane		0.560	0.546	2.5
Ethylbenzene	*	0.434	0.420	3.2*

7AD
VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: Recra.LabNet.Philadelphia Contract: 02744-064-001-9999-00

Lab Code: RECRA Case No.: SAS No.: SDG No.: 10L955

Instrument ID: 5970X Calibration Date: 11/02/97 Time: 1302

Lab File ID: X110203 Init. Calib. Date(s): 10/25/97

Heated Purge: (Y/N) Y GC Column: DB-624 ID: 0.53 (mm)

= Min RRF50 for SPCC Max %D for CCC(*) = 20.0%

COMPOUND	$\overline{RRF}$	RRF50	%D
1,3- and 1,4-Xylene	1.035	1.019	1.5
Styrene	0.938	0.914	2.6
Bromoform #	0.773	0.780	0.9#
Isopropylbenzene	1.357	1.324	2.4
Bromobenzene	1.956	1.876	4.1
1,2,3-Trichloropropane	0.372	0.350	5.9
1,1,2,2-Tetrachloroethane #	0.775	0.740	4.5#
N-Propylbenzene	0.634	0.608	4.1
2-Chlorotoluene	0.636	0.615	3.3
4-Chlorotoluene	0.679	0.653	3.8
1,3,5-Trimethylbenzene	1.829	1.788	2.2
Tert-Butylbenzene	0.495	0.479	3.2
1,2,4-Trimethylbenzene	1.895	1.804	4.8
Sec-Butylbenzene	0.554	0.535	3.4
1,3-Dichlorobenzene	1.313	1.283	2.3
1,4-Dichlorobenzene	1.585	1.283	19.0
4-Isopropyltoluene	2.192	2.156	1.6
1,2-Dichlorobenzene	1.424	1.359	4.6
N-Butylbenzene	0.598	0.567	5.2
1,2-Dibromo-3-chloropropane	0.455	0.408	10.3
Carbon Disulfide	0.387	0.377	2.6
Freon-113	0.220	0.208	5.4
Iodomethane	0.317	0.354	11.7
1,2-Dichloroethane-d4	0.379	0.351	7.4
Toluene-d8	1.080	1.003	7.1
4-Bromofluorobenzene	1.276	1.186	7.0

2E

WATER ORGANICS SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#3840R RFW Lot No.: 9710L955

GC Column(1): HYPERS ID: 4.6 (mm) GC Column(2): ID: ____ (mm)

	CLIENT SAMPLE NO.	1 %REC #	2 %REC #	1 %REC #	2 %REC #	1 %REC #	2 %REC #	TOT OUT
01	04LA-97-0486 02	16 *						1
02	BLK	109						0
03	BLKBS	93						0
04	BLKBSD	95						0

ADVISORY
QC LIMITS
(65-115)

= Triphenylene

Column to be used to flag recovery values
* Values outside of QC limits
D Surrogate diluted out

3E

WATER ORGANICS BLANK SPIKE/BLANK SPIKE DUPLICATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Client : LANL-REQ#3840R RFW Lot No.: 97LE2022-MB1

BLANK Spike - Sample No.: BLK

COMPOUND	SPIKE ADDED ug/L	SAMPLE CONCENTRATION ug/L	BS CONCENTRATION ug/L	BS % REC #	QC LIMITS REC.
Naphthalene	90.0	0	68	75	35-105
Acenaphthylene	115	0	99	86	55-105
Acenaphthene	90.0	0	79	87	55-105
Fluorene	10.5	0	8.8	84	65-100
Phenanthrene	32.0	0	27	86	70-100
Anthracene	33.0	0	29	89	65-125
Fluoranthene	10.5	0	9.2	88	70-105
Pyrene	13.5	0	12	86	65-110
Benzo(a)anthracene	0.650	0	0.60	92	70-115
Chrysene	7.50	0	6.6	87	70-110
Benzo(b)fluoranthrene	0.900	0	0.83	92	70-120
Benzo(k)fluoranthrene	0.850	0	0.80	94	70-120
Benzo(a)pyrene	1.18	0	0.98	83	70-105
Dibenzo(a,h)anthracene	1.50	0	1.4	91	60-115
Benzo(ghi)perylene	3.80	0	3.4	90	55-115
Indeno(1,2,3-cd)pyrene	2.15	0	2.0	94	65-115

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

11/21/97

3E

WATER ORGANICS BLANK SPIKE/BLANK SPIKE DUPLICATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Client : LANL-REQ#3840R RFW Lot No.: 97LE2022-MB1

BLANK Spike - Sample No.: BLK

COMPOUND	SPIKE ADDED ug/L	BSD CONCENTRATION ug/L	BSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC
Naphthalene	90.0	76	84	11	88	35-105
Acenaphthylene	115	100	90	4	113	55-105
Acenaphthene	90.0	83	92	5	18	55-105
Fluorene	10.5	9.2	88	4	52	65-100
Phenanthrene	32.0	29	89	3	27	70-100
Anthracene	33.0	30	90	1	52	65-125
Fluoranthene	10.5	9.3	88	0	22	70-105
Pyrene	13.5	12	89	3	56	65-110
Benzo(a)anthracene	0.650	0.63	97	5	17	70-115
Chrysene	7.50	6.7	89	2	29	70-110
Benzo(b)fluoranthrene	0.900	0.84	93	1	53	70-120
Benzo(k)fluoranthrene	0.850	0.80	94	0	17	70-120
Benzo(a)pyrene	1.18	0.97	82	1	28	70-105
Dibenzo(a,h)anthracene	1.50	1.4	93	2	59	60-115
Benzo(ghi)perylene	3.80	3.4	91	1	23	55-115
Indeno(1,2,3-cd)pyrene	2.15	2.0	95	1	21	65-115

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 16 outside limits
Spike Recovery: 0 out of 32 outside limits

COMMENTS:

Oct 1/21/97

4C

ORGANICS METHOD BLANK SUMMARY

CLIENT SAMPLE NO.

BLK

Lab Name: Recra.LabNet Contract: 2744-64-01

Client: LANL-REQ#3840R

Lab Sample ID: 97LE2022-MB1 Lab File ID: 11049723.51

Matrix:(soil/water) WATER Extraction:(SepF/Cont/Sonc) CONT

Sulfur Cleanup: (Y/N) _ Date Extracted: 10/28/97

Date Analyzed (1): 11/04/97 Date Analyzed (2): _____

Time Analyzed (1): 2233 Time Analyzed (2): ____

Instrument ID (1): 23 Instrument ID (2):

GC Column (1): HYPERS ID: 4.6 (mm) GC Column (2): ID: ____(mm)

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED 1	DATE ANALYZED 2
01	04LA-97-0486	9710L955-002	11/04/97	
02	BLKBS	97LE2022-MB1S	11/04/97	
03	BLKBSD	97LE2022-MB1T	11/04/97	

COMMENTS: _____

11/20/97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: ~~NONE~~ 2744-64-01

Client: ~~LAB~~ LANL-REQ# 3840R

GC Sample ID: 11019709.30

RFW Lot No.: 97101955

DAK 12/2/97

GC Column: DB608

Instrument ID: 09

Method: P09

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/02/97
TIME OF ANALYSIS 1552
STANDARD ID: INDA 3506 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.76	11.71	11.81	4832365	11.74	5168251		7.0
Beta-BHC	13.62	13.57	13.67	2570813				
Delta-BHC	15.08	15.02	15.12	4482939				
gamma-BHC (Lindane)	13.34	13.30	13.40	4681253	13.32	4963451		6.0
Heptachlor	14.64	14.59	14.69	3810875	14.61	4051051		6.3
Aldrin	15.92	15.87	15.97	3615695				
Heptachlor epoxide	18.10	18.05	18.15	3735289				
Endosulfan I	19.46	19.39	19.53	3490243	19.44	3703701		6.1
Dieldrin	20.62	20.55	20.69	3430239	20.60	3666575		6.9
4,4'-DDE	20.29	20.22	20.36	3800157				
Endrin	22.00	21.93	22.07	3063397	21.98	3273451		6.9
Endosulfan II	22.66	22.59	22.73	2988367				
4,4'-DDD	22.39	22.32	22.46	2844359	22.37	3107825		9.3
Endosulfan sulfate	24.33	24.26	24.40	2796015				
4,4'-DDT	23.50	23.43	23.57	3065923	23.48	3260825		6.4
Methoxychlor	26.77	26.70	26.84	1154489	26.75	1221225		5.8
Endrin aldehyde	23.87	23.80	23.94	2310691				
Endrin ketone	27.33	27.26	27.40	2699777				
alpha-Chlordane	19.33	19.26	19.40	3929011				
gamma-Chlordane	18.72	18.65	18.79	3808437				
Tetrachloro-m-xylene	8.95	8.88	9.02	3335701	8.94	3470801		4.1
Decachlorobiphenyl	33.82	33.75	33.89	1761779	33.80	1873731		6.4

%D should not exceed 15%

DAK 11/3/97

12.04.97

RFW 9/93 A

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: ~~NONE~~ 2744-64-01

Client: ~~LAB~~ (Arl-REQ#3840R

GC Sample ID: 11019709.31

RFW Lot No.: 97101955

D AK 12/2/97

GC Column: DB608

Instrument ID: 09

Method: P09

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/02/97
TIME OF ANALYSIS 1645
STANDARD ID: INDB 5503 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.76	11.71	11.81	4832365				
Beta-BHC	13.62	13.57	13.67	2570813	13.61	2674301		4.0
Delta-BHC	15.08	15.02	15.12	4482939	15.07	4693851		4.7
gamma-BHC (Lindane)	13.34	13.30	13.40	4681253				
Heptachlor	14.64	14.59	14.69	3810875				
Aldrin	15.92	15.87	15.97	3615695	15.92	3820201		5.7
Heptachlor epoxide	18.10	18.05	18.15	3735289	18.09	3867151		3.5
Endosulfan I	19.46	19.39	19.53	3490243				
Dieldrin	20.62	20.55	20.69	3430239				
4,4'-DDE	20.29	20.22	20.36	3800157	20.28	3989325		5.0
Endrin	22.00	21.93	22.07	3063397				
Endosulfan II	22.66	22.59	22.73	2988367	22.66	3109425		4.1
4,4'-DDD	22.39	22.32	22.46	2844359				
Endosulfan sulfate	24.33	24.26	24.40	2796015	24.32	2921325		4.5
4,4'-DDT	23.50	23.43	23.57	3065923				
Methoxychlor	26.77	26.70	26.84	1154489				
Endrin aldehyde	23.87	23.80	23.94	2310691	23.87	2467725		6.8
Endrin ketone	27.33	27.26	27.40	2699777	27.32	2836525		5.1
alpha-Chlordane	19.33	19.26	19.40	3929011	19.33	4163901		6.0
gamma-Chlordane	18.72	18.65	18.79	3808437	18.72	4036701		6.0
Tetrachloro-m-xylene	8.95	8.88	9.02	3335701	8.94	3389675		1.6
Decachlorobiphenyl	33.82	33.75	33.89	1761779	33.80	1811141		2.8

%D should not exceed 15%

DAK 11/3/97

gw 12-04-97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: ~~NONE~~ 2744-64-01

Client: ~~LAB~~ LANL-REG#3840R

GC Sample ID: 11019709.32

RFW Lot No.: 97101955 DAL 12/2/97

GC Column: DB608

Instrument ID: 09

Method: P0960

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/02/97
TIME OF ANALYSIS 1738
STANDARD ID: AR1660 1903

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Aroclor-1016	11.57	11.50	11.64	83700	11.57	86690		3.6
Aroclor-1016	13.24	13.17	13.31	158740	13.24	162950		2.7
Aroclor-1016	14.69	14.62	14.76	228982	14.68	238730		4.3
Aroclor-1016	15.32	15.25	15.39	124112	15.31	128550		3.6
Aroclor-1016	17.18	17.11	17.25	103693	17.17	108460		4.6
Total				**699227**		**725380**		**3.7**
Aroclor-1260	20.88	20.81	20.95	150664	20.86	159930		6.2
Aroclor-1260	21.55	21.48	21.62	243924	21.54	254180		4.2
Aroclor-1260	21.86	21.79	21.93	322661	21.85	337420		4.6
Aroclor-1260	23.47	23.40	23.54	165481	23.46	183940		11
Aroclor-1260	25.40	25.33	25.47	450221	25.39	477940		6.2
Total				**1332951**		**1413410**		**6.0**
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Total								

%D should not exceed 15%

DAL 11/3/97

gw 12-04-97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 2744-64-01

Client: IAnL-Reg # 3840R DAL 12/2/97

GC Sample ID: 11019710.01

RFW Lot No.: 97101955

GC Column: RTX1701

Instrument ID: 10

Method: P10

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/01/97
TIME OF ANALYSIS 1357
STANDARD ID: INDA 3506 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.89	11.84	11.94	4053589	11.89	4495751		11
Beta-BHC	15.84	15.79	15.89	2209637				
Delta-BHC	16.83	16.78	16.88	2581459				
gamma-BHC (Lindane)	13.37	13.32	13.42	4017001	13.37	4544601		13
Heptachlor	14.39	14.34	14.44	3723965	14.39	4226101		13
Aldrin	15.49	15.44	15.54	3630911				
Heptachlor epoxide	17.79	17.74	17.84	3347607				
Endosulfan I	18.87	18.80	18.94	3088699	18.87	3392351		9.8
Dieldrin	20.12	20.05	20.19	3082975	20.12	3382525		9.7
4,4'-DDE	19.53	19.46	19.60	3027451				
Endrin	20.88	20.81	20.95	2681599	20.88	2932375		9.4
Endosulfan II	22.42	22.35	22.49	2498507				
4,4'-DDD	22.16	22.09	22.23	2244065	22.16	2384301		6.2
Endosulfan sulfate	24.75	24.68	24.82	1574439				
4,4'-DDT	22.84	22.77	22.91	1766603	22.84	1911651		8.2
Methoxychlor	24.86	24.79	24.93	941522	24.86	1010895		7.4
Endrin aldehyde	23.75	23.68	23.82	630700				
Endrin ketone	26.28	26.21	26.35	1717473				
alpha-Chlordane	19.16	19.09	19.23	3524043				
gamma-Chlordane	18.95	18.88	19.02	3353803				
Tetrachloro-m-xylene	8.85	8.78	8.92	2971795	8.82	3315275		12
Decachlorobiphenyl	30.32	30.26	30.40	1310003	30.33	1387321		5.9

%D should not exceed 15%

DAL 11/3/97

11-04-97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 2744-64-01

Client: LANL-Req #3840R

GC Sample ID: 11019710.02

RFW Lot No.: 97101955 DAC 12/2/97

GC Column: RTX1701

Instrument ID: 10

Method: P10

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/01/97
TIME OF ANALYSIS 1450
STANDARD ID: INDB 5503 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.89	11.84	11.94	4053589				
Beta-BHC	15.84	15.79	15.89	2209637	15.84	2425001		9.7
Delta-BHC	16.83	16.78	16.88	2581459	16.83	2727451		5.7
gamma-BHC (Lindane)	13.37	13.32	13.42	4017001				
Heptachlor	14.39	14.34	14.44	3723965				
Aldrin	15.49	15.44	15.54	3630911	15.49	4076051		12
Heptachlor epoxide	17.79	17.74	17.84	3347607	17.79	3707801		11
Endosulfan I	18.87	18.80	18.94	3088699				
Dieldrin	20.12	20.05	20.19	3082975				
4,4'-DDE	19.53	19.46	19.60	3027451	19.53	3310125		9.3
Endrin	20.88	20.81	20.95	2681599				
Endosulfan II	22.42	22.35	22.49	2498507	22.42	2668401		6.8
4,4'-DDD	22.16	22.09	22.23	2244065				
Endosulfan sulfate	24.75	24.68	24.82	1574439	24.75	1704401		8.3
4,4'-DDT	22.84	22.77	22.91	1766603				
Methoxychlor	24.86	24.79	24.93	941522				
Endrin aldehyde	23.75	23.68	23.82	630700	23.75	701075		11
Endrin ketone	26.28	26.21	26.35	1717473	26.28	1752601		2.0
alpha-Chlordane	19.16	19.09	19.23	3524043	19.16	3840351		9.0
gamma-Chlordane	18.95	18.88	19.02	3353803	18.95	3721351		11
Tetrachloro-m-xylene	8.85	8.78	8.92	2971795	8.85	3191025		7.4
Decachlorobiphenyl	30.32	30.26	30.40	1310003	30.32	1348491		2.9

%D should not exceed 15%

DAC 11/3/97

gw 12-04-97

042

RFW 9/93 A

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 2744-64-01

Client: Lanl-Req #3840R

GC Sample ID: 11019710.03

RFW Lot No.: 9710955

DAK 12/2/97

GC Column: RTX1701

Instrument ID: 10

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/01/97

TIME OF ANALYSIS 1543

Method: P1060

STANDARD ID: AR1660 1903

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Aroclor-1016	12.33	12.26	12.40	139457	12.33	151710		8.8
Aroclor-1016	14.11	14.04	14.18	194743	14.11	218970		12
Aroclor-1016	14.55	14.48	14.62	88523	14.55	98950		12
Aroclor-1016	16.17	16.10	16.24	97616	16.17	108640		11
Aroclor-1016	16.54	16.47	16.61	68692	16.54	77140		12
Total				**589031**		**655410**		**11**
Aroclor-1260	20.39	20.32	20.46	181422	20.39	197190		8.7
Aroclor-1260	21.21	21.14	21.28	195585	21.21	203290		3.9
Aroclor-1260	22.41	22.34	22.48	155528	22.41	172010		11
Aroclor-1260	23.61	23.54	23.68	142272	23.61	153700		8.0
Aroclor-1260	24.60	24.53	24.67	247715	24.60	269120		8.6
Total				**922522**		**995310**		**7.9**
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Total								

%D should not exceed 15%

DAK 11/3/97

11-04-97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 2744-64-01

Client: Lanc-Reg #3840R

DAL 12/2/97

GC Sample ID: 11019710.15

RFW Lot No.: 97101955

GC Column: RTX1701

Instrument ID: 10

Method: P10

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/02/97
TIME OF ANALYSIS 0236
STANDARD ID: INDA 3506 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.89	11.84	11.94	4053589	11.90	4492801		11
Beta-BHC	15.84	15.79	15.89	2209637				
Delta-BHC	16.83	16.78	16.88	2581459				
gamma-BHC (Lindane)	13.37	13.32	13.42	4017001	13.38	4546901		13
Heptachlor	14.39	14.34	14.44	3723965	14.40	4324001	+	16
Aldrin	15.49	15.44	15.54	3630911				
Heptachlor epoxide	17.79	17.74	17.84	3347607				
Endosulfan I	18.87	18.80	18.94	3088699	18.86	3409701		10
Dieldrin	20.12	20.05	20.19	3082975	20.11	3388425		9.9
4,4'-DDE	19.53	19.46	19.60	3027451				
Endrin	20.88	20.81	20.95	2681599	20.87	3008701		12
Endosulfan II	22.42	22.35	22.49	2498507				
4,4'-DDD	22.16	22.09	22.23	2244065	22.15	2429351		8.3
Endosulfan sulfate	24.75	24.68	24.82	1574439				
4,4'-DDT	22.84	22.77	22.91	1766603	22.83	1883251		6.6
Methoxychlor	24.86	24.79	24.93	941522	24.85	1012015		7.5
Endrin aldehyde	23.75	23.68	23.82	630700				
Endrin ketone	26.28	26.21	26.35	1717473				
alpha-Chlordane	19.16	19.09	19.23	3524043				
gamma-Chlordane	18.95	18.88	19.02	3353803				
Tetrachloro-m-xylene	8.85	8.78	8.92	2971795	8.84	3305175		11
Decachlorobiphenyl	30.32	30.26	30.40	1310003	30.32	1385691		5.8

%D should not exceed 15%

DAL 11/3/97

gw D 04-97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 2744-64-01

Client: Canl-Reg #3840R

DAL 12/2/97

GC Sample ID: 11019710.16

RFW Lot No.: 97110935

GC Column: RTX1701

Instrument ID: 10

Method: P10

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/02/97
TIME OF ANALYSIS 0329
STANDARD ID: INDB 5503 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.89	11.84	11.94	4053589				
Beta-BHC	15.84	15.79	15.89	2209637	15.84	2473901		12
Delta-BHC	16.83	16.78	16.88	2581459	16.82	2836851		9.9
gamma-BHC (Lindane)	13.37	13.32	13.42	4017001				
Heptachlor	14.39	14.34	14.44	3723965				
Aldrin	15.49	15.44	15.54	3630911	15.49	4138101		14
Heptachlor epoxide	17.79	17.74	17.84	3347607	17.78	3686451		10
Endosulfan I	18.87	18.80	18.94	3088699				
Dieldrin	20.12	20.05	20.19	3082975				
4,4'-DDE	19.53	19.46	19.60	3027451	19.52	3383525		12
Endrin	20.88	20.81	20.95	2681599				
Endosulfan II	22.42	22.35	22.49	2498507	22.41	2690775		7.7
4,4'-DDD	22.16	22.09	22.23	2244065				
Endosulfan sulfate	24.75	24.68	24.82	1574439	24.74	1769001		12
4,4'-DDT	22.84	22.77	22.91	1766603				
Methoxychlor	24.86	24.79	24.93	941522				
Endrin aldehyde	23.75	23.68	23.82	630700	23.74	744275	+	18
Endrin ketone	26.28	26.21	26.35	1717473	26.28	1800825		4.9
alpha-Chlordane	19.16	19.09	19.23	3524043	19.16	3823001		8.5
gamma-Chlordane	18.95	18.88	19.02	3353803	18.95	3746151		12
Tetrachloro-m-xylene	8.85	8.78	8.92	2971795	8.84	3327025		12
Decachlorobiphenyl	30.32	30.26	30.40	1310003	30.32	1372761		4.8

%D should not exceed 15%

DAL 11/3/97

12-04-97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 2744-64-01

Client: Lanl - Req. 3840R

GC Sample ID: 11019710.17

RFW Lot No.: 9710L955

DAL 12/2/97

GC Column: RTX1701

Instrument ID: 10

Method: P1060

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/02/97
TIME OF ANALYSIS 0422
STANDARD ID: AR1660 1903

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Aroclor-1016	12.33	12.26	12.40	139457	12.32	156630		12
Aroclor-1016	14.11	14.04	14.18	194743	14.10	225090	+	16
Aroclor-1016	14.55	14.48	14.62	88523	14.54	102290	+	16
Aroclor-1016	16.17	16.10	16.24	97616	16.16	109740		12
Aroclor-1016	16.54	16.47	16.61	68692	16.53	77470		13
Total				**589031**		**671220**		**14**
Aroclor-1260	20.39	20.32	20.46	181422	20.38	198450		9.4
Aroclor-1260	21.21	21.14	21.28	195585	21.20	213590		9.2
Aroclor-1260	22.41	22.34	22.48	155528	22.40	174250		12
Aroclor-1260	23.61	23.54	23.68	142272	23.60	150200		5.6
Aroclor-1260	24.60	24.53	24.67	247715	24.59	265280		7.1
Total				**922522**		**1001770**		**8.6**
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Total								

%D should not exceed 15%

DAL 11/3/97

PW 12-04-97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 2744-64-01

Client: LANL - Req # 3840R

GC Sample ID: 11019710.30

RFW Lot No.: 97101955

DAL 12/2/97

GC Column: RTX1701

Instrument ID: 10

Method: P10

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/02/97
TIME OF ANALYSIS 1552
STANDARD ID: INDA 3506 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.89	11.84	11.94	4053589	11.90	4647501		15
Beta-BHC	15.84	15.79	15.89	2209637				
Delta-BHC	16.83	16.78	16.88	2581459				
gamma-BHC (Lindane)	13.37	13.32	13.42	4017001	13.38	4629501		15
Heptachlor	14.39	14.34	14.44	3723965	14.39	4390851	+	18
Aldrin	15.49	15.44	15.54	3630911				
Heptachlor epoxide	17.79	17.74	17.84	3347607				
Endosulfan I	18.87	18.80	18.94	3088699	18.86	3451851		12
Dieldrin	20.12	20.05	20.19	3082975	20.11	3491501		13
4,4'-DDE	19.53	19.46	19.60	3027451				
Endrin	20.88	20.81	20.95	2681599	20.87	3048851		14
Endosulfan II	22.42	22.35	22.49	2498507				
4,4'-DDD	22.16	22.09	22.23	2244065	22.15	2472775		10
Endosulfan sulfate	24.75	24.68	24.82	1574439				
4,4'-DDT	22.84	22.77	22.91	1766603	22.83	1965301		11
Methoxychlor	24.86	24.79	24.93	941522	24.85	1028540		9.2
Endrin aldehyde	23.75	23.68	23.82	630700				
Endrin ketone	26.28	26.21	26.35	1717473				
alpha-Chlordane	19.16	19.09	19.23	3524043				
gamma-Chlordane	18.95	18.88	19.02	3353803				
Tetrachloro-m-xylene	8.85	8.78	8.92	2971795	8.84	3343275		13
Decachlorobiphenyl	30.32	30.26	30.40	1310003	30.32	1399491		6.8

%D should not exceed 15%

DAL 11/3/97

gw 12-4-97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 2744-64-01

Client: Lanl - Req #3840R

GC Sample ID: 11019710.31

RFW Lot No.: 97101955

GC Column: RTX1701

Instrument ID: 10

Method: P10

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/02/97
TIME OF ANALYSIS 1645
STANDARD ID: INDB 5503 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.89	11.84	11.94	4053589				
Beta-BHC	15.84	15.79	15.89	2209637	15.83	2452001		11
Delta-BHC	16.83	16.78	16.88	2581459	16.82	2812901		9.0
gamma-BHC (Lindane)	13.37	13.32	13.42	4017001				
Heptachlor	14.39	14.34	14.44	3723965				
Aldrin	15.49	15.44	15.54	3630911	15.49	4107451		13
Heptachlor epoxide	17.79	17.74	17.84	3347607	17.78	3741151		12
Endosulfan I	18.87	18.80	18.94	3088699				
Dieldrin	20.12	20.05	20.19	3082975				
4,4'-DDE	19.53	19.46	19.60	3027451	19.52	3339401		10
Endrin	20.88	20.81	20.95	2681599				
Endosulfan II	22.42	22.35	22.49	2498507	22.41	2645401		5.9
4,4'-DDD	22.16	22.09	22.23	2244065				
Endosulfan sulfate	24.75	24.68	24.82	1574439	24.74	1732601		10
4,4'-DDT	22.84	22.77	22.91	1766603				
Methoxychlor	24.86	24.79	24.93	941522				
Endrin aldehyde	23.75	23.68	23.82	630700	23.74	725325		15
Endrin ketone	26.28	26.21	26.35	1717473	26.27	1769601		3.0
alpha-Chlordane	19.16	19.09	19.23	3524043	19.15	3872251		9.9
gamma-Chlordane	18.95	18.88	19.02	3353803	18.95	3733651		11
Tetrachloro-m-xylene	8.85	8.78	8.92	2971795	8.84	3262675		9.8
Decachlorobiphenyl	30.32	30.26	30.40	1310003	30.32	1376101		5.0

%D should not exceed 15%

DAC 11/3/97

gw 12-04-97

048

RFW 9/93 A

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: 2744-64-01

Client: Lanl-Req # 3840R

GC Sample ID: 11019710.32

RFW Lot No.: 9710995

GC Column: RTX1701

Instrument ID: 10

Method: P1060

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/02/97
TIME OF ANALYSIS 1738
STANDARD ID: AR1660 1903

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Aroclor-1016	12.33	12.26	12.40	139457	12.32	153650		10
Aroclor-1016	14.11	14.04	14.18	194743	14.10	217780		12
Aroclor-1016	14.55	14.48	14.62	88523	14.54	99320		12
Aroclor-1016	16.17	16.10	16.24	97616	16.15	108310		11
Aroclor-1016	16.54	16.47	16.61	68692	16.53	77280		13
Total				**589031**		**656340**		**11**
Aroclor-1260	20.39	20.32	20.46	181422	20.37	196800		8.5
Aroclor-1260	21.21	21.14	21.28	195585	21.20	205940		5.3
Aroclor-1260	22.41	22.34	22.48	155528	22.40	169870		9.2
Aroclor-1260	23.61	23.54	23.68	142272	23.60	152350		7.1
Aroclor-1260	24.60	24.53	24.67	247715	24.59	269280		8.7
Total				**922522**		**994240**		**7.8**
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Total								

%D should not exceed 15%

DAL 11/3/97

JW 12-04-97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: NONE

Client: LAB

GC Sample ID: 11049723.04

RFW Lot No.:

GC Column: HYPERSIL,4.6m

Instrument ID: 23

Method: 23001

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/01/97

DATE OF ANALYSIS 11/04/97
TIME OF ANALYSIS 0709
STANDARD ID: STD 5535031D

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Naphthalene								
Acenaphthylene								
Acenaphthene								
Fluorene								
Phenanthrene	5.03	4.98	5.08	181	5.03	192		6.1
Anthracene	5.52	5.46	5.58	409	5.52	415		1.5
Fluoranthene	6.07	6.01	6.13	394	6.07	419		6.3
Pyrene	6.47	6.41	6.53	948	6.47	1084		14
Triphenylene	7.05	6.98	7.12	143	7.05	161		13
Benzo(a)anthracene	7.88	7.80	7.96	7351	7.88	7981		8.6
Chrysene	8.15	8.07	8.23	555	8.15	609		9.7
Benzo(b)fluoranthren	9.29	9.20	9.38	1293	9.29	1406		8.7
Benzo(k)fluoranthren	9.80	9.70	9.90	6893	9.80	7916		15
Benzo(a)pyrene	10.32	10.22	10.42	6923	10.32	6110		- 12
Dibenzo(a,h)anthrace	11.13	11.02	11.24	4360	11.13	5009		15
Benzo(ghi)perylene	11.56	11.44	11.68	2979	11.56	3467	+	16
Indeno(1,2,3-cd)pyre								
	12.42	12.29	12.55	3820	12.42	4279		12

%D should not exceed 15%

11/14/97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: NONE

Client: LAB

GC Sample ID: 11049723.50

RFW Lot No.: _____

GC Column: HYPERSIL,4.6m

Instrument ID: 23

Method: 23001

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/01/97

DATE OF ANALYSIS 11/04/97
TIME OF ANALYSIS 2214
STANDARD ID: STD 5535031D

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Naphthalene								
Acenaphthylene								
Acenaphthene								
Fluorene								
Phenanthrene	5.03	4.98	5.08	181	5.05	188		3.9
Anthracene	5.52	5.46	5.58	409	5.55	409		0.0
Fluoranthene	6.07	6.01	6.13	394	6.10	416		5.6
Pyrene	6.47	6.41	6.53	948	6.49	1000		5.5
Triphenylene	7.05	6.98	7.12	143	7.07	155		8.4
Benzo(a)anthracene	7.88	7.80	7.96	7351	7.91	7892		7.4
Chrysene	8.15	8.07	8.23	555	8.19	594		7.0
Benzo(b)fluoranthren	9.29	9.20	9.38	1293	9.32	1452		12
Benzo(k)fluoranthren	9.80	9.70	9.90	6893	9.84	7717		12
Benzo(a)pyrene	10.32	10.22	10.42	6923	10.35	7113		2.7
Dibenzo(a,h)anthrace	11.13	11.02	11.24	4360	11.16	4803		10
Benzo(ghi)perylene	11.56	11.44	11.68	2979	11.59	3340		12
Indeno(1,2,3-cd)pyre								
	12.42	12.29	12.55	3820	12.44	4359		14

%D should not exceed 15%

11/14/97

RFW 9/93 A

030

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: NONE

Client: LAB

GC Sample ID: 11049723.56

RFW Lot No.: _____

GC Column: HYPERSIL,4.6m

Instrument ID: 23

Method: 23001

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/01/97

DATE OF ANALYSIS 11/05/97
TIME OF ANALYSIS 0012
STANDARD ID: STD 5535031D

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Naphthalene								
Acenaphthylene								
Acenaphthene								
Fluorene								
Phenanthrene	5.03	4.98	5.08	181	5.05	188		3.9
Anthracene	5.52	5.46	5.58	409	5.55	413		1
Fluoranthene	6.07	6.01	6.13	394	6.10	421		6.9
Pyrene	6.47	6.41	6.53	948	6.49	1013		6.9
Triphenylene	7.05	6.98	7.12	143	7.06	156		9.1
Benzo(a)anthracene	7.88	7.80	7.96	7351	7.91	7891		7.3
Chrysene	8.15	8.07	8.23	555	8.19	603		8.6
Benzo(b)fluoranthren	9.29	9.20	9.38	1293	9.33	1434		11
Benzo(k)fluoranthren	9.80	9.70	9.90	6893	9.84	7748		12
Benzo(a)pyrene	10.32	10.22	10.42	6923	10.35	7107		2.7
Dibenzo(a,h)anthrace	11.13	11.02	11.24	4360	11.17	4738		8.7
Benzo(ghi)perylene	11.56	11.44	11.68	2979	11.60	3318		11
Indeno(1,2,3-cd)pyre								
	12.42	12.29	12.55	3820	12.45	4336		14

%D should not exceed 15%

11/14/97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: _____

Client: _____

GC Sample ID: 11049724.04

RFW Lot No.: _____

GC Column: HYPERSIL,4.6

Instrument ID: 24

Method: 24001

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/01/97

DATE OF ANALYSIS 11/04/97
TIME OF ANALYSIS 0709
STANDARD ID: STD 5535031D

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Naphthalene	3.12	3.08	3.14	47	3.12	48		2.1
Acenaphthylene	3.63	3.59	3.67	33	3.63	35		6.1
Acenaphthene	4.35	4.31	4.39	22	4.35	23		4.5
Fluorene	4.58	4.52	4.62	235	4.58	245		4.3
Phenanthrene								
Anthracene								
Fluoranthene								
Pyrene								
Triphenylene	7.10	7.03	7.17	989	7.10	1068		8.0
Benzo(a)anthracene								
Chrysene								
Benzo(b)fluoranthren								
Benzo(k)fluoranthren								
Benzo(a)pyrene								
Dibenzo(a,h)anthrace								
Benzo(ghi)perylene								
Indeno(1,2,3-cd)pyre	11.88	11.76	12.00	304	11.88	336		11

%D should not exceed 15%

11/14/97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: _____

Client: _____

GC Sample ID: 11049724.50

RFW Lot No.: _____

GC Column: HYPERSIL,4.6

Instrument ID: 24

Method: 24001

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/01/97

DATE OF ANALYSIS 11/04/97
TIME OF ANALYSIS 2214
STANDARD ID: STD 5535031D

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Naphthalene	3.12	3.08	3.14	47	3.13	49		4.3
Acenaphthylene	3.63	3.59	3.67	33	3.65	35		6.1
Acenaphthene	4.35	4.31	4.39	22	4.37	23		4.5
Fluorene	4.58	4.52	4.62	235	4.59	248		5.5
Phenanthrene								
Anthracene								
Fluoranthene								
Pyrene								
Triphenylene	7.10	7.03	7.17	989	7.13	1082		9.4
Benzo(a)anthracene								
Chrysene								
Benzo(b)fluoranthren								
Benzo(k)fluoranthren								
Benzo(a)pyrene								
Dibenzo(a,h)anthrace								
Benzo(ghi)perylene								
Indeno(1,2,3-cd)pyre	11.88	11.76	12.00	304	11.91	355	+	17

%D should not exceed 15%

11/14/97

RFW 9/93 A

053

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: _____

Client: _____

GC Sample ID: 11049724.56

RFW Lot No.: _____

GC Column: HYPERSIL,4.6

Instrument ID: 24

Method: 24001

DATE(S) OF INIT. CALIB FROM: 10/01/97 TO: 10/01/97

DATE OF ANALYSIS 11/05/97
TIME OF ANALYSIS 0012
STANDARD ID: STD 5535031D

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Naphthalene	3.12	3.08	3.14	47	3.13	50		6.4
Acenaphthylene	3.63	3.59	3.67	33	3.65	36		9.1
Acenaphthene	4.35	4.31	4.39	22	4.37	24		9.1
Fluorene	4.58	4.52	4.62	235	4.59	254		8.1
Phenanthrene								
Anthracene								
Fluoranthene								
Pyrene								
Triphenylene	7.10	7.03	7.17	989	7.12	1098		11
Benzo(a)anthracene								
Chrysene								
Benzo(b)fluoranthren								
Benzo(k)fluoranthren								
Benzo(a)pyrene								
Dibenzo(a,h)anthrace								
Benzo(ghi)perylene								
Indeno(1,2,3-cd)pyre	11.88	11.76	12.00	304	11.92	351		15

%D should not exceed 15%

RFW 9/93 A

2E

WATER PESTICIDE SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#3840R

RFW Lot No.: 9710L955

	CLIENT SAMPLE NO.	S1 (DCB)#	OTHER TCX
01	04LA-97-0486 01	8 *	2 *
02	PBLKCULE2012-MB1	95	32
03	PBLKCULE2012-MB1 BS	89	28

	ADVISORY QC LIMITS
S1 (DCB) = Decachlorobiphenyl	(22-126)
S2 (TCX) = Tetrachloro-m-xylene	(27-129)

Column to be used to flag recovery values
* Values outside of QC limits
D Surrogates diluted out

JW 12-04-97

3E

WATER PESTICIDE MATRIX SPIKE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#3840R RFW Lot No.: 9710L955

MATRIX Spike - Sample No.: PBLKCULE2012-MB1 Level:(low/med) LOW

COMPOUND	SPIKE ADDED UG/L	SAMPLE CONCENTRATION UG/L	MS CONCENTRATION UG/L	MS % REC #	QC LIMITS REC
gamma-BHC (Lindane)	0.200	0	0.160	80	56 -127
Heptachlor	0.200	0	0.0800	40 *	50 -129
Aldrin	0.200	0	0.0700	35 *	48 -133
Dieldrin	0.500	0	0.430	86	57 -131
Endrin	0.500	0	0.420	84	46 -150
4,4'-DDT	0.500	0	0.430	86	38 -138

Column to be used to flag recovery value with an asterisk
* Values outside of QC limits

Spike Recovery: 2 out of 6 outside limits

COMMENTS:

JW 12-04-97

4C

PESTICIDE METHOD BLANK SUMMARY

Lab Name: Recra.LabNet

Contract: 2744-64-01

Case No.: LANL-REQ#3840R

Lab Sample ID: 97LE2012-MB1

Lab File ID: 11019709 .19

Matrix:(Soil/Water) WATER

Level:(low/med) LOW

Date Extracted: 10/27/97

Extraction:(SepF/Cont/Sonc) CONT

Date Analyzed (1): 11/02/97

Date Analyzed (2): 11/02/97

Time Analyzed (1): 0608

Time Analyzed (2): 0608

Instrument ID (1): 09

Instrument ID (2): 10

GC Column ID (1): DB608

GC Column ID (2): RTX1701

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED 1	DATE ANALYZED 2
01	04LA-97-0486 01	9710L955-001	11/01/97	11/01/97
02	PBLKCULE2012-MB1 BS	97LE2012-MB1S	11/02/97	11/02/97

COMMENTS:

12-04-97

FORM IV PEST

5/88 Rev.

8H

PESTICIDE ANALYSIS SEQUENCE

Lab Name: Recra.LabNet

Contract: 02744-064-001-9999-00

Client: LANL-REQ#3840R

GC Sample ID: 10249709

Instrument ID: 09

GC Column ID: DB608

Dates of Analyses: 10/24/97 to 10/25/97

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	ZZZZZ	EVAL 2003	10/24/97	1200
02	ZZZZZ	AR1660 1903	10/24/97	1253
03	ZZZZZ	TOXAPH 2101	10/24/97	1347
04	ZZZZZ	AR1221 1706	10/24/97	1441
05	ZZZZZ	AR1232 2201	10/24/97	1534
06	ZZZZZ	AR1242 1903	10/24/97	1627
07	ZZZZZ	AR1248 2302	10/24/97	1720
08	ZZZZZ	AR1254 1501	10/24/97	1813
09	ZZZZZ	INDA 3501 A	10/24/97	1906
10	ZZZZZ	INDA 3502 B	10/24/97	1959
11	ZZZZZ	INDA 3506 C	10/24/97	2052
12	ZZZZZ	INDA 3504 D	10/24/97	2145
13	ZZZZZ	INDA 3505 E	10/24/97	2238
14	ZZZZZ	INDB 5501 A	10/24/97	2331
15	ZZZZZ	INDB 5501 B	10/25/97	0024
16	ZZZZZ	INDB 5503 C	10/25/97	0117
17	ZZZZZ	INDB 5504 D	10/25/97	0210
18	ZZZZZ	INDB 5505 E	10/25/97	0303
19	ZZZZZ	AR1254 5401 A	10/25/97	0356
20	ZZZZZ	AR1254 5402 B	10/25/97	0449
21	ZZZZZ	AR1254 5403 C	10/25/97	0542
22	ZZZZZ	AR1254 5404 D	10/25/97	0635
23	ZZZZZ	AR1254 5405 E	10/25/97	0728
24	ZZZZZ	AR1660 3401 A	10/25/97	0821
25	ZZZZZ	AR1660 3402 B	10/25/97	0914
26	ZZZZZ	AR1660 3403 C	10/25/97	1008
27	ZZZZZ	AR1660 3404 D	10/25/97	1101
28	ZZZZZ	AR1660 3405 E	10/25/97	1155

gw 13-04-97

FORM VIII PEST

8H

PESTICIDE ANALYSIS SEQUENCE

Lab Name: Recra.LabNet

Contract: 02744-064-001-9999-00

Client: LANL-REQ#3840R

GC Sample ID: 11019709

Instrument ID: 09

GC Column ID: DB608

Dates of Analyses: 11/01/97 to 11/02/97

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	ZZZZZ	INDA 3506 C	11/01/97	1357
02	ZZZZZ	INDB 5503 C	11/01/97	1450
03	ZZZZZ	AR1660 1903	11/01/97	1543
04	ZZZZZ	EVAL 2003	11/01/97	1636
05	ZZZZZ	9710L792-001	11/01/97	1729
06	ZZZZZ	9710L792-002	11/01/97	1824
07	ZZZZZ	9710L910-001	11/01/97	1919
08	ZZZZZ	9710L910-002	11/01/97	2014
09	04LA-97-0486 01	9710L955-001	11/01/97	2109
10	ZZZZZ	WSRC HEXANE	11/01/97	2204
11	ZZZZZ	9710L754-001	11/01/97	2257
12	ZZZZZ	9710L754-001R	11/01/97	2352
13	ZZZZZ	9710L754-001S	11/02/97	0048
14	ZZZZZ	HEXANE	11/02/97	0143
15	ZZZZZ	INDA 3506 C	11/02/97	0236
16	ZZZZZ	INDB 5503 C	11/02/97	0329
17	ZZZZZ	AR1660 1903	11/02/97	0422
18	ZZZZZ	EVAL 2003	11/02/97	0515
19	PBLKCULE2012	97LE2012-MB1	11/02/97	0608
20	PBLKCULE2012 MS	97LE2012-MB1S	11/02/97	0701
21	ZZZZZ	9710L913-001	11/02/97	0754
22	ZZZZZ	9710L913-002	11/02/97	0847
23	ZZZZZ	9710L913-003	11/02/97	0940
24	ZZZZZ	9710L930-001	11/02/97	1034
25	ZZZZZ	9710L930-001S	11/02/97	1127
26	ZZZZZ	9710L930-001R	11/02/97	1220
27	ZZZZZ	9710L930-002	11/02/97	1313
28	ZZZZZ	9710L930-004	11/02/97	1406
29	ZZZZZ	WSRC HEXANE	11/02/97	1459
30	ZZZZZ	INDA 3506 C	11/02/97	1552
31	ZZZZZ	INDB 5503 C	11/02/97	1645
32	ZZZZZ	AR1660 1903	11/02/97	1738

pw 12-04-97

FORM VIII PEST

8H

PESTICIDE ANALYSIS SEQUENCE

Lab Name: Recra.LabNet

Contract: 02744-064-001-9999-00

Client: LANL-REQ#3840R

GC Sample ID: 10249710

Instrument ID: 10

GC Column ID: RTX1701

Dates of Analyses: 10/24/97 to 10/25/97

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	ZZZZZ	EVAL 2003	10/24/97	1200
02	ZZZZZ	AR1660 1903	10/24/97	1253
03	ZZZZZ	TOXAPH 2101	10/24/97	1347
04	ZZZZZ	AR1221 1706	10/24/97	1441
05	ZZZZZ	AR1232 2201	10/24/97	1534
06	ZZZZZ	AR1242 1903	10/24/97	1627
07	ZZZZZ	AR1248 2302	10/24/97	1720
08	ZZZZZ	AR1254 1501	10/24/97	1813
09	ZZZZZ	INDA 3501 A	10/24/97	1906
10	ZZZZZ	INDA 3502 B	10/24/97	1959
11	ZZZZZ	INDA 3506 C	10/24/97	2052
12	ZZZZZ	INDA 3504 D	10/24/97	2145
13	ZZZZZ	INDA 3505 E	10/24/97	2238
14	ZZZZZ	INDB 5501 A	10/24/97	2331
15	ZZZZZ	INDB 5501 B	10/25/97	0024
16	ZZZZZ	INDB 5503 C	10/25/97	0117
17	ZZZZZ	INDB 5504 D	10/25/97	0210
18	ZZZZZ	INDB 5505 E	10/25/97	0303
19	ZZZZZ	AR1254 5401 A	10/25/97	0356
20	ZZZZZ	AR1254 5402 B	10/25/97	0449
21	ZZZZZ	AR1254 5403 C	10/25/97	0542
22	ZZZZZ	AR1254 5404 D	10/25/97	0635
23	ZZZZZ	AR1254 5405 E	10/25/97	0728
24	ZZZZZ	AR1660 3401 A	10/25/97	0821
25	ZZZZZ	AR1660 3402 B	10/25/97	0914
26	ZZZZZ	AR1660 3403 C	10/25/97	1008
27	ZZZZZ	AR1660 3404 D	10/25/97	1101
28	ZZZZZ	AR1660 3405 E	10/25/97	1155

10-24-97

FORM VIII PEST

8H

PESTICIDE ANALYSIS SEQUENCE

Lab Name: Recra.LabNet

Contract: 02744-064-001-9999-00

Client: LANL-REQ#3840R

GC Sample ID: 11019710

Instrument ID: 10

GC Column ID: RTX1701

Dates of Analyses: 11/01/97 to 11/02/97

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	ZZZZZ	INDA 3506 C	11/01/97	1357
02	ZZZZZ	INDB 5503 C	11/01/97	1450
03	ZZZZZ	AR1660 1903	11/01/97	1543
04	ZZZZZ	EVAL 2003	11/01/97	1636
05	ZZZZZ	9710L792-001	11/01/97	1729
06	ZZZZZ	9710L792-002	11/01/97	1824
07	ZZZZZ	9710L910-001	11/01/97	1919
08	ZZZZZ	9710L910-002	11/01/97	2014
09	04LA-97-0486 01	9710L955-001	11/01/97	2109
10	ZZZZZ	WSRC HEXANE	11/01/97	2204
11	ZZZZZ	9710L754-001	11/01/97	2257
12	ZZZZZ	9710L754-001R	11/01/97	2352
13	ZZZZZ	9710L754-001S	11/02/97	0048
14	ZZZZZ	HEXANE	11/02/97	0143
15	ZZZZZ	INDA 3506 C	11/02/97	0236
16	ZZZZZ	INDB 5503 C	11/02/97	0329
17	ZZZZZ	AR1660 1903	11/02/97	0422
18	ZZZZZ	EVAL 2003	11/02/97	0515
19	PBLKCULE2012	97LE2012-MB1	11/02/97	0608
20	PBLKCULE2012 MS	97LE2012-MB1S	11/02/97	0701
21	ZZZZZ	9710L913-001	11/02/97	0754
22	ZZZZZ	9710L913-002	11/02/97	0847
23	ZZZZZ	9710L913-003	11/02/97	0940
24	ZZZZZ	9710L930-001	11/02/97	1034
25	ZZZZZ	9710L930-001S	11/02/97	1127
26	ZZZZZ	9710L930-001R	11/02/97	1220
27	ZZZZZ	9710L930-002	11/02/97	1313
28	ZZZZZ	9710L930-004	11/02/97	1406
29	ZZZZZ	WSRC HEXANE	11/02/97	1459
30	ZZZZZ	INDA 3506 C	11/02/97	1552
31	ZZZZZ	INDB 5503 C	11/02/97	1645
32	ZZZZZ	AR1660 1903	11/02/97	1738

gw 12-04-97

FORM VIII PEST

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: ~~NONE~~ 2744-64-01

Client: ~~LAB~~ LCMC-REQ #3840R

DAC 12/2/97

GC Sample ID: 11019709.01

RFW Lot No.: 9710L955

GC Column: DB608

Instrument ID: 09

Method: P09

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/01/97
TIME OF ANALYSIS 1357
STANDARD ID: INDA 3506 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.76	11.71	11.81	4832365	11.76	5124251		6.0
Beta-BHC	13.62	13.57	13.67	2570813				
Delta-BHC	15.08	15.02	15.12	4482939				
gamma-BHC (Lindane)	13.34	13.30	13.40	4681253	13.34	4845051		3.5
Heptachlor	14.64	14.59	14.69	3810875	14.64	4014201		5.3
Aldrin	15.92	15.87	15.97	3615695				
Heptachlor epoxide	18.10	18.05	18.15	3735289				
Endosulfan I	19.46	19.39	19.53	3490243	19.46	3727951		6.8
Dieldrin	20.62	20.55	20.69	3430239	20.62	3635851		6.0
4,4'-DDE	20.29	20.22	20.36	3800157				
Endrin	22.00	21.93	22.07	3063397	22.00	3227975		5.4
Endosulfan II	22.66	22.59	22.73	2988367				
4,4'-DDD	22.39	22.32	22.46	2844359	22.39	3056575		7.5
Endosulfan sulfate	24.33	24.26	24.40	2796015				
4,4'-DDT	23.50	23.43	23.57	3065923	23.50	3350901		9.3
Methoxychlor	26.77	26.70	26.84	1154489	26.77	1205521		4.4
Endrin aldehyde	23.87	23.80	23.94	2310691				
Endrin ketone	27.33	27.26	27.40	2699777				
alpha-Chlordane	19.33	19.26	19.40	3929011				
gamma-Chlordane	18.72	18.65	18.79	3808437				
Tetrachloro-m-xylene	8.95	8.88	9.02	3335701	8.96	3475051		4.2
Decachlorobiphenyl	33.82	33.75	33.89	1761779	33.83	1847641		4.9

%D should not exceed 15%

DAC 11/3/97

gw 12-04-97

032

RFW 9/93 A

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: ~~NONE~~ 2744-64-01

Client: ~~LAB~~ LANL - REQ # 3840R

DAL 12/2/97

GC Sample ID: 11019709.02

RFW Lot No.: 9710L955

GC Column: DB608

Instrument ID: 09

Method: P09

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/01/97
TIME OF ANALYSIS 1450
STANDARD ID: INDB 5503 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.76	11.71	11.81	4832365				
Beta-BHC	13.62	13.57	13.67	2570813	13.62	2678451		4.2
Delta-BHC	15.08	15.02	15.12	4482939	15.08	4699901		4.8
gamma-BHC (Lindane)	13.34	13.30	13.40	4681253				
Heptachlor	14.64	14.59	14.69	3810875				
Aldrin	15.92	15.87	15.97	3615695	15.92	3893451		7.7
Heptachlor epoxide	18.10	18.05	18.15	3735289	18.10	3909551		4.7
Endosulfan I	19.46	19.39	19.53	3490243				
Dieldrin	20.62	20.55	20.69	3430239				
4,4'-DDE	20.29	20.22	20.36	3800157	20.29	4008901		5.5
Endrin	22.00	21.93	22.07	3063397				
Endosulfan II	22.66	22.59	22.73	2988367	22.66	3159225		5.7
4,4'-DDD	22.39	22.32	22.46	2844359				
Endosulfan sulfate	24.33	24.26	24.40	2796015	24.33	2910225		4.1
4,4'-DDT	23.50	23.43	23.57	3065923				
Methoxychlor	26.77	26.70	26.84	1154489				
Endrin aldehyde	23.87	23.80	23.94	2310691	23.87	2425875		5.0
Endrin ketone	27.33	27.26	27.40	2699777	27.33	2775475		2.8
alpha-Chlordane	19.33	19.26	19.40	3929011	19.33	4215951		7.3
gamma-Chlordane	18.72	18.65	18.79	3808437	18.72	4045151		6.2
Tetrachloro-m-xylene	8.95	8.88	9.02	3335701	8.95	3403925		2.0
Decachlorobiphenyl	33.82	33.75	33.89	1761779	33.82	1830841		3.9

%D should not exceed 15%

DAL 11/3/97

JW 12-04-97

033

RFW 9/93 A

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: ~~NONE~~ 2744-64-01

Client: ~~LAB~~ LAML-REG #3840R

DAC 12/1/97

GC Sample ID: 11019709.03

RFW Lot No.: 9710L955

GC Column: DB608

Instrument ID: 09

Method: P0960

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/01/97
TIME OF ANALYSIS 1543
STANDARD ID: AR1660 1903

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Aroclor-1016	11.57	11.50	11.64	83700	11.57	87080		4.0
Aroclor-1016	13.24	13.17	13.31	158740	13.24	166650		5.0
Aroclor-1016	14.69	14.62	14.76	228982	14.69	244570		6.8
Aroclor-1016	15.32	15.25	15.39	124112	15.32	131230		5.7
Aroclor-1016	17.18	17.11	17.25	103693	17.18	109390		5.5
Total				**699227**		**738920**		**5.7**
Aroclor-1260	20.88	20.81	20.95	150664	20.88	162250		7.7
Aroclor-1260	21.55	21.48	21.62	243924	21.55	258520		6.0
Aroclor-1260	21.86	21.79	21.93	322661	21.86	342210		6.1
Aroclor-1260	23.47	23.40	23.54	165481	23.47	188780		14
Aroclor-1260	25.40	25.33	25.47	450221	25.40	485470		7.8
Total				**1332951**		**1437230**		**7.8**
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Total								

%D should not exceed 15%

DAC 11/3/97

JW 12-04-97

034

RFW 9/93 A

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: ~~NONE~~ 2744-64-01

Client: ~~LAB~~ Client-Reg #3840R DAK 12/2/97

GC Sample ID: 11019709.15

RFW Lot No.: 97101955

GC Column: DB608

Instrument ID: 09

Method: P09

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/02/97
TIME OF ANALYSIS 0236
STANDARD ID: INDA 3506 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.76	11.71	11.81	4832365	11.74	4985651		3.2
Beta-BHC	13.62	13.57	13.67	2570813				
Delta-BHC	15.08	15.02	15.12	4482939				
gamma-BHC (Lindane)	13.34	13.30	13.40	4681253	13.33	4791301		2.4
Heptachlor	14.64	14.59	14.69	3810875	14.62	3896401		2.2
Aldrin	15.92	15.87	15.97	3615695				
Heptachlor epoxide	18.10	18.05	18.15	3735289				
Endosulfan I	19.46	19.39	19.53	3490243	19.45	3494251		0.1
Dieldrin	20.62	20.55	20.69	3430239	20.60	3525875		2.8
4,4'-DDE	20.29	20.22	20.36	3800157				
Endrin	22.00	21.93	22.07	3063397	21.99	3155525		3.0
Endosulfan II	22.66	22.59	22.73	2988367				
4,4'-DDD	22.39	22.32	22.46	2844359	22.37	3026651		6.4
Endosulfan sulfate	24.33	24.26	24.40	2796015				
4,4'-DDT	23.50	23.43	23.57	3065923	23.49	3132175		2.2
Methoxychlor	26.77	26.70	26.84	1154489	26.75	1213185		5.1
Endrin aldehyde	23.87	23.80	23.94	2310691				
Endrin ketone	27.33	27.26	27.40	2699777				
alpha-Chlordane	19.33	19.26	19.40	3929011				
gamma-Chlordane	18.72	18.65	18.79	3808437				
Tetrachloro-m-xylene	8.95	8.88	9.02	3335701	8.94	3377275		1.2
Decachlorobiphenyl	33.82	33.75	33.89	1761779	33.80	1808491		2.7

%D should not exceed 15%

DAK 11/3/97

gw 12-04-97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: ~~NONE~~ 2744-64-01

Client: ~~LAB~~ LANL-REG#38408

GC Sample ID: 11019709.16

RFW Lot No.: 97101955

DAC 12/2/97

GC Column: DB608

Instrument ID: 09

Method: P09

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/02/97
TIME OF ANALYSIS 0329
STANDARD ID: INDB 5503 C

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Alpha-BHC	11.76	11.71	11.81	4832365				
Beta-BHC	13.62	13.57	13.67	2570813	13.61	2718701		5.8
Delta-BHC	15.08	15.02	15.12	4482939	15.07	4748651		5.9
gamma-BHC (Lindane)	13.34	13.30	13.40	4681253				
Heptachlor	14.64	14.59	14.69	3810875				
Aldrin	15.92	15.87	15.97	3615695	15.92	3800001		5.1
Heptachlor epoxide	18.10	18.05	18.15	3735289	18.09	3813401		2.1
Endosulfan I	19.46	19.39	19.53	3490243				
Dieldrin	20.62	20.55	20.69	3430239				
4,4'-DDE	20.29	20.22	20.36	3800157	20.28	3975625		4.6
Endrin	22.00	21.93	22.07	3063397				
Endosulfan II	22.66	22.59	22.73	2988367	22.66	3082825		3.2
4,4'-DDD	22.39	22.32	22.46	2844359				
Endosulfan sulfate	24.33	24.26	24.40	2796015	24.33	2909851		4.1
4,4'-DDT	23.50	23.43	23.57	3065923				
Methoxychlor	26.77	26.70	26.84	1154489				
Endrin aldehyde	23.87	23.80	23.94	2310691	23.87	2444351		5.8
Endrin ketone	27.33	27.26	27.40	2699777	27.33	2796251		3.6
alpha-Chlordane	19.33	19.26	19.40	3929011	19.33	4154201		5.7
gamma-Chlordane	18.72	18.65	18.79	3808437	18.72	3992401		4.8
Tetrachloro-m-xylene	8.95	8.88	9.02	3335701	8.94	3421175		2.6
Decachlorobiphenyl	33.82	33.75	33.89	1761779	33.82	1830221		3.9

%D should not exceed 15%

DAC 11/3/97

gw 12-04-97

CALIBRATION VERIFICATION SUMMARY

Lab Name: Recra.LabNet

Contract: ~~NONE~~ 2744-64-01

Client: ~~LAB~~ LANL-REG #3840R DAL 12/2/97

GC Sample ID: 11019709.17

RFW Lot No.: 97101955

GC Column: DB608

Instrument ID: 09

Method: P0960

DATE(S) OF INIT. CALIB FROM: 10/24/97 TO: 10/25/97

DATE OF ANALYSIS 11/02/97
TIME OF ANALYSIS 0422
STANDARD ID: AR1660 1903

COMPOUND	RT	RT WINDOW FROM	RT WINDOW TO	INITIAL RESP. FACT.	RT	CONTINUING RESP. FACT.	FL	%D
Aroclor-1016	11.57	11.50	11.64	83700	11.57	86010		2.8
Aroclor-1016	13.24	13.17	13.31	158740	13.24	161030		1.4
Aroclor-1016	14.69	14.62	14.76	228982	14.68	241040		5.3
Aroclor-1016	15.32	15.25	15.39	124112	15.31	128820		3.8
Aroclor-1016	17.18	17.11	17.25	103693	17.17	108020		4.2
Total				**699227**		**724920**		**3.7**
Aroclor-1260	20.88	20.81	20.95	150664	20.87	157670		4.7
Aroclor-1260	21.55	21.48	21.62	243924	21.54	251900		3.3
Aroclor-1260	21.86	21.79	21.93	322661	21.85	336000		4.1
Aroclor-1260	23.47	23.40	23.54	165481	23.46	184030		11
Aroclor-1260	25.40	25.33	25.47	450221	25.39	473020		5.1
Total				**1332951**		**1402620**		**5.2**
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Toxaphene								
Total								

%D should not exceed 15%

DAL 11/3/97

JW 12-04-97

Paragon Analytics, Incorporated

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 9710227
Client Name: Los Alamos National Laboratory SMO
Client Project Name: 3841R
Client Project Number: NONE
Client PO Number:

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
04LA-97-0486	9710227-1		Water	10/20/97	

Thursday, October 23, 1997

DATA ENTERED 110397H

REQUEST NUMBER: 3841R

ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

These samples are on:

SHIP DATE: 10/23/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 2 day

LANL Request Number: 3841R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
TCN		04LA-97-0486	12	W	10/20/97	
METTAL	+ B	04LA-97-0486	14	W	10/20/97	
METTAL	+ U	04LA-97-0486	14	W	10/20/97	

Final Page of REQUEST NUMBER 3841R

Paragon Analytics, Inc.

TOTAL METALS CASE NARRATIVE

Los Alamos National Laboratory SMO

3841R

Order Number - 9710227

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Inorganic Qualifiers
Section 4: Sample Results
Section 5: Summary Report Forms
Section 6: Supporting Raw Data

Appendix A: Digestion Bench Sheets

Section 1: Case Narrative

1.1 This report consists of 1 water sample.

Due to limitation of the reporting software:

a) Some mercury values appear as 0.0. When this occurs the actual value is hand entered.

b) For Mercury, the ICB is also used as the preparation blank, therefore the run chronology will show the same time for both.

c) Trace ICP elements which are calibrated daily with a multipoint calibration do not appear on the run log. The calibration standards can be located at the beginning of each raw data package for this instrument.

1.2 The sample was received cool and intact on 10/24/97. The client had not designated a sample for quality control. The lab designated a sample from request number 3846R as the quality control sample for this Order Number.

1.3 The sample had been correctly preserved for the requested analyses.

1.4 The sample was prepared for analysis based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0.

1.5 The sample was analyzed and reported based on the Contract Laboratory Program Statement of Work (CLP SOW) ILM03.0

1.6 All standards and solutions are NIST traceable and were used within their recommended shelf life.

1.7 The sample was prepared and analyzed within the established hold times.

All in house quality control procedures were followed, as described below.

1.8 General quality control procedures.

- A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in each digestion batch. There were not more than 20 samples in each digestion batch.
- The preparation (method) blank results associated with each batch were below the practical quantitation limits for the requested analytes.
- The laboratory control sample associated with each batch was within acceptance limits. This indicates complete digestion according to the method.
- All initial and continuing calibration blanks associated with each batch were below the practical quantitation limits for the requested analytes.
- All initial and continuing calibration verifications associated with each batch were within acceptance criteria for the requested analytes. This indicates a valid calibration and stable instrument conditions.
- The interference check samples associated with CLP analyses were within acceptance criteria.

1.9 Matrix specific quality control procedures.

- A matrix spike was digested and analyzed with each batch. All acceptance criteria for accuracy were met.
- A sample duplicate was digested and analyzed with each batch. All acceptance criteria for precision were met.
- A serial dilution was analyzed with each ICP batch. All acceptance criteria were met with the following exceptions.

Analyte	Sample ID
Aluminum	9710229-1L
Barium	9710229-1L
Magnesium	9710229-1L

Associated sample results for these elements have been flagged in the report.

Aluminum, barium and magnesium results in the diluted sample did not agree within 10% with the undiluted sample results. Results for these elements are flagged with an

"E" indicating a potential matrix effect. The concentrations of barium and magnesium in the diluted and undiluted samples were below the CRDL. These relatively low concentrations may have contributed to the greater than 10% difference between the two sets of results.

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

Darryl Patrick Senior Inorganic Chemist	11/9/97 Date
KI Reviewer's Initials	11/9/97 Date

CERTIFICATION

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

Paragon Analytics, Inc.

INORGANICS CASE NARRATIVE

Los Alamos National Laboratory SMO

3841R

Order Number - 9710227

TABLE OF CONTENTS:

Section 1: Case Narrative
Section 2: Chain of Custody
Section 3: Sample Results
Section 4: QC and Summary Report Forms
Section 5: Supporting Raw Data/Benchsheets

Section 1: Case Narrative

1. This report consists of data for 1 water sample analyzed for total cyanide.
2. The sample was received cool and intact on 10/24/97.
3. The sample has been correctly preserved for the requested analyses.
4. The sample was analyzed using procedures based on the following methods from the USEPA:

Analyte	Method
Total Cyanide	9010

5. All standards and solutions were used within their recommended shelf life.
6. The sample was prepared and analyzed within the established hold times for all analyses.
7. Sample results which are below the reporting limit are reported as "ND" on the enclosed report.

All in house quality control procedures were followed, as described below.

8. General quality control procedures.

- A method blank, a laboratory control sample (LCS), a matrix spike and a matrix duplicate were prepared and analyzed for each analysis batch.
- The method blank results were within acceptance limits for all analyses.
- The laboratory control sample (LCS) results were within acceptance limits.
- The matrix spike and matrix duplicate were within acceptance limits.

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

Reporter's Initials	10-30-97 Date
Reviewer's Initials	11-3-97 Date

CERTIFICATION

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Steven Fry Don Gipple Laboratory Manager	11-10-97 Date

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: 3841R LAB NAME _____ LAB CODE_____

NAME OF CCS CHECKER_____ COMPANY_____

NAME OF VALIDATOR R. Sherman_____ COMPANY LATA_____

CCS DATE_____ VALIDATION DATE 11/26/97 EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- x INORGANICS
- o RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? ¨ YES ¨ NO
Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

Boron is non-standard and was not validated.
Uranium was analyzed by ICP and validated using inorganic baseline criteria.

Signature/1st validation Ruth D. Sherman 11/26/97
Signature/2nd validation _____
Qualifiers entered _____ Date_____

CCS AND VALIDATION

Explanation of qualifiers (Q):

U The analyte was analyzed for but not detected above the reported EQL

J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
J+ Likely has a high bias
J- Likely has a low bias

UJ The analyte was analyzed for but not detected. The associated value is an estimate

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone

P Use professional judgement based on data use . It usually has an "M"with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time excedance, the project manager/delegee can decide to use the data with no qualification when analyltes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likley because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

5 Sample result < EQL and < 5X (10X as above) the concentration of the analyte in the blank, which indicates the detected result was indistinguishable from blank contamination and the detected result was changed to non-detected at the EQL.

5a Sample result > EQL and > 5X (10X as above) the concentration of the analyte in the blank, which indicates the reported result is not likely to be related to the contamination in the associated blank.

6 Recovery of surrogates or analyte in the LCS > upper limit, which indicates a potential high bias in the results and a potential for false positive results.

6a Recovery of surrogates or analyte in the LCS < lower limit, which indicates a potential low bias in the results.

6d Result is a non-detect and the recovery of surrogates or the analyte in the LCS is < the lower limit, which indicates a potential for false negative results.

7 % RSD or %D exceeds specification - apply to a positive resultresult, which indicates potential quantitation problems in the analyses and the potential for false positive results.

8 % RSD or %D exceeds the specification - apply to a non-detect, which indicates potential quantitation problems in the analyses and the potential false negative results.

9. Holding time is exceeded. An evaluation of the data of interest with respect to holding time exceedance impact (technically) is recommended. Factors to consider include sample preservation, sample storage practices, use of the data, levels of contamination found in the sample, and the physical, chemical, and biological stability of the target analytes in the sample matrix.

10. Duplicate RPD > advisory 20% limit.

INORGANICS (I)

3 Spike recovery > upper limit (125%) and the results > the EDL.

3a Spike recovery < lower limit (75%) and the results are > the EDL.

3d Spike recovery < 30 % and results < EDL.

3e Spike recovery 30-74% and sample results < EDL.

4 Using the worse case blank, the sample results > the EDL but < 5X the concentration of the related analyte in the blank.

6 Recovery of analyte in the LCS > upper limit.

6a Recovery of analyte in the LCS < lower limit.

7 ICS recovery > 120% and results > EDL.

7a ICS recovery 50-79% .

7b ICS recovery < 50% and result < EDL.

8a For ICV and CCV, recovery is lower than specification

8b For ICV and CCV, recovery is higher than specification

8c For ICV and CCV, results are positive, but < MDL and recovery is lower than the specification.

8d For ICV and CCV, recovery is extremely low and detection may be impaired.

8e For ICV and CCV, recovery is abnormally high - apply to results > MDL.

9 Holding time for Hg has been exceeded. Positive results may be biased low and non-detects may potential be false negatives.

RADIOCHEMISTRY (R)

1 Tracer/carrier recovery < 10%.

1a Tracer recovery 10-30% and the result > EQL.

1b Tracer recovery 10-30% and the result < EQL.

1 Carrier recovery 10-40% and result > EQL.

1 Carrier recovery 10-40% and the result < EQL.

3 Spike recovery > upper limit.

3a Spike recovery < lower limit.

INORGANICS

Calibration Present? x yes no **Initial calibration verification** Present? x yes no **Continuing calibration verification** Present? x yes no	NA OK OK	Obtain from lab. Q=A Obtain form lab. Q=A	
Blanks (Applies to each) Present? x yes no **Initial & continuing calibration blanks** Analyze at each wavelength Beginning and end of each run ICB and CCB analyzed at a frequency of 10% or 2 hours If blank results > EDL reanalyze previous 10 samples **Preparation blank** One per batch ≤ EDL, or if concentration of analyte < 10X EDL, repeat all samples in batch. ***All analytes were detected in the blanks except Sb, As, Cd, Co, Cu, Pb, Se, Ag, U, and V. No action required.***	 OK	 Obtain from lab. Q=A Use "worse" case blank. Sample results > EDL but < 5 X amount found in the blank should be qualified as U.	 I4

AJS
11/26/97

ICP Interference check sample Present? x yes no Solution contains Ag, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, V, & Zn Analyze at beginning of each run Each wavelength used for samples ICS results must be ± 20%of true value	OK	Obtain from lab. Q=A If the ICS recovery is >120% and the results are >EDL, qualify data as J+ If recovery is 50-79%, qualify data as J- If ICS recovery is < 50% and results are < EDL, qualify results as R, PM	 I7 I7a I7b
Spike sample analysis Present? yes x no One per run, per matrix, concentration, SDG % recovery: 75-125% (unless conc. > 4X spike conc.) *Spike analysis was performed on an unknown sample.*	A	Obtain from lab. Q=A If spike recovery > 125% and results < EDL, OK If spike recovery < 75% and results are >EDL, qualify results as J- if same matrix, P if not. If spike recovery > 125% and results are >EDL, qualify data as J+ if same matrix, P if not. If spike recovery 30-74% and sample results < EDL, qualify as UJ if same matrix, P if not. If spike recovery results < 30% and results < EDL, qualify as R, PM.	 I3a I3 I3e I3d

RJS
11/26/97

Duplicate **Present? yes x no** **One per batch of sample of like matrix for each SDG** **RPD : ≤ 20% (advisory)** **If either the sample or duplicate value is less than 5 X EDL, there is a control limit of ± EDL** ***Duplicate analysis was performed on an unknown sample.***	**A**	**Obtain from lab. Q=A** **Q=P because of nature of LANL samples.**	
Laboratory Control Sample (LCS) **Aqueous LCS per batch/SDG** **% recovery : 80-120% (except Ag & Sb)**	**OK**	**If criterion not met, qualify each analyte associated with the LCS in the same batch as J-** **for < 80% and J+ for > 120%**	**I6a** **I6**
Holding time **Analyze water samples for Hg within 28 days of sample collection** **Analyze water samples for CN within 14 days of sample collection**	**OK**	**Compare analysis date with date of sample collection on the Analysis Request.** **Q=PM**	

RJS
11/22/07

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

04LA-97-0486

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

Matrix (soil/water): WATER Lab Sample ID: W9710227-1

Level (low/med): LOW__ Date Received: 10/24/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	488000		E	P
7440-36-0	Antimony_	17.0	U		P
7440-38-2	Arsenic__	45.8	B		P
7440-39-3	Barium___	3730		E	P
7440-41-7	Beryllium	25.2			P
7440-42-8	Boron____	130	B		P
7440-43-9	Cadmium__	1.0	U		P
7440-70-2	Calcium__	391000			P
7440-47-3	Chromium_	538			P
7440-48-4	Cobalt___	460			P
7440-50-8	Copper___	3950			P
7439-89-6	Iron_____	703000			P
7439-92-1	Lead_____	177			P
7439-95-4	Magnesium	350000		E	P
7439-96-5	Manganese	13900			P
7439-97-6	Mercury__	0.18	B		AV
7440-02-0	Nickel___	1940			P
7440-09-7	Potassium	52800			P
7782-49-2	Selenium_	44.2			P
7440-22-4	Silver___	2050			P
7440-23-5	Sodium___	189000			P
7440-28-0	Thallium_	13.0	U		P
7440-61-1	Uranium__	1730			P
7440-62-2	Vanadium_	661			P
7440-66-6_	Zinc_____	1410			P

Color Before: BROWN____ Clarity Before: CLOUDY Texture: N/A___

Color After: TAN_____ Clarity After: CLEAR_ Artifacts: _____

omments:

FORM I - IN ILM03.0

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	-78.1	B	-72.4	B	-75.7	B			14.220	B	P
Antimony	3.4	U	3.4	U	3.4	U			3.400	U	P
Arsenic	2.8	U	2.8	U	2.8	U			2.800	U	P
Barium	0.4	B	0.5	B	0.5	B			0.370	B	P
Beryllium	0.1	U	0.4	B	0.4	B			0.060	U	P
Boron	15.0	B	12.1	B	9.6	U	9.6	U	9.600	U	P
Cadmium	0.2	U	0.2	U	0.2	U			0.200	U	P
Calcium	33.1	B	48.2	B	63.8	B			126.550	B	P
Chromium	1.9	B	1.8	B	1.8	B			1.450	B	P
Cobalt	0.4	U	0.4	U	0.4	U			0.400	U	P
Copper	-0.7	B	-0.9	B	0.4	U			0.400	U	P
Iron	33.0	B	46.7	B	37.0	B			61.700	B	P
Lead	1.3	U	-1.4	B	1.3	U			-2.180	B	P
Magnesium	-9.0	B	6.3	B	25.7	B			84.320	B	P
Manganese	0.3	B	0.6	B	0.4	B			0.230	B	P
Mercury	0.01	U	0.01	U	0.01	U	0.01	U	0.040	U	AV
Nickel	0.4	U	0.4	U	0.4	B			0.450	B	P
Potassium	36.3	B	53.3	B	49.1	B			24.000	U	P
Selenium	2.6	U	2.6	U	2.6	U			2.600	U	P
Silver	0.7	U	0.7	U	0.7	U			0.700	U	P
Sodium	-4.7	B	9.8	B	3.6	U			-8.170	B	P
Thallium	2.6	U	2.6	U	3.9	B			3.140	B	P
Uranium	64.0	U	64.0	U	64.0	U			64.000	U	P
Vanadium	0.5	U	0.5	U	0.5	U			0.500	U	P
Zinc	0.4	U	0.4	U	0.4	U			0.530	B	P

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum											NR
Antimony											NR
Arsenic											NR
Barium											NR
Beryllium											NR
Boron			9.6	U							P
Cadmium											NR
Calcium											NR
Chromium											NR
Cobalt											NR
Copper											NR
Iron											NR
Lead											NR
Magnesium											NR
Manganese											NR
Mercury			0.04	U	0.04	B					AV
Nickel											NR
Potassium											NR
Selenium											NR
Silver											NR
Sodium											NR
Thallium											NR
Uranium											NR
Vanadium											NR
Zinc											NR

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

IN HOUSES

Lab Name: PARAGON_ANALYTICS_____ Contract:_____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_
Matrix: __WATER_____ Level (low/med): _LOW____
% Solids for Sample: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum	75-125	3425.1500		1595.9200		2000.00	91.5		P
Antimony	75-125	502.3200		7.1300	B	500.00	99.0		P
Arsenic	75-125	1959.5600		2.8000	U	2000.00	98.0		P
Barium	75-125	1847.1200		6.3500	B	2000.00	92.0		P
Beryllium	75-125	48.7700		0.0600	U	50.00	97.5		P
Boron	75-125	1016.9400		67.8300	B	1000.00	94.9		P
Cadmium	75-125	44.0400		0.2000	U	50.00	88.1		P
Calcium									NR
Chromium	75-125	184.5300		5.2500	B	200.00	89.6		P
Cobalt	75-125	479.0200		0.4000	U	500.00	95.8		P
Copper	75-125	263.6800		15.7100	B	250.00	99.2		P
Iron	75-125	1805.7500		921.2200		1000.00	88.5		P
Lead	75-125	441.4000		6.5000	U	500.00	88.3		P
Magnesium									NR
Manganese	75-125	478.1300		19.7600		500.00	91.7		P
Mercury	75-125	1.0900		0.0810	B	1.00	100.9		AV
Nickel	75-125	490.8900		7.8500	B	500.00	96.6		P
Potassium									NR
Selenium	75-125	2063.9100		39.2800		2000.00	101.2		P
Silver	75-125	42.5700		0.7000	U	50.00	85.1		P
Sodium									NR
Thallium	75-125	2025.1200		5.6400	B	2000.00	101.0		P
Uranium	75-125	11248.5800		435.4000		10000.00	108.1		P
Vanadium	75-125	461.8200		3.4500	B	500.00	91.7		P
Zinc	75-125	472.1500		12.6900	B	500.00	91.9		P

Comments:

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

IN HOUSED

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: 3841R

Matrix (soil/water): WATER Level (low/med): LOW

% Solids for Sample: 0.0 % Solids for Duplicate: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		1595.9200		1615.3200		1.2		P
Antimony		7.1300	B	4.8400	B	38.3		P
Arsenic		2.8000	U	2.8000	U			P
Barium		6.3500	B	5.9400	B	6.7		P
Beryllium		0.0600	U	0.0600	U			P
Boron		67.8300	B	70.6200	B	4.0		P
Cadmium		0.2000	U	0.2000	U			P
Calcium		1917.0300	B	1893.9800	B	1.2		P
Chromium		5.2500	B	5.0600	B	3.7		P
Cobalt		0.4000	U	0.4000	U			P
Copper		15.7100	B	16.2500	B	3.4		P
Iron		921.2200		922.2200		0.1		P
Lead		6.5000	U	6.5000	U			P
Magnesium		924.2100	B	908.2900	B	1.7		P
Manganese	15.0	19.7600		19.5900		0.9		P
Mercury		0.0810	B	0.0730	B	10.4		AV
Nickel		7.8500	B	7.5900	B	3.4		P
Potassium		3970.7100	B	3933.6900	B	0.9		P
Selenium		39.2800		38.8100		1.2		P
Silver		0.7000	U	0.7000	U			P
Sodium	25000.0	76511.9000		76736.6500		0.3		P
Thallium		5.6400	B	3.3500	B	50.9		P
Uranium	200.0	435.4000		456.8400		4.8		P
Vanadium		3.4500	B	3.1800	B	8.1		P
Zinc		12.6900	B	13.5000	B	6.2		P

TOTAL CYANIDE

Method 9010

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID: 3841R
Client Project No:
Lab Workorder Number: 9710227

Date Collected: 10/20/97
Date Analyzed: 10/29/97
Sample Matrix: Water

Client ID	Lab Sample ID	Total Cyanide Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.01
04LA-97-0486	9710227-1	ND	0.01

A

ND = Not Detected

Total CN in Water Calculations and Quality Control Results

Date analyzed: October 29, 1997
Time analyzed: 8:00-4:00

std (ug/L)	Abs (578nm)	calc soln conc (ug/L)
0	0.000	-4.3
20	0.041	19.8
40	0.078	41.6
100	0.180	101.6
200	0.353	203.4
300	0.519	301.0
400	0.682	396.9

Regression Output:

Constant		-4.2893
Std Err of Y Est		3.0159
R Squared		0.9997
No. of Observations		7
Degrees of Freedom		5
X Coefficient(s)	588.2489	
Std Err of Coef.	4.7172	

ID:	sample aliq (mL)	trap vol (mL)	aliq for color dev (mL)	Abs (578nm)	calc soln conc (ug/L)	sample conc mg/L	Rep Limit mg/L	ICV/CCV recovery %
ICV			10	0.193	109.2			109
ICB			10	0.001	-3.7			
M Blank	50	50	10	0.006	-0.8	-0.00	0.01	
LCS-1	50	50	10	0.589	342.2	0.342	0.01	
DC Low	50	50	10	0.185	104.5	0.105	0.01	
DC High	50	50	10	0.581	337.5	0.34	0.01	
9710143-1	50	50	10	0.006	-0.8	-0.001	0.01	
9710143-1 MS	50	50	10	0.184	103.9	0.104	0.01	
9710143-1 MSD	50	50	10	0.199	112.8	0.11	0.01	
9710206-1	50	50	10	0.005	-1.3	-0.00	0.01	
9710227-1	50	50	10	0.007	-0.2	-0.00	0.01	
CCV	50	50	10	0.179	101.0	0.101	0.01	101
CCB	50	50	10	0.001	-3.7	-0.004	0.01	
9710229-1	50	50	10	0.003	-2.5	-0.003	0.01	
9710229-1 Dup	50	50	10	0.007	-0.2	-0.000	0.01	
9710229-1 MS	50	50	10	0.190	107.5	0.1	0.01	
9710236-1	5	50	10	0.005	-1.3	-0.01	0.1	
9710236-2	50	50	10	0.007	-0.2	-0.00	0.01	
9710236-2	5	50	10	0.005	-1.3	-0.01	0.1	
CCV	50	50	10	0.179	101.0	0.10	0.01	101
CCB	50	50	10	0.002	-3.1	-0.00	0.01	

Total CN in Water Quality Control Results

Date analyzed: October 29, 1997

BLANK SUMMARY

ID	blank CN conc (mg/L)	accept. limit (mg/L)
M Blank	-0.001	< 0.01

LCS SUMMARY

ID	true CN conc (mg/L)	CN conc found (mg/L)	recovery %	recovery accept. limit
LCS-1	0.300	0.342	114	85-115 %

MATRIX SPIKE SUMMARY

ID	spike added CN conc (mg/L)	sample CN conc (mg/L)	spiked sample CN conc (mg/L)	recovery %	recovery accept. limit	RPD %	RPD accept. limit
9710143-1 MS	0.100	-0.001	0.104	105	63-126%		
9710143-1 MSD	0.100	-0.001	0.113	114	63-126%	8	0-30%
9710229-1 MS	0.100	-0.003	0.107	110	63-126%		

ND = Not Detected

DISTILLATION CHECK SUMMARY

ID	true CN conc (mg/L)	CN conc found (mg/L)	recovery %	recovery accept. limit
DC Low	0.100	0.105	105	90-110 %
DC High	0.300	0.337	112	90-110 %

Thursday, October 23, 1997

REQUEST NUMBER: 3841R

ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

97R-227

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/23/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 2 day

These samples are on:

LANL Request Number: 3841R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
TCN		04LA-97-0486	12	W	10/20/97	
METTAL	+ B	04LA-97-0486	14	W	10/20/97	01
METTAL	+ U	04LA-97-0486	14	W	10/20/97	

Thursday, October 23, 1997

REQUEST NUMBER: 3841R

ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

9710227

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/23/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 2 day

These samples are on:

LANL Request Number: 3841R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
						Cooler #1
TCN		04LA-97-0486	12	W	10/20/97	
METTAL	+ B	04LA-97-0486	14	W	10/20/97	01
METTAL	+ U	04LA-97-0486	14	W	10/20/97	

Final Page of REQUEST NUMBER 3841R

U.S. EPA - CLP

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum	25250.0	25690.32	101.7	50500.0	48909.45	96.9	49669.49	98.4	P
Antimony	250.0	250.63	100.3	500.0	481.12	96.2	475.32	95.1	P
Arsenic	250.0	243.80	97.5	500.0	472.46	94.5	464.68	92.9	P
Barium	250.0	237.49	95.0	500.0	458.34	91.7	473.70	94.7	P
Beryllium	250.0	250.72	100.3	500.0	474.84	95.0	471.27	94.3	P
Boron	2500.0	2609.13	104.4	5000.0	5125.71	102.5	5202.03	104.0	P
Cadmium	250.0	242.34	96.9	500.0	457.99	91.6	465.64	93.1	P
Calcium	25250.0	25088.41	99.4	50500.0	48137.39	95.3	47529.46	94.1	P
Chromium	250.0	245.95	98.4	500.0	469.05	93.8	471.57	94.3	P
Cobalt	250.0	249.86	99.9	500.0	461.78	92.4	465.27	93.1	P
Copper	250.0	246.45	98.6	500.0	477.09	95.4	478.51	95.7	P
Iron	10250.0	10392.06	101.4	20500.0	20026.80	97.7	19695.78	96.1	P
Lead	250.0	242.10	96.8	500.0	456.42	91.3	470.96	94.2	P
Magnesium	25250.0	25646.90	101.6	50500.0	48544.55	96.1	48683.60	96.4	P
Manganese	250.0	240.59	96.2	500.0	455.62	91.1	454.56	90.9	P
Mercury	2.5	2.46	98.4	2.0	2.00	100.0	2.00	100.0	AV
Nickel	250.0	246.32	98.5	500.0	466.01	93.2	453.26	90.7	P
Potassium	10000.0	10047.97	100.5	20000.0	19415.72	97.1	19276.98	96.4	P
Selenium	250.0	241.85	96.7	500.0	463.96	92.8	457.93	91.6	P
Silver	250.0	238.59	95.4	500.0	462.17	92.4	460.74	92.1	P
Sodium	10250.0	10326.62	100.7	20500.0	20252.48	98.8	20131.02	98.2	P
Thallium	250.0	251.27	100.5	500.0	495.32	99.1	481.49	96.3	P
Uranium	5000.0	5290.10	105.8	10000.0	10315.38	103.2	10105.82	101.1	P
Vanadium	250.0	248.95	99.6	500.0	472.28	94.5	472.14	94.4	P
Zinc	250.0	248.81	99.5	500.0	456.69	91.3	462.08	92.4	P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Boron				5000.0	5191.06	103.8	5225.49	104.5	P
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead									NR
Magnesium									NR
Manganese									NR
Mercury				2.0	1.89	94.5	2.09	104.5	AV
Nickel									NR
Potassium									NR
Selenium									NR
Silver									NR
Sodium									NR
Thallium									NR
Uranium									NR
Vanadium									NR
Zinc									NR

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

Initial Calibration Source: PLASMACHEM__

Continuing Calibration Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Boron									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead									NR
Magnesium									NR
Manganese									NR
Mercury				2.0	2.02	101.0			AV
Nickel									NR
Potassium									NR
Selenium									NR
Silver									NR
Sodium									NR
Thallium									NR
Uranium									NR
Vanadium									NR
Zinc									NR

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

U.S. EPA - CLP

2B
CRDL STANDARD FOR AA AND ICP

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

A CRDL Standard Source: PLASMACHEM__

ICP CRDL Standard Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
					Initial		Final	
	True	Found	%R	True	Found	%R	Found	%R
Aluminum				400.0	311.75	77.9	277.52	69.4
Antimony				120.0	118.58	98.8	113.30	94.4
Arsenic				20.0	18.66	93.3	20.30	101.5
Barium				400.0	385.01	96.3	369.25	92.3
Beryllium				10.0	10.20	102.0	9.98	99.8
Boron								
Cadmium				10.0	9.53	95.3	8.90	89.0
Calcium				10000.0	9538.42	95.4	8979.11	89.8
Chromium				20.0	20.62	103.1	19.23	96.2
Cobalt				100.0	98.68	98.7	92.28	92.3
Copper				50.0	47.65	95.3	44.14	88.3
Iron				200.0	193.65	96.8	184.83	92.4
Lead				6.0	4.21	70.2	4.61	76.8
Magnesium				10000.0	9859.70	98.6	9178.93	91.8
Manganese				30.0	28.42	94.7	26.67	88.9
Mercury	0.2	0.25	125.0					
Nickel				80.0	77.68	97.1	74.00	92.5
Potassium				10000.0	9780.81	97.8	9402.09	94.0
Selenium				10.0	11.27	112.7	10.76	107.6
Silver				20.0	20.10	100.5	19.18	95.9
Sodium				10000.0	9670.97	96.7	9334.49	93.3
Thallium				20.0	22.14	110.7	21.62	108.1
Uranium				400.0	391.17	97.8	347.13	86.8
Vanadium				100.0	96.12	96.1	90.06	90.1
Zinc				40.0	37.94	94.8	34.73	86.8

U.S. EPA - CLP

2B
CRDL STANDARD FOR AA AND ICP

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

AA CRDL Standard Source: _____

ICP CRDL Standard Source: PLASMACHEM__

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
					Initial		Final	
	True	Found	%R	True	Found	%R	Found	%R
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Boron				200.0	213.16	106.6	207.32	103.7
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead								
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Uranium								
Vanadium								
Zinc								

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	-78.1	B	-72.4	B	-75.7	B			14.220	B	P
Antimony	3.4	U	3.4	U	3.4	U			3.400	U	P
Arsenic	2.8	U	2.8	U	2.8	U			2.800	U	P
Barium	0.4	B	0.5	B	0.5	B			0.370	B	P
Beryllium	0.1	U	0.4	B	0.4	B			0.060	U	P
Boron	15.0	B	12.1	B	9.6	U	9.6	U	9.600	U	P
Cadmium	0.2	U	0.2	U	0.2	U			0.200	U	P
Calcium	33.1	B	48.2	B	63.8	B			126.550	B	P
Chromium	1.9	B	1.8	B	1.8	B			1.450	B	P
Cobalt	0.4	U	0.4	U	0.4	U			0.400	U	P
Copper	-0.7	B	-0.9	B	0.4	U			0.400	U	P
Iron	33.0	B	46.7	B	37.0	B			61.700	B	P
Lead	1.3	U	-1.4	B	1.3	U			-2.180	B	P
Magnesium	-9.0	B	6.3	B	25.7	B			84.320	B	P
Manganese	0.3	B	0.6	B	0.4	B			0.230	B	P
Mercury	0.01	U	0.01	U	0.01	U	0.01	U	0.040	U	AV
Nickel	0.4	U	0.4	U	0.4	B			0.450	B	P
Potassium	36.3	B	53.3	B	49.1	B			24.000	U	P
Selenium	2.6	U	2.6	U	2.6	U			2.600	U	P
Silver	0.7	U	0.7	U	0.7	U			0.700	U	P
Sodium	-4.7	B	9.8	B	3.6	U			-8.170	B	P
Thallium	2.6	U	2.6	U	3.9	B			3.140	B	P
Uranium	64.0	U	64.0	U	64.0	U			64.000	U	P
Vanadium	0.5	U	0.5	U	0.5	U			0.500	U	P
Zinc	0.4	U	0.4	U	0.4	U			0.530	B	P

U.S. EPA - CLP

3
BLANKS

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum											NR
Antimony											NR
Arsenic											NR
Barium											NR
Beryllium											NR
Boron			9.6	U							P
Cadmium											NR
Calcium											NR
Chromium											NR
Cobalt											NR
Copper											NR
Iron											NR
Lead											NR
Magnesium											NR
Manganese											NR
Mercury			0.04	U	0.04	B					AV
Nickel											NR
Potassium											NR
Selenium											NR
Silver											NR
Sodium											NR
Thallium											NR
Uranium											NR
Vanadium											NR
Zinc											NR

U.S. EPA - CLP

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No: _____ SDG No.: 3841R_

ICP ID Number: TJA 61E 4___ ICS Source: HIGH PURITY_

Concentration Units: ug/L

Analyte	True Sol. A	True Sol. AB	Initial Found Sol. A	Initial Found Sol. AB	Initial Found %R	Final Found Sol. A	Final Found Sol. AB	Final Found %R
Aluminum	500000	500000	501464	497824.0	99.6	498749	491284.2	98.3
Antimony								
Arsenic								
Barium		500		467.1	93.4		447.2	89.4
Beryllium		500		475.1	95.0		458.3	91.7
Boron								
Cadmium		1000		889.0	88.9		835.4	83.5
Calcium	500000	500000	497432	490537.6	98.1	480497	469266.4	93.9
Chromium		500		469.1	93.8		456.9	91.4
Cobalt		500		455.9	91.2		441.8	88.4
Copper		500		506.3	101.3		494.7	98.9
Iron	200000	200000	199049	196699.3	98.3	190780	187399.6	93.7
Lead		1000		910.7	91.1		869.0	86.9
Magnesium	500000	500000	503084	498113.5	99.6	491529	482762.2	96.6
Manganese		500		457.9	91.6		442.8	88.6
Mercury								
Nickel		1000		901.4	90.1		855.8	85.6
Potassium								
Selenium								
Silver		1000		1072.7	107.3		1046.9	104.7
Sodium								
Thallium								
Uranium								
Vanadium		500		476.1	95.2		461.9	92.4
Zinc		1000		900.4	90.0		868.0	86.8

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

Solid LCS Source: _____

Aqueous LCS Source: PLASMACHEM__

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum	2000.0	1913.90	95.7						
Antimony	500.0	500.59	100.1						
Arsenic	2000.0	1978.34	98.9						
Barium	2000.0	1854.61	92.7						
Beryllium	50.0	49.37	98.7						
Boron	1000.0	930.36	93.0						
Cadmium	50.0	45.37	90.7						
Calcium	40000.0	39596.84	99.0						
Chromium	200.0	185.08	92.5						
Cobalt	500.0	487.41	97.5						
Copper	250.0	245.03	98.0						
Iron	1000.0	951.02	95.1						
Lead	500.0	474.17	94.8						
Magnesium	40000.0	39977.82	99.9						
Manganese	500.0	466.54	93.3						
Mercury									
Nickel	500.0	491.10	98.2						
Potassium	40000.0	37739.10	94.3						
Selenium	2000.0	2035.72	101.8						
Silver	50.0	42.48	85.0						
Sodium	40000.0	40224.29	100.6						
Thallium	2000.0	2027.60	101.4						
Uranium	10000.0	10987.32	109.9						
Vanadium	500.0	473.88	94.8						
Zinc	500.0	476.27	95.3						

FORM VII - IN

ILM03.0

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

olid LCS Source: _____

Aqueous LCS Source: PLASMACHEM__

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum_									
Antimony_									
Arsenic__									
Barium___									
Beryllium									
Boron____									
Cadmium__									
Calcium__									
Chromium_									
Cobalt___									
Copper___									
Iron_____									
Lead_____									
gnesium									
Manganese									
Mercury__	1.0	1.05	105.0_						
Nickel___									
Potassium									
Selenium_									
Silver___									
Sodium___									
Thallium_									
Uranium__									
Vanadium_									
Zinc_____									

FORM VII - IN

ILM03.0

U.S. EPA - CLP

9

ICP SERIAL DILUTION

EPA SAMPLE NO.

IN HOUSEL

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: 3841R_

Matrix (soil/water): WATER Level (low/med): LOW

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	M
Aluminum	1595.92		1095.40		31.4	E	P
Antimony	7.13	B	17.00	U	100.0		P
Arsenic	2.80	U	14.00	U			P
Barium	6.35	B	7.15	B	12.6	E	P
Beryllium	0.06	U	0.30	U			P
Boron	67.83	B	48.00	U	100.0		P
Cadmium	0.20	U	1.00	U			P
Calcium	1917.03	B	1960.05	B	2.2		P
Chromium	5.25	B	13.10	B	149.5		P
Cobalt	0.40	U	2.00	U			P
Copper	15.71	B	14.15	B	9.9		P
Iron	921.22		958.15		4.0		P
Lead	1.30	U	6.50	U			P
Magnesium	924.21	B	821.60	B	11.1	E	P
Manganese	19.76		20.00	B	1.2		P
Mercury							NR
Nickel	7.85	B	6.75	B	14.0		P
Potassium	3970.71	B	3891.55	B	2.0		P
Selenium	39.28		45.70		16.3		P
Silver	0.70	U	3.50	U			P
Sodium	15302.38		15148.00	B	1.0		P
Thallium	5.64	B	13.00	U	100.0		P
Uranium	435.40		347.05	B	20.3		P
Vanadium	3.45	B	2.50	U	100.0		P
Zinc	12.69	B	11.80	B	7.0		P

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_
ICP ID Number: TJA_61E_4___ Date: 10/15/97
Flame AA ID Number : _____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum	308.22		200	6.2	P
Antimony	206.84		60	3.4	P
Arsenic	189.04		10	2.8	P
Barium	493.41		200	0.1	P
Beryllium	313.04		5	0.1	P
Boron			100		NR
Cadmium	226.50		5	0.2	P
Calcium	317.93		5000	1.5	P
Chromium	267.72		10	0.3	P
Cobalt	228.62		50	0.4	P
Copper	324.75		25	0.4	P
Iron	271.44		100	7.0	P
Lead	220.35		3	1.3	P
Magnesium	279.08		5000	3.7	P
Manganese	257.61		15	0.1	P
Mercury			0.2		NR
Nickel	231.60		40	0.4	P
Potassium	766.49		5000	24.0	P
Selenium	196.03		5	2.6	P
Silver	328.07		10	0.7	P
Sodium	588.99		5000	3.6	P
Thallium	190.86		10	2.6	P
Uranium	292.35		200	64.0	P
Vanadium	292.40		50	0.5	P
Zinc	206.20		20	0.4	P

Comments:

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_
ICP ID Number: TJA61_4_____ Date: 10/15/97
Flame AA ID Number : _____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum			200		NR
Antimony			60		NR
Arsenic			10		NR
Barium			200		NR
Beryllium			5		NR
Boron	249.70		100	9.6	P
Cadmium			5		NR
Calcium			5000		NR
Chromium			10		NR
Cobalt			50		NR
Copper			25		NR
Iron			100		NR
Lead			3		NR
Magnesium			5000		NR
Manganese			15		NR
Mercury			0.2		NR
Nickel			40		NR
Potassium			5000		NR
Selenium			5		NR
Silver			10		NR
Sodium			5000		NR
Thallium			10		NR
Uranium			200		NR
Vanadium			50		NR
Zinc			20		NR

Comments:

U.S. EPA - CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____
Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_
ICP ID Number: _____ Date: 10/15/97
Flame AA ID Number : LEEMAN_4____
Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Aluminum			200		NR
Antimony			60		NR
Arsenic			10		NR
Barium			200		NR
Beryllium			5		NR
Boron			100		NR
Cadmium			5		NR
Calcium			5000		NR
Chromium			10		NR
Cobalt			50		NR
Copper			25		NR
Iron			100		NR
Lead			3		NR
Magnesium			5000		NR
Manganese			15		NR
Mercury	253.70		0.2	0.09 ~~0.0~~ LH 11/6/97	AV
Nickel			40		NR
Potassium			5000		NR
Selenium			5		NR
Silver			10		NR
Sodium			5000		NR
Thallium			10		NR
Uranium			200		NR
Vanadium			50		NR
Zinc			20		NR

Comments:

U.S. EPA - CLP

11A
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

CP ID Number: TJA 61E 4___ Date: 04/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : Al	Ca	Fe	Mg	BA_
Aluminum_	308.22	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony_	206.84	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Arsenic__	189.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Barium___	493.41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron____						
Cadmium__	226.50	0.0000000	0.0000000	0.0001030	0.0000000	0.0000000
Calcium__	317.93	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.72	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt___	228.62	0.0000000	0.0000000	0.0000000	0.0000000	-0.0003500
Copper___	324.75	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Iron_____	271.44	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead_____	220.35	0.0003970	0.0000000	0.0000630	0.0000000	0.0000000
Magnesium	279.08	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.61	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury__						
Nickel___	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.03	0.0000040	0.0000000	-0.0001270	0.0000000	0.0000000
Silver___	328.07	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	588.99	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	190.86	0.0000000	0.0000000	-0.0001380	0.0000000	0.0000000
Uranium__	292.35	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Vanadium_	292.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc_____	206.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

_____

_____

_____

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

CP ID Number: TJA 61E 4___ Date: 04/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : CO_	CR_	MN_	NI_	V__
Aluminum_	308.22	-0.0058000	0.0000000	0.0000000	-0.0013000	0.0270000
Antimony_	206.84	0.0000000	0.0010000	0.0000000	0.0000000	0.0000000
Arsenic__	189.04	0.0000000	-0.0029800	0.0000000	0.0000000	0.0000000
Barium___	493.41	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.04	0.0000000	0.0000000	0.0000000	0.0000000	-0.0031300
Boron____						
Cadmium__	226.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Calcium__	317.93	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.72	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt___	228.62	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Copper___	324.75	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Iron_____	271.44	0.0723000	0.0000000	0.0000000	0.0000000	0.0150000
Lead_____	220.35	-0.0018800	0.0000000	0.0001820	0.0002430	0.0000000
Magnesium	279.08	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.61	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Mercury__						
Nickel___	231.60	-0.0013000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.49	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.03	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Silver___	328.07	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	588.99	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	190.86	0.0010370	0.0000000	-0.0001340	0.0000000	0.0000000
Uranium__	292.35	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Vanadium_	292.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc_____	206.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Comments:

U.S. EPA - CLP

11A
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

ICP ID Number: TJA61 4_____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : Al	Ca	Fe	Mg	BA_
Aluminum_	308.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony_	217.60	0.0001730	0.0000000	-0.0000700	0.0000000	0.0000000
Arsenic__	193.70	0.0032220	0.0000000	0.0002370	0.0000000	0.0000000
Barium___	493.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron____	249.70	0.0000000	0.0000000	-0.0001050	0.0000000	0.0000000
Cadmium__	226.50	0.0000300	0.0000000	0.0002950	0.0000000	0.0000000
Calcium__	315.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium_	267.70	0.0000000	0.0000000	-0.0000410	0.0000000	0.0000000
Cobalt___	228.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0001880
Copper___	324.80	0.0000000	0.0000000	-0.0000450	0.0000000	0.0000000
Iron_____	259.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead_____	220.40	0.0007590	0.0000000	0.0001130	0.0000000	0.0000000
Magnesium	383.20	0.0000000	0.0012260	-0.0007120	0.0000000	0.0000000
Manganese	257.60	0.0000000	0.0000000	0.0000170	0.0000000	0.0000000
Mercury__						
Nickel___	231.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium_	196.00	0.0000000	0.0000000	0.0003760	0.0000000	0.0000000
Silver___	328.10	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium___	589.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium_	377.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Uranium__						
Vanadium_	292.40	0.0000000	-0.0000300	0.0000500	0.0000000	0.0000000
Zinc_____	206.20	0.0000000	0.0000000	0.0000390	0.0000370	0.0000000

Comments:

U.S. EPA - CLP

11B
ICP Interelement Correction Factors (Annually)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

ICP ID Number: TJA61 4_____ Date: 01/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : BE_	CD_	CO_	CR_	MO_
Aluminum	308.20	0.0000000	0.0000000	-0.0047560	0.0000000	0.0084920
Antimony	217.60	0.0019940	0.0000000	0.0000000	0.0000000	-0.0004360
Arsenic	193.70	0.0000000	0.0000000	0.0006940	0.0009930	0.0008130
Barium	493.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	313.00	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Boron	249.70	0.0000000	0.0000000	0.0031110	0.0001900	0.0005560
Cadmium	226.50	0.0000000	0.0000000	0.0001370	0.0000000	0.0001390
Calcium	315.90	0.0000000	0.0000000	0.0032140	0.0000000	0.0000000
Chromium	267.70	0.0000000	0.0002200	0.0000000	0.0000000	-0.0037690
Cobalt	228.60	0.0000000	0.0000000	0.0000000	0.0002450	-0.0019700
Copper	324.80	0.0000000	0.0000000	-0.0003080	0.0000000	0.0006200
Iron	259.90	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.40	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Magnesium	383.20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.60	0.0000000	0.0000000	0.0000000	0.0000000	-0.0001510
Mercury						
Nickel	231.60	0.0000000	0.0000000	0.0004950	0.0000000	-0.0018550
Potassium	766.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.00	0.0000000	0.0000000	0.0009940	0.0000000	0.0000000
Silver	328.10	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium	589.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	377.60	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Uranium						
Vanadium	292.40	0.0000000	0.0000000	0.0000000	0.0000000	-0.0108000
Zinc	206.20	0.0000000	0.0000000	0.0000000	0.0022430	0.0005240

Comments:

U.S. EPA - CLP

12
ICP Linear Ranges (Quarterly)

Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

CP ID Number: TJA 61E 4___ Date: 10/15/97

Analyte	Integ. Time (sec.)	Concentration (ug/L)	M
Aluminum	15.00	500000.0	P
Antimony	15.00	10000.0	P
Arsenic	15.00	10000.0	P
Barium	15.00	10000.0	P
Beryllium	15.00	10000.0	P
Boron			NR
Cadmium	15.00	10000.0	P
Calcium	15.00	500000.0	P
Chromium	15.00	10000.0	P
Cobalt	15.00	10000.0	P
Copper	15.00	10000.0	P
Iron	15.00	200000.0	P
Lead	15.00	10000.0	P
Magnesium	15.00	500000.0	P
Manganese	15.00	10000.0	P
Mercury			NR
Nickel	15.00	10000.0	P
Potassium	15.00	100000.0	P
Selenium	15.00	10000.0	P
Silver	15.00	2000.0	P
Sodium	15.00	100000.0	P
Thallium	15.00	10000.0	P
Uranium	15.00	250000.0	P
Vanadium	15.00	10000.0	P
Zinc	15.00	10000.0	P

Comments:

U.S. EPA - CLP

12
ICP Linear Ranges (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: 3841R_

ICP ID Number: TJA61 4_____ Date: 10/15/97

Analyte	Integ. Time (sec.)	Concentration (ug/L)	M
Aluminum	8.00	1000000.0	P
Antimony	8.00	10000.0	P
Arsenic	8.00	100000.0	P
Barium	8.00	50000.0	P
Beryllium	8.00	25000.0	P
Boron	8.00	100000.0	P
Cadmium	8.00	50000.0	P
Calcium	8.00	1000000.0	P
Chromium	8.00	100000.0	P
Cobalt	8.00	100000.0	P
Copper	8.00	100000.0	P
Iron	8.00	1000000.0	P
Lead	8.00	100000.0	P
Magnesium	8.00	1000000.0	P
Manganese	8.00	50000.0	P
Mercury			NR
Nickel	8.00	100000.0	P
Potassium	8.00	1000000.0	P
Selenium	8.00	100000.0	P
Silver	8.00	10000.0	P
Sodium	8.00	1000000.0	P
Thallium	8.00	100000.0	P
Uranium			NR
Vanadium	8.00	100000.0	P
Zinc	8.00	100000.0	P

Comments:

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3841R_

Instrument ID Number: TJA 61E 4____ Method: P_

Start Date: 10/27/97 End Date: 10/27/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
100PPM_U	1.00	1005																								X	
ZZZZZZ__	1.00	1016																									
ZZZZZZ__	1.00	1020																									
ZZZZZZ__	1.00	1024																									
ICV_____	1.00	1032		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
ICB_____	1.00	1038		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
CRI_____	1.00	1044		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
ICSA____	1.00	1053		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
ICSAB___	1.00	1057		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
PBW_____	1.00	1102		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
LCSW____	1.00	1105		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
HOUSE	1.00	1110		X	X	X	X	X		X	X	X	X	X	X		X	X		X	X	X	X		X	X	X
IN HOUSE	1.00	1114		X	X	X	X	X		X	X	X	X	X	X		X	X		X	X	X	X		X	X	X
IN HOUSE	5.00	1118		X	X	X	X	X		X	X	X	X	X	X		X	X		X	X	X	X		X	X	X
IN HOUSE	1.00	1122		X	X	X	X	X		X		X	X	X	X			X		X		X	X		X	X	X
04LA-97-	5.00	1127		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
CCV_____	1.00	1131		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
CCB_____	1.00	1134		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
IN HOUSE	5.00	1143														X								X			
IN HOUSE	5.00	1147														X								X			
IN HOUSE	25.00	1150														X								X			
IN HOUSE	5.00	1154														X											
CRI_____	1.00	1158		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
ICSA____	1.00	1207		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
ICSAB___	1.00	1211		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
CCV_____	1.00	1217		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
CCB_____	1.00	1221		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3841R_

Instrument ID Number: TJA 61E 4____ Method: P_

Start Date: 10/27/97 End Date: 10/27/97

EPA Sample No.	D/F	Time	% R	Analytes Z N																						
100PPM_U	1.00	1005																								
ZZZZZZ	1.00	1016																								
ZZZZZZ	1.00	1020																								
ZZZZZZ	1.00	1024																								
ICV	1.00	1032		X																						
ICB	1.00	1038		X																						
CRI	1.00	1044		X																						
ICSA	1.00	1053		X																						
ICSAB	1.00	1057		X																						
PBW	1.00	1102		X																						
LCSW	1.00	1105		X																						
IN HOUSE	1.00	1110		X																						
IN HOUSE	1.00	1114		X																						
IN HOUSE	5.00	1118		X																						
IN HOUSE	1.00	1122		X																						
04LA-97-	5.00	1127		X																						
CCV	1.00	1131		X																						
CCB	1.00	1134		X																						
IN HOUSE	5.00	1143																								
IN HOUSE	5.00	1147																								
IN HOUSE	25.00	1150																								
IN HOUSE	5.00	1154																								
CRI	1.00	1158		X																						
ICSA	1.00	1207		X																						
ICSAB	1.00	1211		X																						
CCV	1.00	1217		X																						
CCB	1.00	1221		X																						

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3841R_

Instrument ID Number: TJA61 4_____ Method: P_

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																						
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
STD-BLAN	1.00	0931							X																		
A1	1.00	0934																									
B1	1.00	0937							X																		
ZZZZZZ	1.00	0940																									
ZZZZZZ	1.00	0943																									
ZZZZZZ	1.00	0946																									
ICV	1.00	0954							X																		
ICB	1.00	0957							X																		
CRI	1.00	1000							X																		
ICSA	1.00	1003							X																		
ICSAB	1.00	1006							X																		
CCV	1.00	1009							X																		
CCB	1.00	1012							X																		
PBW	1.00	1016							X																		
LCSW	1.00	1019							X																		
ZZZZZZ	1.00	1022																									
04LA-97-	2.00	1032							X																		
IN HOUSE	1.00	1035							X																		
IN HOUSE	1.00	1038							X																		
IN HOUSE	1.00	1041							X																		
IN HOUSE	5.00	1044							X																		
ZZZZZZ	1.00	1047																									
ZZZZZZ	1.00	1050																									
CCV	1.00	1053							X																		
CCB	1.00	1057							X																		
ZZZZZZ	1.00	1100																									
ZZZZZZ	1.00	1103																									
ZZZZZZ	1.00	1106																									
ZZZZZZ	1.00	1109																									
ZZZZZZ	1.00	1112																									
ZZZZZZ	1.00	1115																									
ZZZZZZ	1.00	1118																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3841R_

Instrument ID Number: TJA61 4_____ Method: P_

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
STD-BLAN	1.00	0931																									
A1	1.00	0934																									
B1	1.00	0937																									
ZZZZZZ	1.00	0940																									
ZZZZZZ	1.00	0943																									
ZZZZZZ	1.00	0946																									
ICV	1.00	0954																									
ICB	1.00	0957																									
CRI	1.00	1000																									
ICSA	1.00	1003																									
ICSAB	1.00	1006																									
CCV	1.00	1009																									
CCB	1.00	1012																									
PBW	1.00	1016																									
LCSW	1.00	1019																									
ZZZZZZ	1.00	1022																									
04LA-97-	2.00	1032																									
IN HOUSE	1.00	1035																									
IN HOUSE	1.00	1038																									
IN HOUSE	1.00	1041																									
IN HOUSE	5.00	1044																									
ZZZZZZ	1.00	1047																									
ZZZZZZ	1.00	1050																									
CCV	1.00	1053																									
CCB	1.00	1057																									
ZZZZZZ	1.00	1100																									
ZZZZZZ	1.00	1103																									
ZZZZZZ	1.00	1106																									
ZZZZZZ	1.00	1109																									
ZZZZZZ	1.00	1112																									
ZZZZZZ	1.00	1115																									
ZZZZZZ	1.00	1118																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3841R_

Instrument ID Number: TJA61 4_____ Method: P_

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																						
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
ZZZZZZ	1.00	1121																								
ZZZZZZ	1.00	1124																								
ZZZZZZ	1.00	1127																								
CCV	1.00	1130							X																	
CCB	1.00	1133							X																	
ZZZZZZ	1.00	1136																								
ZZZZZZ	5.00	1139																								
ZZZZZZ	1.00	1143																								
ZZZZZZ	1.00	1146																								
ZZZZZZ	1.00	1149																								
CRI	1.00	1152							X																	
ICSA	1.00	1155							X																	
ICSAB	1.00	1158							X																	
CCV	1.00	1201							X																	
CCB	1.00	1204							X																	

FORM XIV - IN ILM03.0

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3841R_

nstrument ID Number: TJA61 4_____ Method: P_

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
ZZZZZZ	1.00	1121																									
ZZZZZZ	1.00	1124																									
ZZZZZZ	1.00	1127																									
CCV	1.00	1130																									
CCB	1.00	1133																									
ZZZZZZ	1.00	1136																									
ZZZZZZ	5.00	1139																									
ZZZZZZ	1.00	1143																									
ZZZZZZ	1.00	1146																									
ZZZZZZ	1.00	1149																									
CRI	1.00	1152																									
ICSA	1.00	1155																									
ICSAB	1.00	1158																									
CCV	1.00	1201																									
CCB	1.00	1204																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3841R_

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																								
				AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	U	V
S0	1.00	1133																	X								
S0.2	1.00	1135																	X								
S1	1.00	1138																	X								
S2	1.00	1140																	X								
S5	1.00	1142																	X								
S10	1.00	1145																	X								
ZZZZZZ	1.00	1149																									
ICV	1.00	1151																	X								
ICB	1.00	1153																	X								
PBW	1.00	1153																	X								
CRA	1.00	1155																	X								
CSW	1.00	1158																	X								
ZZZZZZ	1.00	1200																									
ZZZZZZ	1.00	1202																									
ZZZZZZ	1.00	1204																									
ZZZZZZ	1.00	1206																									
ZZZZZZ	1.00	1209																									
ZZZZZZ	1.00	1211																									
ZZZZZZ	1.00	1213																									
ZZZZZZ	1.00	1215																									
CCV	1.00	1218																	X								
CCB	1.00	1220																	X								
ZZZZZZ	1.00	1222																									
ZZZZZZ	1.00	1224																									
ZZZZZZ	1.00	1226																									
ZZZZZZ	1.00	1229																									
ZZZZZZ	1.00	1231																									
ZZZZZZ	1.00	1233																									
ZZZZZZ	1.00	1235																									
ZZZZZZ	1.00	1237																									
ZZZZZZ	1.00	1240																									
ZZZZZZ	1.00	1242																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3841R_

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 10/28/97 End Date: 10/28/97

EPA Sample No.	D/F	Time	% R	Analytes																							
				ZN																							
S0	1.00	1133																									
S0.2	1.00	1135																									
S1	1.00	1138																									
S2	1.00	1140																									
S5	1.00	1142																									
S10	1.00	1145																									
ZZZZZZ	1.00	1149																									
ICV	1.00	1151																									
ICB	1.00	1153																									
PBW	1.00	1153																									
CRA	1.00	1155																									
CSW	1.00	1158																									
ZZZZZZ	1.00	1200																									
ZZZZZZ	1.00	1202																									
ZZZZZZ	1.00	1204																									
ZZZZZZ	1.00	1206																									
ZZZZZZ	1.00	1209																									
ZZZZZZ	1.00	1211																									
ZZZZZZ	1.00	1213																									
ZZZZZZ	1.00	1215																									
CCV	1.00	1218																									
CCB	1.00	1220																									
ZZZZZZ	1.00	1222																									
ZZZZZZ	1.00	1224																									
ZZZZZZ	1.00	1226																									
ZZZZZZ	1.00	1229																									
ZZZZZZ	1.00	1231																									
ZZZZZZ	1.00	1233																									
ZZZZZZ	1.00	1235																									
ZZZZZZ	1.00	1237																									
ZZZZZZ	1.00	1240																									
ZZZZZZ	1.00	1242																									

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:3841F

Instrument ID Number: LEEMAN 4_____ Method: AV

Start Date: 10/28/97 End Date: 10/28/97

E Sa N	EPA Sample No.	D/F	Time	% R	Analytes																				
					AL	SB	AS	BA	BE	B	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA
CCV	CCV	1.00	1244																	X					
CCB	CCB	1.00	1246																	X					
ZZZ	ZZZZZZ	1.00	1248																						
ZZZ	ZZZZZZ	1.00	1251																						
ZZZ	ZZZZZZ	1.00	1253																						
ZZZ	ZZZZZZ	1.00	1255																						
ZZZ	ZZZZZZ	1.00	1257																						
ZZZ	ZZZZZZ	1.00	1300																						
ZZZ	ZZZZZZ	1.00	1302																						
ZZZ	ZZZZZZ	1.00	1304																						
ZZZ	ZZZZZZ	1.00	1306																						
ZZZ	ZZZZZZ	1.00	1308																						
CCV	CCV	1.00	1311																	X					
CCB	CCB	1.00	1313																	X					
ZZZ	ZZZZZZ	1.00	1315																						
ZZZ	ZZZZZZ	1.00	1317																						
ZZZ	ZZZZZZ	1.00	1319																						
ZZZ	ZZZZZZ	1.00	1322																						
ZZZ	ZZZZZZ	1.00	1324																						
ZZZ	ZZZZZZ	1.00	1326																						
ZZZ	ZZZZZZ	1.00	1328																						
ZZZ	ZZZZZZ	1.00	1331																						
ZZZ	ZZZZZZ	1.00	1333																						
ZZZ	ZZZZZZ	1.00	1335																						
CCV	CCV	1.00	1337																	X					
CCB	CCB	1.00	1339																	X					
ZZZ	ZZZZZZ	1.00	1342																						
ZZZ	ZZZZZZ	1.00	1344																						
ZZZ	ZZZZZZ	1.00	1346																						
ZZZ	ZZZZZZ	1.00	1348																						
ZZZ	ZZZZZZ	1.00	1350																						
IN	IN HOUSE	1.00	1353																	X					

FORM XIV - IN ILMO

Thursday, October 23, 1997 DATA ENTERED

Los Alamos
NATIONAL LABORATORY

110397 M

REQUEST NUMBER: 3842R
ANALYSIS TYPE: RADOTH

ATTN: Judy Stone
WESTON
208 WELSH POOL ROAD
LIONVILLE, PA 19341-1225

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/23/97
REPORT DUE: 11/23/97
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 3842R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
D2H		04LA-97-0486	10	W	10/20/97	
O18O16		04LA-97-0486	10	W	10/20/97	

RECRA
LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

2 December 1997

Mr. John Miglio
Los Alamos National Laboratory
TA-3, Building 271
DP. O1U MS-H865
Los Alamos, NM 87545

DEC

Ref: Subcontract No. 7791L0014-8M
Data Package for RFW Batch 9710L954
LANL Request No. 3842R

Dear Mr. Miglio:

Enclosed please find the data package for 1 water sample received 24 October 1997 for LANL Request #3842R. This sample was forwarded to Geochron on 30 October for stable isotope analyses. Results were faxed 20 November.

Please do not hesitate to contact me at (610) 280-3000 with any question you may have regarding either the hard copy or electronic report.

Very truly yours,

Recra LabNet Philadelphia

Judy Stone

Judith L. Stone
Senior Project Manager

Enclosure:

Approved By: _____

Date: 12/5/97

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610)-280-3000 • Fax (610) 280-3041

GEOCHRON LABORATORIES a division of
KRUEGER ENTERPRISES, INC.

711 CONCORD AVENUE ✦ CAMBRIDGE, MASSACHUSETTS 02138 ✦ U.S.A
TELEPHONE: (617) 876-3691 TELEFAX: (617) 661-0148

LANL 9710L954
Req #3842R

STABLE ISOTOPE RATIO ANALYSES — REPORT OF ANALYTICAL WORK

Submitted by: Judy Stone
RECRA
208 Welsh Pool Road
Lionville, PA 19341-1225

Date Received: 10/31/97
Date Reported: 11/20/97
Your Reference: Req. No. 3842R

Our Lab. Number	Your Sample Number	Description	δD*		$\delta^{18}O$*
HOR-95412	04LA-97-0486 10	Water	-74	-10.8	-10.9 **

** Duplicate analyses on separate aliquots of original sample.

*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{sample}‰ = \left[\frac{R_{sample}}{R_{standard}} - 1 \right] \times 1000$$

Where:

D/H standard is SMOW
$^{18}O/^{16}O$ standard is SMOW

And:

$D/H_{standard}$ = 0.000316**
$^{18}O/^{16}O_{standard}$ = 0.0039948**

**Double atom ratio

Paragon Analytics, Incorporated

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 9710228
Client Name: Los Alamos National Laboratory SMO
Client Project Name: 3843R
Client Project Number: None
Client PO Number:

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
04LA-97-0486	9710228-1		Water	10/20/97	

DATA ENTERED

110397 MT

Thursday, October 23, 1997

Los Alamos
NATIONAL LABORATORY

REQUEST NUMBER: 3843R
ANALYSIS TYPE: RAD

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/23/97
REPORT DUE: 11/23/97
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 3843R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
AM241		04LA-97-0486	04	W	10/20/97	
GROSSAB		04LA-97-0486	04	W	10/20/97	
GROSSG		04LA-97-0486	04	W	10/20/97	
GSCAN		04LA-97-0486	04	W	10/20/97	
ISOPU		04LA-97-0486	04	W	10/20/97	
ISOU		04LA-97-0486	04	W	10/20/97	
SR90		04LA-97-0486	20	W	10/20/97	

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3843R

Date File Saved: 12/08/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0486	9710228-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOAM

The sample under Request Number 3843R (Work Order 9710228) was received on 10/24/97 and scheduled for isotopic americium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 12/04/97. The analysis results for this sample are reported in units of pCi/Liter

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

No problems were observed in the preparation and analyses of the samples listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrumentation

Radiochemistry Final Review

12/9/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple
Laboratory Manager

Date

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3843R

Date File Saved: 12/08/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0486	97-10-228-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Sr-90

The sample under Request Number 3843R (Work Order 97-10-228) was received on 10/24/97 and scheduled for strontium-90 analysis, which was completed on 12/07/97.

Total radiostrontium is reported as Sr-90. The presence of other radioisotopes of strontium may cause positive bias in the measured strontium concentration.

This sample consists of water and the result is reported in units of pCi/L

This work order was prepared using PAI SOP717R3 and analyzed using PAI SOP724R5.

Due to limited sample volume, a duplicate or matrix spike could not be prepared. A duplicate LCS was prepared and analyzed instead.

No further anomalies were encountered during this analysis.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Renee Gallegos — 12/8/97
Renee Gallegos — Date
Radiochemistry Instrument Technician

Daniel C Brown — 12/11/97
Radiochemistry Final Review — Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple — Date
Laboratory Manager

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3843R

Date File Saved: 11/24/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0486	97-10-228-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOU

The sample under Request Number 3843R (Work Order 97-10-228) was received on 10/24/97 and scheduled for isotopic uranium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 11/19/97. The analysis results for this sample are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{234}U activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is below the requested MDC . Results should be compared to the method blank activity to determine the validity of the measurement.

No further anomalous situation were observed in the preparation and analyses of the sample listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth — 11/21/97
Radiochemistry Instrument Technician — Date

Radiochemistry Final Review — 11/21/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple — Date
Laboratory Manager

Paragon Analytics, Inc.
Case Narrative File

Request Number: 3843R
Date File Saved: 11/19/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0486	97-10-228-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gross Gamma

The samples under Request Number 3843R (PAI Work Order 97-10-228) were received on 10/24/97 and scheduled for gross gamma analyses, which were completed on 11/06/97.

The analysis results for these samples are reported in units of pCi/Liter referenced to Cs-137.

These samples were prepared according to Paragon Analytics, Inc. procedure PAI SOP739R2.

The HPGe gamma photon detectors were calibrated using a standard of Cesium-137 in water. Counting efficiencies were calculated as the ratio of the net integrated count rate in a region of interest between 50 and 2000 keV to the known photon emission rate of the standard. Samples were analyzed in the same geometry and counts integrated in the same manner.

Efficiency calibration for detector GS06 was not performed prior to the analyses. Efficiency calibration was performed on 11/18/97, with the calculated efficiency applied retroactively to the analysis of the laboratory control sample (LCS 97-10-230-S1). Daily efficiency checks adequately demonstrate stability of detector efficiency between analysis and calibration.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported. Each result should be compared to the result for the appropriate blank for determination of the validity of that measurement.

Gross gamma activity was detected in the blank at a concentration in excess of the minimum detectable concentration (MDC). However, the blank activity is well below that reported for the client samples and is also below the required quantification limit of 100 pCi/Liter. As the sample was depleted for other analyses, no reanalysis is possible, and these results are submitted.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill — 11-21-97
Radiochemistry Instrumentation — Date

Radiochemistry Final Review — 11/24/97
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple — Date
Laboratory Manager

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3843R

Date File Saved: 11/22/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0486	97-10-228-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: GROSS AB

Samples under Request Number 3843R (PAI Work Order 97-10-228) were received on 10/24/97 and scheduled for gross alpha/beta analysis, which was completed on 11/20/97.

The analytical results for these samples are reported in units of pCi/L.

This work order was prepared using PAI SOP702R11, and analyzed using PAI SOP724R5.

Gross alpha results are referenced to ^{241}Am. Gross beta results are referenced to ^{90}Sr/Y.

Following an extended count, the requested MDA for gross alpha/beta for sample 04LA-97-0486 (PAI ID 97-10-228-01) was not achieved due to the presence of elevated levels of dissolved / suspended solids native to the sample. The requested method limits the amount of sample solids residue taken for analysis to 5 mg/cm^2. The sample activity exceeded the reported MDA for both the alpha and beta analyses.

Due to insufficient sample volume, a duplicate sample could not be prepared. The batch duplicate was prepared on a sample from request number 3882R. The duplicate error ratio (DER) for the alpha/ beta analysis of this sample and its duplicate sample were acceptable according to PAI SOP 715 Rev.9. DER is defined as :

$$DER = \frac{|S - D|}{2 * \sqrt{\sigma_S^2 + \sigma_D^2}}$$

The warning limit for DER is 1.42. This sample alpha DER = 0.317. This sample beta DER = 0.280

No further problems were noted during the preparation and analysis of these samples. All remaining quality control criteria were met.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Renee Gallegos
Radiochemistry Instrument Technician

11/22/97
Date

Radiochemistry Final Review

11/24/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Donald Gipple
Laboratory Manager

Date

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3843R

Date File Saved: 11/23/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0486	97-10-228-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

All samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gamma Spectroscopy

The samples under Request Number 3843R (Work Order 9710228) were received on 10/24/97 and scheduled for gamma spec. analyses, which were completed on 11/05/97.

The analysis results for these samples are reported in units of pCi/Liter. The samples were filtered prior to analysis.

This work order was prepared using PAI SOP739R2 and analyzed using PAI SOP713R4.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Bismuth-214 was detected in the blank (97-10-230-B1) at a concentration in excess of the 2σ total propagated uncertainty (TPU). However, since the concentration detected is below the corresponding decision level, no sample results are compromised. Potassium-40 was also detected in the blank at a concentration in excess of the 2σ TPU and in excess of the corresponding decision level. However, since no ^{40}K was identified in the client samples, no quantifications are compromised.

Cadmium-109 and ^{237}Np are often misidentified when using the required library. The observed photopeak at 87 keV is attributed to the K_β x ray of Pb. Likewise, ^{211}Bi and ^{224}Ra are misidentified due to interference from ^{214}Pb at 351 keV and 241 keV, respectively. Due to interference, the GDR software did not attempt to quantify activity concentrations for some analyses. In such cases, zero values are reported in the hard copy reports, and an "NQ" qualifier is submitted in the electronic deliverable.

Quantification of ^{226}Ra at low levels based upon the 186 keV photopeak is unreliable due to interference from ^{235}U, which also has a photopeak at 186 keV. Low levels of ^{235}U, though undetectable by this method, can cause greatly exaggerated ^{226}Ra results. The ^{226}Ra activity reported should be considered qualitative. Activity concentration results above the 2σ TPU for radionuclides identified as present by the analysis software for which spectral interference is suspected are given an "S" flag.

Activity concentrations above the 2σ TPU are reported in some instances where no supporting photopeaks are observed. These anomalous identifications result from the GDR software attempting to calculate net activity concentrations for analytes for which no peaks are observed. Such data have been flagged with an asterisk.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Michael E. Goodwill — 11-23-97
Radiochemistry Instrumentation — Date

Radiochemistry Final Review — 11/24/97
Date

Section 4 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Don Gipple — Date
Laboratory Manager

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: **3843R** LAB NAME: **Paragon** LAB CODE_____

NAME OF VALIDATOR: **Antonia Tallarico** COMPANY: **LATA**

VALIDATION DATE: **23 December 97** EDS ENTRY DATE_____

ANALYTICAL SUITE:

- o VOLATILES
- o SEMIVOLATILES
- o PESTICIDES/AROCLORS
- o HIGH EXPLOSIVES
- o INORGANICS
- **X** RADIOCHEMISTRY

GENERAL CHECKLIST

		PRESENT? Ö if "yes" O if "no"
1.	Case Narrative	_____
2.	Airbills (no. Of shipments___)	_____
3.	Chain-of-custody records	_____
4.	Sample tags	_____
5.	Sample log-in sheets	_____
6.	Internal lab sample transfer records and tracking sheets	_____
7.	Other? Identify_____	

Are all samples assigned to the SDG present? - YES - NO

Identify any samples in the assigned SDG/RN that are missing

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

_____

_____

_____

Signature/1st validation: _____ 23 Dec 97

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

Thursday, October 23, 1997

REQUEST NUMBER: 3843R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

9710228

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/23/97
REPORT DUE: 11/23/97
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 3843R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968
Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
AM241		04LA-97-0486	04	W	10/20/97	
GROSSAB		04LA-97-0486	04	W	10/20/97	
GROSSG		04LA-97-0486	04	W	10/20/97	
GSCAN		04LA-97-0486	04	W	10/20/97	
ISOPU		04LA-97-0486	04	W	10/20/97	
ISOU		04LA-97-0486	04	W	10/20/97	
SR90		04LA-97-0486	20	W	10/20/97	

Final Page of REQUEST NUMBER 3843R

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Monday, December 08, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3843R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710228

Field ID:
Lab ID: 9709122-S1LCS1

Sample Matrix: WATER
Date Prepared: 10-Nov-97
Prep SOP: PAI SOP 780R2
Prep Batch: 143144

Date Collected: 10-Nov-97
Date Analyzed: 25-Nov-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Am-241	7.51 +/- 0.48	0.050	7.16	pCi/L	105%	+/- 25%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.78	pCi/L	77%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Monday, December 08, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3843R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710228

Field ID:
Lab ID: 9709122-B1MB1

Sample Matrix: WATER
Date Prepared: 10-Nov-97
Prep SOP: PAI SOP 780R2
Prep Batch: 143144

Date Collected: 10-Nov-97
Date Analyzed: 24-Nov-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 1000

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
Am-241	0.014 +/- 0.015	0.053	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	2.83	pCi/L	58%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Americium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Monday, December 08, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3843R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710228

		Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID:	04LA-97-0486				
Lab ID:	9710228-1	11/10/97	12/4/97	143144	1
DUP ID:	9710228-1DUP1	11/10/97	11/25/97	143144	1

Sample Matrix: WATER
Date Collected: 20-Oct-97
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: AS RECEIVED

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
Am-241	0.122 +/- 0.033	0.026 +/- 0.011	pCi/L	1.38	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Am-243	4.91	3.88	pCi/L	79%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3843R

Date File Saved: 11/19/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0486	97-10-228-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOPU

The sample under Request Number 3843R (Work Order 97-10-228) was received on 10-24-97 and scheduled for isotopic plutonium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry for isotopic plutonium according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 11/18/97. The analysis results for this sample are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{238}Pu activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is below the requested MDC . Results should be compared to the method blank activity to determine the validity of the measurement.

No problems were observed in the preparation and analyses of the sample listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth
Radiochemistry Instrumentation

Radiochemistry Final Review

11/21/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple
Laboratory Manager

Date

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Thursday, December 11, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3843R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710228

Field ID:
Lab ID: 9709122-S1LCS1

Sample Matrix: WATER
Date Prepared: 10-Nov-97
Prep SOP: PAI SOP 780R2
Prep Batch: 143144

Date Collected: 10-Nov-97
Date Analyzed: 18-Nov-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
Pu-238	0.036 +/- 0.015	0.018	N/A	pCi/L	N/A	N/A	
Pu-239	4.63 +/- 0.32	0.043	4.85	pCi/L	95%	+/- 25%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.88	pCi/L	66%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Thursday, December 11, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3843R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710228

Field ID:
Lab ID: 9709122-B1MB1

Sample Matrix: WATER
Date Prepared: 10-Nov-97
Prep SOP: PAI SOP 780R2
Prep Batch: 143144

Date Collected: 10-Nov-97
Date Analyzed: 18-Nov-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 400

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
Pu-238	0.052 +/- 0.021	0.051	pCi/L	
Pu-239	-0.003 +/- 0.012	0.043	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	2.46	pCi/L	56%	30-110%

Comments:

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:
U - Result is less than the sample specific minimum detectable activity.
Y2 - Chemical Yield outside default limits.
* - Duplicate Analysis not within control limits.

Isotopic Plutonium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Thursday, December 11, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3843R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710228

Field ID:	Prep Date	Analysis Date	Prep Batch	Final Aliquot
Lab ID: 9710228-1	11/10/97	11/18/97	143144	1
DUP ID: 9710228-1DUP1	11/10/97	11/18/97	143144	1

Sample Matrix: WATER
Date Collected: 20-Oct-97
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: AS RECEIVED

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
Pu-238	0.010 +/- 0.014	0.001 +/- 0.012	pCi/L	0.24	< 1.42	
Pu-239	0.017 +/- 0.014	0.025 +/- 0.014	pCi/L	0.22	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
Pu-242	4.39	3	pCi/L	68%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3843R

Date File Saved: 12/08/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0486	97-10-228-01

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Sr-90

The sample under Request Number 3843R (Work Order 97-10-228) was received on 10/24/97 and scheduled for strontium-90 analysis, which was completed on 12/07/97.

Total radiostrontium is reported as Sr-90. The presence of other radioisotopes of strontium may cause positive bias in the measured strontium concentration.

This sample consists of water and the result is reported in units of pCi/L

This work order was prepared using PAI SOP717R3 and analyzed using PAI SOP724R5.

Due to limited sample volume, a duplicate or matrix spike could not be prepared. A duplicate LCS was prepared and analyzed instead.

No further anomalies were encountered during this analysis.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Renee Gallegos
Radiochemistry Instrument Technician

12/8/97
Date

Radiochemistry Final Review

12/11/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple
Laboratory Manager

Date

Sr-90 LCS RESULTS

Method ASTM D5918-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 12/04/97

Client Name: Shared QC

Date Analyzed : 12/05/97

Client Project ID : Blank Spike

Sample Matrix : Water

Lab Workorder Number : 97-11-290

Count Duration: 180 Min.

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
97-11-290-S2	13.7 ± 3.69	10.9 ± 2.04	79.5%	Pass

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

PAI sets control limits for Sr-90 measurements based on Historical Data.

Control Limits = Known ± 27% for Sr-90.

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

Remarks:

Sample 97-11-290-S2 is a LCS duplicate.
Blank Spike for workorders 97-11-290 and 10-228.

Sr-90 LCS RESULTS

Method ASTM D5918-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 12/04/97

Client Name: Shared QC

Date Analyzed : 12/05/97

Client Project ID : Blank Spike

Sample Matrix : Water

Lab Workorder Number : 97-11-290

Count Duration: 180 Min.

Lab Sample ID	Sr-90 Known Value	Sr-90 Rep't Value	Sr-90 Recovery	Flag
97-11-290-S1	13.7 ± 3.69	10.8 ± 2.02	78.9%	Pass

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

PAI sets control limits for Sr-90 measurements based on Historical Data.

Control Limits = Known ± 27% for Sr-90.

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

Remarks:

Blank Spike for workorders 97-11-290 and 10-228.

Sr-90 ANALYSIS RESULTS SUMMARY

Method ASTM D5811-95

Lab Name: Paragon Analytics, Inc.

Date Collected: 12/04/97

Client Name: Shared QC

Date Analyzed : 12/05/97

Client Project ID: Blank

Sample Matrix : Water

Lab Sample ID Series: 97-11-290

Count Duration: 180 Min.

Analyzed by: RG

Client Sample ID	Lab Sample ID	Sr-90 (pCi/l)
Blank	97-11-290-B1	-0.02 ± 0.25
Blank	Decision Level	0.15

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

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP707FC and analyzed using PAI SOP724FC.

Remarks:

Blank for workorders 97-10-228 and 11-290.

Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3843R

Date File Saved: 11/24/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0486	97-10-228-1

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The sample was received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOU

The sample under Request Number 3843R (Work Order 97-10-228) was received on 10/24/97 and scheduled for isotopic uranium analyses.

This sample was prepared according to Paragon Analytics, Inc. procedures PAI SOP776R1, PAI SOP778R3 and PAI SOP780R2.

This sample was analyzed by alpha spectrometry according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 11/19/97. The analysis results for this sample are reported in units of pCi/Liter.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit.

^{234}U activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is below the requested MDC . Results should be compared to the method blank activity to determine the validity of the measurement.

No further anomalous situation were observed in the preparation and analyses of the sample listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

Lisa Duckworth — 11/21/97
Radiochemistry Instrument Technician — Date

Radiochemistry Final Review — 11/21/97
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.

Don Gipple — Date
Laboratory Manager

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Reported on: Thursday, November 20, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3843R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710228

Field ID:
Lab ID: 9709122-S1LCS1

Sample Matrix: WATER
Date Prepared: 10-Nov-97
Prep SOP: PAI SOP 780R2
Prep Batch: 143144

Date Collected: 10-Nov-97
Date Analyzed: 19-Nov-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 200

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
U-234	11.25 +/- 0.72	0.067	11.66	pCi/L	96%	+/- 25%	
U-235	0.510 +/- 0.070	0.067	N/A	pCi/L	N/A	N/A	
U-238	11.89 +/- 0.76	0.052	11.66	pCi/L	102%	+/- 25%	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.40	8.31	pCi/L	99%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Reported on: Thursday, November 20, 1997

Client Name: Los Alamos National Laboratory
Client Project Name: None
Client Project Number: 3843R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order Number: 9710228

Field ID:
Lab ID: 9709122-B1MB1

Sample Matrix: WATER
Date Prepared: 10-Nov-97
Prep SOP: PAI SOP 780R2
Prep Batch: 143144

Date Collected: 10-Nov-97
Date Analyzed: 19-Nov-97
Analytical SOP: PAI SOP 714R4

Final Aliquot: 1
Aliquot Units: L
Report Basis: AS RECEIVED
Count Time (min.): 200

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.056 +/- 0.022	0.055	pCi/L	
U-235	0.020 +/- 0.013	0.046	pCi/L	
U-238	0.036 +/- 0.017	0.046	pCi/L	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.40	8.03	pCi/L	96%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Reported on: Thursday, November 20, 1997

Client Name: Los Alamos National Laboratory

Client Project Name: None

Client Project Number: 3843R

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order Number: 9710228

		Prep Date	Analysis Date	Prep Batch	Final Aliquot
Field ID:	04LA-97-0486				
Lab ID:	9710228-1	11/10/97	11/19/97	143144	1
DUP ID:	9710228-1DUP1	11/10/97	11/19/97	143144	1

Sample Matrix: WATER
Date Collected: 20-Oct-97
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 780R2
Aliquot Units: L
Report Basis: AS RECEIVED

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
U-234	6.84 +/- 0.48	6.77 +/- 0.46	pCi/L	0.05	< 1.42	
U-235	0.337 +/- 0.062	0.232 +/- 0.047	pCi/L	0.68	< 1.42	
U-238	4.98 +/- 0.37	5.29 +/- 0.38	pCi/L	0.29	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	8.40	7.24	pCi/L	86%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate Analysis not within control limits.

Gross Gamma Results Summary

Blank Results

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	11/5/97
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-10-176	Units:	pCi/L

Client Sample ID	Lab Sample ID	Activity	Uncertainty	MDC
Blank	97-10-230-B1	72	11	17

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate.

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

Prepared by MH 11/21/97

Gross Gamma

Laboratory Control Sample Results

Lab Name:	Paragon Analytics, Inc.	Date Analyzed:	11/6/97
Client Name:	Los Alamos National Laboratory SMO	Sample Matrix:	Water
Lab Sample Series:	97-10-176	Units	pCi/L

Sample ID	Reported Activity	Known Value	Percent Recovery	Flag
97-10-230-S1	8694	8702	99.9%	PASS

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

Prepared by 11/21/97