Memo

Date: 04/16/98

To: Pat Longmire, CST-7

CC: Field Unit 4 file, LATA w/o att.

From: Felicia Aguilar Felicia Aguilar

RE: R-9 Water Sample Data

Enclosed are copies of analytical reports for water samples collected from well R-9.

You have previously received R-9 Intermediate Data, which is also included here, please read the memo dated January 30, 1998 for a summary of the intermediate depth analytical data.

Additional R-9 data for samples collected at deeper depths is included in this submittal. Hard copies of the analytical reports including form 1's, and analytical summaries are enclosed. The following factors need to be considered when reviewing this data:

- this data has not been reviewed for completeness and accuracy for reporting purposes,
- baseline validations have been completed on only those analytes for which procedures are in place by the project, and
- no focused validation of the data has been done by a chemist familiar with the intermediate data.

If you have any questions please contact me at 662-1816.

TABLE 5-5. SUMMARY OF STATISTICAL ANALYSES OF URANIUM DISTRIBUTIONS IN GROUNDWATERS AND SPRINGS ON THE PAJARITO PLATEAU AND SURROUNDING AREAS, NORTH CENTRAL NEW MEXICO (CONCENTRATIONS IN UNITS OF MICROGRAMS/LITER).

Statistic	Test Wells[1], Supply Wells[1], Springs[1], LANL BKGD[2], and San Ildefonso[1]
Number	65
Mean	1.86
Standard Error	0.47
Median	0.68
Stand. Dev.	3.78
Kurtosis	14.15
Skewness	3.69
Minimum	0.05
Maximum	19.64
Confidence Level (95.00%)	0.94

1. LANL Surveillance Report for 1996, LA-13343-ENV
2. LANL Background (BKGD) Groundwater Investigation (Spring 1998 Sampling Round)
Dissolved and total uranium concentrations are 48 and 112 micrograms/liter, respectively, in lower perched zone of the basalt (sampled on October 16, 1997 by Canyons Focus Team).

TABLE 5-1. RADIONUCLIDE ACTIVITIES IN CORE SAMPLES IN BASALT (2 SIGMA ERROR), BOREHOLE R-9, UPPER LOS ALAMOS CANYON.

Radionuclide	Core Depth Interval (feet below ground surface)					
(pCi/g)	41-50.5	50.5-55.5	172-178.5	181.1-182.5	185.3-187	205-206
strontium-90	0.04±0.39	0.30±0.43	0.43±0.50	0.03±0.47	0.18±0.47	0.22±0.53
cesium-137	0.006±0.042	-0.035±0.050	-0.019±0.041	-0.036±0.061	0.017±0.065	0.006±0.065
plutonium-238	0.0094±0.0130	0.0088±0.0170	-0.0071±0.0132	0.0036±0.00118	-0.0034±0.0110	0.0044±0.0156
MDA	0.025	0.036	0.044	0.033	0.011	0.033
plutonium-239, 240	-0.0006±0.0090	0.0077±0.0142	0.0085±0.0150	0.0100±0.0112	0.0167±0.0162	0.0034±0.0110
MDA	0.022	0.030	0.032	0.017	0.022	0.010
americium-241	0.127±0.040	0.0104±0.0104	0.0190±0.0154	0.078±0.030	0.038±0.024	0.037±0.066
MDA	0.017	0.0078	0.0095	0.027	0.026	0.036
uranium-234	0.205±0.060	0.336±0.082	0.221±0.066	0.236±0.066	0.138±0.048	0.257±0.070
MDA	0.029	0.031	0.033	0.043	0.031	0.035
uranium-235	0.0190±0.0168	0.030±0.022	0.025±0.022	0.026±0.020	0.0081±0.0128	0.029±0.022
MDA	0.011	0.019	0.022	0.019	0.026	0.023
uranium-238	0.259±0.068	0.248±0.068	0.246±0.070	0.279±0.720	0.184±0.056	0.313±0.078
MDA	0.027	0.033	0.022	0.029	0.034	0.024
gross alpha	1.0±1.1	1.5±1.2	0.62±0.81	3.4±1.5	3.0±1.6	3.6±1.8
gross beta	-0.07±1.3	0.87±1.6	0.06±0.96	1.8±1.4	2.3±1.7	1.2±1.8
gross gamma	2.30±0.22	2.20±0.23	2.10±0.25	3.35±0.36	53.12±0.36	3.87±0.36
MDA	0.25	0.26	0.32	0.44	0.46	0.38

Radionuclides and parameters analyzed by Paragon Analytics, Inc. MDA denotes minimum detectable activity (pCi/g). Error of 2 standard deviations is reported.

TABLE 5-1. RADIONUCLIDE ACTIVITIES IN CORE SAMPLES IN BASALT (2 SIGMA ERROR), BOREHOLE R-9, UPPER LOS ALAMOS CANYON.

Radionuclide	Core Depth Interval (feet below ground surface)					
(pCi/g)	230.4-231.3	236.5-237.3	237.3-238.1	268.5-270.8	280.5-281	291.2-292.6
strontium-90	0.10±0.49	0.06±0.50	0.04±0.47	0.11±0.45	0.27±0.44	0.11±0.65
cesium-137	0.019±0.039	0.112±0.075	-0.008±0.046	-0.010±0.042	-0.006±0.035	0.039±0.050
plutonium-238	-0.0071±0.0096	0.0044±0.0156	0.0044±0.0156	0.0107±0.0184	0.0147±0.0184	0.0032±0.0160
MDA	0.030	0.039	0.037	0.038	0.035	0.039
plutonium-239, 240	0.0089±0.0102	0.0138±0.0079	0.0069±0.0112	0.0017±0.0110	0.0005±0.0080	0.0102±0.0130
MDA	0.031	0.028	0.022	0.029	0.018	0.023
americium-241	0.077±0.032	0.037±0.066	0.037±0.066	0.032±0.024	0.0164±0.0156	0.0139±0.0168
MDA	0.031	0.028	0.033	0.036	0.023	0.031
uranium-234	0.393±0.094	0.415±0.096	0.391±0.090	0.476±0.110	0.634±0.174	0.993±0.156
MDA	0.041	0.037	0.038	0.037	0.037	0.027
uranium-235	0.026±0.022	0.0198±0.0184	0.039±0.026	0.0087±0.0148	0.036±0.028	0.050±0.026
MDA	0.023	0.021	0.020	0.024	0.027	0.022
uranium-238	0.383±0.092	0.402±0.092	0.521±0.102	0.356±0.092	0.704±0.144	0.952±0.152
MDA	0.013	0.030	0.024	0.037	0.031	0.027
gross alpha	2.9±1.8	2.7±1.7	2.1±1.4	2.8±1.8	3.1±1.5	6.4±1.7
gross beta	2.0±1.7	1.9±1.5	1.9±1.5	2.1±1.9	1.8±1.4	4.1±1.2
gross gamma	3.86±0.33	5.68±0.41	0.37±0.23	3.87±0.32	4.36±0.36	5.95±0.47
MDA	0.30	0.41	0.38	0.29	0.32	0.37

Radionuclides and parameters analyzed by Paragon Analytics, Inc. MDA denotes minimum detectable activity (pCi/g). Error of 2 standard deviations is reported.

TABLE 5-1. RADIONUCLIDE ACTIVITIES IN CORE SAMPLES IN PUYE FORMATION (2 SIGMA ERROR), BOREHOLE R-9, UPPER LOS ALAMOS CANYON.

Radionuclide (pCi/g)	Core Depth Interval (feet below ground surface) 568-569.7	570-571.5	582-583.5
strontium-90	0.84±0.47	-0.04±0.42	-0.22±0.34
cesium-137	0.026±0.049	0.002±0.036	-0.080±0.069
plutonium-238	-0.006±0.022	0.027±0.024	0.0069±0.0188
MDA	0.058	0.039	0.043
plutonium-239, 240	0.0007±0.0108	0.0014±0.0110	0.0038±0.0124
MDA	0.026	0.030	0.011
americium-241	0.0011±0.0086	0.0000±0.078	0.0139±0.0168
MDA	0.024	0.023	0.031
uranium-234	0.752±0.108	0.752±0.108	0.660±0.116
MDA	0.023	0.021	0.029
uranium-235	0.047±0.020	0.046±0.022	0.0204±0.0172
MDA	0.0067	0.018	0.024
uranium-238	0.822±0.128	0.766±0.120	0.650±0.116
MDA	0.016	0.013	0.026
gross alpha	3.3±1.3	1.5±1.9	5.1±1.7
gross beta	2.1±1.1	1.7±1.8	2.5±1.1
gross gamma	6.41±0.58	6.01±0.51	4.98±0.48
MDA	0.30	0.41	0.53

Radionuclides and parameters analyzed by Paragon Analytics, Inc. MDA denotes minimum detectable activity (pCi/g). Error of 2 standard deviations is reported.

TABLE 5-4. RADIONUCLIDE ACTIVITIES IN GROUNDWATERS (NON FILTERED, 2 SIGMA ERROR), BOREHOLE R-9, UPPER LOS ALAMOS CANYON.

Radionuclide	Basalt (ft bgs)		Puye Formation (ft bgs)			
(pCi/L)	180	275	579	615	624	688
tritium	347±25	106±7	2.71±0.58	30.3±1.9	13.93±0.90	14.43±0.96
strontium-90	0.47±0.28	0.52±0.64	-0.42±0.66	-0.23±0.68	-0.17±0.64	0.36±0.67
cesium-137	-0.38±2.42	1.39±2.44	-0.322±2.68	-0.045±2.13	-0.826±2.42	-0.381±2.03
plutonium-238	0.037±0.044	0.76±0.26	0.0156±0.0194	0.006±0.022	-0.0010±0.0156	0.020±0.028
MDA	0.084	0.23	0.034	0.051	0.039	0.052
plutonium-239, 240	0.031±0.030	0.01±0.06	-0.0074±0.0130	0.000±0.0154	0.0058±0.0156	-0.0058±0.0158
MDA	0.050	0.11	0.041	0.014	0.035	0.039
americium-241	0.092±0.046	0.106±0.094	0 .029±0.030	0.013±0.024	0.010±0.032	0.042±0.034
MDA	0.047	0.160	0.052	0.051	0.074	0.051
uranium-234	1.54±0.28	0.76±0.26	1.35±0.22	5.06±0.68	2.14±0.32	2.05±0.32
MDA	0.038	0.23	0.044	0.048	0.043	0.075
uranium-235	0.043±0.036	0.76±0.26	0.055±0.038	0.132±0.056	0.120±0.054	0.033±0.034
MDA	0.038	0.23	0.050	0.041	0.046	0.058
uranium-238	1.36±0.26	0.76±0.26	0.949±0.180	2.81±0.40	1.74±0.028	1.47±0.26
MDA	0.057	0.23	0.068	0.053	0.054	0.070
gross alpha	304±56	460±93	1.9±1.7	580±180	270±120	34±35
gross beta	351±58	700±120	3.7±1.8	820±230	310±100	113±42
gross gamma	212±23	244±18	274±21	340±25	351±25	237±19
MDA	31	15	20	19	18	18

Tritium analyzed by University of Miami; other radionuclides and parameters analyzed by Paragon Analytics, Inc. MDA denotes minimum detectable activity (pCi/L). Zones 180 ft, 275 ft , 579 ft, 615 ft, 624 ft, and 688 ft were sampled on 10/6/97, 10/16/97, 12/18/97, 01/12/98, 01/14/98, and 01/20/98, respectively. Error of 2 standard deviations is reported.

TABLE 5-5. RADIONUCLIDE ACTIVITIES IN GROUNDWATERS (FILTERED, 2 SIGMA ERROR), BOREHOLE R-9, UPPER LOS ALAMOS CANYON.

Radionuclide	Basalt (ft bgs)		Puye Formation (ft bgs)			
(pCi/L)	180	275	579	615	624	688
tritium	(see non filtered data for results of tritium analyses for the six saturated zones)					
strontium-90	0.11±0.25	no sample	-0.14±0.69	-0.21±0.87	-0.13±0.63	-0.02±0.84
cesium-137	-0.18±2.07	no sample	-0.837±2.31	-0.688±2.11	-1.43±1.20	0.598±2.18
plutonium-238	0.039±0.048	no sample	-0.001±0.040	0.009±0.024	0.000±0.024	-0.025±0.024
MDA	0.093	no sample	0.086	0.058	0.062	0.065
plutonium-239, 240	0.012±0.024	no sample	-0.0015±0.0134	0.028±0.026	0.0080±0.0162	0.0127±0.0180
MDA	0.055	no sample	0.038	0.017	0.030	0.013
americium-241	0.037±0.030	no sample	0.0111±0.0180	0.012±0.022	0.019±0.034	0.0135±0.0182
MDA	0.037		0.036	0.044	0.069	0.031
uranium-234	0.529±0.142	no sample	1.018±0.192	1.30±0.22	0.688±0.154	1.26±0.22
MDA	0.070		0.052	0.050	0.068	0.038
uranium-235	0.014±0.028	no sample	0.042±0.032	0.016±0.026	0.030±0.028	0.067±0.040
MDA	0.064		0.037	0.052	0.036	0.032
uranium-238	0.628±0.156	no sample	0.870±0.172	0.698±0.146	0.449±0.118	0.691±0.148
MDA	0.060		0.055	0.047	0.048	0.042
gross alpha	0.57±0.65	no sample	0.7±1.0	1.4±1.3	1.20±0.93	-0.1±1.3
gross beta	3.9±1.0	no sample	4.2±1.7	17.2±2.5	3.3±1.5	2.0±1.5
gross gamma	188±30	no sample	274±21	280±21	178±13	252±19
MDA	45		18	17	12	18

Tritium analyzed by University of Miami; other radionuclides and parameters analyzed by Paragon Analytics, Inc. MDA denotes minimum detectable activity (pCi/L). Zones 180 ft, 275 ft , 579 ft, 615 ft, 624 ft, and 688 ft were sampled on 10/6/97, 10/16/97, 12/18/97, 01/12/98, 01/14/98, and 01/20/98, respectively. Error of 2 standard deviations is reported.

	TABLE 5-2. GROUNDWATER CHEMISTRY OF BOREHOLE R-9, UPPER LOS ALAMOS CANYON, NEW MEXICO.							
		DATE	Temp	Ag	Std.D.	Al	Std.D.	Alk(Lab)
SAMPLE ID	DESCRIPTION	MM/DD/YY	°C	ppm	+/-	ppm	+/-	ppm CaCO3
R9-180 ft	Up. basalt, diss.	10/06/97	12.3	<0.001		0.13	0.01	
R9-180 ft	Up. basalt, total	10/06/97	12.3	<0.001		282	3	
R9-275 ft	Low. basalt, diss.	10/16/97	13.2	<0.001		0.27	0.01	
R9-275 ft	Low. basalt, total	10/16/97	13.2	0.08	0.01	1129	20	
R9-579 ft	Puye Fm., diss.	12/18/97	15.7	<0.001		0.08	0.01	
R9-579 ft	Puye Fm., total	12/18/97	15.7	<0.001		14.9	0.1	
R9-615 ft	Puye Fm., diss.	01/12/98	17.2	<0.001		0.17	0.01	
R9-615 ft	Puye Fm., total	01/12/98	17.2	0.005	0.001	543	1	746
R9-624 ft	Puye Fm., diss.	01/14/98	15.3	<0.001		0.43	0.01	
R9-624 ft	Puye Fm., total	01/14/98	15.3	0.002	0.001	193	5	145
R9-688 ft	Puye Fm., diss.	01/20/98	17.9	<0.001		<0.02		
R9-688 ft	Puye Fm., total	01/20/98	17.9	0.010	0.002	196	2	

	As	B	Std.D.	Ba	Std.D.	Be	std.D.	Br
SAMPLE ID	ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm
R9-180 ft	0.0008	0.023	0.002	0.017	0.002	<0.002		0.16
R9-180 ft	0.017	0.15	0.01	1.34	0.02	0.018	0.002	0.16
R9-275 ft	0.0013	<0.01		0.005	0.002	<0.002		0.10
R9-275 ft	0.077	1.16	0.02	7.23	0.02	0.067	0.002	0.08
R9-579 ft	0.0004	0.030	0.001	0.064	0.001	<0.002		0.20
R9-579 ft	0.0012	0.048	0.003	0.19	0.01	<0.002		0.19
R9-615 ft	0.0002	0.047	0.001	0.060	0.001	<0.002		0.25
R9-615 ft	0.102	0.20	0.01	5.08	0.03	0.032	0.001	0.24
R9-624 ft	0.0018	0.041	0.003	0.028	0.001	<0.002		0.15
R9-624 ft	0.014	0.10	0.01	0.90	0.01	0.008	0.001	0.15
R9-688 ft	0.0025	0.046	0.001	0.045	0.001	<0.002		0.05
R9-688 ft	0.019	0.064	0.002	1.38	0.01	0.003	0.001	0.04

TABLE 5-2. GROUNDWATER CHEMISTRY OF BOREHOLE R-9, UPPER LOS ALAMOS CANYON, NEW MEXICO.

	Ca	Std.D.	Cd	Std.D.	Cl	ClO3	Co	Std.D.
SAMPLE ID	ppm	+/-	ppm	+/-	ppm	ppm	ppm	+/-
R9-180 ft	14.1	0.1	0.0004	0.0002	29.2	<0.02	<0.002	
R9-180 ft	91.0	0.6	0.0004	0.0002	29.5	<0.02	0.022	0.002
R9-275 ft	2.91	0.07	0.0010	0.0002	25.5	<0.02	<0.002	
R9-275 ft	1090	10	0.0053	0.0005	26.3	<0.02	1.11	0.02
R9-579 ft	25.4	0.2	<0.0002		13.2	<0.02	<0.002	
R9-579 ft	34.1	0.1	0.0006	0.0002	13.2	<0.02	0.003	0.002
R9-615 ft	25.1	0.1	<0.0002		177	<0.02	<0.002	
R9-615 ft	611	1	0.0061	0.0002	180	<0.02	0.24	0.01
R9-624 ft	16.6	0.1	<0.0002		20.2	<0.02	<0.002	
R9-624 ft	139	2	0.0008	0.0002	20.3	<0.02	0.052	0.002
R9-688 ft	27.1	0.6	<0.0002		7.67	<0.02	<0.002	
R9-688 ft	132	1	0.012	0.001	7.57	<0.02	0.11	0.01

	CO3	Cond.(L)	Cr	Std.D.	Cs	Std.D.	Cu	Std.D.
SAMPLE ID	ppm	µS/cm	ppm	+/-	ppm	+/-	ppm	+/-
R9-180 ft	0	250	<0.002		<0.002		0.004	0.002
R9-180 ft	0	256	0.12	0.01	0.020	0.002	0.27	0.02
R9-275 ft	7.0	457	0.002	0.002	<0.002		0.017	0.002
R9-275 ft	32.6	512	1.22	0.01	0.047	0.002	11.3	0.1
R9-579 ft	0	273	<0.002		<0.002		<0.002	
R9-579 ft	0	273	0.012	0.002	0.002	0.002	0.012	0.002
R9-615 ft	0	987	<0.002		<0.002		0.010	0.002
R9-615 ft	0*	1068	1.65	0.03	0.029	0.004	1.38	0.03
R9-624 ft	0	281	<0.002		<0.002		0.003	0.002
R9-624 ft	0*	321	0.13	0.01	0.003	0.002	0.14	0.01
R9-688 ft	9.2	259	<0.002		<0.002		0.003	0.002
R9-688 ft	9.8	266	0.24	0.01	0.003	0.002	0.82	0.01

TABLE 5-2. GROUNDWATER CHEMISTRY OF BOREHOLE R-9, UPPER LOS ALAMOS CANYON, NEW MEXICO.

	F	Fe	Std.D.	Hardness	HCO3	Hg	K	Std.D.
SAMPLE ID	ppm	ppm	+/-	CaCO3 ppm	ppm	ppm	ppm	+/-
R9-180 ft	0.71	0.06	0.01	57.0	78.5	<0.00005	4.54	0.03
R9-180 ft	0.67	142	1	417	93.0	0.00045	30.6	0.1
R9-275 ft	1.27	0.19	0.01	12.1	105	<0.00005	5.22	0.02
R9-275 ft	1.38	1460	30	7182	400	0.00035	105	1
R9-579 ft	0.74	0.06	0.01	68.5	110	<0.00005	2.93	0.02
R9-579 ft	0.74	9.76	0.02	105	117	<0.00005	3.94	0.01
R9-615 ft	0.42	0.18	0.01	67.0	133	0.00005	24.2	0.1
R9-615 ft	0.42	1051	13	2131	910*	0.00038	92.4	2.0
R9-624 ft	0.56	0.43	0.01	42.5	76.0	<0.00005	2.95	0.01
R9-624 ft	0.56	121	2	537	177*	0.00008	12.2	0.1
R9-688 ft	0.30	0.01	0.01	84.5	118	<0.00005	3.87	0.01
R9-688 ft	0.32	170	2	578	117	<0.00005	10.8	0.1

	I	Li	Std.D.	Mg	Std.D.	Mn	Std.D.	NH4
SAMPLE ID	ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm
R9-180 ft	0.17	<0.01		5.29	0.02	0.051	0.001	0.03
R9-180 ft	0.17	0.23	0.01	46.2	0.2	1.98	0.01	0.03
R9-275 ft	<0.01	0.02	0.01	1.18	0.01	0.013	0.002	0.02
R9-275 ft	---	0.68	0.01	1083	15	31.5	0.3	1.34
R9-579 ft	<0.01	0.03	0.01	1.24	0.01	0.041	0.001	0.09
R9-579 ft	<0.01	0.04	0.01	4.80	0.06	0.33	0.01	0.08
R9-615 ft	0.011	0.03	0.01	1.06	0.01	0.24	0.01	0.23
R9-615 ft	0.015	0.44	0.01	147	1	21.5	0.1	0.94
R9-624 ft	<0.005	<0.01		0.26	0.01	0.03	0.01	0.04
R9-624 ft	0.005	0.12	0.01	46.1	0.5	2.83	0.02	0.04
R9-688 ft	<0.005	0.03	0.01	4.09	0.06	0.05	0.01	0.06
R9-688 ft	<0.005	0.10	0.01	60.3	0.5	2.88	0.02	0.14

TABLE 5-2. GROUNDWATER CHEMISTRY OF BOREHOLE R-9, UPPER LOS ALAMOS CANYON, NEW MEXICO.

	Mo	Std.D.	Na	Std.D.	NO3	Pb	Std.D.	pH
SAMPLE ID	ppm	+/-	ppm	+/-	ppm	ppm	+/-	Field
R9-180 ft	0.025	0.002	26.1	0.2	<0.02	<0.002		8.39
R9-180 ft	0.038	0.002	51.8	0.1	<0.02	0.10	0.01	8.39
R9-275 ft	0.10	0.01	100	1	3.61	<0.002		8.79
R9-275 ft	0.34	0.01	400	5	2.83	0.63	0.01	8.79
R9-579 ft	0.028	0.002	29.8	0.1	10.6	<0.002		7.9
R9-579 ft	0.020	0.002	29.3	0.1	10.7	0.010	0.001	7.9
R9-615 ft	0.05	0.01	167	3	3.41	<0.002		6.95
R9-615 ft	0.39	0.01	215	1	<0.02	2.05	0.01	6.95
R9-624 ft	0.040	0.004	41.0	0.1	8.66	0.006	0.002	9.16
R9-624 ft	0.04	0.01	45.0	0.2	7.36	0.12	0.03	9.16
R9-688 ft	0.007	0.002	20.1	0.5	3.42	<0.002		8.07
R9-688 ft	0.007	0.002	46.3	0.1	3.31	0.14	0.02	8.07

	pH	PO4	Rb	Std.D.	Sb	Se	Si	Std.D.
SAMPLE ID	Lab	ppm	ppm	+/-	ppm	ppm	ppm	+/-
R9-180 ft	8.02	0.14	0.009	0.002	0.0002	<0.0002	14.1	0.3
R9-180 ft	7.49	0.11	0.27	0.01	0.0013	0.0012	120	1
R9-275 ft	8.79	0.61	0.010	0.002	0.0012	0.0015	10.4	0.1
R9-275 ft	9.09	0.99	0.76	0.02	0.0017	0.0017	230	2
R9-579 ft	8.07	<0.05	0.005	0.002	0.0002	<0.0001	17.2	0.2
R9-579 ft	8.07	<0.05	0.008	0.002	0.0010	<0.001	51.4	0.3
R9-615 ft	7.53	<0.05	0.011	0.002	0.0003	<0.0001	4.23	0.03
R9-615 ft	7.66	<0.05	0.37	0.02	0.0007	0.0007	117	1
R9-624 ft	8.08	<0.05	0.004	0.002	0.0003	<0.0001	9.44	0.07
R9-624 ft	8.32	<0.05	0.077	0.005	0.0003	<0.0001	176	4
R9-688 ft	8.01	<0.05	0.004	0.002	0.0003	<0.0001	31.6	0.1
R9-688 ft	8.04	<0.05	0.006	0.002	0.0010	<0.0001	219	2

	TABLE 5-2. GROUNDWATER CHEMISTRY OF BOREHOLE R-9, UPPER LOS ALAMOS CANYON, NEW MEXICO.							
	SiO2	SO4	S2O3	Sn	Std.D.	Sr	Std.D.	Tl
SAMPLE ID	ppm calc	ppm	ppm	ppm	+/-	ppm	+/-	ppm
R9-180 ft	30.2	8.09	<0.01	<0.005		0.093	0.002	<0.002
R9-180 ft	257	8.01	<0.01	<0.005		0.91	0.01	<0.002
R9-275 ft	22.3	53.8	<0.02	<0.005		0.033	0.002	<0.002
R9-275 ft	492	60.2	---	<0.01		13.5	0.1	<0.002
R9-579 ft	36.8	12.4	<0.05	<0.005		0.29	0.01	<0.002
R9-579 ft	110	12.1	<0.05	<0.005		0.36	0.01	<0.002
R9-615 ft	9.1	64.7	<0.05	<0.005		0.28	0.01	<0.002
R9-615 ft	250	65.8	<0.05	<0.005		4.78	0.04	<0.002
R9-624 ft	20.2	27.2	<0.05	<0.005		0.19	0.01	<0.002
R9-624 ft	377	29.4	<0.05	<0.005		1.52	0.01	<0.002
R9-688 ft	67.6	6.37	<0.01	0.005	0.005	0.21	0.01	<0.002
R9-688 ft	469	6.34	<0.01	0.034	0.005	1.32	0.01	<0.002
	Ti	Std.D.	U	V	std.D.	Zn	Std.D.	TSS
SAMPLE ID	ppm	+/-	ppm	ppm	+/-	ppm	+/-	ppm
R9-180 ft	<0.002		<0.1	<0.002		0.01	0.01	---
R9-180 ft	3.77	0.01	<0.1	0.16	0.01	0.61	0.01	med
R9-275 ft	0.006	0.002	<0.1	0.004	0.002	<0.01		---
R9-275 ft	24.0	0.1	<0.1	1.04	0.01	3.17	0.02	high
R9-579 ft	<0.002		<0.1	0.002	0.002	0.09	0.01	---
R9-579 ft	0.64	0.01	<0.1	0.009	0.001	0.02	0.01	low
R9-615 ft	0.003	0.001	<0.1	<0.002		0.03	0.01	---
R9-615 ft	1.99	0.02	<0.1	0.40	0.01	3.85	0.01	high
R9-624 ft	0.005	0.001	<0.1	0.003	0.002	<0.01		---
R9-624 ft	1.96	0.01	<0.1	0.12	0.01	0.35	0.01	med
R9-688 ft	<0.002		<0.1	0.005	0.001	<0.01		---
R9-688 ft	4.76	0.10	<0.1	0.14	0.01	0.76	0.01	med

	TABLE 5-2. GROUNDWATER CHEMISTRY OF BOREHOLE R-9, UPPER LOS ALAMOS CANYON, NEW MEXICO.							
	TDS	Cation	B/CL	LI/CL	F/CL	NA/CL	K/CL	SO4/CL
SAMPLE ID	ppm	Sum	by wt	by wt	by wt	by wt	by wt	by wt
R9-180 ft	252.2	2.414	0.0008	0.0000	0.0243	0.8938	0.1555	0.2771
R9-180 ft	1557.5	50.454	0.0051	0.0078	0.0227	1.7559	1.0373	0.2715
R9-275 ft	388.8	4.770	0.0000	0.0008	0.0498	3.9216	0.2047	2.1098
R9-275 ft	11821.4	365.028	0.0441	0.0259	0.0525	15.2091	3.9924	2.2890
R9-579 ft	329.7	2.773	0.0023	0.0023	0.0561	2.2576	0.2220	0.9394
R9-579 ft	544.1	5.684	0.0036	0.0030	0.0561	2.2197	0.2985	0.9167
R9-615 ft	550.5	9.281	0.0003	0.0002	0.0024	0.9435	0.1367	0.3655
R9-615 ft	4684.1	171.522	0.0011	0.0024	0.0023	1.1944	0.5133	0.3656
R9-624 ft	276.9	2.787	0.0020	0.0000	0.0277	2.0297	0.1460	1.3465
R9-624 ft	1740.5	41.070	0.0049	0.0059	0.0276	2.2167	0.6010	1.4483
R9-688 ft	386.7	2.677	0.0060	0.0039	0.0391	2.6206	0.5046	0.8305
R9-688 ft	2082.6	44.871	0.0085	0.0132	0.0423	6.1162	1.4267	0.8375
	HCO3/CL	CS/CL	BR/CL	Oxalate	Acetate	Formate		
SAMPLE ID	by wt	by wt	by wt	ppm	ppm	ppm		
R9-180 ft	2.6884	0.0000	0.0055		<0.1	0.02		
R9-180 ft	3.1525	0.0007	0.0054		<0.1	0.02		
R9-275 ft	4.1176	0.0000	0.0039	3.03	<0.1	0.04		
R9-275 ft	15.2091	0.0018	0.0030	2.74	<0.1	0.08		
R9-579 ft	8.3333	0.0000	0.0152	<0.02	<0.1	0.03		
R9-579 ft	8.8636	0.0002	0.0144	<0.02	<0.1	0.04		
R9-615 ft	0.7514	0.0000	0.0014	2.85	+	+		
R9-615 ft	0.0000	0.0002	0.0013	2.71	+	+		
R9-624 ft	3.7624	0.0000	0.0074	0.48	+	+		
R9-624 ft	0.0000	0.0001	0.0074	0.47	+	+		
R9-688 ft	15.3846	0.0000	0.0065	0.30	+	+		
R9-688 ft	15.4557	0.0004	0.0053	0.41	+	+		

DATE COLLECTED	PRS	SAMPLE ID N	SAMPLE LOC	MATRIX	BEGIN DEPTH	END DEPTH
9/26/97	R-9 Perched Water	04LA-97-0465	R-9	WATER		
9/26/97	R-9 Perched Water	04LA-97-0466	R-9	WATER		
10/6/97	R-9 Groundwater Char	04LA-97-0480	R-9	WATER	137	13
10/6/97	R-9 Groundwater Char	04LA-97-0481	R-9	WATER	137	13
10/16/97	R-9 Groundwater Char	04LA-97-0483	R-9	WATER	280	28
10/20/97	R-9 Groundwater Char	04LA-97-0486	R-9	WATER	273	27
10/20/97	R-9 Groundwater Char	04LA-97-0487	R-9	WATER	273	27
10/20/97	R-9 Groundwater Char (0	04LA-97-0566	R-9	WATER	273	27
12/20/97	R-9 Groundwater Char	04LA-97-0627	R-9	WATER	500	50
12/20/97	R-9 Groundwater Char	04LA-97-0628	R-9	WATER	500	50
12/18/97	R-9 Groundwater Char	04LA-97-0629	R-9	WATER	571	57
12/18/97	R-9 Groundwater Char	04LA-97-0630	R-9	WATER	571	57
1/6/98	R-9 Groundwater Char	04LA-98-0001	R-9 Puye	WATER	580	58
1/27/98	R-9 Groundwater Char	04LA-98-0026	R-9	WATER	580	58
1/27/98	R-9 Groundwater Char	04LA-98-0027	R-9	WATER	580	58
1/26/98	R-9 Groundwater Char	04LA-98-0028	R-9	WATER	615	61
1/26/98	R-9 Groundwater Char	04LA-98-0029	R-9	WATER	615	61
1/27/98	R-9 Groundwater Char	04LA-98-0030	R-9	WATER	624	62
1/27/98	R-9 Groundwater Char	04LA-98-0031	R-9	WATER	624	62
1/26/98	R-9 Groundwater Char	04LA-98-0032	R-9	WATER	686	68
1/26/98	R-9 Groundwater Char	04LA-98-0033	R-9	WATER	686	68

MATRIX	BEGIN DEPTH	END DEPTH	UNITS	INORG	ORG	OTHER	RAD	RADOTH
WATER							3756R	
WATER				3755R				
WATER	137	137	ft	3778R	3777R		3781R, 3807R	3780R
WATER	137	137	ft	3778R		3779R	3781R	
WATER	280	280	ft	3815R			3817R, 3818R, 3905R	3816R
WATER	273	273	ft	3841R	3840R		3843R, 3844R, 3906R	3842R
WATER	273	273	ft	3846R		3845R	3847R	
WATER	273	273	ft				3882R	
WATER	500	500	ft	4018R	4016R		4019R, 4020R, 4022R	4021R
WATER	500	500	ft	4018R		4017R	4020R	
WATER	571	571	ft				4012R	
WATER	571	571	ft				4011R	
WATER	580	580	ft					4035R, 4036R
WATER	580	580	ft	4069R			4070R, 4071R, 4072R	
WATER	580	580	ft	4069R			4070R	
WATER	615	615	ft	4069R			4070R, 4071R, 4072R	
WATER	615	615	ft	4069R			4070R	
WATER	624	624	ft	4069R			4070R, 4071R, 4072R	
WATER	624	624	ft	4069R			4070R	
WATER	686	686	ft	4069R			4070R, 4071R, 4072R	
WATER	686	686	ft	4069R			4070R	

DATE COLLECTED	PRS	SAMPLE ID N	SAMPLE LOC	MATRIX	BEGIN DEPTH	END DEPTH	UNITS	INORG	ORG	OTHER	RAD	RADOTH
9/26/97	R-9 Perched Water	04LA-97-0465	R-9	WATER							3756R	
9/26/97	R-9 Perched Water	04LA-97-0466	R-9	WATER				3755R				
10/6/97	R-9 Groundwater Char	04LA-97-0480	R-9	WATER	137	137	ft	3778R	3777R		3781R, 3807R	3780R
10/6/97	R-9 Groundwater Char	04LA-97-0481	R-9	WATER	137	137	ft	3778R		3779R	3781R	
10/16/97	R-9 Groundwater Char	04LA-97-0483	R-9	WATER	280	280	ft	3815R			3817R, 3818R, 3905R	3816R
10/20/97	R-9 Groundwater Char	04LA-97-0486	R-9	WATER	273	273	ft	3841R	3840R		3843R, 3844R, 3906R	3842R
10/20/97	R-9 Groundwater Char	04LA-97-0487	R-9	WATER	273	273	ft	3846R		3845R	3847R	
10/20/97	R-9 Groundwater Char (0	04LA-97-0566	R-9	WATER	273	273	ft				3882R	
12/20/97	R-9 Groundwater Char	04LA-97-0627	R-9	WATER	500	500	ft	4018R	4016R		4019R, 4020R, 4022R	4021R
12/20/97	R-9 Groundwater Char	04LA-97-0628	R-9	WATER	500	500	ft	4018R		4017R	4020R	
12/18/97	R-9 Groundwater Char	04LA-97-0629	R-9	WATER	571	571	ft				4012R	
12/18/97	R-9 Groundwater Char	04LA-97-0630	R-9	WATER	571	571	ft				4011R	
1/6/98	R-9 Groundwater Char	04LA-98-0001	R-9 Puye	WATER	580	580	ft					4035R, 4036R
1/27/98	R-9 Groundwater Char	04LA-98-0026	R-9	WATER	580	580	ft	4069R			4070R, 4071R, 4072R	
1/27/98	R-9 Groundwater Char	04LA-98-0027	R-9	WATER	580	580	ft	4069R			4070R	
1/26/98	R-9 Groundwater Char	04LA-98-0028	R-9	WATER	615	615	ft	4069R			4070R, 4071R, 4072R	
1/26/98	R-9 Groundwater Char	04LA-98-0029	R-9	WATER	615	615	ft	4069R			4070R	
1/27/98	R-9 Groundwater Char	04LA-98-0030	R-9	WATER	624	624	ft	4069R			4070R, 4071R, 4072R	
1/27/98	R-9 Groundwater Char	04LA-98-0031	R-9	WATER	624	624	ft	4069R			4070R	
1/26/98	R-9 Groundwater Char	04LA-98-0032	R-9	WATER	686	686	ft	4069R			4070R, 4071R, 4072R	
1/26/98	R-9 Groundwater Char	04LA-98-0033	R-9	WATER	686	686	ft	4069R			4070R	
2/13/98	R-9 Groundwater Char	04LA-98-0034	R-9	WATER								

DATA ENTERED

101097 VT

Wednesday, October 01, 1997

REQUEST NUMBER: 3755R

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:

SHIP DATE: 9/29/97
REPORT DUE: 10/29/97
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 3755R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Not Required

COMMENTS: LA - 1049 , AP; AMENDED: CORRECTION OF ANALYSIS. JV 10/01/97

LANL ER SMO CONTACT: JOHN KEMP MS H865 505665-9968

Signature:

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
ANWQ		04LA-97-0466	01	W	9/26/97	
CL(-1)		04LA-97-0466	01	W	9/26/97	
PO4(-3)		04LA-97-0466	01	W	9/26/97	

Monday, September 29, 1997

REQUEST NUMBER: 3755R

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:

SHIP DATE: 9/29/97
REPORT DUE: 12/25/97
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 3755R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

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

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
ANWQ		04LA-97-0466	01	W	9/26/97	
SIO2DISS		04LA-97-0466	01	W	9/26/97	
TCN		04LA-97-0466	01	W	9/26/97	

PARAGON ANALYTICS, INC.
225 Commerce Drive ◆ Fort Collins, CO 80524 ◆ (800) 443-1511 ◆ (970) 490-1511 ◆ FAX (970) 490-1522

October 31, 1997

Dr. John Miglio
Los Alamos National Laboratory SMO
SMO TA-3, Building 271
Los Alamos, NM 87545

RE: Paragon Workorder: 97-09-289
LANL Request Number: 3755R

Dear Dr. Miglio:

One water sample was received from LANL on September 30, 1997. The sample was scheduled for the Inorganics analysis. The results for this analysis are contained in the enclosed report pages 1-93.

Please note that there was no required EDD for this workorder.

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

FIELD COPY

Report Sent To: Robert A. Tapia
Approved By: _____
Date Sent: 11/6/97

LS/jjc
Enclosure: Report

Wednesday, October 01, 1997

REQUEST NUMBER: 3755R

ANALYSIS TYPE: INORG

Los Alamos
NATIONAL LABORATORY

AMENDED

COC Rcd.
10/2/97
S-Fry

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

97-09-289

Please analyze the enclosed samples according to the schedule indicated:

These samples are on:

SHIP DATE: 9/29/97
REPORT DUE: 10/29/97
TURN AROUND REQ'D: 30 day

LANL Request Number: 3755R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Not Required

COMMENTS: LA - 1049 , AP; AMENDED: CORRECTION OF ANALYSIS. JV 10/01/97

LANL ER SMO CONTACT: JOHN KEMP MS H865 505665-9968

Signature: Jaylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
ANWQ		04LA-97-0466	01	W	9/26/97	
CL(-1)		04LA-97-0466	01	W	9/26/97	
PO4(-3)		04LA-97-0466	01	W	9/26/97	

Tuesday, September 30, 1997

REQUEST NUMBER: 3755R

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: 9/29/97
REPORT DUE: 10/29/97 (-2-)
TURN AROUND REQ'D: ~~30 day~~ 1 day
SZ 10/1/97 per J. Miglio

LANL Request Number: 3755R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Not Required

COMMENTS: LA - 1049 , AP; AMENDED: ADDITIONAL ANALYSIS REQUESTED. JV 9/30/97

LANL ER SMO CONTACT: JOHN KEMP MS H865 505665-9968
Signature: Jaylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
ANWQ (1)		04LA-97-0466	01	W	9/26/97	
CL(-1)		04LA-97-0466	01	W	9/26/97	
PO4(-3)		04LA-97-0466	01	W	9/26/97	
~~SIO2DISS~~		04LA-97-0466	01	W	9/26/97	
~~TCN~~ Cancelled per J. Miglio 10/1/97		04LA-97-0466	01	W	9/26/97	

Final Page of REQUEST NUMBER 3755R

(1) Cl^-, Br^-, PO_4^{3-}, SO_4^{2-}, NO_3^- per J. Miglio 10/1/97 SZ

Paragon Analytics, Inc.

INORGANICS CASE NARRATIVE

Los Alamos National Laboratory SMO

3755R

Order Number - 9709289

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, nitrate, orthophosphate and sulfate.
2. The sample was received cool and intact on 09/30/97.
3. The sample was 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
Nitrate	300.0
Orthophosphate	300.0
Sulfate	300.0

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.
   - While the MS recovery for nitrate was within acceptance limits the MSD recovery for nitrate was outside of acceptance criteria (high). The initial calibration (ICV/LCS) for this analyte as well as all continuing calibrations were within acceptance criteria. Probable cause has been attributed to matrix effect.
   - The MS/MSD results were within acceptance limits for all other analytes.

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

Jm	10·31-97
Reporter's Initials	Date
GJ	10-31-97
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.

Don Gipple Laboratory Manager	Date

BROMIDE

Method 300.0

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID:
Client Project No: 3755R
Lab Workorder Number: 9709289

Date Collected: 09/26/97
Date Analyzed: 09/30/97
Sample Matrix: Water

Client ID	Lab Sample ID	Bromide Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.2
04LA-97-0466	9709289-1	ND	0.2

ND = Not Detected

CHLORIDE

Method 300.0

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID:
Client Project No: 3755R
Lab Workorder Number: 9709289

Date Collected: 09/26/97
Date Analyzed: 09/30/97
Sample Matrix: Water

Client ID	Lab Sample ID	Chloride Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.2
04LA-97-0466	9709289-1	36	4

ND = Not Detected

NITRATE

Method 300.0

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID:
Client Project No: 3755R
Lab Workorder Number: 9709289

Date Collected: 09/26/97
Date Analyzed: 09/30/97
Sample Matrix: Water

Client ID	Lab Sample ID	Nitrate as N Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.2
04LA-97-0466	9709289-1	ND	0.2

ND = Not Detected

SULFATE

Method 300.0

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID:
Client Project No: 3755R
Lab Workorder Number: 9709289

Date Collected: 09/26/97
Date Analyzed: 09/30/97
Sample Matrix: Water

Client ID	Lab Sample ID	Sulfate Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	1
04LA-97-0466	9709289-1	13	1

ND = Not Detected

ORTHOPHOSPHATE

Method 300.0

Lab Name: Paragon Analytics, Inc.
Client Name: Los Alamos National Laboratory SMO
Client Project ID:
Client Project No: 3755R
Lab Workorder Number: 9709289

Date Collected: 09/26/97
Date Analyzed: 09/30/97
Sample Matrix: Water

Client ID	Lab Sample ID	Orthophosphate as P Conc (mg/L)	Detection Limit (mg/L)
	Method Blank	ND	0.2
04LA-97-0466	9709289-1	ND	0.2

ND = Not Detected

Bromide in Water Quality Control Results

Analysis Date: 09/30/97
Ion Chromatograph Analytical Sequence: S970930a.seq

BLANK SUMMARY

	blank Br conc (mg/L)	blank reporting limit (mg/L)
ICB (Method Blank)	ND	< 0.2
CCB-1	ND	< 0.2
CCB-2	ND	< 0.2
CCB-3	ND	< 0.2

ND = Not Detected

CALIBRATION VERIFICATION SUMMARY

	spike added Br conc (mg/L)	Br conc found (mg/L)	recovery %	accept. limit
ICV (LCS)	4.00	4.08	102	85-115%
CCV-1	4.00	4.12	103	90-110%
CCV-2	4.00	4.18	104	90-110%
CCV-3	4.00	4.24	106	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
9709289-1 MS	5.00	ND	5.36	107	85-115%		
9709289-1 MSD	5.00	ND	5.51	110	85-115%	2.8	0-15%

Chloride Quality Control Results

Analysis Date: 09/30/97
Ion Chromatograph Analytical Sequence: S970930a.seq

BLANK SUMMARY

	blank Cl conc (mg/L)	blank reporting limit (mg/L)
ICB (Method Blank)	ND	< 0.2
CCB-1	ND	< 0.2
CCB-2	ND	< 0.2
CCB-3	ND	< 0.2

ND = Not Detected

CALIBRATION VERIFICATION SUMMARY

	spike added Cl conc (mg/L)	Cl conc found (mg/L)	recovery %	accept. limit
ICV (LCS)	4.00	4.18	104	75-115%
CCV-1	4.00	4.25	106	90-110%
CCV-2	4.00	4.24	106	90-110%
CCV-3	4.00	4.22	106	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
9709289-1 MS	100.0	36.3	139.2	103	75-115%		
9709289-1 MSD	100.0	36.3	138.5	102	75-115%	0.5	0-20%

Nitrate Quality Control Results

Analysis Date: 09/30/97
Ion Chromatograph Analytical Sequence: S970930a.seq

BLANK SUMMARY

	blank NO3-N conc (mg/L)	blank reporting limit (mg/L)
ICB (Method Blank)	ND	< 0.2
CCB-1	ND	< 0.2
CCB-2	ND	< 0.2
CCB-3	ND	< 0.2

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	4.25	106	85-115%
CCV-1	4.00	4.24	106	90-110%
CCV-2	4.00	4.36	109	90-110%
CCV-3	4.00	4.28	107	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
9709289-1 MS	5.00	ND	5.71	114	85-115%		
9709289-1 MSD	5.00	ND	5.83	117	85-115%	2.2	0-15%

Orthophosphate Quality Control Results

Analysis Date: 09/30/97
Ion Chromatograph Analytical Sequence: S970930a.seq

BLANK SUMMARY

	blank PO4-P conc (mg/L)	blank reporting limit (mg/L)
ICB (Method Blank)	ND	< 0.2
CCB-1	ND	< 0.2
CCB-2	ND	< 0.2
CCB-3	ND	< 0.2

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	3.87	97	85-115%
CCV-1	4.00	4.08	102	90-110%
CCV-2	4.00	4.25	106	90-110%
CCV-3	4.00	4.10	102	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
9709289-1 MS	5.00	ND	5.24	105	85-115%		
9709289-1 MSD	5.00	ND	5.74	115	85-115%	9.1	0-15%

Sulfate Quality Control Results

Analysis Date: 09/30/97
Ion Chromatograph Analytical Sequence: S970930a.seq

BLANK SUMMARY

	blank SO4 conc (mg/L)	blank reporting limit (mg/L)
ICB (Method Blank)	ND	< 1
CCB-1	ND	< 1
CCB-2	ND	< 1
CCB-3	ND	< 1

ND = Not Detected

CALIBRATION VERIFICATION SUMMARY

	spike added SO4 conc (mg/L)	SO4 conc found (mg/L)	recovery %	accept. limit
ICV (LCS)	20.00	21.01	105	85-115%
CCV-1	20.00	21.24	106	90-110%
CCV-2	20.00	21.40	107	90-110%
CCV-3	20.00	21.22	106	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
9709289-1 MS	20.0	13.1	33.8	103	85-115%		
9709289-1 MSD	20.0	13.1	34.1	105	85-115%	0.8	0-15%

DATA ENTERED
101097

Tuesday, September 30, 1997

REQUEST NUMBER: 3756R
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: 9/30/97
REPORT DUE: 10/29/97
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 3756R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Not Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: JOHN KEMP MS H865 505665-9968
Signature: Marlene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
LH3		04LA-97-0465	01	W	9/26/97	

Final Page of REQUEST NUMBER 3756R

PARAGON ANALYTICS, INC.
225 Commerce Drive ◆ Fort Collins, CO 80524 ◆ (800) 443-1511 ◆ (970) 490-1511 ◆ FAX (970) 490-1522

November 19, 1997

Dr. John Miglio
Los Alamos National Laboratory SMO
SMO TA-3, Building 271
Los Alamos, NM 87545

RE: Paragon Workorder: 97-10-003
LANL Request Number: 3756R

Dear Dr. Miglio:

One water sample was received from LANL on October 1, 1997. The sample was scheduled for Tritium analysis. The results for this analysis are contained in the enclosed report pages 1-42.

Please note that the required EDD was transmitted on November 19, 1997.

Thank you for your confidence in Paragon Analytics, Inc. Should you have any questions, please call.

Sincerely,

FIELD COPY

Paragon Analytics, Inc.
Lance Steere
Senior Project Manager

LS/nmu
Enclosure: Report

Report Sent To: J. Burchemau
Approved By: 11/24/97
Date Sent:

Paragon Analytics, Inc.
Case Narrative File

Request Number: 3756R
Date File Saved: 10/02/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0465	97-10-003-01

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 3756R (PAI Work Order 97-10-003) were received on 10/01/97 and scheduled for tritium analysis, which was completed on 10/02/97.

The analysis results for these samples are 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.

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 — 10/3/97
Chris McNerney, Radiochemistry Instrument Technician — Date

Radiochemistry Final Review — 10/6/97
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

1

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 1

SAMPLE RESULTS SUMMARY

TRITIUM ANALYSIS RESULTS SUMMARY

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 09/26/97

Client Name: Los Alamos National Labor

Date Analyzed: 10/02/97

Lab Sample ID Series: 97-10-003

Count Duration: 60 Min.

Client Project ID: 3756R

Analyzed By : CJM

Client ID	PAI ID	Matrix	H-3 (pCi/l)	MDA
04LA-97-0465•	10-003-01	Water	94• ± 220	350
Blank	10-003-B1	Water	2 ± 210	350
04LA-97-0465	10-003-D1	Water	150 ± 220	350

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.

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PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 2

QC RESULTS SUMMARY

TRITIUM ANALYSIS RESULTS SUMMARY

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/02/97

Client Name: LANL SMO

Date Analyzed: 10/02/97

Lab Sample ID Series: 97-10-003

Count Duration: 60 Min.

Client Project ID: Blank

Analyzed By : CJM

Client ID	PAI ID	Matrix	H-3 (pCi/l)	MDA
Blank	10-003-B1	Water	2 ± 210	350

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.

PARAGON ANALYTICS, INC.
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Section 3

INDIVIDUAL SAMPLE RESULTS

Due to reporting software limitations, individual sample result forms are not available for this test.

Please refer to *Sample Results Summary* for sample results.

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

4

Section 4

RAW DATA

TRITIUM RAW DATA RESULTS SUMMARY 10/03/97

Batch	Sample ID	Rack-Pos	Anal. Volume	Units	Count Eff.	Count Dur.	Sample CPM	Blank CPM	Sample Date	Percent Moisture	Sample Mass	Water Added	Matrix
										N/A	N/A	N/A	
10003H3W.XLS	97-10-003-S1	32- 2	0.0100	liter	0.236	60.00	49.9	9.4	10/02/97	0.0000	0.00	0.00	Water
10003H3W.XLS	97-10-003-B1	32- 3	0.0100	liter	0.236	60.00	9.4	9.4	10/02/97	0.0000	0.00	0.00	Water
10003H3W.XLS	97-10-003-01	32- 4	0.0100	liter	0.236	60.00	9.8	9.4	09/26/97	0.0000	0.00	0.00	Water
10003H3W.XLS	97-10-003-D1	32- 5	0.0100	liter	0.236	60.00	10.1	9.4	09/26/97	0.0000	0.00	0.00	Water
10003H3W.XLS	97-10-003-M1	32- 6	0.0100	liter	0.236	60.00	49.6	9.4	09/26/97	0.0000	0.00	0.00	Water

ID: TRITIUM LS6500 2 OCT 1997 13:24

USER: 9 COMMENT: U09A0202.DBF

PRESET TIME : 60.00

DATA CALC :	CPM	H# :	NO	SAMPLE REPEATS:	1	PRINTER	:EDIT
COUNT BLANK :	NO	IC# :	YES	REPLICATES :	1	RS232	: OFF
TWO PHASE :	NO	AQC :	NO	CYCLE REPEATS :	1	DISK	:EDIT
SCINTILLATOR:	LIQUID	LUMEX:	NO	LOW SAMPLE REJ:	0		
LOW LEVEL :	YES	HALF LIFE CORRECTION DATE:				none	

CHAN: 25.0 - 270.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0
CHAN: 300.0 - 1000.0 %ERROR:20.00 FACTOR: 1.000000 BKG. SUB: 0

SAM NO	POS	TIME MIN	IC#	WIND1 CPM	WIND1 %ERROR	WIND2 CPM	WIND2 %ERROR	LUMEX %	ELAPSED TIME
				97-10-003 -28 $\bar{x}$ = 9.36					
1	32-1	60.00	70.80	9.25	8.49	52.50	3.56	0.67	60.94
2	32-2	60.00	4.759	49.85	3.66	51.88	3.58	1.41	122.13
3	32-3	60.00	49.33	9.37	8.44	49.47	3.67	1.00	183.16
4	32-4	60.00	40.10	9.85	8.23	51.95	3.58	0.20	244.06
5	32-5	60.00	46.09	10.12	8.12	52.82	3.55	0.18	304.95
6	32-6	60.00	4.863	49.58	3.67	52.22	3.57	0.09	365.84

LS6500 Run Log

Date	Sample ID	Count Duration	Rack	Position	Test	User #	File ID	Initials/Comments
9/23/97	97-08-368-[illegible]	100min	52	8	3H	2		BP
↓	↓ 56	↓	↓	9	↓	↓		↓
9/26/97	Daily QC	4,10,10	24	1-3	QC	1		BP
9/26/97	97-09-158-RB1	75min	6	1	3H	2		BP
↓	↓ -RB2	↓	↓	2	↓	↓		↓
↓	↓ -RB3	↓	↓	3	↓	↓		↓
10/2/97	Daily QC	4,10,10	24	1-3	QC	1		[illegible]
10/2/97	97-10-003-RB	60min	32-1	1	3H	9		[illegible]
↓	↓ S1	↓	↓	↓	↓	↓		↓
↓	↓ B1	↓	↓	↓	↓	↓		↓
↓	↓ O1	↓	↓	↓	↓	↓		↓
↓	↓ -D1	↓	↓	↓	↓	↓		↓
↓	↓ -M1	↓	32-6	6	↓	↓		↓
9/26/97	97-09-158-RB4	75 min	6	4	3H	2		CJM late entry 10/3/97
↓	↓ -RB5	↓	↓	5	↓	↓		↓
↓	↓ -RB6	↓	↓	6	↓	↓		↓
↓	↓ -RB7	↓	↓	7	↓	↓		↓
↓	↓ -S1	↓	↓	8	↓	↓		↓
↓	↓ -S2	↓	↓	9	↓	↓		↓
↓	↓ -S3	↓	↓	10	↓	↓		↓
↓	↓ -S4	↓	↓	11	↓	↓		↓
↓	↓ -S5	↓	↓	12	↓	↓		↓
↓	↓ -S6	↓	9	1	↓	↓		↓
↓	↓ -01	↓	↓	2	↓	↓		↓
↓	↓ -02	↓	↓	3	↓	↓		↓
↓	↓ -03	↓	↓	4	↓	↓		↓
↓	↓ -04	↓	↓	5	↓	↓		↓
↓	↓ -05	↓	↓	6	↓	↓		↓
↓	↓ -06	↓	↓	7	↓	↓		↓
↓	↓ -07	↓	↓	8	↓	↓		↓
↓	↓ -08	↓	↓	9	↓	↓		↓
↓	↓ -09	↓	↓	10	↓	↓		↓
↓	↓ -10	↓	↓	11	↓	↓		↓

000014

ID: TRITIUM-LS6000 3 OCT 1997 09:4

USER: 2 COMMENT: WITH LUMEX CORRECTION

PRESET TIME :	0.10						
DATA CALC :	CPM	H#	:YES	SAMPLE REPEATS:	1	PRINTER	: ST
COUNT BLANK :	NO	IC#	: NO	REPLICATES :	1	RS232	: ST
TWO PHASE :	NO	AQC	: NO	CYCLE REPEATS :	1		
SCINTILLATOR:	LIQUID	LUMEX	:YES	LOW SAMPLE REJ:	0		
LOW LEVEL :	YES	HALF LIFE CORRECTION DATE:				none	

CHAN: 25.0 - 270.0 %ERROR: 0.00 FACTOR: 1.000000 BKG. SUB: 0
CHAN: 350.0 - 1000.0 %ERROR: 0.00 FACTOR: 1.000000 BKG. SUB: 0

ALPHA-BETA DISCRIMINATION: NO

SAM NO	POS	TIME MIN	H#	WIND1 CPM	WIND1 %ERROR	WIND2 CPM	WIND2 %ERROR	LUMEX %	ELAPSED TIME
1	32-1	0.10	137.9	0.00	0.00	50.00	89.44	0.37	0.60
2	32-2	0.10	136.5	10.00	200.00	60.00	81.65	0.49	1.27
3	32-3	0.10	137.1	0.00	0.00	30.00	115.47	0.97	1.96
4	32-4	0.10	137.0	40.00	100.00	50.00	89.44	0.73	2.64
5	32-5	0.10	137.2	10.00	200.00	60.00	81.65	0.24	3.34
6	32-6	0.10	136.4	60.00	81.65	50.00	89.44	0.17	4.02

LSC Run Log

Instrument ID: LS 6000

	Date	Sample ID	Count Duration	Rack & Position	Test	User #	File ID	Initials/Comments
1	9-29-97	97-07-217-S1	100min	23 - 11	Pu-241	18		cjm
2	↓	↓ - BA	↓	↓ - 12	↓	↓		↓
3	9-24-97	97-07-217-SA	100min	53 - 1	Pu-241	18		cjm
4	↓	-SB	↓	- 2	↓	↓		↓
5	↓	-SC	↓	- 3	↓	↓		↓
6	10-3-97	Daily QC	10min	62 cjm - 1-3	3H	1		cjm
7	10-3-97	97-B-003 - RB	10 min	32 - 1	3H	2		cjm
8	↓	-S1	↓	- 2	↓	↓		↓
9	↓	-B1	↓	- 3	↓	↓		↓
10	↓	-O1	↓	- 4	↓	↓		↓
11	↓	-D1	↓	- 5	↓	↓		↓
12	↓	-M1	↓	- 6	↓	↓		↓
13	10-3-97	97-09-158 - RB1	10min	6 - 1	3H	10		cjm
14	↓	-RB2	↓	- 2	↓	↓		↓
15	↓	-RB3	↓	- 3	↓	↓		↓
16	↓	-RB4	↓	- 4	↓	↓		↓
17	↓	-RB5	↓	- 5	↓	↓		↓
18	↓	-RB6	↓	- 6	↓	↓		↓
19	↓	-RB7	↓	- 7	↓	↓		↓
20	↓	-S1	↓	- 8	↓	↓		↓
21	↓	-S2	↓	- 9	↓	↓		↓
22	↓	-S3	↓	- 10	↓	↓		↓
23	↓	-S4	↓	- 11	↓	↓		↓
24	↓	-S5	↓	- 12	↓	↓		↓
25	↓	-S6	↓	9 - 1	↓	↓		↓
26	↓	-O1	↓	- 2	↓	↓		↓
27	↓	-O2	↓	- 3	↓	↓		↓
28	↓	-O3	↓	- 4	↓	↓		↓
29	↓	-O4	↓	- 5	↓	↓		↓
30	↓	-O5	↓	- 6	↓	↓		↓

Paragon Analytics, Inc. Reviewed By:_____ Date:_____ FRM 762FC0.XLS (6/30/97)

000016

141557

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 5

5

QUALITY ASSURANCE SUMMARY REPORTS

QUALITY ASSURANCE SUMMARY SHEET

ATI-FC WORKORDER NO. ALL LSC work from 5/1/97 until LS6000TA repairs are complete

Please explain briefly any QA or other problems associated with the analysis of samples. Problems could result from logi-in, matrix, color, odor, dilution, consistency, scheduling, equipment or instrumentation.

Due to problems with the Beckman LS6000TA, a "loaner" LS6500 was obtained from the manufacturer.

The loaner does not have a quench monitor, but the LS6000TA's quench monitor is still functional.

Consequently, samples will be counted for approx 0.1 m. on the LS6000TA only to monitor the quench factor (H#). Samples will then be counted on the LS6500 for 3H data acquisition.

TECHNICIAN/ANALYST Daniel C Burn DATE 5/20/97

RESOURCE MANAGER [illegible] DATE 5/20/97

The purpose of the QA Summary Sheet is to document any problems associated with the analysis of the samples. Documentation of problems will greatly increase the communication from group to group. But more importantly, it will help our Project Managers communicate with our clients.

ATI FM 302FC1
(1/25/95)

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 6

LABORATORY BENCH SHEETS

6

TRITIUM IN WATER

Analyst:KB

Prep. Date:S:10/2/97

Prep. Date:C10/2/97

SOP Used: 700Rev3

Analytical Balance No:13

Pipet for Scintillation Cocktail: T-002

Type of Cocktail: Ultima Gold- LLT

Data File Name W09A0702.DBF

Count Date/Time 10/2/97

PAI -W.O.#	Sample Vol. Vol. (ml)	Distilation Run No.	Distilation Column No.	Final Aliquot (ml)	Rack Number	Rack Position Number	Remarks	
97-10-003-RB	50	NA	NA	10.0	32	1	REAGENT BLANK 10mLs MILLI-Q WATER + 10 mLs COCKTAIL	9.2
97-10-003-S1	50	1	1	10.0	32	2	LCS 7502.6 pCi/L	49.8
97-10-003-B1	50	1	2	10.0	32	3	BLANK	9.4
97-10-003-01	50	1	3	10.0	32	4		9.9
97-10-003-D1	50	1	4	10.0	32	5	DUP OF 97-10-003-01	10.1
97-10-003-M1	50	1	5	10.0	32	6	MATRIX SPIKE OF 97-10-003-01	51.8

* Water added includes the volume of standard added into LCS and Matrix Spike.

* All Samples are UNfiltered

Spike Witness: AC 10/2/97

Spike Std ID	Vol./ml			Pipet ID
445.1284.25	2.0190			C-002

Relinquished by:KB 10/2/97

Received by: SG 10/2/97

Reviewed by: [illegible] 10/2/97

375.1 pCi added

S1 conc. = 7502 pCi/L

rec = 7757/7502 = 103%

000020

SAMPLE CONDITION FORM

METHOD Tritium in water MATRIX Aq EXT. DATE 10-02-97 TECH KB

WORK ORDER #	SAMPLE CONDITION	SAMPLE ODOR
97-10-003-01	light brown milky color pH-neutral	

KB
10-02-97

000021

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 7

STANDARDS TRACEABILITY DOCUMENTS

7

A 4.9037g aliquot of primary std. #445 (tritium 21.9 nCi/g) was weighed into a plastic bottle and diluted to a final solution weight of 429.9g w/DI H_2O.

Calculation

$$21.9\ nCi/g = 21{,}900\ pCi/g \times 4.9037g = 107{,}500.53\ pCi$$

$$\frac{107{,}500.53\ pCi}{429.9\ g} = 250.1\ pCi/g\ (1.0\ mL = 1.0g)$$

6/3/92

Verified 4/11/97 DCB

Continued on Page

Read and Understood By

Signed 4/11/97 Date

Signed 4/11/97 Date

Standard Verification
H3:Std.445.1284.25
Expected activity 190.63 pCi/ml on 3/26/97

Three 10 ml aliquots were put into LSC vials w/ 10 ml UG-LLT cocktail.

Sample ID	Activity (pCi/ml)	spike vol (ml)	count cpm	avg. bkg.	det eff
97-15-115-S1	187.89 +/- 16.16	10	1007.42	10.50	0.2390
97-15-115-S2	187.05 +/- 16.11	10	1002.93	10.50	0.2390
97-15-115-S3	187.08 +/- 16.11	10	1003.13	10.50	0.2390
97-15-115-B1			10.40		
97-15-115-B2			10.52		
97-15-115-B3			10.58		

Average act. 187.34 +/- 16.13 Decay Date: 03/26/97
= 98.27% of known

Std #	Nuclide	Initial act (pCi/ml)	Cal date	Half-life(yrs)	Current act (pCi/ml)	Current act (dpm/ml)
445..25	H-3	250.10	06/03/92	12.28	190.63	423.20

000024

Paragon IO 445
rec'd 3-03-97

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory-Las Vegas
Nuclear Radiation Assessment Division

Calibration Certificate

Description

Principal radionuclide: Tritium (H-3) Half-life: 12.43 years

Nominal activity: 110 nanocuries

Nominal volume: 5 ml in ampoule/bottle number: 2606-1

Measurement Activity of principal radionuclide

Activity per gram of this solution

21.9 nanocuries of Tritium

at 0400 hours PST on June 3, 1992

Activity of daughter radionuclide

The principal activity was accompanied at the quoted time by

[illegible] curies Per gram

of the daughter nuclide [illegible]

Total mass of this solution

[illegible] 5.0 grams

Method of measurement

The activity of the primary solution and this dilution were measured by liquid scintillation counting.

Counting efficiencies for both standardizations were determined by counting solutions directly traceable to the National Institute of Standards & Technology (NIST).

Useful Life

This radionuclide has decayed through 0.0 half lives since it was contained by EMSL-LV

We recommend that this solution should not be used after December 1999

000025

Purity

The manufacturer states that activities other than that of the principal nuclide and of its daughter nuclides, if any, were estimated/known to be:

(1) none	less than equal to	%	of the principal activity
(2)	less than equal to	%	of the principal activity
(3)	less than equal to	%	of the principal activity

The activity of impurity (1) is not (2) is not (3) is not included in the quoted figures of the principal activity.

Random Errors

The precision of this standard was such that the certified value of the radioactive concentration of the principal activity had a standard error (sm) not greater than ± 0.4 %

(The 99.7% confidence limits are given by t(sm) where t is obtained from the student t factor for the degree of freedom (n-1)).

The maximum uncertainty due to the assessable systematic errors (dilution, counting, and known uncertainty of the standard) is obtained by the separate arithmetic summation of the positive and negative systematic error (+ δ − δ'). These have been estimated not to exceed

- 2.9 % or - 2.9 %

the overall uncertainty (often called accuracy) is an estimate of the possible divergence of the quoted result from the true value. It is a combination of random error [t(sm)] at the 99.7% confidence limits and the worst case estimate of the systematic errors (+ δ , − δ')
The overall uncertainty is therefore calculated on the basis of + [t(sm) + δ] , − [t(sm) − δ]

and is - 4.2 % - 4.2 % of the quoted radioactive concentration

Decay Schemes

This standardization is based on the following assumptions of the principle nuclide, its daughter nuclides and impurities (no allowance for error in these assumptions or the assumption of quoted half-life have been included in the statement of accuracy above).

Tritium decays 100 percent by beta emission. The maximum energy is 18.6 Kev, the average is 5.68 Kev.

Chemical Composition of Solution

Carrier content per gram of solution:

100 percent H_2O

Other components:

Barium less than 0.004 percent
Lead less than 3×10^{-5} percent

Preservative:

Remarks

Date Certificate Prepared June 17, 1999

000026

U.S. DEPARTMENT OF COMMERCE
National Institute of Standards & Technology
Gaithersburg, MD 20899

Paragon ID 445
rec'd 3-03-97

REPORT OF TRACEABILITY

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory
Las Vegas, Nevada

Radionuclide	Hydrogen-3
Source identification	2606-1, prepared by EMSL
Source description	Liquid in 5-mL flame-sealed glass ampoule
Source mass	Approximately 5.0 grams
Source composition	Hydrogen-3 in water
Reference time	0700 EST June 3, 1992

	NIST DATA	EMSL DATA
Radioactivity concentration	810.5 Bq g^{-1}	810.3 Bq g^{-1}
Expanded uncertainty	0.64 percent [1,2]*	4.3 percent [3]
Photon-emitting impurities	None observed [4]	None observed
Measuring instrument	$4\pi\beta$ liquid-scintillation counters calibrated with SRM 4926D	Liquid-scintillation counting
Half life	12.43 ± 0.05 years [5]	
Difference from NIST		-0.05 percent [6]

For the Director,

J.M. Robin Hutchinson, Acting Group Leader
Radioactivity Group
Physics Laboratory

Gaithersburg, MD 20899
January 1994

*Notes on next page

NOTES

(1) The uncertainty analysis methodology and nomenclature used for the reported uncertainties are based on uniform NIST guidelines and are compatible with those adopted by the principal international metrology standardization bodies [cf., B.N. Taylor and C.E. Kuyatt, *NIST Technical Note 1129* (1993)].

(2) The combined standard uncertainty, u_c = 0.32 percent, is the quadratic combination of the standard deviation (or standard deviation of the mean where appropriate), or approximations thereof, for the following component uncertainties:

a)	11 liquid-scintillation measurements on each of 4 vials	0.11 percent
b)	gravimetric	0.05 percent
c)	calibration of SRM 4926D	0.29 percent
d)	background	0.00 percent
e)	half life	0.03 percent

The expanded uncertainty, U = 0.64 percent, is obtained by multiplying u_c by a coverage factor of k = 2 and is assumed to provide an uncertainty interval of at least 95% confidence.

(3) Overall uncertainty reported by EMSL.

(4) The limit of detection for photon-emitting impurities is:

$$0.08\ \gamma\ s^{-1}g^{-1} \text{ for energies between 90 and 2700 keV.}$$

(5) Unterweger, M.P., Coursey, B.M., Schima, F.J., and Mann, W.B., Int. J. Appl. Radiat. Isot., 31, 611 (1980).

(6) This result demonstrates the traceability of EMSL to NIST, for this measurement, to within five percent as specified in the appendix, Traceability Studies, of the EPA-NIST interagency agreement of April 1976, as amended.

For further information call Larry Lucas at 301-975-5546 or Jeffrey Cessna at 301-975-5539.

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 8

CHAIN OF CUSTODY

8

Tuesday, September 30, 1997

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 3756RC

REQUEST NUMBER: 3756R
ANALYSIS TYPE: RAD

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

97.10.003

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-97-0465	01	500 ml poly	LH3 01

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 3756R Page 1

Relinquished By:	Date	Time	Received By:	Date	Time
John Kemp / John Kemp (PRINTED NAME / SIGNATURE)	9/30/97	1:30	FDX (PRINTED NAME / SIGNATURE)		
FDX (PRINTED NAME / SIGNATURE)			[illegible] (PRINTED NAME / SIGNATURE)	10/1/97	1000
PRINTED NAME / SIGNATURE			PRINTED NAME / SIGNATURE		

Received for DISPOSAL By:	Date	Time
PRINTED NAME / SIGNATURE		

Remarks:

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 9

ADDITIONAL SUPPORTING DOCUMENTATION

9

Liquid ScintillationCounter

Instrument Calibration

Initial Efficiency Calibration
Standards Traceability

LS6500 BACKGROUND DETERMINATION

REAGENT BLANK; New Cocktail; Water Added

Reagent Blanks consist of 10ml Ultima Gold Cocktail and "dead" water.
Instrument background for reporting purposes is determined by the average of the most recent 20 reagent blank counts.
Control limits (3 sigma) are derived from the first 30 data points.
Interim control limits and instrument backgrounds are from 05/11/97 - 05/14/97 data until sufficient data is acquired.
As of 07/05/97 the intrument background will be determined by the average of the last 7 reagent blanks. This will permit the "rolling mean" to better track short term variations in the instrument background.

Date	ID	CPM	In Control?	Running Mean
09/17/97	97-08-241-RB	9.20	OK	9.87
09/18/97	97-08-202-RB	10.06	OK	9.79
Reset mean & control limits from 5/11/97 to present. DCB 9/24/97				
09/19/97	97-08-283-RB	8.65	OK	9.63
09/22/97	97-08-022-RB	8.68	OK	9.46
10/02/97	97-10-003-RB	9.25	OK	9.36

r:\inst\lsc6500\eff_h3.xls

Tritium Efficiency Calibration

8/14/97
Beckman LS 6500
H# from LS6000

Known Activity of Std. 405.0921.88

574.54 dpm/ml as of	6/3/92	
1/2 life =	12.43	yrs.
current activity =	430.00	dpm/ml
volume =	5.0448	ml
Average Spike Activity =	2169.27	dpm

Sample ID	WIND1 cpm	WIND2 cpm	%LUMEX	H# (from LS6000)	
97-17-107-RB1	10.27	54.25	0.03	141.7	
97-17-107-RB2	10.22	51.40	0.03	141.9	
97-17-107-RB3	9.58	52.85	0.03	143.1	
97-17-107-RB4	10.65	54.65	2.00	142.8	
97-17-107-RB5	9.80	52.43	0.03	142.9	
97-17-107-S1	523.34	61.20	0.00	142.7	
97-17-107-S2	519.12	59.53	0.00	143.1	
97-17-107-S3	530.66	58.89	0.00	142.6	
97-17-107-S4	526.95	54.58	0.00	142.2	
97-17-107-S5	506.94	60.35	0.00	142.3	
		56.01	0.21	142.53	averages

average LCS=	521.40
average bkg=	10.10
net cpm=	511.30
/known dpm=	2169.27
efficiency=	0.2357

WIND2 cpm*	%LUMEX	H# (from LS6000)	
57.12	5.00	157.53	UCL
49.11	0.00	127.53	LCL
See Tech. Mgr.	See Tech. Mgr.	Std. Addition	Corrective Action

*For low level samples. If WIND2 cpm > UCL use linear function

WIND2 cpm=0.0111(WIND1 cpm)+53.12

Calculated WIND2 cpm should be within 5% of actual value.

PJB 8/22/97

TRITIUM IN WATER

Analyst:BP

Prep. Date:S:5/12/97

Prep. Date:C:5/12/97

SOP Used: 700Rev3

Pipet for Scintillation Cocktail: T-002

Pipet for 5 mL Aliquot: B-14

Type of Cocktail: Ultima Gold- LLT

Data File Name

Count Date/Time

PAI -W.O.#	Sample Vol. Vol. (ml)	Final Aliquot (ml)	Rack Number	Rack Position Number	Remarks
97-17-107-RB1	NA	10			REAGENT BLANK 10mLs MILLI-Q WATER + 10 mLs COCKTAIL
97-17-107-RB2	NA	10			REAGENT BLANK 10mLs MILLI-Q WATER + 10 mLs COCKTAIL
97-17-107-RB3	NA	10			REAGENT BLANK 10mLs MILLI-Q WATER + 10 mLs COCKTAIL
97-17-107-RB4	NA	10			REAGENT BLANK 10mLs MILLI-Q WATER + 10 mLs COCKTAIL
97-17-107-RB5	NA	10			REAGENT BLANK 10mLs MILLI-Q WATER + 10 mLs COCKTAIL
97-17-107-S1	NA	10			BLANK SPIKE
97-17-107-S2	NA	10			BLANK SPIKE
97-17-107-S3	NA	10			BLANK SPIKE
97-17-107-S4	NA	10			BLANK SPIKE
97-17-107-S5	NA	10			BLANK SPIKE

* 5ML of standard, that was spiked into blank spike, is added to the total volume of blank spike.

Spike Std ID	Vol./ml	Pipet ID
4050921.88	5.0448	B-14

Relinquished by:BP 5/12/97

Received by: RG 5/12/97

Reviewed by:BP 5/12/97

000035

A 3.8664 g aliquot of primary std #405 (tritium, 21.9 nCi/g) was weighed into a plastic bottle and diluted to a final solution weight of 327.2 g with DI H_2O.

Calculations

$$\frac{21.9\ nCi}{g} = \frac{21{,}900\ pCi}{g} \times 3.8664\ g = 84{,}674\ pCi$$

$$\frac{84{,}674\ pCi}{327.2\ g} = \frac{258.8\ pCi}{mL} \pm 11.1 \quad (1.0\ mL = 1.0\ g)$$

Calibration Date : 6-3-92

Half Life : 12.43 years

Exp Date : Dec. 1999

Continued on Page

Read and Understood By

Robert Thomp 9-6-96 Signed Date

Robert Thomp 9/27/96 Signed Date

rec'd 9-04-96

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory-Las Vegas
Nuclear Radiation Assessment Division

Calibration Certificate

Description

Principal radionuclide: Tritium (H-3) Half-life: 12.43 years

Nominal activity: 110 nano curies

Nominal volume: 5 ml in ampoule/bottle number: 2606-1

Measurement Activity of principal radionuclide

Activity per gram of this solution

21.9 nano curies of Tritium

at 0400 hours PST on June 3, 1992

Activity of daughter radionuclide

The principal activity was accompanied at the quoted time by

curies Per gram

of the daughter nuclide

Total mass of this solution

APPROX. 5.0 grams

Method of measurement

The activity of the primary solution and this dilution were measured by liquid scintillation counting.

Counting efficiencies for both standardizations were determined by counting solutions directly traceable to the National Institute of Standards & Technology (NIST).

Useful Life

This radionuclide has decayed through 0.0 half lives since it was obtained by EMSL-LV

We recommend that this solution should not be used after December 1999

Purity

The manufacturer states that activities other than that of the principal nuclide and of its daughter nuclides, if any, were estimated/known to be:

(1) none	less than equal to	%	of the principal activity
(2)	less than equal to	%	of the principal activity
(3)	less than equal to	%	of the principal activity

The activity of impurity (1) is not (2) is not (3) is not included in the quoted figures of the principal activity.

Random Errors

The precision of this standard was such that the certified value of the radioactive concentration of the principal activity had a standard error (sm) not greater than ± 0.4 %

(The 99.7% confidence limits are given by t(sm) where t is obtained from the student t factor for the degree of freedom (n-1)).

The maximum uncertainty due to the assessable systematic errors (dilution, counting, and known uncertainty of the standard) is obtained by the separate arithmetic summation of the positive and negative systematic error ($+\delta$ $-\delta'$). These have been estimated not to exceed

- 2.9 % or - 2.9 %

the overall uncertainty (often called accuracy) is an estimate of the possible divergence of the quoted result from the true value. It is a combination of random error [t(sm)] at the 99.7% confidence limits and the worst case estimate of the systematic errors ($+\delta$, $-\delta'$)
The overall uncertainty is therefore calculated on the basis of + [t(sm) $+\delta$], - [t(sm) $+\delta$]
and is - 4.3 %, - 4.3 % of the quoted radioactive concentration.

Decay Schemes

This standardization is based on the following assumptions of the principle nuclide, its daughter nuclides and impurities (no allowance for error in these assumptions or the assumption of quoted half-life have been included in the statement of accuracy above).

Tritium decays 100 percent by beta emission. The maximum energy is 18.6 Kev, the average is 5.68 Kev.

Chemical Composition of Solution

Carrier content per gram of solution:

100 percent H_2O

Other components:

Barium less than 0.004 percent
Lead less than 3×10^{-5} percent

Preservative:

Remarks

Date Certificate Prepared June 17, 1992

[illegible]

U.S. DEPARTMENT OF COMMERCE
National Institute of Standards & Technology
Gaithersburg, MD 20899

recd 4-04-96

REPORT OF TRACEABILITY

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory
Las Vegas, Nevada

Radionuclide	Hydrogen-3
Source identification	2606-1, prepared by EMSL
Source description	Liquid in 5-mL flame-sealed glass ampoule
Source mass	Approximately 5.0 grams
Source composition	Hydrogen-3 in water
Reference time	0700 EST June 3, 1993

	NIST DATA	EMSL DATA
Radioactivity concentration	810.5 Bq g^{-1}	810.3 Bq g^{-1}
Expanded uncertainty	0.64 percent [1,2]*	4.3 percent [3]
Photon-emitting impurities	None observed [4]	None observed
Measuring instrument	$4\pi\beta$ liquid-scintillation counters calibrated with SRM 4926D	Liquid-scintillation counting
Half life	12.43 ± 0.05 years [5]	
Difference from NIST		-0.05 percent [6]

For the Director,

J.M. Robin Hutchinson, Acting Group Leader
Radioactivity Group
Physics Laboratory

Gaithersburg, MD 20899
January 1994

*Notes on next page

NOTES

(1) The [illegible] methodology and nomenclature used for the reported uncertainties are based on uniform NIST guidelines and are compatible with those adopted by the principal international metrology standardization bodies [cf., B.N. Taylor and C.E. Kuyatt, *NIST Technical Note 1129* (1993)].

(2) The combined standard uncertainty, u_c = 0.32 percent, is the quadratic combination of the standard deviation (or standard deviation of the mean where appropriate), or approximations thereof, for the following component uncertainties:

a)	11 liquid-scintillation measurements on each of 4 vials	0.11 percent
b)	gravimetric	0.05 percent
c)	calibration of SRM 4926D	0.29 percent
d)	background	0.00 percent
e)	half life	0.03 percent

The expanded uncertainty, U = 0.64 percent, is obtained by multiplying u_c by a coverage factor of k = 2 and is assumed to provide an uncertainty interval of at least 95% confidence.

(3) Overall uncertainty reported by EMSL.

(4) The limit of detection for photon-emitting impurities is:

$$0.08\ \gamma\ s^{-1}g^{-1} \text{ for energies between 90 and 2700 keV.}$$

(5) Unterweger, M.P., Coursey, B.M., Schima, F.J., and Mann, W.B., Int. J. Appl. Radiat. Isot., 31, 611 (1980).

(6) This result demonstrates the traceability of EMSL to NIST, for this measurement, to within five percent as specified in the appendix, Traceability Studies, of the EPA-NIST interagency agreement of April 1976, as amended.

For further information call Larry Lucas at 301-975-5546 or Jeffrey Cessna at 301-975-5539.

Liquid ScintillationCounter

Quality Control Data

Daily Instrument Performance Checks

DAILY INSTRUMENT PERFORMANCE CHECKS - LS6500

Daily IPCs consist of the following standards;

Efficiency Check -

Beckman Tritium Standard	Beckman C-14 Standard	Beckman Background Vial
Lot HHU0203	Lot CHU1812	Lot BHU0705
99600 dpm	100600 dpm	03/22/97 REF
03/22/97 REF	03/22/97 REF	03/22/02 EXP
03/22/02 EXP	03/22/02 EXP	
REPLACED 05/19/97		
Lot HFG1311		
101186 dpm		
04/23/93 REF		
04/23/98 EXP		

OK=Passes 3sig control limits

OKQ=Passes QAP limits of +/- 10%.

Obs	Date	H-3 CPM		C-14 CPM		Bkg CPM		Decay Corrected H-CPM	H-UCL	H-LCL	C-UCL	C-LCL	B-UCL	B-LCL
93	9/16/97	39768.40	OK	13560.31	OKQ	11.90	OK	50955.85	55828.65	45677.98	15527.33	14214.76	17.02	9.52
94	9/17/97	40237.01	OK	13320.01	FAIL	11.60	OK	51564.24	55828.65	45677.98	15527.33	14214.76	17.02	9.52
95	9/18/97	39943.21	OK	13063.81	FAIL	12.40	OK	51195.63	55828.65	45677.98	15527.33	14214.76	17.02	9.52
96	9/19/97	39159.77	OK	12912.71	FAIL	11.90	OK	50199.23	55828.65	45677.98	15527.33	14214.76	17.02	9.52
97	9/22/97	40420.51	OK	13034.81	FAIL	11.80	OK	51839.37	55828.65	45677.98	15527.33	14214.76	17.02	9.52
98	9/23/97	39892.60	OK	13154.91	FAIL	12.90	OK	51170.22	55828.65	45677.98	15527.33	14214.76	17.02	9.52
99	9/26/97	40327.01	OK	13080.11	FAIL	12.80	OK	51751.38	55828.65	45677.98	15527.33	14214.76	17.02	9.52
100	10/2/97	40489.01	OK	12966.61	FAIL	11.30	OK	52007.38	55828.65	45677.98	15527.33	14214.76	17.02	9.52

Tuesday, September 30, 1997

REQUEST NUMBER: 3756R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

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

97-10-003

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 9/30/97
REPORT DUE: 10/29/97
TURN AROUND REQ'D: 30 day

These samples are on:

LANL Request Number: 3756R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Not Received
COMMENTS: LA - 1049 , AP;

LANL ER SMO CONTACT: JOHN KEMP MS H865 505665-9968
Signature: Jerlene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
LH3		04LA-97-0465	01	W	9/26/97	

Final Page of REQUEST NUMBER 3756R

Tuesday, September 30, 1997

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 3756RC

REQUEST NUMBER: 3756R
ANALYSIS TYPE: RAD

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

97-10-003

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-97-0465	01	500 ml poly	LH3 01

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 3756R

Relinquished By:		Date	Time
John Kemp (PRINTED NAME)	John Kemp (SIGNATURE)	9/30/97	1:30
FDX (PRINTED NAME)	(SIGNATURE)		
(PRINTED NAME)	(SIGNATURE)		

Received By:		Date	Time
FDX (PRINTED NAME)	(SIGNATURE)		
(PRINTED NAME)	(SIGNATURE)	10/1/97	1000
(PRINTED NAME)	(SIGNATURE)		

Received for DISPOSAL By:		Date	Time
(PRINTED NAME)	(SIGNATURE)		

Remarks:

Paragon Analytics, Inc. - Fort Collins, Colorado

CONDITION OF SAMPLE UPON RECEIPT

CLIENT: LANL SHIPPING CONTAINER #: Cooler

WORKORDER NO. 97-10-003 INITIALS: DA DATE: 10/1/97

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

Describe "NO" items (except No's 1, 13, &14):_____

Was the client contacted? Yes____ No____

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

Describe actions taken or client instructions:_____

Group Leader's Signature:_____ Date:_____

Cooler Temperature: 0°C

FRM 201FC7 (30/7/97)

Tuesday, October 07, 1997

Los Alamos
NATIONAL LABORATORY

DATA ENTERED

110397 M

REQUEST NUMBER: 3779R
ANALYSIS TYPE: OTHER

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

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: 3779R
Per Agreement Number:
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; PO # G5004

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-97-0481	01	W	10/6/97	

Tuesday, October 07, 1997

REQUEST NUMBER: 3779R
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:

SHIP DATE: 10/7/97
REPORT DUE: 10/10/97
TURN AROUND REQ'D: 1 day

These samples are on:

LANL Request Number: 3779R
Per Agreement Number:
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP; PO # G5004

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-97-0481	01	W	10/6/97	

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

October 20, 1997

Lab. No. 24029701

SIX FOLD DISSOLVED ORGANIC CARBON
FRACTIONATION RESULTS

Sample	04LA-97-0481 1	
Conductivity (microsiemens/cm2)	235	
pH	7.7	
Dissolved organic carbon (MG/L)	6.2	
Hydrophobics Total (MG/L)	3.9	(63)
bases	0.1	(2)
acids	1.8	(29)
neutrals	2.0	(32)
Hydrophilics Total (MG/L)	2.3	(37)
bases	0.1	(2)
acids	1.4	(23)
neutrals	0.8	(13)

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

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Quality Analytical Services Since 1936
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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

October 20, 1997

Lab. No. 2402971D

SIX FOLD DISSOLVED ORGANIC CARBON
FRACTIONATION RESULTS

Sample	04LA-97-0481 1	
Conductivity (microsiemens/cm2)	235	
pH	7.7	
Dissolved organic carbon (MG/L)	6.2	
Hydrophobics Total (MG/L)	3.6	(58)
bases	0.1	(2)
acids	1.6	(26)
neutrals	1.9	(31)
Hydrophilics Total (MG/L)	2.6	(42)
bases	0.3	(5)
acids	1.4	(23)
neutrals	0.9	(15)

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

Rec'd on 11/22/97 from SMO R'

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LABORATORIES, INC.
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Phone: (303) 278-4455 • FAX: (303) 278-7012

3779R
rec'd 10-23

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

October 20, 1997

Lab. No. 240297ST

SIX FOLD DISSOLVED ORGANIC CARBON
FRACTIONATION RESULTS

Sample	SURROGATE STANDARD		
Conductivity (microsiemens/cm2)	12		
pH	7.5		
Dissolved organic carbon (MG/L)	8.6		
Hydrophobics			
Total (MG/L)	3.3	(38)	
bases	0.0	(--)	
acids	2.6	(30)	BENZOIC ACID 91% RECOVERY
neutrals	0.7	(8)	
Hydrophilics			
Total (MG/L)	5.3	(62)	
bases	0.1	(1)	
acids	2.4	(28)	ACETIC ACID 88% RECOVERY
neutrals	2.8	(33)	METHANOL 88% RECOVERY

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

Tuesday, October 07, 1997

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 3779RC

REQUEST NUMBER: 3779R
ANALYSIS TYPE: OTHER

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

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-97-0481	01	1 L amber glass	HUMACID

Relinquished By:		Date	Time
John Kemp (PRINTED NAME)	(SIGNATURE)	10/7/97	1:30
PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE		

Received By:		Date	Time
MARY DUNLAP (PRINTED NAME)	(SIGNATURE)	10/8/97	10:00
PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE		

Received for DISPOSAL By:		Date	Time
PRINTED NAME	SIGNATURE		

Remarks:

HUFFMAN LABORATORIES, INC.
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4630 Indiana Street · Golden, CO 80403

ANALYSIS: SIX FOLD DOC FRACTIONATION	HUFFMAN LAB NO: STd
PROCEDURE: USGS/WRI 79-4	pH: 7.53 METER: Orion 611
CUSTOMER:	CONDUCTIVITY: 12.42 µMHOS
CUSTOMER'S SAMPLE NO:	METER: Fisher C9-326-2
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	8.56	8.61				
	8.65					
B. HCL	0.454	.43	V3/V1			
x2 0.257	.45					
C. NACH		17.16	V4/V1			
x10 1.88	16.0					
x4 4.35	17.16					
D. XAD	4.48	4.95	V2/V1			
x2 2.53	4.95					
E. CATION	4.44	4.90	V2/V1			
x2 2.49	4.90					
F. ANION	2.77	2.77	V2/V1			
x2 1.37	2.66					

VOLUME FRACTIONATED	V1	170	DILUTED TO VOLUME	V2	192
VOLUME HCL	V3	25.4	VOLUME NACH	V1	27.8

COLUMN BLANKS:	XAD	0.213 MG/L C	CATION	0.230 MG/L C	ANION	0.244 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 Mix

	mg	mg/L
Benzoic	~~2.87~~ 4.174 mg	2.87
Acetic	6.836	2.73
Methanol	8.517	3.19
		8.79 mg/L

used diluted x10 & other values. Should probably ignore low for unknown reason

ANALYST Bonnie Christy	DATE 10-15-97	REVIEWED SH	DATE 10-2-97

9/22/92

2

HUFFMAN LABORATORIES, INC.
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ANALYSIS: SIX FOLD DOC FRACTIONATION	HUFFMAN LAB NO: OI
PROCEDURE: USGS/NRI 79-4	pH: 5.97 METER: Orion 611
CUSTOMER:	CONDUCTIVITY: 0.43 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	0.146	.13				
	0.115					
B. HCL	0.299	.30	V3/V1			
x 2 0.174	.27					
C. NAOH	~~0.4 pc~~	.59	V4/V1			
x 10 0.421	3.4					
x 4 0.283	.89					
D. XAD	0.269	.27	V2/V1			
x2 0.186	.29					
E. CATION	0.258	.26	V2/V1			
X 2 0.169	.25					
F. ANION	0.296	.30	V2/V1			
x 2 0.218	.35					

VOLUME FRACTIONATED	V1	158	DILUTED TO VOLUME	V2	180
VOLUME HCL	V3	25	VOLUME NACH	V1	25.8

COLUMN BLANKS:	LAD	0.231 MG/L C	CATION	0.237 MG/L C	ANION	0.546 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: Ongoing OI - .05

Blank .05, .2, .3, .3, .3

ANALYST [illegible]	DATE 10-15-97	REVIEWED EH	DATE 10-20-97

9/22/92

HUFFMAN LABORATORIES, INC.
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ANALYSIS: SIX FOLD DOC FRACTIONATION	HUFFMAN LAB NO: 2462-01
PROCEDURE: USGS/WRI 79-4	pH: 7.63 METER: Orion 611
CUSTOMER: Fallon	CONDUCTIVITY: 235 µMHOS
CUSTOMER'S SAMPLE NO: 1-41A-97-0451 1	METER: Fisher 09-326-2
SAMPLE DILUTION: Z	SCREEN DOC: 6.5

SAMPLE	DOC	AVERAGE	DILUTION FACTOR (ROUND TO NEAREST 0.1)	DETERMINED MG/L C	BLANK MG/L C	RESULT MG/L C
A. INITIAL	6.18	6.19				
	6.20					
B. HCL	0.843	.84	V3/V1			
X2 0.407	.73					
C. NACH		12.55	V4/V1			
X10 1.17	10.9					
X4 3.25	12.55					
D. XAD	~~2.25~~ DC		V2/V1			
	2.01	~~2.00~~ EH				
1.18 X2 ~~1.37~~ DC	2.28	2.25				
E. CATION	1.90	~~1.90~~ EH	V2/V1			
X2 1.15	~~2.22~~	2.22				
F. ANION	1.01	1.01	V2/V1			
X2 0.525	.97					

VOLUME FRACTIONATED	V1	16C	DILUTED TO VOLUME	V2	18C
VOLUME HCL	V3	25	VOLUME NACH	V1	25.4

COLUMN BLANKS:	IAD	0.181	MG/L C	CATION	0.337 MG/L C	ANION	0.244 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 Oliveira	DATE 10-15-97	REVIEWED [illegible]	DATE 10-20-97

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. 2402-01 Dup
PROCEDURE: USGS/WRI 79-4	pH: 7.65 METER: Cole-Parmer 611
CUSTOMER: Lisa Kramer	CONDUCTIVITY: 235 µMHOS
CUSTOMER'S SAMPLE NO: 041A-97-0415 11	METER: Brinkman 69 3262
SAMPLE DILUTION: 6	SCREEN DOC: 6.8

SAMPLE	DOC	AVERAGE	DILUTION FACTOR (ROUND TO NEAREST 0.1)	DETERMINED MG/L C	BLANK MG/L C	RESULT MG/L C
A. INITIAL	6.20	6.20				
	6.19					
B. HCL	0.224	.72	V3/V1			
X2 0.339	.59					
C. NAOH		11.04	V4/V1			
X10 1.55	14.7					
X4 2.82	11.04					
D. XAD	2.25	~~2.25~~ 2.60	V2/V1			
		2.60				
X2 1.37	2.66					
E. CATION	1.98	1.95	V2/V1			
		2.32				
X2 1.20	2.32					
F. ANION	1.07	1.07	V2/V1			
X2 0.519	.95					

VOLUME FRACTIONATED	V1	160	DILUTED TO VOLUME	V2	180
VOLUME HCL	V3	25.2	VOLUME NAOH	V1	26

COLUMN BLANKS:	XAD	0.200 MG/L C	CATION	0.290 MG/L C	ANION	0.154 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: used calculated x ADF factor values

ANALYST Bonnie Rhoades	DATE 10-15-97	REVIEWED [illegible]	DATE 10-20-97

9/22/92

(5)

HUFFMAN
LABORATORIES, INC.
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4630 Indiana Street • Golden, CO 80403

.5 + 1 mg/L STd BN99 Prep 10-15-97

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: 9.0 BN= 461	100 mg/L stock Solution BN= 99
☑ ~~KHP~~ ☐ Benzoic Acid ☐ _____	☐ KHP ☑ ~~Benzoic Acid~~ ☐ _____	☑ ~~KHP~~ ☑ ~~Benzoic Acid~~ ☐ BN= 461
prep date 10-15-97	prep date ~~9-30-97 BC~~ 10-15-97	prep date 9-30-97 both

		Sample #	Dilution	Loop Size 5.05	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
13	12	Cal run					559.4 mV		
14	13	Cal run					560.4 mV		
15	14	Cal run					560.3 mV		
16	15	Cal run					557.9 mV		
17	16	Cal run					556.4 mV		
18	17	Cal run					555.8 mV		
19	18	5ppm KHP				4.9833			
20	19	5ppm KHP				5.1394			
21	20	9ppm Benzoic				9.12269			
22	21	9ppm Benzoic				8.98388			
23	22	DI				0.04328			
24	23	DI				0.08506			
25	24	.5ppm KHP				0.55037			
26	25	.5ppm KHP				0.54564			
27	26	DI				0.08257			
28	27	DI				0.09783			
29	28	DI In				0.14576			
30	29	DI In				0.11492			
31	30	STd In				8.55722			
32	31	STd In				8.64736			
33	32	2097-03 In				6.26874			
34	33	2097-03 In				6.24698			
35	34	24-02-01 In				6.18427 ~~6.19655~~			
36	35	2402-01 In ~~24-02-0~~				6.19655			

Analyst	Date	Reviewed	Date	Page
B Christy	10-15-97	SH	10-20-97	1 of 5

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 10-15-97
1 mg/L STD BN99 10-15-97

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 10-15-97	prep date 10-15-97	prep date 9-30-97 Kolb

	Sample #	Dilution	Loop Size 5.05	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
37	2482-01 In Dup				6.20123			
38	240201 In D Dup				6.19245 ~~5.23284~~			
39	5 ppm KHP				5.23284 ~~6.12703~~			
40	DI				0.12703			
41	An B1 1				0.54564			
42	An B1 2				0.24433			
43	An B1 3				3.56835			
44	An B1 4				0.24407			
45	An B1 5				0.19373			
46	Cat B1 1				0.23655			
47	Cat B1 2				0.22981			
48	Cat B1 3			DC 10.15	~~0.33727~~	0.85561		
49	Cat B1 4			DC 10.15	~~0.29029~~	0.33727		
50	Cat B1 5				0.29029			
51	1 ppm				0.99093			
52	DI				0.08707			
53	Xa D B1 1				0.23085			
54	Xa D B1 2				0.21251			
55	Xa D B1 3				0.21276			
56	Xa D B1 4				0.18117			
57	Xa D B1 5				0.20015			
58	.5 ppm				0.54286			
59	DI				0.05491			
60	DI H_2SO_4	x 2			0.17453			

Analyst B Christy	Date 10-15-97	Reviewed [illegible]	Date 10-20-97	Page 2 of 5

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

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+1 ~~ppm~~/L Stds BN99 Prep 10-15-97

5 mg/L Std: BN= 99	10 mg/L Std: BN= 461	100 mg/L stock Solution BN= 99
☑ KHP ☐ Benzoic Acid ☐ _____	☐ KHP ☑ Benzoic Acid ☐ _____	☐ KHP ☑ Benzoic Acid ☐ BN= 461
prep date 10-15-97	prep date 10-15-97	prep date 9-30-97

	Sample #	Dilution	Loop Size 5.05	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
61	DI H_2SO_4				0.29922			
62	STd H_2SO_4	x2			0.25708			
63	STd H_2SO_4				0.43413			
64	2097-03 H_2SO_4	x2			0.21508			
65	2097-03 H_2SO_4				0.37030			
66	2402-01 H_2SO_4	x2			0.40736			
67	2402-01 H_2SO_4				0.84346			
68	2402-01D H_2SO_4	x2			0.33886			
69	2402-01D H_2SO_4				0.72360			
70	1 ppm				1.03655			
71	DI				0.07707			
72	DI An	x2			0.21818			
73	DI An				0.29659			
74	STd An ~~2402~~	x2			1.37033			
75	STd An				2.76900			
76	2097-03 An	x2			0.37940			
77	2097-03 An				0.65223			
78	2402-01 An	x2			0.52456			
79	2402-01 An				1.01446			
80	2402-01D An	x2			0.51875			
81	2402-01D An				1.06647			
82	1 ppm				1.02335 ~~1.023335~~			
83	DI				0.06188			
84	DI Cat	x2			0.16968			

Analyst B Clausty	Date 10-15-97	Reviewed EH	Date 10-20-97	Page 5 of 5

rev. 0.0 10/6/95

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

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 + 1 mg/L Stds BN 99 Prep 10-15-97

5 mg/L Std: BN= 99	10 mg/L Std: BN= 461	100 mg/L stock Solution BN= 99
☑ KHP ☐ Benzoic Acid ☐ _____	☐ KHP ☑ Benzoic Acid ☐ _____	☑ KHP ☑ Benzoic Acid ☐ BN= 461
prep date 10-15-97	prep date 10-15-97	prep date 9-30-97

	Sample #	Dilution	Loop Size 5.0 S	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
85	DI Cat				0.25812			
86	STd Cat	x2			2.49466			
87	STd Cat				4.43618			
88	2097-03 Cat	x2			1.10309			
89	2097-03 Cat				1.80556			
90	2402-01 Cat	x2			1.14593			
91	2402-01 Cat				1.89970			
92	2402-01 D Cat	x2			1.20243			
93	2402-01 D Cat				1.98403			
94	5ppm KHP				5.12009			
95	DI				0.09658			
96	DI XaD	x2			0.18604			
97	DI XaD				0.26882			
98	STd XaD	x2			2.52843			
99	STd XaD				4.47648			
100	2097-03 XaD	x2			1.14876			
101	2097-03 XaD				1.92733			
102	2402-01 XaD	x2			1.17837			
103	2402-01 XaD				2.01167			
104	2402-01 D XaD	x2			1.37131			
105	2402-01 D XaD				2.25258			
106	5ppm				5.04067			
107	DI				0.07034			
108	DI NaOH	x10			0.28268			

Analyst B. Clinette	Date 10-15-97	Reviewed G.H.	Date 10-20-97	Page 4 of 5

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

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

.54 1mg/L STds BN 99 Exp 10-15-97

5 mg/L Std: BN= 99	10 mg/L Std: BN= 461	100 mg/L stock Solution BN= 99
☑ KHP ☐ Benzoic Acid ☐ _____	☐ KHP ☑ Benzoic Acid ☐ _____	☑ KHP ☑ Benzoic Acid ☐ BN= 461
prep date 10-15-97	prep date 10-15-97	prep date 9-30-97

	Sample #	Dilution	Loop Size	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
109	DI ~~H_2SO_4~~ NaOH	1:4			0.42140			
110	STd ~~H_2SO_4~~ NaOH	x10			1.88362			
111	STd NaOH	x4			4.35807			
112	2097-03 NaOH	x10			1.80098			
113	2097-03 NaOH	x4			3.64928			
114	2402-01 NaOH	x10			~~1.F~~ 1.17079			
115	2402-01 NaOH	x4			3.27607			
116	2402-01 Dup NaOH	x10			1.55458			
117	2402-01 Dup NaOH	x4			2.81923			
118	5ppm				5.15149			
119	DI				0.10436			
120	2432-01	~~6~~			2.84016			
121	2432-01	~~6~~			2.82826			
122	2432-02				2.81719			
123	2432-02				2.81923			
124	2432-03				3.66541			
125	2432-03				3.03499			
126	1ppm				1.09717			
127	1ppm				1.04240			
128	~~1ppm~~ DI				0.07857			
129	DI				0.06810			

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SPL# 00001	01:25:48		TIC =	55.2574 mV	2.58878 ug C	0.51263 ppm
SPL# 00001	01:30:48		TOC =	0.26961 mV	0.01263 ug C	0.00250 ppm
SPL# 00002	01:33:53		TIC =	0.76185 mV	0.03569 ug C	0.00706 ppm
SPL# 00002	01:38:53		TOC =	4.59923 mV	0.21547 ug C	0.04266 ppm
SPL# 00003	01:41:58		TIC =	0.92237 mV	0.04321 ug C	0.00855 ppm
SPL# 00003	01:46:58		TOC =	6.50320 mV	0.30467 ug C	0.06033 ppm
SPL# 00004	01:50:03		TIC =	0.97589 mV	0.04572 ug C	0.00905 ppm
SPL# 00004	01:55:03		TOC =	5.53642 mV	0.25937 ug C	0.05136 ppm
SPL# 00005	01:58:08		TIC =	1.24360 mV	0.05826 ug C	0.01153 ppm
SPL# 00005	02:03:08		TOC =	4.43405 mV	0.20773 ug C	0.04113 ppm
SPL# 00006	02:06:13		TIC =	1.56506 mV	0.07332 ug C	0.01451 ppm
SPL# 00006	02:11:13		TOC =	2.78556 mV	0.13050 ug C	0.02584 ppm
SPL# 00007	02:14:18		TIC =	0.92237 mV	0.04321 ug C	0.00855 ppm
SPL# 00007	02:19:18		TOC =	3.49916 mV	0.16393 ug C	0.03246 ppm
SPL# 00008	02:22:23		TIC =	2.18185 mV	0.10221 ug C	0.02024 ppm
SPL# 00008	02:27:23		TOC =	2.37438 mV	0.11123 ug C	0.02202 ppm
SPL# 00009	02:30:28		TIC =	1.48467 mV	0.06955 ug C	0.01377 ppm
SPL# 00009	02:35:28		TOC =	1.55316 mV	0.07276 ug C	0.01440 ppm
SPL# 00010	02:38:33		TIC =	1.35073 mV	0.06328 ug C	0.01253 ppm
SPL# 00010	02:43:33		TOC =	2.10048 mV	0.09840 ug C	0.01948 ppm
SPL# 00011	02:46:38		TIC =	1.80631 mV	0.08462 ug C	0.01675 ppm
SPL# 00011	02:51:38		TOC =	1.63522 mV	0.07660 ug C	0.01517 ppm
SPL# 00012	02:54:43		TIC =	0.89562 mV	0.04195 ug C	0.00830 ppm
SPL# 00012	03:05:32		TOC =	0.02424 mV	0.00113 ug C	0.00022 ppm
SPL# 00013	03:16:21		TOC =	559.409 mV	26.2080 ug C	5.18971 ppm
SPL# 00014	03:23:47		TOC =	560.406 mV	26.2548 ug C	5.19896 ppm
SPL# 00015	03:31:13		TOC =	560.347 mV	26.2520 ug C	5.19842 ppm
SPL# 00016	03:53:21		TOC =	557.944 mV	26.1394 ug C	5.17612 ppm
SPL# 00017	04:00:47		TOC =	556.422 mV	26.0681 ug C	5.16200 ppm
SPL# 00018	04:08:13		TOC =	555.779 mV	26.0380 ug C	5.15604 ppm
SPL# 00019	04:16:25		TIC =	22.2167 mV	1.00767 ug C	0.19953 ppm
SPL# 00019	04:21:25		TOC =	554.844 mV	25.1658 ug C	4.98333 ppm
SPL# 00020	04:24:30		TIC =	26.9556 mV	1.22261 ug C	0.24210 ppm
SPL# 00020	04:29:30		TOC =	572.203 mV	25.9532 ug C	5.13924 ppm
SPL# 00021	04:32:35		TIC =	11.6485 mV	0.52833 ug C	0.10462 ppm
SPL# 00021	04:37:35	N.L.	TOC =	1015.72 mV	46.0696 ug C	9.12269 ppm
SPL# 00022	04:40:40		TIC =	11.1005 mV	0.50348 ug C	0.09969 ppm
SPL# 00022	04:45:40	N.L.	TOC =	1000.26 mV	45.3686 ug C	8.98388 ppm

SPL# 00024	04:56:50		TIC =	8.12573 mV	0.36855 ug C	0.07298	ppm
SPL# 00024	05:01:50		TOC =	9.47168 mV	0.42960 ug C	0.08506	ppm
SPL# 00025	05:04:55		TIC =	12.5816 mV	0.57065 ug C	0.11300	ppm
SPL# 00025	05:09:55		TOC =	61.2784 mV	2.77938 ug C	0.55037	ppm
SPL# 00026	05:13:00		TIC =	12.1971 mV	0.55321 ug C	0.10954	ppm
SPL# 00026	05:18:00		TOC =	60.7519 mV	2.75550 ug C	0.54564	ppm
SPL# 00027	05:21:05		TIC =	6.63224 mV	0.30081 ug C	0.05956	ppm
SPL# 00027	05:26:05		TOC =	9.19343 mV	0.41698 ug C	0.08257	ppm
SPL# 00028	05:29:10		TIC =	11.8953 mV	0.53952 ug C	0.10683	ppm
SPL# 00028	05:34:10		TOC =	10.8934 mV	0.49408 ug C	0.09783	ppm
SPL# 00029	05:37:15		TIC =	10.9088 mV	0.49478 ug C	0.09797	ppm
SPL# 00029	05:42:15		TOC =	16.2293 mV	0.73610 ug C	0.14576	ppm
SPL# 00030	05:45:20		TIC =	19.8934 mV	0.90229 ug C	0.17867	ppm
SPL# 00030	05:50:20		TOC =	12.7960 mV	0.58038 ug C	0.11492	ppm
SPL# 00031	05:53:25		TIC =	28.2901 mV	1.28314 ug C	0.25408	ppm
SPL# 00031	05:58:25		TOC =	952.761 mV	43.2140 ug C	8.55722	ppm
SPL# 00032	06:01:30		TIC =	30.6847 mV	1.39175 ug C	0.27559	ppm
SPL# 00032	06:06:30		TOC =	962.797 mV	43.6692 ug C	8.64736	ppm
SPL# 00033	06:09:35	N.L.	TIC =	1407.22 mV	63.8264 ug C	12.6389	ppm
SPL# 00033	06:14:35		TOC =	697.961 mV	31.6571 ug C	6.26874	ppm
SPL# 00034	06:17:40	N.L.	TIC =	1402.08 mV	63.5935 ug C	12.5928	ppm
SPL# 00034	06:22:40		TOC =	695.538 mV	31.5472 ug C	6.24698	ppm
SPL# 00035	06:25:45	N.L.	TIC =	1829.05 mV	82.9595 ug C	16.4276	ppm
SPL# 00035	06:30:45		TOC =	688.557 mV	31.2306 ug C	6.18427	ppm
SPL# 00036	06:33:50	N.L.	TIC =	1864.83 mV	84.5822 ug C	16.7490	ppm
SPL# 00036	06:38:50		TOC =	689.924 mV	31.2926 ug C	6.19655	ppm
SPL# 00037	06:41:55	N.L.	TIC =	1864.48 mV	84.5665 ug C	16.7458	ppm
SPL# 00037	06:46:55		TOC =	690.445 mV	31.3162 ug C	6.20123	ppm
SPL# 00038	06:50:00	N.L.	TIC =	1846.77 mV	83.7632 ug C	16.5868	ppm
SPL# 00038	06:55:00		TOC =	689.468 mV	31.2719 ug C	6.19245	ppm
SPL# 00039	06:58:05		TIC =	27.5230 mV	1.24835 ug C	0.24719	ppm
SPL# 00039	07:03:05		TOC =	582.624 mV	26.4258 ug C	5.23284	ppm
SPL# 00040	07:06:10		TIC =	9.10602 mV	0.41301 ug C	0.08178	ppm
SPL# 00040	07:11:10		TOC =	14.1437 mV	0.64151 ug C	0.12703	ppm
SPL# 00041	07:14:15		TIC =	34.0118 mV	1.54266 ug C	0.30547	ppm
SPL# 00041	07:19:15		TOC =	60.7519 mV	2.75550 ug C	0.54564	ppm
SPL# 00042	07:22:20		TIC =	29.9422 mV	1.35807 ug C	0.26892	ppm
SPL# 00042	07:27:20		TOC =	27.2044 mV	1.23390 ug C	0.24433	ppm
SPL# 00043	07:30:25		TIC =	166.070 mV	7.53235 ug C	1.49155	ppm
SPL# 00043	07:35:25		TOC =	375.032 mV	17.0102 ug C	3.36835	ppm
SPL# 00044	07:38:30		TIC =	18.8894 mV	0.85675 ug C	0.16965	ppm
SPL# 00044	07:43:30		TOC =	27.1755 mV	1.23259 ug C	0.24407	ppm

SPL# 00045	07:51:35	TOC =	21.5704 mV	0.97835 ug C	0.19575	ppm
SPL# 00046	07:54:40	TIC =	26.1907 mV	1.18792 ug C	0.23523	ppm
SPL# 00046	07:59:40	TOC =	26.3377 mV	1.19459 ug C	0.23655	ppm
SPL# 00047	08:02:45	TIC =	25.7946 mV	1.16995 ug C	0.23167	ppm
SPL# 00047	08:07:45	TOC =	25.5878 mV	1.16057 ug C	0.22981	ppm
SPL# 00048	08:10:50	TIC =	39.3086 mV	1.78291 ug C	0.35305	ppm
SPL# 00048	08:15:50	TOC =	95.2642 mV	4.32086 ug C	0.85561	ppm
SPL# 00049	08:18:55	TIC =	24.8622 mV	1.12767 ug C	0.22330	ppm
SPL# 00049	08:23:55	TOC =	37.5523 mV	1.70325 ug C	0.33727	ppm
SPL# 00050	08:27:00	TIC =	25.3988 mV	1.15200 ug C	0.22811	ppm
SPL# 00050	08:32:00	TOC =	32.3212 mV	1.46598 ug C	0.29029	ppm
SPL# 00051	08:35:05	TIC =	7.69074 mV	0.34882 ug C	0.06907	ppm
SPL# 00051	08:40:05	TOC =	110.331 mV	5.00424 ug C	0.99093	ppm
SPL# 00052	08:43:10	TIC =	6.49672 mV	0.29466 ug C	0.05835	ppm
SPL# 00052	08:48:10	TOC =	9.69440 mV	0.43970 ug C	0.08707	ppm
SPL# 00053	08:51:15	TIC =	29.5429 mV	1.33996 ug C	0.26533	ppm
SPL# 00053	08:56:15	TOC =	25.7031 mV	1.16580 ug C	0.23085	ppm
SPL# 00054	08:59:20	TIC =	27.4378 mV	1.24449 ug C	0.24643	ppm
SPL# 00054	09:04:20	TOC =	23.6609 mV	1.07318 ug C	0.21251	ppm
SPL# 00055	09:07:25	TIC =	33.4652 mV	1.51787 ug C	0.30056	ppm
SPL# 00055	09:12:25	TOC =	23.6896 mV	1.07448 ug C	0.21276	ppm
SPL# 00056	09:15:30	TIC =	29.8280 mV	1.35290 ug C	0.26790	ppm
SPL# 00056	09:20:30	TOC =	20.1724 mV	0.91494 ug C	0.18117	ppm
SPL# 00057	09:23:35	TIC =	33.2927 mV	1.51004 ug C	0.29901	ppm
SPL# 00057	09:28:35	TOC =	22.2852 mV	1.01078 ug C	0.20015	ppm
SPL# 00058	09:31:40	TIC =	20.5640 mV	0.93271 ug C	0.18469	ppm
SPL# 00058	09:36:40	TOC =	60.4424 mV	2.74146 ug C	0.54286	ppm
SPL# 00059	09:39:45	TIC =	12.0050 mV	0.54450 ug C	0.10782	ppm
SPL# 00059	09:44:45	TOC =	6.33732 mV	0.28743 ug C	0.05691	ppm
SPL# 00060	09:47:50	TIC =	38.0006 mV	1.72358 ug C	0.34130	ppm
SPL# 00060	09:52:50	TOC =	19.4323 mV	0.88138 ug C	0.17453	ppm
SPL# 00061	09:55:55	TIC =	19.4469 mV	0.88204 ug C	0.17466	ppm
SPL# 00061	10:00:55	TOC =	33.3161 mV	1.51110 ug C	0.29922	ppm
SPL# 00062	10:04:00	TIC =	20.9556 mV	0.95047 ug C	0.18821	ppm
SPL# 00062	10:09:00	TOC =	28.6234 mV	1.29826 ug C	0.25708	ppm
SPL# 00063	10:12:05	TIC =	20.1727 mV	0.91496 ug C	0.18118	ppm
SPL# 00063	10:17:05	TOC =	48.3371 mV	2.19240 ug C	0.43413	ppm
SPL# 00064	10:20:10	TIC =	18.0544 mV	0.81888 ug C	0.16215	ppm
SPL# 00064	10:25:10	TOC =	23.9480 mV	1.08620 ug C	0.21508	ppm
SPL# 00065	10:28:15	TIC =	20.3963 mV	0.92510 ug C	0.18318	ppm
SPL# 00065	10:33:15	TOC =	41.2301 mV	1.87006 ug C	0.37030	ppm
SPL# 00066	10:36:20	TIC =	17.6097 mV	0.79871 ug C	0.15816	ppm
SPL# 00066	10:41:20	TOC =	45.3559 mV	2.05719 ug C	0.40736	ppm

SPL#	00067	10:49:20	TOC =	[illegible]	mV	[illegible] ug C	[illegible] ppm
SPL#	00068	10:52:30	TIC =	19.3632	mV	0.87825 ug C	0.17391 ppm
SPL#	00068	10:57:30	TOC =	37.7297	mV	1.71129 ug C	0.33886 ppm
SPL#	00069	11:00:35	TIC =	19.4190	mV	0.88078 ug C	0.17441 ppm
SPL#	00069	11:05:35	TOC =	80.5656	mV	3.65418 ug C	0.72360 ppm
SPL#	00070	11:08:40	TIC =	17.6097	mV	0.79871 ug C	0.15816 ppm
SPL#	00070	11:13:40	TOC =	115.410	mV	5.23459 ug C	1.03655 ppm
SPL#	00071	11:16:45	TIC =	17.7208	mV	0.80375 ug C	0.15915 ppm
SPL#	00071	11:21:45	TOC =	8.58187	mV	0.38924 ug C	0.07707 ppm
SPL#	00072	11:24:50	TIC =	38.7269	mV	1.75652 ug C	0.34782 ppm
SPL#	00072	11:29:50	TOC =	24.2927	mV	1.10183 ug C	0.21818 ppm
SPL#	00073	11:32:55	TIC =	33.7528	mV	1.53091 ug C	0.30315 ppm
SPL#	00073	11:37:55	TOC =	33.0232	mV	1.49782 ug C	0.29659 ppm
SPL#	00074	11:41:00	TIC =	32.7757	mV	1.48659 ug C	0.29437 ppm
SPL#	00074	11:46:00	TOC =	152.572	mV	6.92015 ug C	1.37033 ppm
SPL#	00075	11:49:05	TIC =	28.4323	mV	1.28959 ug C	0.25536 ppm
SPL#	00075	11:54:05	TOC =	308.301	mV	13.9835 ug C	2.76900 ppm
SPL#	00076	11:57:10	TIC =	41.1167	mV	1.86491 ug C	0.36928 ppm
SPL#	00076	12:02:10	TOC =	42.2434	mV	1.91602 ug C	0.37940 ppm
SPL#	00077	12:05:15	TIC =	56.6730	mV	2.57049 ug C	0.50900 ppm
SPL#	00077	12:10:15	TOC =	72.6196	mV	3.29378 ug C	0.65223 ppm
SPL#	00078	12:13:20	TIC =	46.5228	mV	2.11011 ug C	0.41784 ppm
SPL#	00078	12:18:20	TOC =	58.4046	mV	2.64903 ug C	0.52456 ppm
SPL#	00079	12:21:25	TIC =	42.8436	mV	1.94324 ug C	0.38479 ppm
SPL#	00079	12:26:25	TOC =	112.950	mV	5.12303 ug C	1.01446 ppm
SPL#	00080	12:29:30	TIC =	42.9609	mV	1.94856 ug C	0.38585 ppm
SPL#	00080	12:34:30	TOC =	57.7580	mV	2.61970 ug C	0.51875 ppm
SPL#	00081	12:37:35	TIC =	54.1758	mV	2.45723 ug C	0.48658 ppm
SPL#	00081	12:42:35	TOC =	118.740	mV	5.38565 ug C	1.06647 ppm
SPL#	00082	12:45:40	TIC =	19.5585	mV	0.88710 ug C	0.17566 ppm
SPL#	00082	12:50:40	TOC =	113.940	mV	5.16791 ug C	1.02335 ppm
SPL#	00083	12:53:45	TIC =	18.3325	mV	0.83150 ug C	0.16465 ppm
SPL#	00083	12:58:45	TOC =	6.89049	mV	0.31252 ug C	0.06188 ppm
SPL#	00084	13:01:50	TIC =	17.7486	mV	0.80501 ug C	0.15940 ppm
SPL#	00084	13:06:50	TOC =	18.8922	mV	0.85688 ug C	0.16968 ppm
SPL#	00085	13:09:55	TIC =	19.6143	mV	0.88963 ug C	0.17616 ppm
SPL#	00085	13:14:55	TOC =	28.7395	mV	1.30352 ug C	0.25812 ppm
SPL#	00086	13:18:00	TIC =	17.4985	mV	0.79367 ug C	0.15716 ppm
SPL#	00086	13:23:00	TOC =	277.756	mV	12.5980 ug C	2.49466 ppm
SPL#	00087	13:26:05	TIC =	19.0566	mV	0.86434 ug C	0.17115 ppm
SPL#	00087	13:31:05	TOC =	493.925	mV	22.4027 ug C	4.43618 ppm
SPL#	00088	13:34:10	TIC =	46.4933	mV	2.10877 ug C	0.41757 ppm
SPL#	00088	13:39:10	TOC =	122.818	mV	5.57060 ug C	1.10309 ppm

SPL# 00089	13:47:15	TOC =	201.031 mV	9.11809 ug C	1.80[illegible] ppm
SPL# 00090	13:50:20	TIC =	69.8448 mV	3.16792 ug C	0.62731 ppm
SPL# 00090	13:55:20	TOC =	127.588 mV	5.78695 ug C	1.14593 ppm
SPL# 00091	13:58:25	TIC =	158.846 mV	7.20470 ug C	1.42667 ppm
SPL# 00091	14:03:25	TOC =	211.513 mV	9.59351 ug C	1.89970 ppm
SPL# 00092	14:06:30	TIC =	76.9215 mV	3.48890 ug C	0.69087 ppm
SPL# 00092	14:11:30	TOC =	133.879 mV	6.07228 ug C	1.20243 ppm
SPL# 00093	14:14:35	TIC =	160.771 mV	7.29203 ug C	1.44397 ppm
SPL# 00093	14:19:35	TOC =	220.902 mV	10.0194 ug C	1.98403 ppm
SPL# 00094	14:22:40	TIC =	25.0034 mV	1.13407 ug C	0.22456 ppm
SPL# 00094	14:27:40	TOC =	570.071 mV	25.8564 ug C	5.12009 ppm
SPL# 00095	14:30:45	TIC =	13.8747 mV	0.62930 ug C	0.12461 ppm
SPL# 00095	14:35:45	TOC =	10.7538 mV	0.48775 ug C	0.09658 ppm
SPL# 00096	14:38:50	TIC =	16.2781 mV	0.73832 ug C	0.14620 ppm
SPL# 00096	14:43:50	TOC =	20.7139 mV	0.93951 ug C	0.18604 ppm
SPL# 00097	14:46:55	TIC =	17.5819 mV	0.79745 ug C	0.15791 ppm
SPL# 00097	14:51:55	TOC =	29.9304 mV	1.35754 ug C	0.26882 ppm
SPL# 00098	14:55:00	TIC =	17.6097 mV	0.79871 ug C	0.15816 ppm
SPL# 00098	15:00:00	TOC =	281.516 mV	12.7686 ug C	2.52843 ppm
SPL# 00099	15:03:05	TIC =	19.4748 mV	0.88331 ug C	0.17491 ppm
SPL# 00099	15:08:05	TOC =	498.411 mV	22.6062 ug C	4.47648 ppm
SPL# 00100	15:11:10	TIC =	39.1631 mV	1.77631 ug C	0.35174 ppm
SPL# 00100	15:16:10	TOC =	127.903 mV	5.80122 ug C	1.14876 ppm
SPL# 00101	15:19:15	TIC =	67.6204 mV	3.06703 ug C	0.60733 ppm
SPL# 00101	15:24:15	TOC =	214.589 mV	9.73301 ug C	1.92733 ppm
SPL# 00102	15:27:20	TIC =	66.0199 mV	2.99444 ug C	0.59295 ppm
SPL# 00102	15:32:20	TOC =	131.200 mV	5.95077 ug C	1.17837 ppm
SPL# 00103	15:35:25	TIC =	148.737 mV	6.74620 ug C	1.33588 ppm
SPL# 00103	15:40:25	TOC =	223.979 mV	10.1589 ug C	2.01167 ppm
SPL# 00104	15:43:30	TIC =	39.4251 mV	1.78819 ug C	0.35409 ppm
SPL# 00104	15:48:30	TOC =	152.681 mV	6.92511 ug C	1.37131 ppm
SPL# 00105	15:51:35	TIC =	74.7602 mV	3.39086 ug C	0.67145 ppm
SPL# 00105	15:56:35	TOC =	250.802 mV	11.3755 ug C	2.25258 ppm
SPL# 00106	15:59:40	TIC =	23.5094 mV	1.06631 ug C	0.21115 ppm
SPL# 00106	16:04:40	TOC =	561.228 mV	25.4554 ug C	5.04067 ppm
SPL# 00107	16:07:45	TIC =	17.1931 mV	0.77982 ug C	0.15442 ppm
SPL# 00107	16:12:45	TOC =	7.83245 mV	0.35525 ug C	0.07034 ppm
SPL# 00108	16:15:50	TIC =	9.21508 mV	0.41796 ug C	0.08276 ppm
SPL# 00108	16:20:50	TOC =	31.4743 mV	1.42757 ug C	0.28268 ppm
SPL# 00109	16:23:55	TIC =	8.83350 mV	0.40065 ug C	0.07933 ppm
SPL# 00109	16:28:55	TOC =	46.9195 mV	2.12811 ug C	0.42140 ppm
SPL# 00110	16:32:00	TIC =	9.86996 mV	0.44766 ug C	0.08864 ppm
SPL# 00110	16:37:00	TOC =	209.722 mV	9.51226 ug C	1.88362 ppm

SPL# 00111	16:45:05		TOC =	485.228 mV	22.0083 ug C	4.35807	ppm
SPL# 00112	16:48:10		TIC =	8.61561 mV	0.39077 ug C	0.07738	ppm
SPL# 00112	16:53:10		TOC =	200.521 mV	9.09496 ug C	1.80098	ppm
SPL# 00113	16:56:15		TIC =	10.0885 mV	0.45757 ug C	0.09060	ppm
SPL# 00113	17:01:15		TOC =	406.311 mV	18.4289 ug C	3.64928	ppm
SPL# 00114	17:04:20		TIC =	10.1158 mV	0.45881 ug C	0.09085	ppm
SPL# 00114	17:09:20		TOC =	130.356 mV	5.91251 ug C	1.17079	ppm
SPL# 00115	17:12:25		TIC =	17.5819 mV	0.79745 ug C	0.15791	ppm
SPL# 00115	17:17:25		TOC =	364.758 mV	16.5442 ug C	3.27607	ppm
SPL# 00116	17:20:30		TIC =	8.28897 mV	0.37595 ug C	0.07444	ppm
SPL# 00116	17:25:30		TOC =	173.087 mV	7.85062 ug C	1.55458	ppm
SPL# 00117	17:28:35		TIC =	9.73345 mV	0.44147 ug C	0.08742	ppm
SPL# 00117	17:33:35		TOC =	313.894 mV	14.2371 ug C	2.81923	ppm
SPL# 00118	17:36:40		TIC =	21.1236 mV	0.95809 ug C	0.18972	ppm
SPL# 00118	17:41:40		TOC =	573.567 mV	26.0150 ug C	5.15149	ppm
SPL# 00119	17:44:45		TIC =	26.7005 mV	1.21104 ug C	0.23981	ppm
SPL# 00119	17:49:45		TOC =	11.6199 mV	0.52704 ug C	0.10436	ppm
SPL# 00120	17:52:50	N.L.	TIC =	1903.26 mV	86.3253 ug C	17.0941	ppm
SPL# 00120	17:57:50		TOC =	316.224 mV	14.3428 ug C	2.84016	ppm
SPL# 00121	18:00:55	N.L.	TIC =	2053.47 mV	93.1385 ug C	18.4433	ppm
SPL# 00121	18:05:55		TOC =	314.898 mV	14.2827 ug C	2.82826	ppm
SPL# 00122	18:09:00	N.L.	TIC =	1801.26 mV	81.6990 ug C	16.1780	ppm
SPL# 00122	18:14:00		TOC =	313.665 mV	14.2268 ug C	2.81719	ppm
SPL# 00123	18:17:05	N.L.	TIC =	1897.42 mV	86.0605 ug C	17.0417	ppm
SPL# 00123	18:22:05		TOC =	313.894 mV	14.2371 ug C	2.81923	ppm
SPL# 00124	18:25:10	N.L.	TIC =	1833.16 mV	83.1458 ug C	16.4645	ppm
SPL# 00124	18:30:10		TOC =	341.302 mV	15.4803 ug C	3.06541	ppm
SPL# 00125	18:33:15	N.L.	TIC =	1772.17 mV	80.3796 ug C	15.9168	ppm
SPL# 00125	18:38:15		TOC =	337.915 mV	15.3267 ug C	3.03499	ppm
SPL# 00126	18:41:20		TIC =	30.8562 mV	1.39953 ug C	0.27713	ppm
SPL# 00126	18:46:20		TOC =	122.159 mV	5.54073 ug C	1.09717	ppm
SPL# 00127	18:49:25		TIC =	27.0690 mV	1.22776 ug C	0.24312	ppm
SPL# 00127	18:54:25		TOC =	116.061 mV	5.26411 ug C	1.04240	ppm
SPL# 00128	18:57:30		TIC =	33.8679 mV	1.53613 ug C	0.30418	ppm
SPL# 00128	19:02:30		TOC =	8.74858 mV	0.39680 ug C	0.07857	ppm
SPL# 00129	19:05:35		TIC =	27.2959 mV	1.23805 ug C	0.24515	ppm
SPL# 00129	19:10:35		TOC =	7.58292 mV	0.34393 ug C	0.06810	ppm

MA4255600030

OCS/VALIDATION COVER SHEET

COPY

α Code____ SOG/RN: 3807 LAB NAME UOM LAB CODE

NAME OF OCS CHECKER_____ COMPANY_____

NAME OF VALIDATOR_____ COMPANY_____

OCS DATE_____ VALIDATION DATE_____ EDS ENTRY DATE_____

ANALYTICAL SUITE:
- α VOLATILES
- α SEMIVOLATILES
- α PESTICIDES/AROCLORS
- α HIGH EXPLOSIVES
- α INORGANICS
- α RADIOCHEMISTRY

GENERAL CHECKLIST

	PRESENT? ✓ 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 SOG present? ☑ YES ☐ NO

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

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact:

_____

_____

_____

_____

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_____

_____

_____

11-25-97

UNIVERSITY OF Miami

RN 3807R

NOV 1997 RECEIVED

November 19, 1997

Rec'd 11-25-97

TRITIUM LABORATORY

Data Release #97-103
Job # 1008

COPY

LOS ALAMOS NATIONAL LABORATORY
TRITIUM SAMPLES

Purchase Order No. G5005

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

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

COPY

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
Recvd : 97/10/21
Job# : 1008
Final : 97/11/18

Purchase Order: G5005
Contact: J. Valdez 505/665-9968
Env. Sci. & Waste Tech. 665-9118(F)
CTS-7, Los Alamos, NM 87545

Cust	LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
LANL-	04LA-97-0480	1008.01	971006	500	229	108.7	3.6

COPY

Tuesday, October 28, 1997

Los Alamos
ATIONAL LABORATORY

AMENDED

REQUEST NUMBER: 3807R
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: 10/20/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 5 day

These samples are on:

LANL Request Number: 3807R
Per Agreement Number: PO 256BA
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; PO # G5005. AMENDED : CORRECTION ON REPORT DUE DATE. JV 10/28/97

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
LH3		04LA-97-0480	09	W	10/6/97	

Final Page of REQUEST NUMBER 3807R

COPY

Monday, October 20, 1997

REQUEST NUMBER: 3807R
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:

SHIP DATE: 10/20/97
REPORT DUE: 10/10/97
TURN AROUND REQ'D: 1 day

These samples are on:

LANL Request Number: 3807R
Per Agreement Number: PO 256BA
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP; PO # G5005

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-97-0480	09	W	10/6/97	

Final Page of REQUEST NUMBER 3807R

DATA ENTERED 110397 M

Tuesday, October 21, 1997

Los Alamos
NATIONAL LABORATORY

AMENDED

REQUEST NUMBER: 3818R
ANALYSIS TYPE: RAD

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

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 10/20/97
REPORT DUE: 11/11/97
TURN AROUND REQ'D: 15 day

These samples are on:

LANL Request Number: 3818R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; SAMPLE TO BE SHIPPED YO TELEDYNE. AMENDED: CORRECTION ON REPORT DUE DATE, JV 10/21/97

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
LH3		04LA-97-0483	07	W	10/16/97	

C 11/97 NT

Monday, October 20, 1997

REQUEST NUMBER: 3818R

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: 10/20/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 5 day

These samples are on:

LANL Request Number: 3818R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; SAMPLE TO BE SHIPPED YO 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
H3		04LA-97-0483	07	W	10/16/97	

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

18 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 9710L884
LANL Request No. 3818R

Dear Mr. Miglio:

Enclosed please find the data package for 1 water sample received 21 October 1997 for LANL Request #3818R. This sample was forwarded to Teledyne and analyzed for tritium on a 5 day turnaround. The results were faxed 30 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

Report Sent To: [illegible]
Approved By: _____
Date Sent: 11/19/97

Enclosure:

FIELD COPY

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

TELEDYNE
BROWN ENGINEERING
Environmental Services

50 VAN BUREN AVENUE
P.O. BOX 1235
WESTWOOD, NEW JERSEY 07675-1235
(201) 664-7070 FAX (201) 664-5586

WESTON/LOS ALAMOS NL PROJECT

rec'd 11/17/97

Case Narrative/Cover Sheet for Reports of Analysis and Lab Data

Date 11-10-97

TI #'s 660617

WO # 4-5927 Contains one water for low level tritium analysis, received 10/22/97 in good condition.

Comments:

There were no unusual occurrences with the analysis of this sample.

Contents:	Procedure #'s	Bench & Work Sheet Pages	Calibration, Background & Source Checks
Reports of Analysis		1	
Tritium	PRO-052-35	2	13
C-O-C		4	
Other		-	

TIQA Spike Activity (pCi/l) for TI # 60444

Nuclide	Introduced	Acceptable Range	Measured	% Recovery
H-3	1400 ± 400	1000 - 1900	1350 ± 220	96

"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 hard copy data package has been authorized by the laboratory manager or his designee, as verified by the following signature." A. J. Hogan

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 11/06/97

WORK ORDER NUMBER	CUSTOMER P.O. NUMBER	DATE RECEIVED	DELIVERY DATE	PAGE 1
4-5927	LL-2293-F4 MOD 1	10/22/97	10/28/97	

JUDY STONE
REGRA ENVIRONMENTAL INC
208 WELSH POOL ROAD
LIONVILLE PA 19341-1333

LIQUIDS

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	START TIME	STOP DATE	STOP TIME	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	MID-COUNT TIME TIME	VOLUME - UNITS ASH-WGHT-% *	LAB.
60617	001-04LA-97-0483	07	10/16				H-3	L.T. 1.	E 02	10/29			5

LAST PAGE OF REPORT

J Guenther
APPROVED BY J. GUENTHER 11/06/97

SEND 1 COPIES TO RE081S JUDY STONE

2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GE(LI) GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

Rush - Results

Customer Recra
Analyst JB
Preparation Date 10-27-97
Distilled Yes

TRITIUM BY DIRECT COUNT
LIQUID SCINTILLATION
WITH SECONDARY RESULT

Counter 2550
Disk

Mud sample not entered.

Ti 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
60617	L	10/28/97	300	200	10.0	1.25	0.09				
Secondary	Result										
60617	L	10/29/97	222	200	10.0	1.25	.09				
Secondary	Result										
			TOTAL-								
Secondary	Result										
60617	L	10/29/97	522	400	10.0	1.25	0.09				LT. 1.E+002
Secondary	Result										2.8 ± 8.0E01
Secondary	Result										
Secondary	Result										
Secondary	Result										
Seondary	Result										
Secondary	Result										

Result Units pCi/L
Code A

Entered 10/29/97 ACM

Calc. by JB Date 10-29-97
Checked by JB Date 10-29

IWL-39d ed 07/05/84 Rev. 12/04/91

Customer TIQA
Analyst JB
Preparation Date 10·30·97
Distilled

TRITIUM BY DIRECT COUNT
LIQUID SCINTILLATION
WITH SECONDARY RESULT

Counter 2250·2550
Disk

TI 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
60441	WO	10/31/97	282	100	1.0	4.03	0.10				LT. 4.21 E+003
Secondary	Result										-5.45 ± 2.36 E 03
42		11/1/97	103	100	10.0	0.98	0.09				LT. 2.31 E+002
Secondary	Result										2.50 ± 14.19 E01
43		11/1/97	625	100	1.0	4.03	0.10				1.00 ± 0.29 E04
Secondary	Result										LT. 4.21 E+003
44		11/1/97	367	100	10.0	0.98	0.09				1.35 ± 0.22 E03
Secondary	Result										LT. 2.31 E+002
Secondary	Result										
Secondary	Result										
Secondary	Result										
Seondary	Result										
Secondary	Result										

Result Units pCi/L
Code A

Calc. by [illegible] Date 11/3/97
Checked by [illegible] Date 11/4

IWL-39d Issued 07/05/84 Rev. 12/04/91

TELEDYNE ISOTOPES

INVENTORY OF CERTIFIED STANDARD

NUCLIDE: H-3

PURCHASED FROM: NIST

CERTIFICATE NUMBER: SRM 4926D-131 DATE: 7/25/89

PURCHASE ORDER NO: 58506 DATE: 9/22/93

DATE	DISPOSITION	COMMENTS
3/17/97	10 aliquots each 0.02298 gm for 10 ml Quench Curve P-2550 Ultima Gold XR. D. Miller	2605 dpm / 0.02298 gm

CERTIFICATE ATTACHED

H-3 Standard NIST 4926 D-131 on 7/25/89

$$\frac{2.897 \times 10^3 \text{ Bq}}{\text{gm}} \times \frac{60 \text{ dpm}}{\text{gm}} = \frac{1.738 \times 10^5 \text{ dpm}}{\text{gm}}$$

Decay to 3/17/97

$$\frac{1.738 \times 10^5 \text{ dpm}}{\text{gm}} \times .6522 = \frac{1.13352 \times 10^5 \text{ dpm}}{\text{gm}}$$

Individual Aliquot Activity

$$0.02298 \text{ gm} \times \frac{1.13352 \times 10^5 \text{ dpm}}{\text{gm}} = \boxed{2605 \text{ dpm}}$$

A. Miller

Protocol #:18 H3 10.0ML GXR QUENCH User : PACKARD

Time: 30.00
Data Mode: Count Standards Nuclide: H39710ML
Background Subtract: None

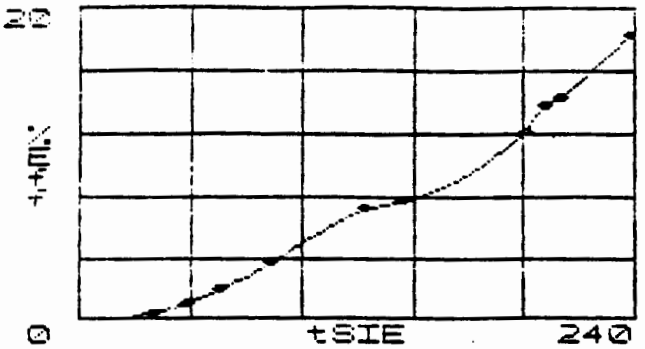
	LL	UL	LCR	2SX	BKG
Region A:	0.0 -	18.6	0	0.5	0.00

Quench Indicator: tSIE/AEC
Ext Std Terminator: Count

H-3 NIST 4926 D - 131; ULTIMA GOLD XR
Low Level Count Mode On

S#	TIME	CPMA	SIS	tSIE	FLAG
1	30.00	601.33	7.358	238.25	S
2	30.00	477.57	6.948	208.98	S
3	30.00	460.70	6.828	201.25	S
4	30.00	409.20	6.632	193.41	S
5	30.00	272.63	5.932	139.73	S
6	30.00	264.90	5.732	122.36	S
7	30.00	148.90	5.125	82.439	S
8	30.00	81.37	4.758	60.156	S
9	30.00	45.97	4.576	46.042	S
10	30.00	22.07	4.332	30.810	S

Data Mode: DPM
QIP Type: tSIE/AEC



tSIE	%Eff
238.25	18.27
208.98	14.34
201.25	13.84
193.41	12.22
139.73	7.76
122.36	7.26
82.44	3.77
60.16	1.92
46.04	0.98
30.81	0.40

Protocol #:14 3H 10.0ML GOLD User : PACKARD 2

Time: 100.00
Data Mode: DPM Nuclide: H3610ML97 Quench Set: H39710ML
Background Subtract: None

	LL	UL	LCR	2SZ	BKG
Region A:	2.0 -	10.4	0	0.5	0.00
Region B:	18.6 -	156	0	0.0	0.00
Region C:	1.5 -	10.4	0	0.0	0.00

Quench Indicator: tSIE/AEC
Ext Std Terminator: Count

Luminescence Correction On
Heterogeneity Monitor On
Low Level Count Mode On

S#	TIME	CPMA	CPMB	DPM1	tSIE	EFFA
1	100.00	468.08	13.11	2585.18	238.76	0.18
2	100.00	367.15	12.73	2582.10	209.49	0.14
3	100.00	352.70	11.81	2612.54	200.70	0.14
4	100.00	310.64	12.06	2639.23	191.35	0.12
5	100.00	201.89	11.95	2623.75	141.76	0.08
6	100.00	182.20	14.26	2548.79	122.29	0.07
7	100.00	98.03	13.36	2682.72	82.023	0.04
8	100.00	47.04	11.75	2592.06	59.544	0.02
9	100.00	25.73	9.51	2711.22	46.103	0.01
10	100.00	10.19	9.89	2627.50	31.148	0.00

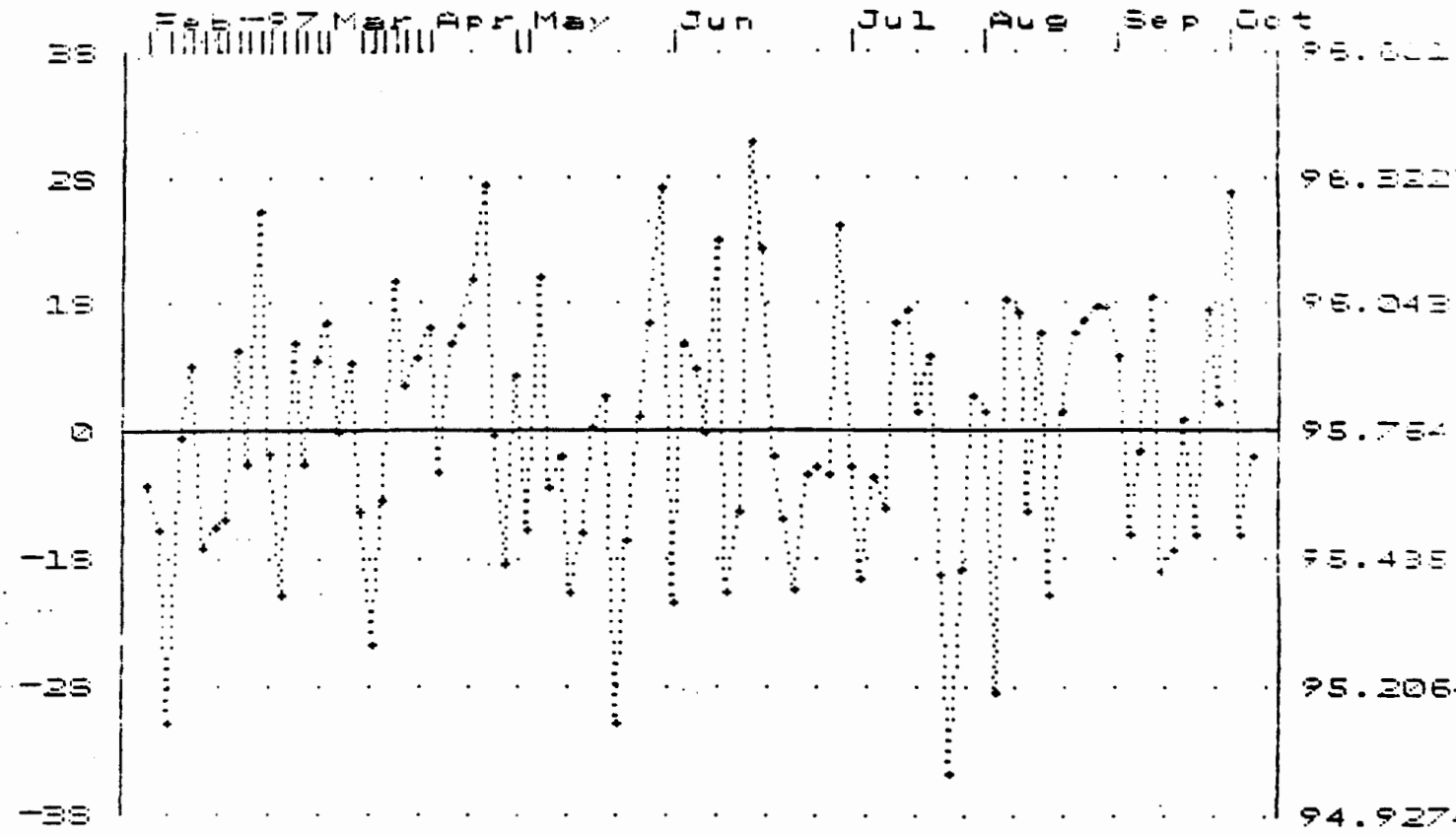
14C EFFICIENCY:

Value	Date	Time
95.48	30 Apr 97	10:54
95.89	01 May 97	10:35
95.55	02 May 97	17:24
96.11	05 May 97	13:24
95.64	09 May 97	02:43
95.71	12 May 97	15:43
95.42	13 May 97	12:21
95.55	14 May 97	13:15
95.77	18 May 97	09:49
95.84	22 May 97	01:32
95.13	22 May 97	17:16
95.53	28 May 97	05:11
95.79	29 May 97	09:52
96.01	30 May 97	07:39
96.31	31 May 97	08:02
95.39	01 Jun 97	09:13
95.96	03 Jun 97	11:46
95.90	05 Jun 97	10:26
95.76	06 Jun 97	05:19
96.19	07 Jun 97	07:33
95.41	10 Jun 97	06:30
95.59	11 Jun 97	19:23
96.41	12 Jun 97	20:57
96.17	16 Jun 97	00:12
95.71	17 Jun 97	11:40
95.58	19 Jun 97	20:53
95.42	23 Jun 97	02:15
95.67	25 Jun 97	03:40
95.69	26 Jun 97	04:30
95.67	27 Jun 97	13:33
96.22	29 Jun 97	00:03
95.69	01 Jul 97	02:22
95.44	04 Jul 97	02:00
95.66	08 Jul 97	13:21
95.60	10 Jul 97	03:39
96.01	12 Jul 97	21:48
96.03	14 Jul 97	19:03
95.81	19 Jul 97	06:00
95.93	24 Jul 97	06:02
95.46	25 Jul 97	00:03
95.03	29 Jul 97	14:50
95.46	30 Jul 97	03:53
95.84	31 Jul 97	06:08
95.81	01 Aug 97	06:42
95.20	04 Aug 97	16:49
96.05	06 Aug 97	05:24
96.03	06 Aug 97	14:53
95.59	08 Aug 97	01:40
95.98	09 Aug 97	20:44
95.41	18 Aug 97	06:17
95.81	20 Aug 97	18:21
95.98	22 Aug 97	17:06
96.01	24 Aug 97	15:48
96.04	27 Aug 97	04:00
96.04	28 Aug 97	22:00

95.93	01 Sep 97	13:17
95.54	03 Sep 97	10:06
95.72	05 Sep 97	08:24
96.06	08 Sep 97	20:08
95.46	13 Sep 97	21:03
95.51	16 Sep 97	09:33
95.79	18 Sep 97	11:11
95.54	23 Sep 97	04:42
96.04	26 Sep 97	10:07
95.82	29 Sep 97	12:48
96.30	01 Oct 97	08:15
95.54	03 Oct 97	15:39
95.71	06 Oct 97	16:01
95.65	26 Feb 97	22:00
95.55	27 Feb 97	17:55
95.13	04 Mar 97	01:04
95.75	05 Mar 97	01:47
95.91	07 Mar 97	17:45
95.51	09 Mar 97	11:44
95.56	11 Mar 97	17:18
95.58	12 Mar 97	21:58
95.94	14 Mar 97	11:39
95.69	18 Mar 97	01:04
96.26	19 Mar 97	02:26
95.71	21 Mar 97	05:46
95.41	21 Mar 97	15:57
95.96	24 Mar 97	19:35
95.69	25 Mar 97	23:23
95.92	27 Mar 97	00:42
96.01	28 Mar 97	03:24
95.76	28 Mar 97	23:25
95.92	31 Mar 97	22:58
95.59	02 Apr 97	21:08
95.30	03 Apr 97	22:59
95.62	04 Apr 97	20:57
96.10	07 Apr 97	16:49
95.86	09 Apr 97	05:08
95.93	10 Apr 97	08:33
96.00	12 Apr 97	09:47
95.68	17 Apr 97	10:34
95.96	19 Apr 97	04:41
96.00	22 Apr 97	17:06
96.10	24 Apr 97	08:10
96.31	27 Apr 97	13:26
95.76	29 Apr 97	08:24

95.76	Mean
0.276	SD
100	# of points

Parameter: 14C EFFICIENCY
Total Points:100 Valid Points:100 Mean: 95.76 SD: 0.279



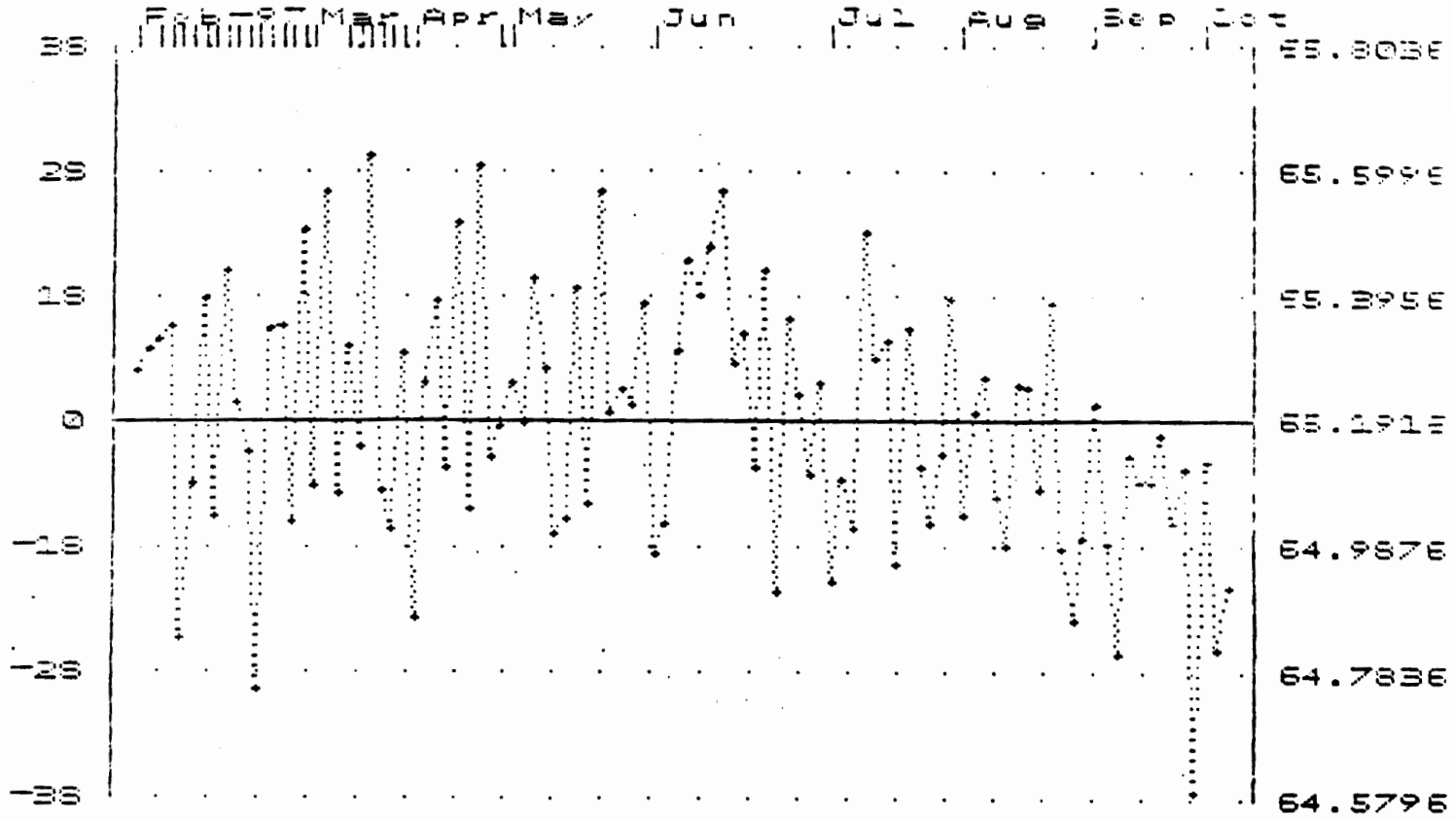
3H EFFICIENCY:

Value	Date	Time
65.18	01 May 97	10:37
65.25	02 May 97	17:26
65.19	05 May 97	13:25
65.43	09 May 97	02:44
65.28	12 May 97	15:44
65.01	13 May 97	12:23
65.03	14 May 97	13:16
65.41	18 May 97	09:50
65.06	22 May 97	01:33
65.57	22 May 97	17:18
65.20	26 May 97	05:13
65.25	29 May 97	09:54
65.22	30 May 97	07:40
65.39	31 May 97	08:03
64.98	01 Jun 97	09:14
65.03	03 Jun 97	11:47
65.31	05 Jun 97	10:27
65.46	06 Jun 97	05:21
65.40	07 Jun 97	07:34
65.48	10 Jun 97	06:32
65.57	11 Jun 97	19:24
65.29	12 Jun 97	20:58
65.34	16 Jun 97	00:13
65.12	17 Jun 97	11:41
65.44	19 Jun 97	20:55
64.92	23 Jun 97	02:16
65.37	25 Jun 97	03:41
65.23	26 Jun 97	04:31
65.11	27 Jun 97	13:34
65.26	29 Jun 97	00:04
64.93	01 Jul 97	02:24
65.10	04 Jul 97	02:01
65.02	08 Jul 97	13:23
65.51	10 Jul 97	03:40
65.30	12 Jul 97	21:49
65.33	14 Jul 97	19:04
64.96	19 Jul 97	06:01
65.35	24 Jul 97	06:03
65.12	25 Jul 97	00:04
65.03	29 Jul 97	14:51
65.14	30 Jul 97	03:54
65.40	31 Jul 97	06:09
65.04	01 Aug 97	06:43
65.20	04 Aug 97	16:50
65.26	06 Aug 97	05:26
65.07	06 Aug 97	14:54
64.99	08 Aug 97	01:42
65.25	09 Aug 97	20:45
65.25	18 Aug 97	06:18
65.08	20 Aug 97	18:23
65.39	22 Aug 97	17:07
64.99	24 Aug 97	15:50
64.87	27 Aug 97	04:02
65.00	28 Aug 97	22:02
65.22	01 Sep 97	13:18

65.00	03 Sep 97	10:07
64.82	05 Sep 97	08:25
65.14	08 Sep 97	20:10
65.09	13 Sep 97	21:04
65.09	16 Sep 97	09:35
65.17	18 Sep 97	11:12
65.03	23 Sep 97	04:43
65.12	26 Sep 97	10:08
64.60	29 Sep 97	12:49
65.13	01 Oct 97	08:16
64.83	03 Oct 97	15:40
64.92	06 Oct 97	16:02
65.28	26 Feb 97	22:02
65.32	27 Feb 97	17:57
65.33	04 Mar 97	01:05
65.35	05 Mar 97	01:48
64.84	07 Mar 97	17:47
65.09	09 Mar 97	11:45
65.39	11 Mar 97	17:19
65.04	12 Mar 97	21:59
65.44	14 Mar 97	11:40
65.22	18 Mar 97	01:05
65.14	19 Mar 97	02:27
64.76	21 Mar 97	05:47
65.35	21 Mar 97	15:58
65.35	24 Mar 97	19:36
65.03	25 Mar 97	23:24
65.51	27 Mar 97	00:44
65.09	28 Mar 97	03:26
65.57	28 Mar 97	23:26
65.08	31 Mar 97	23:00
65.32	02 Apr 97	21:09
65.15	03 Apr 97	23:00
65.62	04 Apr 97	20:58
65.08	07 Apr 97	16:50
65.02	09 Apr 97	05:09
65.30	10 Apr 97	08:34
64.87	12 Apr 97	09:48
65.26	17 Apr 97	10:36
65.39	19 Apr 97	04:42
65.12	22 Apr 97	17:07
65.52	24 Apr 97	08:11
65.05	27 Apr 97	13:27
65.61	29 Apr 97	08:26
65.14	30 Apr 97	10:55

65.19	Mean
0.204	SD
100	# of points

Parameter: 3H EFFICIENCY
Total Points:100 Valid Points:100 Mean: 65.19 SD: 0.204



TELEDYNE ISOTOPES

BACKGROUND

Month/Year Sept. 1997 Liquid Scintillation Counter P-2550

Control Limits: 1 ml ultima gold XR 2.-8. cpm; 3 ml ultima gold XR 2.-8. cpm; 10 ml ultima gold XR 0.5-5. cpm

Date	Δt (min)	1.0 ml gold (cpm)	3.0 ml gold (cpm)	10.0 ml gold (cpm)	Initial
1	100/200			1.07/1.23	ACM
2	100			1.14	ACM
3	100			1.05	ACM
4	100			1.10	JB
5	100/100			1.47/1.16	JB
6	600			1.23	JB
7					
8	200			1.16	JB
9					
10	200			1.15	JB
11	100			1.29	JB
12	600			1.17	JB
13					
14	200			1.06	JB
15					
16	200			1.45	JB
17					
18	200/100			1.06, 0.92	JB
19	~~600~~ 100			JB ~~1.06~~ 1.11	JB
20	600			1.06	JB
21					
22					
23	200			1.20	JB
24	200			0.93	ACM
25	100			1.32	ACM
26	600			1.04	ACM
27					
28					
29	200			1.04	JB
30					
31					

Comments/Changes:

Reviewed by: A. Miller Date: 10/3/97

TWL-65A 3/94

TELEDYNE ISOTOPES

BACKGROUND

Month/Year Oct 1997 Liquid Scintillation Counter P 2550

Control Limits: 1 ml ultima gold XR 2.-8. cpm; 3 ml ultima gold XR 2.-8. cpm; 10 ml ultima gold XR 0.5-5. cpm

Date	Δt (min)	1.0 ml gold (cpm)	3.0 ml gold (cpm)	10.0 ml gold (cpm)	Initial
1	100/200			1.11/1.29	AZM
2	100			1.06	AZM
3	200			1.08	AZM
4	100			1.16	AZM
5					
6	100/100/200			1.12/1.14/2.24	AZM
7	200/100/200			1.02/1.18/1.22	AZM
8	100/100			0.90/0.71	AZM
9	100/100/200			0.67/0.90/1.10	AZM
10	200			1.17	AZM
11	100/100			1.11/1.39	AZM
12	100			1.13	AZM
13	100			0.96	AZM
14	100/100			0.79/1.01	AZM
15	200			1.21	AZM
16	200/200			1.10/1.24	AZM
17	100			0.89	AZM
18	100			1.03	AZM
19					
20	200			1.37	AZM
21	200			1.08	AZM
22	100			1.04	AZM
23	100/100			1.03/1.32	AZM
24	100/100			0.96/1.24	AZM
25	100			1.05	AZM
26	~~100~~				
27	100/200/200			1.39/0.99/1.25	AZM
28	100/200			1.33/1.25	AZM
29	200/200			1.24/0.77	AZM
30	100			1.24	AZM
31	200			1.13	AZM

Comments/Changes:

Reviewed by: A. Miller Date: 11-3-97

TWL-65A 3/94

RECRA LabNet Use Only

9710L 884

Custody Transfer Record/Lab Work Request

RECRA LabNet

Client LANL-REQ#3818R

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 10-21-97 Date Due 10-26-97

Account # LANL-LOSAL

Refrigerator #							3												
#/Type Container	Liquid						1P												
	Solid																		
Volume	Liquid						500												
	Solid																		
Preservatives							—												
ANALYSES REQUESTED →		ORGANIC								INORG									
		VOA	BNA	Pest PCB	Herb		H3			Metal	CN								
		RECRA LabNet Use Only																	
							15413												
							✓												

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-97-0483 07			W	10-16-97	—

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Special Instructions:
RSA-CLIENT INFO
BASE COMP

DATE/REVISIONS
→ NO MABIL Rec'd
→ BATCH SUBBED TO TELEDYNE

5.5 °C

Relinquished by	Received by	Date	Time
FedEx	[illegible]	10/21/97	1000

Relinquished by	Received by	Date	Time

RECRA LabNet Use Only

Samples were
1) Shipped ✓ or
4117 9900 3642
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, Labels and COC Record? Y or (N)
NOTES

ORIGINAL REWRITTEN

Page 1 of 1

18

WESTON®

OFF-LOAD / SUBCONTRACT FORM (side 1)

Client Name: LANL Reg. 3313, 3318

Lab Project Manager: Judy Stone

Date Rec'd/Expected: 10/21/97
(circle one)

Today's Date: 10/21/97

Total No. Samples in Shipment: 3

Work Order #: 02744-064-001

RFW #	Date of Collection	Quant.	Matrix	Parameter	Due Date	Unit Cost	QC Required	Del.	Detect. Limits	Analyte List	Hold Time Sample/Ext.	Method Ref.
9710L884	10/16/97	1	Water	~~X~~ H3 ~~(Low level~~ H3)	11/27	per quote	per method	full report	as low as possible	H3	per method	Teledyne OP
9710L885	10/16/97	2	S	~~X~~ H3	11/27	"	"	"	"	"	"	"

Other special requirements/certifications: Report results using the LANL sample IDs and Request numbers

Hazard/Safety: Yes/No/Unknown = Radiation High Hazard High PCBs/Dioxins Other
(please circle and indicate)

Laboratory Sign-Off: Judy Stone

Date: 10/21/97

RFW 21-21-00, 8-11/94

19

Monday, October 20, 1997

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 3818RC

REQUEST NUMBER: 3818R
ANALYSIS TYPE: RAD

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

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-97-0483	07	500 ml poly	H3

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 3818R Page 1

Relinquished By:	Date	Time	Received By:	Date	Time
Jaylene Valdez / Jaylene Valdez	10-20-97	15:10			
PRINTED NAME / SIGNATURE			PRINTED NAME / SIGNATURE		
KEO Bx	10/21/97	1000		10/21/97	1000
PRINTED NAME / SIGNATURE			PRINTED NAME / SIGNATURE		
PRINTED NAME / SIGNATURE			PRINTED NAME / SIGNATURE		

Received for DISPOSAL By:	Date	Time	Remarks:
PRINTED NAME / SIGNATURE			

Monday, October 20, 1997

REQUEST NUMBER: 3818R

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: 10/20/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 5 day

These samples are on:

LANL Request Number: 3818R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; SAMPLE TO BE SHIPPED YO 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
H3		04LA-97-0483	07	W	10/16/97	

Final Page of REQUEST NUMBER 3818R

Thursday, Octobe 997

REQUEST NUMBER: 3844R
ANALYSIS TYPE: RAD

Los Alamo
NATIONAL LABOR TORY

97-10-143

ATTN: Judy Sto e
WESTC
208 WE GH 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: 3844R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; PLEASE SHIP SAMPLE 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
H3		04LA-97-0486	06	W	10/20/97	

Final Page of REQUEST NUMBER 3844R

RECEIVED
OCT 29 1997
TMA/ Eberline
OAK RIDGE LAB

Thermo NU tech
601 Scarboro Road
Oak Ridge, TN 37830
(423) 481-0683
FAX (423) 483-4621
FAX (423) 481-0121

TNU-OR-6856

November 24, 1997

John Miglio
Los Alamos National Laboratory
TA-3, Building 271, DPOIU
MS-H865
Los Alamos, NM 87545

CASE NARRATIVE
Work Order #97-10143-OR
LANL Request # 3844R

SAMPLE RECEIPT

This work order contains one water sample received 10/29/97. This sample was analyzed for Trutium.

CLIENT ID	LAB ID
04LA-97-0486	97-10143-04

The file name for this sample is 3844R1.TXT.

ANALYTICAL METHODS

Tritium was performed by beta liquid scintillation using EPA Method 906.0 modified.

SPECIAL PROBLEMS OR UNUSUAL CIRCUMSTANCES

Sample demonstrated slightly positive results for Tritium activity. Results for the replicate demonstrated an acceptable relative percent diffference. Results for the laboratory control sample demonstrated an acceptable normalized difference. No significant problems were noted during the analysis process.

CERTIFICATION OF ACCURACY

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.

M.R. McDougall
Laboratory Manager

Date: 11/24/97

A Subsidiary of Thermo Remediation, a Thermo Ecotek Company

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: **3844R** LAB NAME: Thermo NUtech LAB CODE_____

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

VALIDATION DATE: **5 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: _____ 5 Dec 97

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

971014302

Thermo NUtech

RECRA Environmental, Inc./LANL

METHOD BLANK

Method Blank

SDG: 9710143
Contact: John Miglio

Client/Case No: RECRA Environmental, Inc./LANL-3844R
Contract: L00228

Lab Sample ID 971014302

Client sample ID Method Blank
Matrix: Water

ANALYTE	Method	Result pCi/l	1 sigma Error pCi/l	MDA pCi/l	RDL pCi/l	Qual
Tritium	EPA 906.0 Modified	160.28	153.31	516.12	300.00	U

00025

Lab ID TNU/OR
Form LANL-BLK
Report Date 11/24/1997

971014303

Thermo NUtech

RECRA Environmental, Inc./LANL

DUPLICATE

Duplicate

SDG: 9710143
Contact: John Miglio

Client/Case No: RECRA Environmental, Inc./LANL-3844R
Contract: L00228

Lab Sample ID: 971014303

Client sample ID 04LA-97-0486
Matrix: Water

ANALYTE	Method	Result pCi/l	1 sigma Error pCi/l	MDA pCi/l	RDL pCi/l	Qual
Tritium	EPA 906.0 Modified	2466.32	223.39	515.42	300.00	

00026

Lab ID TNU/OR
Form LANL-DUP
Report Date 11/24/1997

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	OK	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). *A matrix spike is required for tritium analysis. No matrix spike was reported. 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
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

A15Rev97

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.	OK	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

15 Dec 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**

A 5 Dec 97

971014304

Thermo NUtech

RECRA Environmental, Inc./LANL

SAMPLE DATA SHEET

04LA-97-0486

SDG: 9710143
Contact: John Miglio

Client/Case No: RECRA Environmental, Inc./LANL-3844R
Contract: L00228

Lab Sample ID: 971014304

Client sample ID 04LA-97-0486
Matrix: Water

ANALYTE	Method	Result pCi/l		1 sigma Error pCi/l	MDA pCi/l	RDL pCi/l	Qual
Tritium	EPA 906.0 Modified	2811.16	A	232.81	517.75	300.00	

00027

Lab ID TNU/OR
Form LANL-RES
Report Date 11/24/1997

M 5 Dec 97

Friday, October 24, 1997

DATA ENTERED

110397M

REQUEST NUMBER: 3845R

ANALYSIS TYPE: OTHER

Los Alamos
NATIONAL LABORATORY

AMENDED

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: 10/23/97
REPORT DUE: 11/23/97
TURN AROUND REQ'D: 30 day

LANL Request Number: 3845R
Per Agreement Number:
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; PO # G50040018-2A. AMENDED: CORRECTION ON REPORT DUE DATE, JV 10/24/97.

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
HUMACID		04LA-97-0487	01	W	10/20/97	

Final Page of REQUEST NUMBER 3845R

Thursday, October 23, 1997

REQUEST NUMBER: 3845R

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:

SHIP DATE: 10/23/97
REPORT DUE: 10/28/97
TURN AROUND REQ'D: 2 day

These samples are on:

LANL Request Number: 3845R
Per Agreement Number:
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; PO # G50040018-2A

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-97-0487	01	W	10/20/97	

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

RN 3845R
Rec'd 11/4/97

October 30, 1997

FIELD COPY

Lab. No. 24809701

SIX FOLD DISSOLVED ORGANIC CARBON
FRACTIONATION RESULTS

Sample	04LA-97-0487 01	
Conductivity (microsiemens/cm2)	120	
pH	8.3	
Dissolved organic carbon (MG/L)	7.6	
Hydrophobics Total (MG/L)	4.2	(55)
bases	0.0	(--)
acids	1.9	(25)
neutrals	2.3	(30)
Hydrophilics Total (MG/L)	3.3	(44)
bases	0.0	(--)
acids	2.1	(27)
neutrals	1.3	(17)

Report Sent To: Robert A. Fayette
Approved By:
Date Sent: 11/5/97

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

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

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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

October 30, 1997

Lab. No. 2480971D

SIX FOLD DISSOLVED ORGANIC CARBON
FRACTIONATION RESULTS

Sample	04LA-97-0487 01	
Conductivity (microsiemens/cm2)	122	
pH	8.3	
Dissolved organic carbon (MG/L)	7.8	
Hydrophobics		
Total (MG/L)	4.3	(55)
bases	0.0	(--)
acids	1.9	(24)
neutrals	2.4	(31)
Hydrophilics		
Total (MG/L)	3.5	(45)
bases	0.0	(--)
acids	2.2	(28)
neutrals	1.4	(18)

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

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

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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

October 30, 1997

Lab. No. 248097ST

SIX FOLD DISSOLVED ORGANIC CARBON
FRACTIONATION RESULTS

Sample	SURROGATE STANDARD		
Conductivity (microsiemens/cm2)	13		
pH	8.2		
Dissolved organic carbon (MG/L)	8.9		
Hydrophobics			
Total (MG/L)	3.3	(37)	
bases	0.0	(--)	
acids	2.9	(33)	BENZOIC ACID RECOVERY 90%
neutrals	0.3	(3)	
Hydrophilics			
Total (MG/L)	5.6	(63)	
bases	0.0	(--)	
acids	2.9	(33)	ACETIC ACID RECOVERY 105%
neutrals	2.7	(30)	METHANOL RECOVERY 88%

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

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: 7.04 METER: Orion 611
CUSTOMER:	CONDUCTIVITY: 0.36 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	0.13	.12				
	0.11					
B. ~~HCL~~/H_2SO_4	0.24	.24	V3/V1			
x2 0.20	.20					
C. NAOH		1.95	V4/V1			
x 10 0.37	2.70					
x4 0.57	1.96					
D. XAD	0.29	.29	V2/V1			
x2 0.19	.28					
E. CATION	0.27	.27	V2/V1			
x2 0.17	.24					
F. ANION	~~0.23~~ BC	.23	V2/V1			
	0.23					
x2 0.18	.26					

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

COLUMN BLANKS:	XAD	0.18 MG/L C	CATION	0.27 MG/L C	ANION	0.48 MG/L C

CALCULATED RESULTS

TOTAL HYDROPHOBICS	A-D	160	TOTAL HYDROPHILICS	D	
BASES	B		BASES	D-E	
ACIDS	C		ACIDS	E-F	
NEUTRALS	A-D-B-C		NEUTRALS	F	

COMMENTS: original DI .10
Blank .05, .3, .3, .3, .3

ANALYST D. Clausing	DATE 11-24-97	REVIEWED S.H.	DATE 12-30-97

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: 8.17 METER: Orion 611
CUSTOMER:	CONDUCTIVITY: 13.29 µMHOS
CUSTOMER'S SAMPLE NO:	METER: Fisher 29-326-2
SAMPLE DILUTION: e	SCREEN DOC: E

SAMPLE	DOC	AVERAGE	DILUTION FACTOR (ROUND TO NEAREST 0.1)	DETERMINED MG/L C	BLANK MG/L C	RESULT MG/L C
A. INITIAL	8.88	8.69				
	8.88					
B. ~~HCL~~ H_2SO_4	0.39	.39	V3/V1			
X2 0.29	.48					
C. NAOH		22.14	V4/V1			
X 10 2.33	22.3					
X4 5.61	22.14					
D. XAD	5.29	5.29	V2/V1			
X2 2.65	5.20					
E. CATION	5.28	5.28	V2/V1			
X2 2.62	5.14					
F. ANION	2.69	2.69	V2/V1			
X2 1.37	2.64					

VOLUME FRACTIONATED	V1	172	DILUTED TO VOLUME	V2	192
VOLUME HCL	V3	25.2	VOLUME NACH	V1	25

COLUMN BLANKS:	XAD	0.14	MG/L C	CATION	0.20 MG/L C	ANION	0.21 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	100T		mg/L
Benzoic	4.670	mg	3.21
Acetic	4.880	mg	2.75
Methanol	8.164	mg	3.06
			9.02

ANALYST Dennis Blasky	DATE 10-29-97	REVIEWED GH	DATE 10-30-97

9/22/92

E

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

ANALYSIS: SIX FOLD DOC FRACTIONATION	HUFFMAN LAB NO: 2480-01
PROCEDURE: USGS/WRI 79-4	pH: 8.33 METER: Orion 611
CUSTOMER: [illegible]	CONDUCTIVITY: 120.7 µMHOS
CUSTOMER'S SAMPLE NO: CULA-97-0487 C1	METER: Fisher 09-326-2
SAMPLE DILUTION: 3	SCREEN DOC: 21

SAMPLE	DOC	AVERAGE	DILUTION FACTOR (ROUND TO NEAREST 0.1)	DETERMINED MG/L C	BLANK MG/L C	RESULT MG/L C
A. INITIAL	7.53	7.58				
	7.64					
B. HCL/H2SO4	0.35	.36	V3/V1			
x 2 0.26						
	.41					
C. NAOH		14.14	V4/V1			
x10 1.54	14.4					
x4 3.61	14.14					
D. XAD	3.28	3.28	V2/V1			
x2 1.67	3.24					
E. CATION	3.40	3.40	V2/V1			
x2 1.72	3.34					
F. ANION	1.40	1.40	V2/V1			
x2 0.74	1.38					

VOLUME FRACTIONATED	V1	162	DILUTED TO VOLUME	V2	180
VOLUME HCL	V3	25	VOLUME NAOH	V1	25

COLUMN BLANKS:	XAD	0.15 MG/L C	CATION	0.32 MG/L C	ANION	0.18 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 J. Christy	DATE 10-29-97	REVIEWED [illegible]	DATE 10-30-97

9/22/92

(3) (5)

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

ANALYSIS: SIX FOLD DOC FRACTIONATION	HUFFMAN LAB NO: 2480-01 P4p
PROCEDURE: USGS/NRI 79-4	pH: 8.33 METER: Orion 611
CUSTOMER: Los Alamos CUSTOMER'S Miglio	CONDUCTIVITY: 122.7 µMHOS
SAMPLE NO: C4LA-97-048701	METER: Fisher 09-326-2
SAMPLE DILUTION: 3	SCREEN DOC: 21

SAMPLE	DOC	AVERAGE	DILUTION FACTOR (ROUND TO NEAREST 0.1)	DETERMINED MG/L C	BLANK MG/L C	RESULT MG/L C
A. INITIAL	~~2.6~~ ~~7.83~~ 7.84	7.84				
	~~2.87~~ 7.84					
	7.83					
B. ~~HCL~~ H_2SO_4	0.47	.47	V3/V1			
x2 0.25	.40					
C. NAOH		14.34	V4/V1			
x10 1.46	13.6					
x2 3.66	14.34					
D. XAD	3.43	3.43	V2/V1			
x2 1.74	3.38					
E. CATION	3.46	3.46	V2/V1			
x2 1.73	3.36					
F. ANION	1.52	1.52	V2/V1			
x2 0.76	1.42					

VOLUME FRACTIONATED	V1	162	DILUTED TO VOLUME	V2	180
VOLUME HCL	V3	25	VOLUME NACH	V1	25

COLUMN BLANKS:	XAD	0.20	MG/L C	CATION	0.32	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:

ANALYST Dominic J. Christy	DATE 10-29-97	REVIEWED SH	DATE 10-31-97

9/22/92

4

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403
.5 mg/L STd BN99 [illegible] 10-29-97
1 mg/L STd BN99 [illegible] 10-29-97

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: 8 BN= 461	100 mg/L stock Solution BN= 99
☑ KHP ☐ Benzoic Acid ☐ _____	☐ KHP ☑ Benzoic Acid ☐ _____	☑ KHP ☑ Benzoic Acid ☐ BN= 461
prep date 10-29-97	prep date 10-29-97	prep date 9-30-97 both

	Sample #	Dilution	Loop Size	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
12	DI				0.14674			
13	DI				0.11922			
14	5ppm					MW 521.292	Cal	
15	5ppm					517.958	Memo	
16	5ppm					515.643		
17	5ppm KHP				5.63565			
18	8ppm Benzoic				7.93036			
19	8ppm				7.97399			
20	DI				0.15961			
21	DI				0.12004			
22	1ppm KHP				1.06658			
23	1ppm KHP				1.08074			
24	.5ppm KHP				0.61729			
25	.5ppm KHP				0.60372			
26	DI In				0.13201			
27	DI In				0.10512			
28	STd In				8.87709			
29	STd In				8.87856			
30	2480-01 In				7.53007			
31	2480-01 In				7.64347			
32	2480-01 Dup In				7.82838			
33	2480-01 Dup In				7.83731			
34	5ppm KHP				5.11054 0.14645			
35	DI				0.14019			

Analyst	Date	Reviewed	Date	Page
D Christy	10-27-97	EH	10-30-97	1 of 6

rev. 0.0 10/6/95

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

.5 mg/L Std BN 99 prep 10-29-97
1 mg/L Std BN 99 prep 10-29-97

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: 8 BN= 461	100 mg/L stock Solution BN= 99
☐ KHP ☐ Benzoic Acid ☐ _____	☐ KHP ☑ Benzoic Acid ☐ _____	☑ KHP ☑ Benzoic Acid ☐ BN= 461
prep date 10-29-97	prep date 10-29-97	prep date 9-30-97

	Sample #	Dilution	Loop Size	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
36	An Bl 1				0.47766			
37	An Bl 2				0.20978			
38	An Bl 3				0.18022			
39	An Bl 4				0.25267			
40	Cat Bl 1				0.27258			
41	Cat Bl 2				0.19898			
42	Cat Bl 3				0.31691			
43	Cat Bl 4				0.31578			
44	XaD Bl 1				0.17967			
45	XaD Bl 2				0.14210			
46	.5 ppm KHP				0.61698			
47	DI				0.10025			
48	XaD Bl 3				0.14948			
49	XaD Bl 4				0.19539			
50	.5 ppm KHP				0.61185			
51	DI				0.05761			
52	DI H_2SO_4	x2			0.20396			
53	DI H_2SO_4				0.23535			
54	Std H_2SO_4	x2			0.29342			
55	Std H_2SO_4				0.39213			
56	2480-01 H_2SO_4	x2			0.26191			
57	2480-01 H_2SO_4				0.35366			
58	2480-01 D H_2SO_4	x2			0.25043			
59	2486-01 D H_2SO_4				0.47032			

Analyst: D. Christy	Date 10-29-97	Reviewed	Date 10-30-97	Page 2 of 6

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

.5 mg/L Std BN 99 10-29-97
1 mg/L Std BN 99 10-29-97

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: 8 BN= 461	100 mg/L stock Solution BN= 99
☑ KHP ☐ Benzoic Acid ☐ _____	☐ KHP ☑ Benzoic Acid ☐ _____	☑ KHP ☑ Benzoic Acid ☐ BN 461
prep date 10-29-97	prep date 10-29-97	prep date 9-30-97

	Sample #	Dilution	Loop Size	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
60	.5 ppm ~~H2SO4~~				0.63998			
61	DI				0.12656			
62	DI An	X2			0.18352			
63	DI An				0.23173			
64	STd An	X2			1.3741			
65	STd An				2.68701			
66	2480-01 An	X2			0.73985			
67	2480-01 An				1.40339			
68	2480-01 D An	X2			0.76186			
69	2480-01 D An				1.52249			
70	1 ppm				0.62756			
71	DI				0.10539			
72	DI Cat	X2			0.17334			
73	DI Cat				0.26865			
74	STd Cat	X2			2.61759			
75	STd Cat				5.28323			
76	2480-01 Cat	X2			1.72104			
77	2480-01 Cat				3.39667			
78	2480-01 D Cat	X2			1.72840			
79	2480-01 D cat				3.46004			
80	DI XqD ~~KHP~~ ~~5 ppm~~ bc	X2			0.18793	DI XqD		
81	DI XqD ~~DI~~ bc				0.29032			
82	5 ppm ~~DI XqD~~ bc	~~X2~~			5.11773			
83	DI ~~DI XqD~~ bc				0.14565			

Analyst	Date	Reviewed	Date	Page
B Christy	10-29-97	G H	10-30-97	3 of 6

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

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

. 5 mg/L STD BN 99 prep 10-29-97
1 mg/L STD BN 99 prep 10-29-97

5 mg/L Std: BN= 99	10 mg/L Std: 8 BN= 461	100 mg/L stock Solution BN= 99
☑ KHP ☐ Benzoic Acid ☐ _____	☐ KHP ☑ Benzoic Acid ☐ _____	☑ KHP ☑ Benzoic Acid ☐ BN 461
prep date 10-29-97	prep date 10-29-97	prep date 9-30-97

	Sample #	Dilution	Loop Size	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
84	STd XaD	x2			2.65370			
85	STd XaD				5.29277			
86	2480-01 XaD	x2			1.67345			
87	2480-01 XaD				3.27820			
88	2180-01 D XaD	x2			1.73650			
89	2180-01 D XaD				3.42939			
90	5 ppm KHP				5.14819			
91	DI				0.14183			
92	DI NaOH	x10			0.36769			
93	DI NaOH	x4			0.56861			
94	STd NaOH	~~x10~~ 4			5.61374			
95	STd NaOH	~~x4~~ pc			2.32672			
96	2480-01 NaOH	~~10~~ x10 pc			1.53929			
97	2480-01 NaOH	x4			3.61405			
98	2180-01 D NaOH	x10			1.45701			
99	2180-01 D NaOH	x4			3.65583			
100	5 ppm KHP				5.13655			
101	DI				0.14921			
102	2509-01				4.42509 ~~4.15~~	pc		
103	2509-01				4.46290			
104	2508-01				2.84977			
105	2508-01				2.88742			
106	2508-02				2.86972			
107	2508-02				2.73152			

Analyst	Date	Reviewed	Date	Page
R Pirietz	10-29-97	E H	10-30-97	4 of 6

rev. 0.0 10/6/95

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

.5mg/L Std BN99 Prep 10-29-97
1mg/L Std BN99 Prep 10-29-97

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: 8 BN= 461	100 mg/L stock Solution BN= 99
☑ KHP ☐ Benzoic Acid ☐ _____	☐ KHP ☑ Benzoic Acid ☐ _____	☐ KHP ☐ Benzoic Acid ☐ BN-461
prep date 10-29-97	prep date 10-29-97	prep date

	Sample #	Dilution	Loop Size	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
108	2508-03				2.96634			
109	2508-03				2.99224			
110	5ppm KHP				5.13932			
111	DI				0.12357			
112	2504-01				0.67377			
113	2504-01				0.67194			
114	2504-02				0.76373			
115	2504-02				0.75907			
116	2504-03				0.56084			
117	2504-03				0.55219			
118	2504-04				0.58628			
119	2504-04				0.57938			
120	2504-05				0.77613			
121	2504-05				0.68233			
122	1ppm				1.05935			
123	DI				0.69160			
124	2504-06				0.76901			
125	2504-06				0.70747			
126	2504-07				0.69182			
127	2504-07				0.67591			
128	2504-08				0.68600			
129	2504-08				0.69274			
130	2504-09				0.73830			
131	2504-09				0.75565			

Analyst	Date	Reviewed	Date	Page
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LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403

.5 mg/L STD DV 99 prep 10-29-97
1 mg/L STD DV 99 prep 10-29-97

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: 8 BN= 461	100 mg/L stock Solution BN= 99
☑ KHP ☐ Benzoic Acid ☐ _____	☐ KHP ☑ Benzoic Acid ☐ _____	☐ KHP ☐ Benzoic Acid ☐ SA = 461
prep date 10-29-97	prep date 10-29-97	prep date

	Sample #	Dilution	Loop Size	TIC (mg/L)	TOC (mg/L)	Notes	QC	% Recovery
132	2504-10				0.54326			
133	2504-10				0.56562			
134	.5 ppm				0.58448			
135	.5 ppm KHP				0.57788			
136	8 ppm				1.04688			
137	DI				0.04728			
138	DI				0.09052			

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10-29-97

SPL# 00001	00:38:12	TIC =	36.5515 mV	1.79046 ug C	0.35454 pp
SPL# 00001	00:43:12	TOC =	14.2281 mV	0.69695 ug C	0.13801 pp
SPL# 00002	00:46:17	TIC =	1.16327 mV	0.05698 ug C	0.01128 pp
SPL# 00002	00:51:17	TOC =	14.8473 mV	0.72728 ug C	0.14401 pp
SPL# 00003	00:54:22	TIC =	0.97589 mV	0.04780 ug C	0.00946 pp
SPL# 00003	00:59:22	TOC =	10.3911 mV	0.50900 ug C	0.10079 pp
SPL# 00004	01:02:27	TIC =	0.94913 mV	0.04649 ug C	0.00920 pp
SPL# 00004	01:07:27	TOC =	9.88938 mV	0.48442 ug C	0.09592 pp
SPL# 00005	01:10:32	TIC =	0.70836 mV	0.03469 ug C	0.00687 pp
SPL# 00005	01:15:32	TOC =	6.55851 mV	0.32126 ug C	0.06361 pp
SPL# 00006	01:18:37	TIC =	0.65487 mV	0.03207 ug C	0.00635 pp
SPL# 00006	01:23:37	TOC =	4.98490 mV	0.24418 ug C	0.04835 pp
SPL# 00007	01:26:42	TIC =	0.73510 mV	0.03600 ug C	0.00713 pp
SPL# 00007	01:31:42	TOC =	4.84712 mV	0.23743 ug C	0.04701 pp
SPL# 00008	01:34:47	TIC =	1.37751 mV	0.06747 ug C	0.01336 pp
SPL# 00008	01:39:47	TOC =	4.87467 mV	0.23878 ug C	0.04728 pp
SPL# 00009	01:42:52	TIC =	0.94913 mV	0.04649 ug C	0.00920 pp
SPL# 00009	01:47:52	TOC =	3.60905 mV	0.17678 ug C	0.03500 pp
SPL# 00010	01:50:57	TIC =	1.24360 mV	0.06091 ug C	0.01206 pp
SPL# 00010	01:55:57	TOC =	4.59923 mV	0.22529 ug C	0.04461 pp
SPL# 00011	01:59:02	TIC =	0.97589 mV	0.04780 ug C	0.00946 pp
SPL# 00011	02:04:02	TOC =	3.03245 mV	0.14854 ug C	0.02941 pp
SPL# 00012	02:07:07	TIC =	8.56115 mV	0.41936 ug C	0.08304 pp
SPL# 00012	02:12:07	TOC =	15.1290 mV	0.74108 ug C	0.14674 pp
SPL# 00013	02:15:12	TIC =	8.01695 mV	0.39270 ug C	0.07776 pp
SPL# 00013	02:20:12	TOC =	12.2916 mV	0.60209 ug C	0.11922 pp
SPL# 00014	02:23:17	TIC =	11.8953 mV	0.58268 ug C	0.11538 pp
SPL# 00014	02:28:17	TOC =	521.297 mV	25.5354 ug C	5.05652 pp
SPL# 00015	02:31:22	TIC =	14.7020 mV	0.72016 ug C	0.14260 pp
SPL# 00015	02:36:22	TOC =	517.958 mV	25.3719 ug C	5.02413 pp
SPL# 00016	02:39:27	TIC =	17.0544 mV	0.83539 ug C	0.16542 pp
SPL# 00016	02:44:27	TOC =	515.643 mV	25.2585 ug C	5.00168 pp
SPL# 00017	02:47:32	TIC =	15.9458 mV	0.78109 ug C	0.15467 pp
SPL# 00017	02:52:32	TOC =	519.145 mV	25.4300 ug C	5.03565 pp
SPL# 00018	02:55:37	TIC =	14.7572 mV	0.72287 ug C	0.14314 pp
SPL# 00018	03:00:37	TOC =	817.572 mV	40.0483 ug C	7.93036 pp
SPL# 00019	03:03:42	TIC =	15.4479 mV	0.75670 ug C	0.14984 pp
SPL# 00019	03:08:42	TOC =	822.070 mV	40.2686 ug C	7.97399 pp
SPL# 00020	03:11:47	TIC =	7.20189 mV	0.35278 ug C	0.06985 pp
SPL# 00020	03:16:47	TOC =	16.4553 mV	0.80605 ug C	0.15961 pp
[illegible]	[illegible]	TIC =	[illegible] mV	[illegible] ug C	0.06485 pp

SPL# 00022	03:27:57	TIC =	11.4018 mV	0.55851 ug C	0.11059 pp
SPL# 00022	03:32:57	TOC =	109.958 mV	5.38623 ug C	1.06658 pp
SPL# 00023	03:36:02	TIC =	11.7581 mV	0.57596 ug C	0.11405 pp
SPL# 00023	03:41:02	TOC =	111.418 mV	5.45775 ug C	1.08074 pp
SPL# 00024	03:44:07	TIC =	17.4708 mV	0.85579 ug C	0.16946 pp
SPL# 00024	03:49:07	TOC =	63.6389 mV	3.11732 ug C	0.61729 pp
SPL# 00025	03:52:12	TIC =	19.1959 mV	0.94030 ug C	0.18619 pp
SPL# 00025	03:57:12	TOC =	62.2399 mV	3.04879 ug C	0.60372 pp
SPL# 00026	04:00:17	TIC =	17.8875 mV	0.87621 ug C	0.17350 pp
SPL# 00026	04:05:17	TOC =	13.6098 mV	0.66666 ug C	0.13201 pp
SPL# 00027	04:08:22	TIC =	17.9709 mV	0.88029 ug C	0.17431 pp
SPL# 00027	04:13:22	TOC =	10.8376 mV	0.53087 ug C	0.10512 pp
SPL# 00028	04:16:27	TIC =	30.0849 mV	1.47369 ug C	0.29182 pp
SPL# 00028	04:21:27	TOC =	915.175 mV	44.8293 ug C	8.87709 pp
SPL# 00029	04:24:32	TIC =	32.4026 mV	1.58722 ug C	0.31430 pp
SPL# 00029	04:29:32	TOC =	915.327 mV	44.8368 ug C	8.87856 pp
SPL# 00030	04:32:37	TIC =	897.470 mV	43.9620 ug C	8.70536 pp
SPL# 00030	04:37:37	TOC =	776.305 mV	38.0268 ug C	7.53007 pp
SPL# 00031	04:40:42	TIC =	894.712 mV	43.8269 ug C	8.67860 pp
SPL# 00031	04:45:42	TOC =	787.998 mV	38.5996 ug C	7.64349 pp
SPL# 00032	04:48:47	TIC =	903.749 mV	44.2696 ug C	8.76626 pp
SPL# 00032	04:53:47	TOC =	807.059 mV	39.5333 ug C	7.82838 pp
SPL# 00033	04:56:52	TIC =	929.264 mV	45.5195 ug C	9.01376 pp
SPL# 00033	05:01:52	TOC =	807.979 mV	39.5784 ug C	7.83731 pp
SPL# 00034	05:04:57	TIC =	21.7119 mV	1.06354 ug C	0.21060 pp
SPL# 00034	05:09:57	TOC =	526.866 mV	25.8082 ug C	5.11054 pp
SPL# 00035	05:13:02	TIC =	11.9501 mV	0.58537 ug C	0.11591 pp
SPL# 00035	05:18:02	TOC =	14.4532 mV	0.70798 ug C	0.14019 pp
SPL# 00036	05:21:07	TIC =	51.3329 mV	2.51451 ug C	0.49792 pp
SPL# 00036	05:26:07	TOC =	49.2440 mV	2.41219 ug C	0.47766 pp
SPL# 00037	05:29:12	TIC =	19.5864 mV	0.95942 ug C	0.18998 pp
SPL# 00037	05:34:12	TOC =	21.6275 mV	1.05941 ug C	0.20978 pp
SPL# 00038	05:37:17	TIC =	24.1853 mV	1.18471 ug C	0.23459 pp
SPL# 00038	05:42:17	TOC =	18.5798 mV	0.91011 ug C	0.18022 pp
SPL# 00039	05:45:22	TIC =	18.1934 mV	0.89119 ug C	0.17647 pp
SPL# 00039	05:50:22	TOC =	26.0491 mV	1.27600 ug C	0.25267 pp
SPL# 00040	05:53:27	TIC =	27.6365 mV	1.35376 ug C	0.26807 pp
SPL# 00040	05:58:27	TOC =	28.1017 mV	1.37654 ug C	0.27258 pp
SPL# 00041	06:01:32	TIC =	33.6665 mV	1.64913 ug C	0.32656 pp
SPL# 00041	06:06:32	TOC =	20.5143 mV	1.00488 ug C	0.19898 pp
SPL# 00042	06:09:37	TIC =	29.3718 mV	1.43876 ug C	0.28490 pp
SPL# 00042	06:14:37	TOC =	32.6721 mV	1.60042 ug C	0.31691 pp
[illegible]	[illegible]	TIC =	[illegible] mV	1.54791 ug C	0.30651 pp

SPL# 00044	06:25:47	TIC =	28.4892 mV	1.39552 ug C	0.27634 ppm
SPL# 00044	06:30:47	TOC =	18.5230 mV	0.90733 ug C	0.17967 ppm
SPL# 00045	06:33:52	TIC =	26.6721 mV	1.30652 ug C	0.25871 ppm
SPL# 00045	06:38:52	TOC =	14.6502 mV	0.71763 ug C	0.14210 ppm
SPL# 00046	06:41:57	TIC =	18.7780 mV	0.91982 ug C	0.18214 ppm
SPL# 00046	06:46:57	TOC =	63.6078 mV	3.11579 ug C	0.61698 ppm
SPL# 00047	06:50:02	TIC =	18.4995 mV	0.90618 ug C	0.17944 ppm
SPL# 00047	06:55:02	TOC =	10.3353 mV	0.50627 ug C	0.10025 ppm
SPL# 00048	06:58:07	TIC =	32.7183 mV	1.60269 ug C	0.31736 ppm
SPL# 00048	07:03:07	TOC =	15.4109 mV	0.75489 ug C	0.14948 ppm
SPL# 00049	07:06:12	TIC =	25.8794 mV	1.26769 ug C	0.25102 ppm
SPL# 00049	07:11:12	TOC =	20.1439 mV	0.98673 ug C	0.19539 ppm
SPL# 00050	07:14:17	TIC =	19.9493 mV	0.97720 ug C	0.19350 ppm
SPL# 00050	07:19:17	TOC =	63.0789 mV	3.08988 ug C	0.61185 ppm
SPL# 00051	07:22:22	TIC =	11.8678 mV	0.58133 ug C	0.11511 ppm
SPL# 00051	07:27:22	TOC =	8.97095 mV	0.43943 ug C	0.08701 ppm
SPL# 00052	07:30:27	TIC =	47.3804 mV	2.32090 ug C	0.45958 ppm
SPL# 00052	07:35:27	TOC =	21.0278 mV	1.03003 ug C	0.20396 ppm
SPL# 00053	07:38:32	TIC =	29.8851 mV	1.46390 ug C	0.28988 ppm
SPL# 00053	07:43:32	TOC =	24.2640 mV	1.18856 ug C	0.23535 ppm
SPL# 00054	07:46:37	TIC =	35.8286 mV	1.75504 ug C	0.34753 ppm
SPL# 00054	07:51:37	TOC =	30.2504 mV	1.48180 ug C	0.29342 ppm
SPL# 00055	07:54:42	TIC =	29.5714 mV	1.44854 ug C	0.28683 ppm
SPL# 00055	07:59:42	TOC =	40.4270 mV	1.98029 ug C	0.39213 ppm
SPL# 00056	08:02:47	TIC =	29.1439 mV	1.42760 ug C	0.28269 ppm
SPL# 00056	08:07:47	TOC =	27.0020 mV	1.32268 ug C	0.26191 ppm
SPL# 00057	08:10:52	TIC =	27.2676 mV	1.33569 ug C	0.26449 ppm
SPL# 00057	08:15:52	TOC =	36.4603 mV	1.78599 ug C	0.35366 ppm
SPL# 00058	08:18:57	TIC =	27.4662 mV	1.34542 ug C	0.26641 ppm
SPL# 00058	08:23:57	TOC =	25.8184 mV	1.26470 ug C	0.25043 ppm
SPL# 00059	08:27:02	TIC =	26.4172 mV	1.29403 ug C	0.25624 ppm
SPL# 00059	08:32:02	TOC =	48.4881 mV	2.37516 ug C	0.47032 ppm
SPL# 00060	08:35:07	TIC =	29.4858 mV	1.44435 ug C	0.28600 ppm
SPL# 00060	08:40:07	TOC =	65.9790 mV	3.23194 ug C	0.63998 ppm
SPL# 00061	08:43:12	TIC =	25.3988 mV	1.24415 ug C	0.24636 ppm
SPL# 00061	08:48:12	TOC =	13.0484 mV	0.63916 ug C	0.12656 ppm
SPL# 00062	08:51:17	TIC =	45.2540 mV	2.21674 ug C	0.43895 ppm
SPL# 00062	08:56:17	TOC =	18.9206 mV	0.92681 ug C	0.18352 ppm
SPL# 00063	08:59:22	TIC =	58.0927 mV	2.84564 ug C	0.56349 ppm
SPL# 00063	09:04:22	TOC =	23.8905 mV	1.17026 ug C	0.23173 ppm
SPL# 00064	09:07:27	TIC =	39.5416 mV	1.93692 ug C	0.38354 ppm
SPL# 00064	09:12:27	TOC =	141.488 mV	6.93069 ug C	1.37241 ppm
SPL# 00065	09:15:32	TIC =	36.7831 mV	1.80180 ug C	0.35679 ppm

SPL# 00066	09:23:37	TIC =	53.1565 mV	2.60384 ug C	0.51561 ppm
SPL# 00066	09:28:37	TOC =	76.2746 mV	3.73627 ug C	0.73985 ppm
SPL# 00067	09:31:42	TIC =	70.0615 mV	3.43192 ug C	0.67958 ppm
SPL# 00067	09:36:42	TOC =	144.681 mV	7.08709 ug C	1.40338 ppm
SPL# 00068	09:39:47	TIC =	53.0367 mV	2.59797 ug C	0.51445 ppm
SPL# 00068	09:44:47	TOC =	78.5439 mV	3.84743 ug C	0.76186 ppm
SPL# 00069	09:47:52	TIC =	65.4671 mV	3.20687 ug C	0.63502 ppm
SPL# 00069	09:52:52	TOC =	156.960 mV	7.68857 ug C	1.52249 ppm
SPL# 00070	09:55:57	TIC =	28.6883 mV	1.40528 ug C	0.27827 ppm
SPL# 00070	10:00:57	TOC =	64.6984 mV	3.16922 ug C	0.62756 ppm
SPL# 00071	10:04:02	TIC =	18.4717 mV	0.90482 ug C	0.17917 ppm
SPL# 00071	10:09:02	TOC =	10.8655 mV	0.53224 ug C	0.10539 ppm
SPL# 00072	10:12:07	TIC =	27.3811 mV	1.34125 ug C	0.26559 ppm
SPL# 00072	10:17:07	TOC =	17.8705 mV	0.87537 ug C	0.17334 ppm
SPL# 00073	10:20:12	TIC =	27.9490 mV	1.36906 ug C	0.27110 ppm
SPL# 00073	10:25:12	TOC =	27.6962 mV	1.35668 ug C	0.26865 ppm
SPL# 00074	10:28:17	TIC =	29.5143 mV	1.44574 ug C	0.28628 ppm
SPL# 00074	10:33:17	TOC =	269.858 mV	13.2189 ug C	2.61759 ppm
SPL# 00075	10:36:22	TIC =	29.6854 mV	1.45412 ug C	0.28794 ppm
SPL# 00075	10:41:22	TOC =	544.669 mV	26.6803 ug C	5.28323 ppm
SPL# 00076	10:44:27	TIC =	63.1700 mV	3.09435 ug C	0.61274 ppm
SPL# 00076	10:49:27	TOC =	177.429 mV	8.69126 ug C	1.72104 ppm
SPL# 00077	10:52:32	TIC =	127.121 mV	6.22694 ug C	1.23306 ppm
SPL# 00077	10:57:32	TOC =	350.114 mV	17.1501 ug C	3.39607 ppm
SPL# 00078	11:00:37	TIC =	65.9584 mV	3.23094 ug C	0.63978 ppm
SPL# 00078	11:05:37	TOC =	178.187 mV	8.72840 ug C	1.72840 ppm
SPL# 00079	11:08:42	TIC =	140.235 mV	6.86932 ug C	1.36026 ppm
SPL# 00079	11:13:42	TOC =	356.710 mV	17.4732 ug C	3.46004 ppm
SPL# 00080	11:16:47	TIC =	26.0209 mV	1.27462 ug C	0.25240 ppm
SPL# 00080	11:21:47	TOC =	19.3754 mV	0.94909 ug C	0.18793 ppm
SPL# 00081	11:24:52	TIC =	27.2108 mV	1.33291 ug C	0.26394 ppm
SPL# 00081	11:29:52	TOC =	29.9304 mV	1.46612 ug C	0.29032 ppm
SPL# 00082	11:32:57	TIC =	23.7628 mV	1.16401 ug C	0.23049 ppm
SPL# 00082	11:37:57	TOC =	527.607 mV	25.8445 ug C	5.11773 ppm
SPL# 00083	11:41:02	TIC =	29.8851 mV	1.46390 ug C	0.28988 ppm
SPL# 00083	11:46:02	TOC =	15.0163 mV	0.73556 ug C	0.14565 ppm
SPL# 00084	11:49:07	TIC =	25.8794 mV	1.26769 ug C	0.25102 ppm
SPL# 00084	11:54:07	TOC =	273.580 mV	13.4012 ug C	2.65370 ppm
SPL# 00085	11:57:12	TIC =	29.6284 mV	1.45133 ug C	0.28739 ppm
SPL# 00085	12:02:12	TOC =	545.653 mV	26.7285 ug C	5.29277 ppm
SPL# 00086	12:05:17	TIC =	52.6775 mV	2.58038 ug C	0.51096 ppm
SPL# 00086	12:10:17	TOC =	172.523 mV	8.45092 ug C	1.67345 ppm
SPL# 00087	12:13:22	TIC =	97.5989 mV	4.78083 ug C	0.94669 ppm

SPL# 00088	12:21:27		TIC =	46.7297 mV	2.28903 ug C	0.45327	ppm
SPL# 00088	12:26:27		TOC =	179.022 mV	8.76930 ug C	1.73650	ppm
SPL# 00089	12:29:32		TIC =	71.1468 mV	3.48509 ug C	0.69011	ppm
SPL# 00089	12:34:32		TOC =	353.549 mV	17.3184 ug C	3.42939	ppm
SPL# 00090	12:37:37		TIC =	26.1058 mV	1.27878 ug C	0.25322	ppm
SPL# 00090	12:42:37		TOC =	530.747 mV	25.9983 ug C	5.14819	ppm
SPL# 00091	12:45:42		TIC =	23.2844 mV	1.14057 ug C	0.22585	ppm
SPL# 00091	12:50:42		TOC =	14.6220 mV	0.71625 ug C	0.14183	ppm
SPL# 00092	12:53:47		TIC =	6.76781 mV	0.33151 ug C	0.06564	ppm
SPL# 00092	12:58:47		TOC =	37.9071 mV	1.85686 ug C	0.36769	ppm
SPL# 00093	13:01:52		TIC =	7.71792 mV	0.37805 ug C	0.07486	ppm
SPL# 00093	13:06:52		TOC =	58.6204 mV	2.87149 ug C	0.56861	ppm
SPL# 00094	13:09:57		TIC =	7.71792 mV	0.37805 ug C	0.07486	ppm
SPL# 00094	13:14:57		TOC =	578.743 mV	28.3494 ug C	5.61374	ppm
SPL# 00095	13:18:02		TIC =	6.03625 mV	0.29568 ug C	0.05855	ppm
SPL# 00095	13:23:02		TOC =	239.357 mV	11.7247 ug C	2.32173	ppm
SPL# 00096	13:26:07		TIC =	6.65935 mV	0.32620 ug C	0.06459	ppm
SPL# 00096	13:31:07		TOC =	156.629 mV	7.67240 ug C	1.51929	ppm
SPL# 00097	13:34:12		TIC =	7.88100 mV	0.38604 ug C	0.07644	ppm
SPL# 00097	13:39:12		TOC =	372.587 mV	18.2509 ug C	3.61405	ppm
SPL# 00098	13:42:17		TIC =	7.41909 mV	0.36342 ug C	0.07196	ppm
SPL# 00098	13:47:17		TOC =	150.209 mV	7.35788 ug C	1.45701	ppm
SPL# 00099	13:50:22		TIC =	12.1971 mV	0.59746 ug C	0.11831	ppm
SPL# 00099	13:55:22		TOC =	376.895 mV	18.4620 ug C	3.65583	ppm
SPL# 00100	13:58:27		TIC =	23.9036 mV	1.17090 ug C	0.23186	ppm
SPL# 00100	14:03:27		TOC =	529.547 mV	25.9396 ug C	5.13655	ppm
SPL# 00101	14:06:32		TIC =	17.1654 mV	0.84083 ug C	0.16650	ppm
SPL# 00101	14:11:32		TOC =	15.3827 mV	0.75351 ug C	0.14921	ppm
SPL# 00102	14:14:37	N.L.	TIC =	1737.19 mV	85.0951 ug C	16.8505	ppm
SPL# 00102	14:19:37		TOC =	456.200 mV	22.3467 ug C	4.42509	ppm
SPL# 00103	14:22:42	N.L.	TIC =	2064.65 mV	101.136 ug C	20.0268	ppm
SPL# 00103	14:27:42		TOC =	460.098 mV	22.5376 ug C	4.46290	ppm
SPL# 00104	14:30:47	N.L.	TIC =	2002.64 mV	98.0983 ug C	19.4254	ppm
SPL# 00104	14:35:47		TOC =	293.794 mV	14.3913 ug C	2.84977	ppm
SPL# 00105	14:38:52	N.L.	TIC =	2033.56 mV	99.6126 ug C	19.7253	ppm
SPL# 00105	14:43:52		TOC =	297.676 mV	14.5815 ug C	2.88742	ppm
SPL# 00106	14:46:57	N.L.	TIC =	1985.80 mV	97.2732 ug C	19.2620	ppm
SPL# 00106	14:51:57		TOC =	289.665 mV	14.1891 ug C	2.80972	ppm
SPL# 00107	14:55:02	O.R.	TIC =	2253.87 mV	110.405 ug C	21.8623	ppm
SPL# 00107	15:00:02		TOC =	281.603 mV	13.7942 ug C	2.73152	ppm
SPL# 00108	15:03:07	N.L.	TIC =	1745.26 mV	85.4903 ug C	16.9288	ppm
SPL# 00108	15:08:07		TOC =	305.812 mV	14.9800 ug C	2.96634	ppm
SPL# 00108	15:11:12	N.L.	TIC =	1473.41 mV	72.1743 ug C	14.2919	ppm

SPL# 00110	15:19:17		TIC =	24.0726 mV	1.17918 ug C	0.23350 ppm
SPL# 00110	15:24:17		TOC =	529.833 mV	25.9535 ug C	5.13932 ppm
SPL# 00111	15:27:22		TIC =	23.0313 mV	1.12817 ug C	0.22340 ppm
SPL# 00111	15:32:22		TOC =	12.7399 mV	0.62405 ug C	0.12357 ppm
SPL# 00112	15:35:27	N.L.	TIC =	1623.99 mV	79.5504 ug C	15.7526 ppm
SPL# 00112	15:40:27		TOC =	69.4619 mV	3.40255 ug C	0.67377 ppm
SPL# 00113	15:43:32	N.L.	TIC =	1344.55 mV	65.8619 ug C	13.0420 ppm
SPL# 00113	15:48:32		TOC =	69.2730 mV	3.39330 ug C	0.67194 ppm
SPL# 00114	15:51:37		TIC =	17.8042 mV	0.87212 ug C	0.17269 ppm
SPL# 00114	15:56:37		TOC =	78.7361 mV	3.85684 ug C	0.76373 ppm
SPL# 00115	15:59:42		TIC =	15.8075 mV	0.77432 ug C	0.15333 ppm
SPL# 00115	16:04:42		TOC =	78.2557 mV	3.83331 ug C	0.75907 ppm
SPL# 00116	16:07:47	N.L.	TIC =	1378.01 mV	67.5011 ug C	13.3666 ppm
SPL# 00116	16:12:47		TOC =	57.8195 mV	2.83226 ug C	0.56084 ppm
SPL# 00117	16:15:52	N.L.	TIC =	1206.72 mV	59.1103 ug C	11.7050 ppm
SPL# 00117	16:20:52		TOC =	56.9277 mV	2.78857 ug C	0.55219 ppm
SPL# 00118	16:23:57		TIC =	23.6502 mV	1.15849 ug C	0.22940 ppm
SPL# 00118	16:28:57		TOC =	60.4424 mV	2.96074 ug C	0.58628 ppm
SPL# 00119	16:32:02		TIC =	21.7119 mV	1.06354 ug C	0.21060 ppm
SPL# 00119	16:37:02		TOC =	59.7314 mV	2.92591 ug C	0.57938 ppm
SPL# 00120	16:40:07	N.L.	TIC =	1655.62 mV	81.0998 ug C	16.0594 ppm
SPL# 00120	16:45:07		TOC =	80.0193 mV	3.91970 ug C	0.77617 ppm
SPL# 00121	16:48:12	N.L.	TIC =	1390.11 mV	68.0937 ug C	13.4839 ppm
SPL# 00121	16:53:12		TOC =	70.3441 mV	3.44577 ug C	0.68233 ppm
SPL# 00122	16:56:17		TIC =	30.3133 mV	1.48488 ug C	0.29403 ppm
SPL# 00122	17:01:17		TOC =	109.212 mV	5.34971 ug C	1.05935 ppm
SPL# 00123	17:04:22		TIC =	26.8989 mV	1.31763 ug C	0.26091 ppm
SPL# 00123	17:09:22		TOC =	9.44385 mV	0.46260 ug C	0.09160 ppm
SPL# 00124	17:12:27		TIC =	20.1727 mV	0.98814 ug C	0.19567 ppm
SPL# 00124	17:17:27		TOC =	79.2811 mV	3.88354 ug C	0.76901 ppm
SPL# 00125	17:20:32		TIC =	18.8058 mV	0.92119 ug C	0.18241 ppm
SPL# 00125	17:25:32		TOC =	72.9364 mV	3.57275 ug C	0.70747 ppm
SPL# 00126	17:28:37	N.L.	TIC =	1740.28 mV	85.2466 ug C	16.8805 ppm
SPL# 00126	17:33:37		TOC =	71.3226 mV	3.49370 ug C	0.69182 ppm
SPL# 00127	17:36:42	N.L.	TIC =	1455.33 mV	71.2884 ug C	14.1165 ppm
SPL# 00127	17:41:42		TOC =	69.6823 mV	3.41335 ug C	0.67591 ppm
SPL# 00128	17:44:47		TIC =	19.4190 mV	0.95122 ug C	0.18836 ppm
SPL# 00128	17:49:47		TOC =	70.7227 mV	3.46431 ug C	0.68600 ppm
SPL# 00129	17:52:52		TIC =	18.2212 mV	0.89255 ug C	0.17674 ppm
SPL# 00129	17:57:52		TOC =	71.4174 mV	3.49834 ug C	0.69274 ppm
SPL# 00130	18:00:57		TIC =	19.7538 mV	0.96763 ug C	0.19161 ppm
SPL# 00130	18:05:57		TOC =	76.1152 mV	3.72846 ug C	0.73830 ppm
SPL# 00131	18:08:02		TIC =	20.4801 mV	1.00321 ug C	0.19865 ppm

SPL# 00132	18:17:07	N.L.	TIC =	1127.27	mV	55.2187	ug C	10.9344 ppm
SPL# 00132	18:22:07		TOC =	56.0068	mV	2.74346	ug C	0.54326 ppm
SPL# 00133	18:25:12		TIC =	876.126	mV	42.9165	ug C	8.49832 ppm
SPL# 00133	18:30:12		TOC =	58.3122	mV	2.85639	ug C	0.56562 ppm
SPL# 00134	18:33:17		TIC =	35.3088	mV	1.72958	ug C	0.34249 ppm
SPL# 00134	18:38:17		TOC =	60.2568	mV	2.95165	ug C	0.58448 ppm
SPL# 00135	18:41:22		TIC =	33.7240	mV	1.65195	ug C	0.32711 ppm
SPL# 00135	18:46:22		TOC =	59.5769	mV	2.91834	ug C	0.57788 ppm
SPL# 00136	18:49:27		TIC =	29.0015	mV	1.42062	ug C	0.28131 ppm
SPL# 00136	18:54:27		TOC =	107.927	mV	5.28674	ug C	1.04688 ppm
SPL# 00137	18:57:32		TIC =	14.2330	mV	0.69719	ug C	0.13805 ppm
SPL# 00137	19:02:32		TOC =	4.87467	mV	0.23878	ug C	0.04728 ppm
SPL# 00138	19:05:37		TIC =	28.3185	mV	1.38717	ug C	0.27468 ppm
SPL# 00138	19:10:37		TOC =	9.33253	mV	0.45714	ug C	0.09052 ppm

Thursday, October 23, 199

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 3845RC

REQUEST NUMBER: 3845R
ANALYSIS TYPE: OTHER

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

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-97-0487	01	1 L amber glass	HUMACID

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 3845R Page 1

Relinquished By:		Date	Time
Joylene Valdez (PRINTED NAME)	Joylene Valdez (SIGNATURE)	10-23-97	12:55
PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE		

Received By:		Date	Time
MARY DUNLAP (PRINTED NAME)	Mary Dunlap (SIGNATURE)	10/24/97	9:15
PRINTED NAME	SIGNATURE		
PRINTED NAME	SIGNATURE		

Received for DISPOSAL By:		Date	Time
PRINTED NAME	SIGNATURE		

Remarks:

Wednesday, November 05, 1997

REQUEST NUMBER: 3882R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

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

9711049

Please analyze the enclosed samples according to the schedule indicated:

SHIP DATE: 11/5/97
REPORT DUE: 12/5/97
TURN AROUND REQ'D: 30 days

These samples are on:

LANL Request Number: 3882R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MA42 5560 0030

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; PREVIOUS SCREENIED UNDER 04LA-97-0486

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
GROSSAB		04LA-97-0566	01	W	10/20/97	-01

Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 3882R

Date File Saved: 11/22/97

Section 1. Sample Identification Numbers

LANL Sample IDs	PAI Sample IDs
04LA-97-0566	97-11-049

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: GROSS AB

Samples under Request Number 3882R (PAI Work Order 97-11-049) were received on 11/06/97 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.

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

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.

for Donald Gipple
Laboratory Manager

11/24/97
Date

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: **3882R** LAB NAME: **Paragon** LAB CODE_____

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

VALIDATION DATE: **5 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: _____ 5Dec97

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

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.

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? 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).**	**NA**	**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**

M 5 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.** *The decision level result from the blank was used in place of the MDA for this test.*	**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

M5 Dec 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**

A 15 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: 3882R

Sample Matrix : Water

Lab Sample ID Series: 97-11-049

Count Duration: 600 Min.

Analyzed By : RG

Client Sample ID	Lab Sample ID	Gross Alpha (pCi/l)	Gross Beta (pCi/l)
04LA-97-0566	11-049-01	15.0 ± 3.7	32.0 ± 5.2
04LA-97-0566	11-049-D1	16.8 ± 3.6	29.8 ± 4.9

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 97-11-049-D1 is a duplicate of sample 97-11-049-01.

M 5 Dec 97

Thursday, November 13, 1997

Los Alamos
NATIONAL LABORATORY

DATA ENTERED
112697 VI

REQUEST NUMBER: 3905R
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: 11/13/97
REPORT DUE: 12/15/97
TURN AROUND REQ'D: 30 days

These samples are on:

LANL Request Number: 3905R
Per Agreement Number: PO 256BA
Project Cost Code: MA4255600030

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP; PO # G5007

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-97-0483	09	W	10/16/97	

3905
3906

UNIVERSITY OF Miami

January 6, 1998

TRITIUM LABORATORY

Data Release #98-07
Job # 1016

1998 JAN

LOS ALAMOS NATIONAL LABORATORY
TRITIUM SAMPLES

Purchase Order No. G5007

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. Temple
Approved By:
Date Sent: 1/14/98

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
Recvd : 97/11/14
Job# : 1016
Final : 98/01/02

Purchase Order: G5007
Contact: J. Valdez 505/665-9968
Env. Sci. & Waste Tech. 665-9118(F)
CTS-7, Los Alamos, NM 87545

Cust LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
LANL-04LA-97-0483	1016.01	971016	500	170	32.5	1.1
LANL-04LA-97-0486	1016.02	971020	500	157	21.0 *	0.7

* Average of duplicate runs

3905RA
3906RA

UNIVERSITY OF Miami

February 18, 1998

FEB 1998

TRITIUM LABORATORY

Data Release #98-07 - Amendment II
Job # 1016

LOS ALAMOS NATIONAL LABORATORY
TRITIUM SAMPLES

Purchase Order No. G5007

Report Compiled: Robert A. Tapia

Approved By: _____

Date Sent: 2/24/98

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

FIELD COPY

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.

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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: G5007
Recvd : 97/11/14 Contact: J. Valdez 505/665-9968
Job# : 1016 Env. Sci. & Waste Tech. 665-9118(F)
Final : 98/02/17 LABORATORY & REQUESTED RERUNS CTS-7, Los Alamos, NM 87545

Cust LABEL INFO		JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
LANL REQUEST #3906R:							
LANL-04LA-97-0486	ORIGINAL	1016.01	971016	500	216	34.0	1.2
LANL-04LA-97-0486	RERUN	1016.01	971016	500	170	32.5	1.3
LANL-04LA-97-0486	AVERAGE	1016.01	971016	500	170	33.3	1.1
LANL-04LA-97-0486	RERUN #2	1016.01	971016	500	DIR	34	3
LANL REQUEST #3905R:							
LANL-04LA-97-0483	ORIGINAL	1016.02	971020	500	222	21.1	0.7
LANL-04LA-97-0483	RERUN	1016.02	971020	500	157	20.9	0.7
LANL-04LA-97-0483	AVERAGE	1016.02	971020	500	157	21.0	0.7
LANL-04LA-97-0483	RERUN #2	1016.02	971020	500	DIR	21	2

UNIVERSITY OF Miami

January 20, 1998

3905 Add
3906 Add

TRITIUM LABORATORY

Data Release #98-07 - Amendment
Job # 1016

JAN 1998 RECEIVED

LOS ALAMOS NATIONAL LABORATORY
TRITIUM SAMPLES

Purchase Order No. G5007

Report Sent To: [illegible]

Approved By: _____

Date Sent: 1/27/98

for 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

COPY

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

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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
Recvd : 97/11/14
Job# : 1016
Final : 98/01/02

Purchase Order: G5007
Contact: J. Valdez 505/665-9968
Env. Sci. & Waste Tech. 665-9118(F)
CTS-7, Los Alamos, NM 87545

Cust LABEL INFO		JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
LANL REQUEST #3906R:							
LANL-04LA-97-0486	ORIGINAL	1016.01	971016	500	216	34.0	1.2
LANL-04LA-97-0486	RERUN	1016.01	971016	500	170	32.5	1.3
LANL-04LA-97-0486	AVERAGE	1016.01	971016	500	170	33.3	1.1
LANL REQUEST #3905R:							
LANL-04LA-97-0483	ORIGINAL	1016.02	971020	500	222	21.1	0.7
LANL-04LA-97-0483	RERUN	1016.02	971020	500	157	20.9	0.7
LANL-04LA-97-0483	AVERAGE	1016.02	971020	500	157	21.0	0.7

UNIVERSITY OF Miami

Ref.210-018:JDH:cg
January 16, 1998

Dr. Joylene Valdez
Los Alamos National Laboratory
Environmental Science & Waste
Technology, CTS-7
Los Alamos, New Mexico 87545

Dear Joylene:

It appears that we have made an error of sample mix up on the last set of samples that you sent us. When you phoned to request possible reruns, the mistake became apparent. We have good QA/QC here at the lab, and this should never have happened, but it did, and we sincerely apologize. Following this cover letter is the replacement table of final data with the corrected sample identifications and a listing of all runs, including our laboratory reruns.

We propose to do a second set reruns on both samples, using direct counting, without enrichment. There is sufficient sample remaining to do so. Due to the sample label mix-up on our part, we will not charge for <u>any</u> analyses of these samples.

Please let us know if there is additional assistance we can give.

Sincerely,

James D. Happell

Dr. James D. Happell
Associate Research Professor

Enclosure

CC: Patrick Longmire

Rosenstiel School of Marine and Atmospheric Science
Tritium Laboratory
4600 Rickenbacker Causeway
Miami, Florida 33149-1098
(305) 361-4100
Fax (305) 361-4112

DATA ENTERED

010798 RT

Monday, December 22, 1997

REQUEST NUMBER: 4011R

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

These samples are on:

LANL Request Number: 4011R
Per Agreement Number: 7791L0014-9S
Project Cost Code: MA4355600040

RAD SCREENING: Not Required

COMMENTS: LA - 1049 , AP; SAMPLES SHIPPED 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-97-0630	01	W	12/18/97	

Final Page of REQUEST NUMBER 4011R

TELEDYNE
BROWN ENGINEERING
Environmental Services
50 VAN BUREN AVENUE
P.O. BOX 1235
WESTWOOD, NEW JERSEY 07675-1235
(201) 664-7070 FAX (201) 664-5585

4011

WESTON/LOS ALAMOS NL PROJECT

Case Narrative/Cover Sheet for Reports of Analysis and Lab Data

Date 3-17-98

TI #'s 66184 - 66185

WO # L8 Contains two water samples for low level tritium analysis by enrichment, received 12/30/97 in good condition.

Comments:

There were no unusual occurrences with the analysis of these sample.

Contents:	Procedure #'s	Bench & Work Sheet Pages	Calibration, Background & Source Checks
Reports of Analysis		1	
Tritium	PRO-052-35	3	15
C-O-C		7	
Other		-	

TIQA Spike Activity (pCi/l) for TI # 69700

Nuclide	Introduced	Acceptable Range	Measured	% Recovery
H-3	1700 ± 700	1200 - 2200	1800 ± 300	106

"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 hard copy data package has been authorized by the laboratory manager or his designee, as verified by the following signature." A. J. Negun

TELEDYNE BROWN ENGINEERING Environmental Services

REPORT OF ANALYSIS

Mar 17 1998, 08:47 am

LOGIN # LS

Address:	Work Order #:	Client P.O. #:	Date Released	Delivery Date:	Page: 1
JUDY STONE RECRA ENVIRONMENTAL INC 208 WELSH POOL ROAD LANSDALE PA 19341-1333	LS	LS2B LL-2253-P4 NOD1 Release #:	12/30/97	01/29/98	

Telebyte Sample #	Customer's Identification	Sta. #	Collection Date Start Date/Time	End Date/Time	Matrix/ Method	Activity	Units	Date Date	Volume	Units	Lab	Comment
Matrix - W:Other												
LS-1	04LA-97-0027-19		12/30/97 11:00		Water							
TIB-66184					H-3	7.9 +-1.7 E 00	pCi/l	03/15/98			52	
	04LA-97-0027				H-3	L.T. 2. E 00		03/15/98			52	
LS-2	04LA-97-0630-03		12/18/97 13:30		Water							
TIB-66185					H-3	1.0 +-0.2 E 01		03/15/98			52	
					H-3	L.T. 2. E 00		03/16/98			52	

04LA-97-0630

Approved By: J Duenther

Last Page of Report

Lab Key: 22 - Rad Chem

Copy: 1 of 1

(LB-1,2)

Counter P-2550
Disk

TRITIUM BY ENRICHMENT AND LIQUID SCINTILLATION

H-3 (LS & ENR)

Customer RECRA
Analyst F.D.

TI No.	Type	Mid Count	N	Δt min	V LS ml	Bkg. cpm	Eff.	Enrichment	Result
66184	WO	3/15/98 Cell No. 61	1446	600	10.0	1.63	0.20	V+ ____ g ____ g Vf 11.683 g Vo 243.9 g	2.9 ± 1.7 E00 SECONDARY L.T. 2. E00
66185	WO	3/16/98 Cell No. 10	1614	600	10.0	1.63	0.20	V+ ____ g ____ g Vf 11.384 g Vo 253.3 g	1.0 ± 0.2 E01 SECONDARY L.T. 2. E00
		Cell No.						V+ ____ g ____ g Vf ____ g Vo ____ g	SECONDARY
		Cell No.						V+ ____ g ____ g Vf ____ g Vo ____ g	SECONDARY

Result Units pCi/l
Code A

Calc. by [signature] Date 03-16-98
Checked by [signature] Date 3-16-98

IWL-38 Issued 06/20/84

41

15 Mar 98 08:17 Page #1

Protocol #: 5 H3LS10.0ML 600MIN User : PACKARD 2550

Time: 600.00
Data Mode: DPM Nuclide: H3G10ML97 Quench Set: H3971OML
Background Subtract: None

	LL	UL	LCR	2σ%	BKG
Region A:	2.0 -	10.4	0	0.5	0.00
Region B:	18.6 -	156	0	0.0	0.00
Region C:	1.5 -	10.4	0	0.0	0.00

Quench Indicator: tSIE/AEC
Ext Std Terminator: Count

PACKARD 2550
Luminescence Correction On
Heterogeneity Monitor On
Color Quench Correction On
Low Level Count Mode On

S#	TIME	CPMA	CPMB	DPM1	tSIE	EFF	FLAG			
1	600.00	1.63	4.84	8.22	251.37	0.20	E	BLANK	10.0	
2	600.00	2.41	5.21	12.05	253.36	0.20	E	RECRA	66184	10.0 } ENR
3	600.00	2.69	5.15	13.53	252.29	0.20	E	"	66185	" }

TELEDYNE ISOTOPES

BACKGROUND

Month/Year MARCH 1998 Liquid Scintillation Counter P-2550

Control Limits: 1 ml ultima gold XR 2.-8. cpm; 5 ml ultima gold XR 2.-8. cpm; 10 ml ultima gold XR 0.5-8. cpm

Date	ΔE (min)	1.0 ml gold (cpm)	5.0 ml gold (cpm)	10.0 ml gold (cpm)	Initial
1	200			1.30	F.D.
2	100	1.53			F.D.
3	200/100	1.63		1.20	F.D.
4					
5	100	1.68			F.D.
6	100	1.21			F.D.
7	400/100	1.39		0.98	F.D.
8	100			1.25	F.D.
9	100/100	1.53		1.26	F.D.
10					
11	100/100	1.41/1.06			F.D.
12	600			1.80	F.D.
13	100	1.54			F.D.
14	100	1.64			F.D.
15	600			1.63	F.D.
16	100			1.92	F.D.
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					

Comments/Changes: _____

Reviewed by: _____ Date: _____

TWL-65A 3/94

Customer TBQA
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

	Ti 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										
	Secondary	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

TELEDYNE ISOTOPES

INVENTORY OF CERTIFIED STANDARD

NUCLIDE: H-3

PURCHASED FROM: NIST

CERTIFICATE NUMBER: SRM 4926D-131 DATE: 7/25/89

PURCHASE ORDER NO: 58506 DATE: 9/22/93

DATE	DISPOSITION	COMMENTS
3/17/97	10 aliquots each 0.02298g for 10 ml Quench Curve P.2550 Ultima Gold XR D. Miller	2605 dpm / 0.02298 g

CERTIFICATE ATTACHED

H-3 Standard NIST 4926 D-131 on 7/25/89

$$\frac{2.897 \times 10^3 \text{ Bq}}{\text{gm}} \times \frac{60 \text{ dpm}}{\text{gm}} = \frac{1.738 \times 10^5 \text{ dpm}}{\text{gm}}$$

Decay to 3/17/97

$$\frac{1.738 \times 10^5 \text{ dpm}}{\text{gm}} \times .6522 = \frac{1.13352 \times 10^5 \text{ dpm}}{\text{gm}}$$

Individual Aliquot Activity

$$0.02298 \text{ gm} \times \frac{1.13352 \times 10^5 \text{ dpm}}{\text{gm}} = \boxed{2605 \text{ dpm}}$$

A. Miller

RECRA LabNet Use Only
97121950

Custody Transfer Record/Lab Work Request

RECRA LabNet

Client: LANL – REQ # 4011R
Est. Final Proj. Sampling Date:
Project #: 02744-NL4-001-9999-00
Project Contact/Phone #:
RECRA Project Manager: J.T.S.
QC: SW SEC/GLP TAT: 30 DAY
Date Rec'd: 12-29-97 Date Due: 1-22-98
Account #: LANL-COSAL

Refrigerator #
#/Type Container: Liquid / Solid
Volume: Liquid / Solid
Preservatives

ANALYSES REQUESTED: ORGANIC: VOA, BNA, Pest/PCB, Herb; INORG: Metal, CN, LMB

RECRA LabNet Use Only

MATRIX CODES	Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected	VOA	BNA	Pest/PCB	Herb	Metal	CN	LMB
S - Soil, SE - Sediment, SO - Solid, SL - Sludge, W - Water, O - Oil, A - Air, DS - Drum Solids, DL - Drum Liquids, L - EP/TCLP Leachate, W - Wipe, X - Other, F - Fish	001	04LA-97-0630-01			W	12/29/97	1830							X

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Special Instructions:

Temp - 58°C

DATE/REVISIONS:
1. → BATCH SUBMITTED TO TELEDYNE
2.
3.
4.
5.
6.

RECRA LabNet Use Only

Samples were: 1) Shipped ✓ or
4117 9908 4844
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'd Y or N

Discrepancies Between Sample Labels and COC Record? Y or N
NOTES: # 4117 9900 4844

Relinquished by	Received by	Date	Time
[illegible]	[illegible]	12/30/97	1000

Relinquished by	Received by	Date	Time

ORIGINAL

REWRITTEN

Page 1 of 1

Monday, December 22, 1997

REQUEST NUMBER: 4011R
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: 12/22/97
REPORT DUE: 1/22/97
TURN AROUND REQ'D: 30 days

These samples are on:

LANL Request Number: 4011R
Per Agreement Number: 7791L0014-93
Project Cost Code: MA435600040

RAD SCREENING: Not Required
COMMENTS: LA - 1049 , AP; SAMPLES SHIPPED TO TELEDYNE.

LANL ER SMO CONTACT: Jaylene Valdez MS H855 5056659965
Signature: Jaylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
LH3		04LA-97-0630	01	W	12/18/97	

Final Page of REQUEST NUMBER 4011R

Monday, December 22, 1997

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 4011RC

REQUEST NUMBER: 4011R
ANALYSIS TYPE: RAD

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

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-97-0630	01	500 ml poly	LH3

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 4011R Page 1

Relinquished By:	Date	Time	Received By:	Date	Time
John Kemp (PRINTED NAME) (SIGNATURE)	12/22/97	12:00	(PRINTED NAME) (SIGNATURE)		
FED Ex (PRINTED NAME) (SIGNATURE)	12/23/97	1000	(PRINTED NAME) (SIGNATURE)	12/23/97	1100
(PRINTED NAME) (SIGNATURE)			(PRINTED NAME) (SIGNATURE)		

Received for DISPOSAL By:	Date	Time	Remarks:
(PRINTED NAME) (SIGNATURE)			

RECRA LabNet Use Only
97121949

Custody Transfer Record/Lab Work Request

RECRA LabNet

Client: LANL – REQ# 4022A
Est. Final Proj. Sampling Date:
Project #: 02744-064-001-9999-00
Project Contact/Phone #: J.S.
RECRA Project Manager:
QC: SPEC Del: 04A TAT: 30 DAY
Date Rec'd: 12-23-97 Date Due: 1-22-98
Account #: LANL-LOSA

Refrigerator #
#/Type Container: Liquid / Solid
Volume: Liquid / Solid
Preservatives

ANALYSES REQUESTED → ORGANIC: VOA, BNA, Pest/PCB, Herb; INORG: Metal, CN; LH3

RECRA LabNet Use Only

MATRIX CODES:
S - Soil
SE - Sediment
SG - 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	Mark QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected	VOA	BNA	Pest/PCB	Herb	Metal	CN	LH3
001	04LA-97-06227-10			W	12/23/97	1300							X

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Special Instructions:

Temp - 5.8°C

DATE/REVISIONS:
1.
2.
3.
4.
5.
6.

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) Intact on Outer Package Y or N
3) Present on Sample Y or N
4) Intact on Sample Y or N
COC Record Present Upon Sample Rec'd Y or N

Discrepancies Between Sample Labels and COC Record? Y or N
NOTES: *4117990048 4

Relinquished by	Received by	Date	Time
[illegible]	[illegible]	12/23/97	1000

Relinquished by	Received by	Date	Time

ORIGINAL REWRITTEN

Page 1 of 1

Monday, December 22, 1997

REQUEST NUMBER: 4022R
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: 12/22/97
REPORT DUE: 1/22/98
TURN AROUND REQ'D: 30 days

These samples are on:

LANL Request Number: 4022R
Per Agreement Number: 7791L0014-98
Project Cost Code: MA4358000040

RAD SCREENING: Yes, Received

COMMENTS: LA - 1049 , AP; SAMPLE SHIPPED TO TELEDYNE.

LANL ER SMO CONTACT: Joylene Valdez MS H855 5058659968

Signature: Joylene Valdez

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
LHS		04LA-97-0627	10	W	12/20/97	

Final Page of REQUEST NUMBER 4022R

Monday, December 22, 1997

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 4022RC

REQUEST NUMBER: 4022R
ANALYSIS TYPE: RAD

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

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE
04LA-97-0827	10	500 ml poly	LHS

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 4022R Page 1

Relinquished By:		Date	Time
John Kemp (PRINTED NAME)	John Kemp (SIGNATURE)	12/22/97	12:05
FED. EX (PRINTED NAME)	FED. EX (SIGNATURE)	12/23/97	1000
(PRINTED NAME)	(SIGNATURE)		

Received By:		Date	Time
(PRINTED NAME)	(SIGNATURE)		
Donna Smith (PRINTED NAME)	Donna Smith (SIGNATURE)	12/23/97	1000
(PRINTED NAME)	(SIGNATURE)		

Received for DISPOSAL By:		Date	Time
(PRINTED NAME)	(SIGNATURE)		

Remarks:

Monday, December 22, 1997

REQUEST NUMBER: 4012R

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:

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

These samples are on:

LANL Request Number: 4012R
Per Agreement Number: PO 256BA
Project Cost Code: MA4355600040

RAD SCREENING: Yes, Received
COMMENTS: LA - 1049 , AP; P.O. #G5009

LANL ER SMO CONTACT: JOHN KEMP MS H865 505665-9968

Signature:

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
LH3		04LA-97-0629	01	W	12/18/97	

Monday, December 22, 1997

REQUEST NUMBER: 4019R
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:

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

These samples are on:

LANL Request Number: 4019R
Per Agreement Number: PO 256BA
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
LH3		04LA-97-0627	08	W	12/20/97	

4012 R
4019 R

UNIVERSITY OF Miami

February 18, 1998

TRITIUM LABORATORY

Data Release #98-20
Job # 1031

FEB 1998

LOS ALAMOS NATIONAL LABORATORY
TRITIUM SAMPLES

Purchase Order No. G5009-TEL-8-2A

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. Lopillo

Approved By: _____

Date Certified: 2/23/98

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: G5007
Recvd : 97/12/23 Contact: J. Valdez 505/665-9968
Job# : 1031 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 #4019R-04LA-97-0627	1031.01	971220	500	217	3.00	0.11
LANL-REQ #4012R-04LA-97-0629	1031.02	971218	250	133	3.76	0.14

4012R Rec
4019R Rec

UNIVERSITY OF Miami

April 8, 1998

APR 1998

TRITIUM LABORATORY

Data Release #98-20 - Amendment
Job # 1031

LOS ALAMOS NATIONAL LABORATORY
TRITIUM SAMPLES

Purchase Order No. G5009-TEL-8-2A

FIELD COP

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 Cert'd: [illegible]

Approved By: _____

Date Cert'd: 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).

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$$F = 0.9645 - (\text{year}-1990) \times 0.0008$$

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

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Reliability of results

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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: G5007
Recvd : 97/12/23 Contact: J. Valdez 505/665-9968
Job# : 1031 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	#4019R-04LA-97-0627	1031.01	971220	500	162	2.96*	0.10
LANL-REQ	#4012R-04LA-97-0629	1031.02	971218	250	130	3.85*	0.13

* Average of duplicate runs

Monday, December 22, 1997

REQUEST NUMBER: 4016R
ANALYSIS TYPE: ORG

Los Alamos
NATIONAL LABORATORY

920

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

LANL Request Number: 4016R
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
1 VOAGCMS		04LA-97-0627	01	W	12/20/97	—
VOAGCMS		04LA-97-0627	02	W	12/20/97	—
2 PESTPCB		04LA-97-0627	03	W	12/20/97	—
3 PAH		04LA-97-0627	04	W	12/20/97	—
4 TOC		04LA-97-0627	05	W	12/20/97	—

5.3

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

Recra LabNet Philadelphia
Analytical Report

Client : LANL-REQ#4016R
RFW# : 9712L920
Subcontract# : 7791L0014-9S

W.O.# : 02744-064-001-9999-00
Date Received: 12-23-97

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. The sample was acidified prior to analysis.

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.

for Bruce C Miller unit leader
J. Michael Taylor
Vice President and Laboratory Manager
Lionville Analytical Laboratory

2-2-98
Date

njp\i12-920

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 18 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#4016R
RFW#: 9712L920

W.O.#: 02744-064-001-9999-00
Date Received: 12-23-97

POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC

1. One (1) water sample was collected on 12-20-97.

2. The sample and its associated QC samples were prepared on 01-08-98 and analyzed according to criteria set forth in EPA Method 8310 for Polynuclear Aromatic Hydrocarbon target compounds on 01-22-98.

3. The cooler temperature 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 in the data package.

5. All initial calibrations associated with this data set were within acceptance criteria.

6. Continuing calibration criteria were met for all continuing calibration verification standards analyzed prior to the sample extracts.

7. One (1) of four (4) surrogate recoveries was outside acceptance criteria. A copy of the Sample Discrepancy Report (SDR) has been enclosed in the data package.

8. All blank spike recoveries were within acceptance criteria

Bruce C Fuller unit leader
for J. Michael Taylor
Vice President and Laboratory Manager
Lionville Analytical Laboratory

2-13-98
Date

jeh\gc\12-920.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.

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#4016R
RFW # : 9712L920
Subcontract #: 7791L0014-9S

W.O. #: 02744-064-001-9999-00
Date Received: 12-23-97

GC/MS VOLATILE

One (1) water sample was collected on 12-20-97.

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 01-02-98.

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. 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 2x 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.
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 Miller unit leader
J. Michael Taylor
Vice President and Laboratory Manager
Lionville Analytical Laboratory

2-6-98
Date

mmz/voa/12-920v.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 129 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#4016R
RFW# : 9712L920

W.O.# : 02744-064-001-9999-00
Date Received : 12-23-97

PESTICIDE/PCB

1. The set of samples consisted of one (1) water sample collected on 12-20-97.

2. The sample and its associated QC samples were extracted on 12-26-97 and analyzed based on SW846, 3rd Edition, procedures on 01-12,13-98. 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.

5. The method blank was below the reporting limits for all target compounds.

6. All surrogate recoveries were within acceptance criteria.

7. All blank spike recoveries were within acceptance criteria.

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. Ingersoll Unit Leader

J. Michael Taylor
Vice President and Laboratory Manager
Lionville Analytical Laboratory

2-12-98
Date

jeh\pcb\12-920.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 299 pages.

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

CCS/VALIDATION COVER SHEET

M Code_____ SDG/RN: **4016R** LAB NAME: **RECRA** LAB CODE_____

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

VALIDATION DATE: **9 March 98** 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: _____ 9 March 98

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

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.: 12L920

Lab File ID (Standard): X010203 Date Analyzed: 01/02/98

Instrument ID: 5970X Time Analyzed: 0858

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	512769	15.90	410823	20.19	273514	23.01
	UPPER LIMIT	1025538	16.40	821646	20.69	547028	23.51
	LOWER LIMIT	256384	15.40	205412	19.69	136757	22.51
	EPA SAMPLE NO.						
01	VBLKUE	578235	15.89	480275	20.21	311408	23.01
02	VBLKUEBS	517686	15.91	423372	20.21	271798	23.01
03	04LA-97-0627 01/02	555850	15.90	469306	20.21	308485	23.01
04	04LA-97-0627 01/02M	541302	15.90	428932	20.21	296619	23.02
05	04LA-97-0627 01/02M	550335	15.91	458023	20.21	300369	23.02
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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.

021 2/6/98

2A

WATER VOLATILE SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#4016R

RFW Lot No.: 9712L920

	CLIENT SAMPLE NO.	S1 (DCE) #	S2 (TOL) #	S3 (BFB) #	OTHER	TOT OUT
01	04LA-97-0627 01/02	91	89	90		0
02	04LA-97-0627 01/02MS	94	101	96		0
03	04LA-97-0627 01/02MSD	95	94	92		0
04	VBLKUELVX002-MB1	91	93	93		0
05	VBLKUELVX002-MB1 BS	91	95	96		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.: 12L920

Lab File ID: X010213 Lab Sample ID: 98LVX002-MB1

Date Analyzed: 01/02/98 Time Analyzed: 1406

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	VBLKUEBS	98LVX002-MB1S	X010214	1441
02	04LA-97-0627 01/02	9712L920-001	X010215	1517
03	04LA-97-0627 01/02M	9712L920-001S	X010216	1553
04	04LA-97-0627 01/02M	9712L920-001T	X010217	1628
05				
06				
07				
08				
09				
10				
11				
12				
13				
14				
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16				
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27				
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29				
30				

COMMENTS:

1A

VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLKUE

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 98LVX002-MB1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x010213

Level: (low/med) LOW Date Received: 01/02/98

% Moisture: not dec. _____ Date Analyzed: 01/02/98

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	9	
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

1B

VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLKUE

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 98LVX002-MB1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x010213

Level: (low/med) LOW Date Received: 01/02/98

% Moisture: not dec. _____ Date Analyzed: 01/02/98

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

1E

VOLATILE ORGANICS ANALYSIS SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKUE

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 98LVX002-MB1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x010213

Level: (low/med) LOW Date Received: 01/02/98

% Moisture: not dec. _____ Date Analyzed: 01/02/98

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 1/87 Rev.

3A

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#4016R RFW Lot No.: 9712L920-001

MATRIX Spike - Sample No.: 04LA-97-0627 01/02 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	34.8	70	61 -145
Benzene	50.0	0	43.6	87	76 -127
Trichloroethene	50.0	0	43.8	88	71 -120
Toluene	50.0	0	44.9	90	76 -125
Chlorobenzene	50.0	0	58.3	117	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	34.0	68	2	14	61 -145
Benzene	50.0	43.1	86	1	11	76 -127
Trichloroethene	50.0	42.6	85	3	14	71 -120
Toluene	50.0	41.3	83	8	13	76 -125
Chlorobenzene	50.0	54.6	109	7	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:

3A

WATER VOLATILE MATRIX SPIKE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#4016R RFW Lot No.: 9712L920

MATRIX Spike - Sample No.: VBLKUELVX002-MB1 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	32.2	64	61 -145
Benzene	50.0	0	41.4	83	76 -127
Trichloroethene	50.0	0	41.2	82	71 -120
Toluene	50.0	0	41.4	83	76 -125
Chlorobenzene	50.0	0	52.4	105	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:

2E

WATER PESTICIDE SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#4016R

RFW Lot No.: 9712L920

	CLIENT SAMPLE NO.	S1 (DCB)#	OTHER TCX
01	04LA-97-0627 03	50	45
02	PBLKKPLE2382-MB1	83	52
03	PBLKKPLE2382-MB1 BS	88	70

	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

gwl 01-28-98

3E

WATER PESTICIDE MATRIX SPIKE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#4016R RFW Lot No.: 9712L920

MATRIX Spike - Sample No.: PBLKKPLE2382-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	0.180	90	56 -127
Heptachlor	0.200	0	0.170	85	50 -129
Aldrin	0.200	0	0.150	75	48 -133
Dieldrin	0.500	0	0.480	96	57 -131
Endrin	0.500	0	0.480	96	46 -150
4,4'-DDT	0.500	0	0.490	98	38 -138

Column to be used to flag recovery value with an asterisk
* Values outside of QC limits

Spike Recovery: 0 out of 6 outside limits

COMMENTS:

gw 8-28-98

4C

PESTICIDE METHOD BLANK SUMMARY

Lab Name: Recra.LabNet

Contract: 2744-64-01

Case No.: LANL-REQ#4016R

Lab Sample ID: 97LE2382-MB1

Lab File ID: 01129808 .05

Matrix:(Soil/Water) WATER

Level:(low/med) LOW

Date Extracted: 12/26/97

Extraction:(SepF/Cont/Sonc) CONT

Date Analyzed (1): 01/12/98

Date Analyzed (2): 01/12/98

Time Analyzed (1): 2317

Time Analyzed (2): 1645

Instrument ID (1): 08

Instrument ID (2): 09

GC Column ID (1): HP1701

GC Column ID (2): DB608

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-97-0627 03	9712L920-002	01/13/98	01/12/98
02	PBLKKPLE2382-MB1 BS	97LE2382-MB1S	01/13/98	01/12/98

COMMENTS:

gw 01-28-98

1D

PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

PBLKKP

Lab Name: Recra.LabNet Work Order: 02744064001

Client: LANL-REQ#4016R

Matrix: WATER Lab Sample ID: 97LE2382-MB1

Sample wt/vol: 1000 (g/mL) ML Lab File ID: 01129808.05

Level: (low/med) LOW Date Received: 12/26/97

% Moisture: not dec. _____ dec. Date Extracted: 12/26/97

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/12/98

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

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gw 01/28/98

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

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? X yes no	NA	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 *The internal standard 1,4-difluorobenze was replaced by fluorobenzene. No action taken.*	OK 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

M9 March 98

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 analyzed in place of dibromofluoromethane. The QC limits for 1,2-dichloroethane are reported as broader than those for dibromofluoromethane. 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**

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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 are detected in the blank at 3 ug/l and 9 ug/l respectively. The methylene chloride result in the sample is 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 holding time, as per the above criteria, was exceeded by 6 days. The sample results 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 yes X no** *TICs were requested but not found.*	**See comment**		

M9 March98

1A
VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

04LA-97-0627 01/02

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9712L920-001

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x010215

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

% Moisture: not dec. _____ Date Analyzed: 01/02/98

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	160	B	
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	10	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	

PM

19 March 98

1B
VOLATILE ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

04LA-97-0627 01/02

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9712L920-001

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x010215

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

% Moisture: not dec. _____ Date Analyzed: 01/02/98

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 1/87 Rev.

19 March 98

1E

VOLATILE ORGANICS ANALYSIS SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

04LA-97-0627 01/02

Lab Name: Recra.LabNet Contract: 02744064001

Lab Code: Recra Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9712L920-001

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: x010215

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

% Moisture: not dec. _____ Date Analyzed: 01/02/98

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.				

M 9 March 98

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** **Decachlorobipheny l 50-160** *The surrogate recovery for Tetrachloro-m-xylene is 45%. All results 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.**	**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).**	

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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	

19 March 98

1D
PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

04LA-97-0627 03

Lab Name: Recra.LabNet Work Order: 02744064001

Client: LANL-REQ#4016R

Matrix: WATER Lab Sample ID: 9712L920-002

Sample wt/vol: 980 (g/mL) ML Lab File ID: 01129808.07

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

% Moisture: not dec. _____ dec. Date Extracted: 12/26/97

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/13/98

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

(UJ, ~~B~~ P3c)

FORM 1 PEST 12/88 Rev.

gw 01-28-98

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2E

WATER ORGANICS SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#4016R RFW Lot No.: 9712L920

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-97-0627 04	62 *						1
02	BLK	80						0
03	BLKBS	91						0
04	BLKBSD	88						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#4016R RFW Lot No.: 98LE0044-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	71	79	35-105
Acenaphthylene	115	0	95	82	55-105
Acenaphthene	90.0	0	76	84	55-105
Fluorene	10.5	0	8.7	83	65-100
Phenanthrene	32.0	0	26	82	70-100
Anthracene	33.0	0	28	85	65-125
Fluoranthene	10.5	0	9.0	86	70-105
Pyrene	13.5	0	11	82	65-110
Benzo(a)anthracene	0.650	0	0.57	88	70-115
Chrysene	7.50	0	6.3	85	70-110
Benzo(b)fluoranthrene	0.900	0	0.78	87	70-120
Benzo(k)fluoranthrene	0.850	0	0.75	88	70-120
Benzo(a)pyrene	1.18	0	1.0	86	70-105
Dibenzo(a,h)anthracene	1.50	0	1.3	85	60-115
Benzo(ghi)perylene	3.80	0	3.2	83	55-115
Indeno(1,2,3-cd)pyrene	2.15	0	1.9	87	65-115

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Cl 2/2/98

3E

WATER ORGANICS BLANK SPIKE/BLANK SPIKE DUPLICATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Client : LANL-REQ#4016R RFW Lot No.: 98LE0044-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	74	6	88	35-105
Acenaphthylene	115	91	79	3	113	55-105
Acenaphthene	90.0	72	80	4	18	55-105
Fluorene	10.5	8.5	81	2	52	65-100
Phenanthrene	32.0	26	82	0	27	70-100
Anthracene	33.0	27	83	2	52	65-125
Fluoranthene	10.5	9.0	86	0	22	70-105
Pyrene	13.5	11	81	1	56	65-110
Benzo(a)anthracene	0.650	0.57	88	0	17	70-115
Chrysene	7.50	6.5	87	2	29	70-110
Benzo(b)fluoranthrene	0.900	0.79	88	1	53	70-120
Benzo(k)fluoranthrene	0.850	0.75	88	0	17	70-120
Benzo(a)pyrene	1.18	1.0	87	1	28	70-105
Dibenzo(a,h)anthracene	1.50	1.3	86	1	59	60-115
Benzo(ghi)perylene	3.80	3.2	84	1	23	55-115
Indeno(1,2,3-cd)pyrene	2.15	1.9	88	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:

Ok 2/2/98

4C

ORGANICS METHOD BLANK SUMMARY

CLIENT SAMPLE NO.

BLK

Lab Name: Recra.LabNet Contract: 2744-64-01

Client: LANL-REQ#4016R

Lab Sample ID: 98LE0044-MB1 Lab File ID: 01209823.62

Matrix:(soil/water) WATER Extraction:(SepF/Cont/Sonc) CONT

Sulfur Cleanup: (Y/N) _ Date Extracted: 01/08/98

Date Analyzed (1): 01/22/98 Date Analyzed (2): _____

Time Analyzed (1): 0855 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-97-0627	9712L920-003	01/22/98	
02	BLKBS	98LE0044-MB1S	01/22/98	
03	BLKBSD	98LE0044-MB1T	01/22/98	

COMMENTS: _____

01/28/98

2A

WATER VOLATILE SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#4016R

RFW Lot No.: 9712L920

	CLIENT SAMPLE NO.	S1 (DCE) #	S2 (TOL) #	S3 (BFB) #	OTHER	TOT OUT
01	04LA-97-0627 01/02	91	89	90		0
02	04LA-97-0627 01/02MS	94	101	96		0
03	04LA-97-0627 01/02MSD	95	94	92		0
04	VBLKUELVX002-MB1	91	93	93		0
05	VBLKUELVX002-MB1 BS	91	95	96		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

3A

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#4016R RFW Lot No.: 9712L920-001

MATRIX Spike - Sample No.: 04LA-97-0627 01/02 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	34.8	70	61 -145
Benzene	50.0	0	43.6	87	76 -127
Trichloroethene	50.0	0	43.8	88	71 -120
Toluene	50.0	0	44.9	90	76 -125
Chlorobenzene	50.0	0	58.3	117	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	34.0	68	2	14	61 -145
Benzene	50.0	43.1	86	1	11	76 -127
Trichloroethene	50.0	42.6	85	3	14	71 -120
Toluene	50.0	41.3	83	8	13	76 -125
Chlorobenzene	50.0	54.6	109	7	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:

3A

WATER VOLATILE MATRIX SPIKE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#4016R RFW Lot No.: 9712L920

MATRIX Spike - Sample No.: VBLKUELVX002-MB1 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	32.2	64	61 -145
Benzene	50.0	0	41.4	83	76 -127
Trichloroethene	50.0	0	41.2	82	71 -120
Toluene	50.0	0	41.4	83	76 -125
Chlorobenzene	50.0	0	52.4	105	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.: 12L920

Lab File ID: X010213 Lab Sample ID: 98LVX002-MB1

Date Analyzed: 01/02/98 Time Analyzed: 1406

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	VBLKUEBS	98LVX002-MB1S	X010214	1441
02	04LA-97-0627 01/02	9712L920-001	X010215	1517
03	04LA-97-0627 01/02M	9712L920-001S	X010216	1553
04	04LA-97-0627 01/02M	9712L920-001T	X010217	1628
05				
06				
07				
08				
09				
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11				
12				
13				
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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.: 12L920

Lab File ID: X122408 BFB Injection Date: 12/24/97

Instrument ID: 5970X BFB Injection Time: 1437

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	18.7
75	30.0 - 60.0% of mass 95	48.7
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.6
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	50.0 - 100.0% of mass 95	88.0
175	5.0 - 9.0% of mass 174	6.5 (7.4)1
176	95.0 - 100.9% of mass 174	83.7 (95.1)1
177	5.0 - 9.0% of mass 176	6.3 (7.6)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	VSTD200	VSTD200	X122409	12/24/97	1502
02	VSTD100	VSTD100	X122410	12/24/97	1535
03	VSTD50	VSTD50	X122411	12/24/97	1608
04	VSTD20	VSTD20	X122412	12/24/97	1642
05	VSTD10	VSTD10	X122413	12/24/97	1716
06	VSTD05	VSTD05	X122414	12/24/97	1751
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.: 12L920

Lab File ID: X010201 BFB Injection Date: 01/02/98

Instrument ID: 5970X BFB Injection Time: 0757

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	18.0
75	30.0 - 60.0% of mass 95	48.9
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.8
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	50.0 - 100.0% of mass 95	88.8
175	5.0 - 9.0% of mass 174	7.2 (8.1)1
176	95.0 - 100.9% of mass 174	87.2 (98.2)1
177	5.0 - 9.0% of mass 176	6.6 (7.6)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	X010203	01/02/98	0858
02	VSTD200 Iodomethane	VSTD200	X010208	01/02/98	1104
03	VSTD100	VSTD100	X010209	01/02/98	1142
04	VSTD50	VSTD50	X010210	01/02/98	1218
05	VSTD20	VSTD20	X010211	01/02/98	1255
06	VSTD10	VSTD10	X010212	01/02/98	1330
07	VBLKUE	98LVX002-MB1	X010213	01/02/98	1406
08	VBLKUEBS	98LVX002-MB1S	X010214	01/02/98	1441
09	04LA-97-0627 01/02	9712L920-001	X010215	01/02/98	1517
10	04LA-97-0627 01/02M	9712L920-001S	X010216	01/02/98	1553
11	04LA-97-0627 01/02M	9712L920-001T	X010217	01/02/98	1628
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.: 12L920

Lab File ID (Standard): X010203 Date Analyzed: 01/02/98

Instrument ID: 5970X Time Analyzed: 0858

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	512769	15.90	410823	20.19	273514	23.01
	UPPER LIMIT	1025538	16.40	821646	20.69	547028	23.51
	LOWER LIMIT	256384	15.40	205412	19.69	136757	22.51
	EPA SAMPLE NO.						
01	VBLKUE	578235	15.89	480275	20.21	311408	23.01
02	VBLKUEBS	517686	15.91	423372	20.21	271798	23.01
03	04LA-97-0627 01/02	555850	15.90	469306	20.21	308485	23.01
04	04LA-97-0627 01/02M	541302	15.90	428932	20.21	296619	23.02
05	04LA-97-0627 01/02M	550335	15.91	458023	20.21	300369	23.02
06							
07							
08							
09							
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12							
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14							
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17							
18							
19							
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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.

021 2/6/98

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.: 12L920

Instrument ID: 5970X Calibration Date(s): 12/24/97 12/24/97

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 =x122413.d RRF20 =x122412.d
RRF50 =x122411.d RRF100=x122410.d RRF200=x122409.d

COMPOUND		RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	% RSD	
Dichlorodifluoromethane		0.527	0.509	0.464	0.440	0.436	0.475	8.6	
Chloromethane	#	0.342	0.318	0.301	0.271	0.212	0.289	17.3	#
Vinyl Chloride	*	0.274	0.261	0.248	0.232	0.228	0.249	7.7	*
Bromomethane		0.206	0.218	0.157	0.152	0.204	0.187	16.3	
Chloroethane		0.171	0.165	0.148	0.141	0.143	0.154	8.8	
Trichlorofluoromethane		0.814	0.728	0.665	0.624	0.605	0.687	12.4	
1,1-Dichloroethene	*	0.253	0.245	0.219	0.204	0.204	0.225	10.2	*
Methylene Chloride		0.716	0.525	0.403	0.358	0.325	0.465	34.2	
Acetone		0.195	0.112	0.087	0.086	0.072	0.110	44.4	
trans-1,2-Dichloroethene		0.450	0.427	0.386	0.364	0.348	0.395	10.8	
1,1-Dichloroethane	#	0.666	0.613	0.598	0.556	0.524	0.591	9.2	#
cis-1,2-Dichloroethene		0.493	0.455	0.379	0.379	0.357	0.413	14.1	
2,2-Dichloropropane		0.661	0.595	0.541	0.523	0.496	0.563	11.6	
2-Butanone		0.215	0.174	0.164	0.166	0.146	0.173	14.8	
Bromochloromethane		0.329	0.325	0.302	0.285	0.262	0.301	9.3	
Chloroform	*	0.890	0.833	0.799	0.751	0.688	0.792	9.7	*
1,1,1-Trichloroethane		0.783	0.756	0.728	0.660	0.627	0.711	9.2	
Carbon Tetrachloride		0.552	0.581	0.550	0.568	0.496	0.549	5.9	
1,1-Dichloropropene		0.189	0.180	0.160	0.157	0.143	0.166	11.2	
Benzene		0.948	0.858	0.767	0.752	0.687	0.802	12.7	
1,2-Dichloroethane		0.490	0.459	0.423	0.395	0.367	0.427	11.5	
Trichloroethene		0.578	0.536	0.494	0.461	0.416	0.497	12.7	
1,2-Dichloropropane	*	0.408	0.376	0.356	0.344	0.312	0.359	10.0	*
Dibromomethane		0.630	0.569	0.516	0.500	0.447	0.532	13.1	
Bromodichloromethane		0.894	0.871	0.827	0.799	0.729	0.824	7.9	
cis-1,3-Dichloropropene		0.739	0.716	0.664	0.661	0.650	0.686	5.7	
Toluene	*	0.835	0.758	0.676	0.654	0.623	0.709	12.2	*
4-Methyl-2-Pentanone		0.570	0.496	0.494	0.504	0.451	0.503	8.5	
trans-1,3-Dichloropropene		0.679	0.630	0.588	0.647	0.574	0.624	6.9	
1,1,2-Trichloroethane		0.592	0.531	0.472	0.484	0.434	0.503	12.1	
Tetrachloroethene		0.680	0.656	0.562	0.523	0.473	0.579	15.2	
1,3-Dichloropropane		0.804	0.749	0.637	0.623	0.562	0.675	14.6	
2-Hexanone		0.368	0.339	0.315	0.346	0.303	0.334	7.7	
Dibromochloromethane		1.057	1.006	0.905	0.910	0.811	0.938	10.2	
1,2-Dibromoethane		1.027	0.877	0.797	0.777	0.691	0.834	15.2	
Chlorobenzene	#	0.956	0.872	0.770	0.737	0.702	0.807	12.9	#
1,1,1,2-Tetrachloroethane		0.705	0.662	0.561	0.535	0.482	0.589	15.7	
Ethylbenzene	*	0.498	0.460	0.388	0.370	0.326	0.408	17.0	*

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.: 12L920

Instrument ID: 5970X Calibration Date(s): 12/24/97 12/24/97

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 =x122413.d RRF20 =x122412.d
RRF50 =x122411.d RRF100=x122410.d RRF200=x122409.d

COMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	% RSD
Xylenes (Total)	0.550	0.502	0.429	0.402	0.360	0.449	17.2
Styrene	1.034	0.944	0.848	0.793	0.732	0.870	13.8
Bromoform #	0.906	0.879	0.793	0.798	0.704	0.816	9.8#
Isopropylbenzene	1.524	1.404	1.209	1.140	1.028	1.261	15.9
Bromobenzene	2.289	2.059	1.793	1.738	1.660	1.908	13.7
1,2,3-Trichloropropane	0.458	0.414	0.361	0.363	0.344	0.388	12.2
1,1,2,2-Tetrachloroethane #	1.650	1.350	1.260	1.226	1.286	1.354	12.7#
N-Propylbenzene	0.552	0.527	0.453	0.453	0.447	0.486	10.2
2-Chlorotoluene	0.588	0.551	0.482	0.468	0.464	0.511	10.9
4-Chlorotoluene	0.624	0.597	0.520	0.526	0.471	0.548	11.3
1,3,5-Trimethylbenzene	2.359	2.071	1.786	1.716	1.680	1.922	15.0
Tert-Butylbenzene	0.466	0.435	0.382	0.375	0.364	0.404	10.9
1,2,4-Trimethylbenzene	2.111	1.933	1.723	1.669	1.690	1.825	10.5
Sec-Butylbenzene	0.514	0.493	0.428	0.402	0.401	0.448	11.7
1,3-Dichlorobenzene	1.561	1.403	1.212	1.161	1.134	1.294	14.1
1,4-Dichlorobenzene	1.561	1.403	1.212	1.161	1.134	1.294	14.1
4-Isopropyltoluene	2.541	2.285	1.973	1.828	1.781	2.082	15.6
1,2-Dichlorobenzene	1.544	1.298	1.093	1.081	0.998	1.203	18.3
N-Butylbenzene	0.570	0.580	0.530	0.524	0.491	0.539	6.7
1,2-Dibromo-3-chloropropane	0.484	0.452	0.440	0.483	0.461	0.464	4.2
Carbon Disulfide	0.553	0.600	0.556	0.502	0.529	0.548	6.6
Freon-113	0.356	0.321	0.293	0.273	0.264	0.301	12.5
1,2-Dichloroethane-d4	0.417	0.433	0.365	0.346	0.321	0.376	12.6
Toluene-d8	1.110	1.124	0.948	0.927	0.846	0.991	12.2
4-Bromofluorobenzene	1.282	1.367	1.148	1.106	1.095	1.200	10.0

FORM VI VOA MAC-SW846HP

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.: 12L920

Instrument ID: 5970X Calibration Date: 01/02/98 Time: 0858

Lab File ID: X010203 Init. Calib. Date(s): 12/24/97 01/02/98

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		0.364	50.0	38.3	23.4	
Chloromethane	#	0.200	50.0	34.5	31.0	#
Vinyl Chloride	*	0.220	50.0	44.2	11.6	*
Bromomethane		0.213	50.0	56.9	13.8	
Chloroethane		0.141	50.0	46.0	8.0	
Trichlorofluoromethane		0.577	50.0	42.0	16.0	
1,1-Dichloroethene	*	0.202	50.0	44.7	10.6	*
Methylene Chloride		0.441	50.0	47.4	5.2	
Acetone		0.078	50.0	35.1	29.8	
trans-1,2-Dichloroethene		0.367	50.0	46.5	7.0	
1,1-Dichloroethane	#	0.572	50.0	48.3	3.4	#
cis-1,2-Dichloroethene		0.396	50.0	48.0	4.0	
2,2-Dichloropropane		0.533	50.0	47.3	5.4	
2-Butanone		0.147	50.0	42.6	14.8	
Bromochloromethane		0.300	50.0	50.0	0.0	
Chloroform	*	0.760	50.0	48.0	4.0	*
1,1,1-Trichloroethane		0.675	50.0	47.5	5.0	
Carbon Tetrachloride		0.597	50.0	54.3	8.6	
1,1-Dichloropropene		0.163	50.0	49.1	1.8	
Benzene		0.790	50.0	49.2	1.6	
1,2-Dichloroethane		0.416	50.0	48.7	2.6	
Trichloroethene		0.526	50.0	52.9	5.8	
1,2-Dichloropropane	*	0.349	50.0	48.6	2.8	*
Dibromomethane		0.520	50.0	48.8	2.4	
Bromodichloromethane		0.810	50.0	49.2	1.6	
cis-1,3-Dichloropropene		0.672	50.0	48.9	2.2	
Toluene	*	0.694	50.0	49.0	2.0	*
4-Methyl-2-Pentanone		0.433	50.0	43.1	13.8	
trans-1,3-Dichloropropene		0.602	50.0	48.3	3.4	
1,1,2-Trichloroethane		0.476	50.0	47.4	5.2	
Tetrachloroethene		0.577	50.0	49.8	0.4	
1,3-Dichloropropane		0.647	50.0	48.0	4.0	
2-Hexanone		0.280	50.0	41.8	16.4	
Dibromochloromethane		0.927	50.0	49.4	1.2	
1,2-Dibromoethane		0.774	50.0	46.4	7.2	
Chlorobenzene	#	0.789	50.0	48.8	2.4	#
1,1,1,2-Tetrachloroethane		0.573	50.0	48.6	2.8	
Ethylbenzene	*	0.406	50.0	49.7	0.6	*

FORM VII VOA MAC-SW846HP-7

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.: 12L920

Instrument ID: 5970X Calibration Date: 01/02/98 Time: 0858

Lab File ID: X010203 Init. Calib. Date(s): 12/24/97 01/02/98

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
Xylenes (Total)	0.437	150	146	2.7
Styrene	0.865	50.0	49.7	0.6
Bromoform #	0.789	50.0	48.3	3.4#
Isopropylbenzene	1.203	50.0	47.7	4.6
Bromobenzene	1.735	50.0	45.5	9.0
1,2,3-Trichloropropane	0.350	50.0	45.1	9.8
1,1,2,2-Tetrachloroethane #	1.049	50.0	38.7	22.6#
N-Propylbenzene	0.465	50.0	47.8	4.4
2-Chlorotoluene	0.488	50.0	47.8	4.4
4-Chlorotoluene	0.524	50.0	47.9	4.2
1,3,5-Trimethylbenzene	1.776	50.0	46.2	7.6
Tert-Butylbenzene	0.380	50.0	47.0	6.0
1,2,4-Trimethylbenzene	1.714	50.0	47.0	6.0
Sec-Butylbenzene	0.410	50.0	45.8	8.4
1,3-Dichlorobenzene	1.046	50.0	40.4	19.2
1,4-Dichlorobenzene	1.198	50.0	46.3	7.4
4-Isopropyltoluene	1.964	50.0	47.2	5.6
1,2-Dichlorobenzene	1.099	50.0	45.7	8.6
N-Butylbenzene	0.523	50.0	48.5	3.0
1,2-Dibromo-3-chloropropane	0.414	50.0	44.6	10.8
Carbon Disulfide	0.532	50.0	48.5	3.0
Freon-113	0.268	50.0	44.4	11.2
1,2-Dichloroethane-d4	0.356	50.0	47.3	5.4
Toluene-d8	0.941	50.0	47.5	5.0
4-Bromofluorobenzene	1.103	50.0	46.0	8.0

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.: 12L920

Instrument ID: 5970X Calibration Date: 01/02/98 Time: 0858

Lab File ID: X010203 Init. Calib. Date(s): 12/24/97 01/02/98

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		0.475	0.364	23.4
Chloromethane	#	0.289	0.200	30.8#
Vinyl Chloride	*	0.249	0.220	11.6*
Bromomethane		0.187	0.213	13.9
Chloroethane		0.154	0.141	8.4
Trichlorofluoromethane		0.687	0.577	16.0
1,1-Dichloroethene	*	0.225	0.202	10.2*
Methylene Chloride		0.465	0.441	5.2
Acetone		0.110	0.078	29.1
trans-1,2-Dichloroethene		0.395	0.367	7.1
1,1-Dichloroethane	#	0.591	0.572	3.2#
cis-1,2-Dichloroethene		0.413	0.396	4.1
2,2-Dichloropropane		0.563	0.533	5.3
2-Butanone		0.173	0.147	15.0
Bromochloromethane		0.301	0.300	0.3
Chloroform	*	0.792	0.760	4.0*
1,1,1-Trichloroethane		0.711	0.675	5.1
Carbon Tetrachloride		0.549	0.597	8.7
1,1-Dichloropropene		0.166	0.163	1.8
Benzene		0.802	0.790	1.5
1,2-Dichloroethane		0.427	0.416	2.6
Trichloroethene		0.497	0.526	5.8
1,2-Dichloropropane	*	0.359	0.349	2.8*
Dibromomethane		0.532	0.520	2.2
Bromodichloromethane		0.824	0.810	1.7
cis-1,3-Dichloropropene		0.686	0.672	2.0
Toluene	*	0.709	0.694	2.1*
4-Methyl-2-Pentanone		0.503	0.433	13.9
trans-1,3-Dichloropropene		0.624	0.602	3.5
1,1,2-Trichloroethane		0.503	0.476	5.4
Tetrachloroethene		0.579	0.577	0.3
1,3-Dichloropropane		0.675	0.647	4.1
2-Hexanone		0.334	0.280	16.2
Dibromochloromethane		0.938	0.927	1.2
1,2-Dibromoethane		0.834	0.774	7.2
Chlorobenzene	#	0.807	0.789	2.2#
1,1,1,2-Tetrachloroethane		0.589	0.573	2.7
Ethylbenzene	*	0.408	0.406	0.5*

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.: 12L920

Instrument ID: 5970X Calibration Date: 01/02/98 Time: 0858

Lab File ID: X010203 Init. Calib. Date(s): 12/24/97 01/02/98

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
Xylenes (Total)	0.449	0.437	2.7
Styrene	0.870	0.865	0.6
Bromoform #	0.816	0.789	3.3#
Isopropylbenzene	1.261	1.203	4.6
Bromobenzene	1.908	1.735	9.1
1,2,3-Trichloropropane	0.388	0.350	9.8
1,1,2,2-Tetrachloroethane #	1.354	1.049	22.5#
N-Propylbenzene	0.486	0.465	4.3
2-Chlorotoluene	0.511	0.488	4.5
4-Chlorotoluene	0.548	0.524	4.4
1,3,5-Trimethylbenzene	1.922	1.776	7.6
Tert-Butylbenzene	0.404	0.380	5.9
1,2,4-Trimethylbenzene	1.825	1.714	6.1
Sec-Butylbenzene	0.448	0.410	8.5
1,3-Dichlorobenzene	1.294	1.046	19.2
1,4-Dichlorobenzene	1.294	1.198	7.4
4-Isopropyltoluene	2.082	1.964	5.7
1,2-Dichlorobenzene	1.203	1.099	8.6
N-Butylbenzene	0.539	0.523	3.0
1,2-Dibromo-3-chloropropane	0.464	0.414	10.8
Carbon Disulfide	0.548	0.532	2.9
Freon-113	0.301	0.268	11.0
1,2-Dichloroethane-d4	0.376	0.356	5.3
Toluene-d8	0.991	0.941	5.0
4-Bromofluorobenzene	1.200	1.103	8.1

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.: 12L920

Instrument ID: 5970X Calibration Date(s): 12/24/97 01/02/98

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 =x010212.d RRF20 =x010211.d
RRF50 =x010210.d RRF100=x010209.d RRF200=x010208.d

COMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	% RSD
Iodomethane	0.512	0.619	0.511	0.456	0.514	0.522	11.3

FORM VI VOA MAC-SW846HI

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.: 12L920

Instrument ID: 5970X Calibration Date: 01/02/98 Time: 1218

Lab File ID: X010210 Init. Calib. Date(s): 12/24/97 01/02/98

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
Iodomethane	0.511	50.0	51.7	3.4

FORM VII VOA MAC-SW846HP-7

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.: 12L920

Instrument ID: 5970X Calibration Date: 01/02/98 Time: 1218

Lab File ID: X010210 Init. Calib. Date(s): 12/24/97 01/02/98

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
Iodomethane	0.522	0.511	2.1

FORM VII VOA MAC-SW846HP-7

2E

WATER PESTICIDE SURROGATE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#4016R

RFW Lot No.: 9712L920

	CLIENT SAMPLE NO.	S1 (DCB)#	OTHER TCX
01	04LA-97-0627 03	50	45
02	PBLKKPLE2382-MB1	83	52
03	PBLKKPLE2382-MB1 BS	88	70

	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 01-28-98

3E

WATER PESTICIDE MATRIX SPIKE RECOVERY

Lab Name: Recra.LabNet Contract: 2744-64-01

Case No.: LANL-REQ#4016R RFW Lot No.: 9712L920

MATRIX Spike - Sample No.: PBLKKPLE2382-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	0.180	90	56 -127
Heptachlor	0.200	0	0.170	85	50 -129
Aldrin	0.200	0	0.150	75	48 -133
Dieldrin	0.500	0	0.480	96	57 -131
Endrin	0.500	0	0.480	96	46 -150
4,4'-DDT	0.500	0	0.490	98	38 -138

Column to be used to flag recovery value with an asterisk
* Values outside of QC limits

Spike Recovery: 0 out of 6 outside limits

COMMENTS:

gw 8-28-98

4C

PESTICIDE METHOD BLANK SUMMARY

Lab Name: Recra.LabNet

Contract: 2744-64-01

Case No.: LANL-REQ#4016R

Lab Sample ID: 97LE2382-MB1

Lab File ID: 01129808 .05

Matrix:(Soil/Water) WATER

Level:(low/med) LOW

Date Extracted: 12/26/97

Extraction:(SepF/Cont/Sonc) CONT

Date Analyzed (1): 01/12/98

Date Analyzed (2): 01/12/98

Time Analyzed (1): 2317

Time Analyzed (2): 1645

Instrument ID (1): 08

Instrument ID (2): 09

GC Column ID (1): HP1701

GC Column ID (2): DB608

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-97-0627 03	9712L920-002	01/13/98	01/12/98
02	PBLKKPLE2382-MB1 BS	97LE2382-MB1S	01/13/98	01/12/98

COMMENTS:

gw 01-28-98

8H

PESTICIDE ANALYSIS SEQUENCE

Lab Name: Recra.LabNet

Contract: 02744-064-001-9999-00

Client: LANL-REQ#4016R

GC Sample ID: 01099807

Instrument ID: 07

GC Column ID: DB608

Dates of Analyses: 01/09/98 to 01/10/98

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	ZZZZZ	EVAL 2004	01/09/98	2242
02	ZZZZZ	TOXAPH 2102	01/09/98	2332
03	ZZZZZ	AR1221 3001	01/10/98	0021
04	ZZZZZ	AR1232 2202	01/10/98	0110
05	ZZZZZ	AR1242 3101	01/10/98	0159
06	ZZZZZ	AR1248 2301	01/10/98	0248
07	ZZZZZ	AR1254 1502	01/10/98	0337
08	ZZZZZ	AR1660 1904	01/10/98	0426
09	ZZZZZ	INDA 6901 A	01/10/98	0515
10	ZZZZZ	INDA 6902 B	01/10/98	0604
11	ZZZZZ	INDA 6903 C	01/10/98	0652
12	ZZZZZ	INDA 6904 D	01/10/98	0741
13	ZZZZZ	INDA 6905 E	01/10/98	0830
14	ZZZZZ	INDB 5501 A	01/10/98	0919
15	ZZZZZ	INDB 5502 B	01/10/98	1008
16	ZZZZZ	INDB 5503 C	01/10/98	1057
17	ZZZZZ	INDB 5504 D	01/10/98	1146
18	ZZZZZ	INDB 5505 E	01/10/98	1235
19	ZZZZZ	AR1254 5401 A	01/10/98	1324
20	ZZZZZ	AR1254 5402 B	01/10/98	1413
21	ZZZZZ	AR1254 5403 C	01/10/98	1502
22	ZZZZZ	AR1254 5404 D	01/10/98	1551
23	ZZZZZ	AR1254 5405 E	01/10/98	1640
24	ZZZZZ	AR1660 6801 A	01/10/98	1728
25	ZZZZZ	AR1660 6802 B	01/10/98	1817
26	ZZZZZ	AR1660 6803 C	01/10/98	1906
27	ZZZZZ	AR1660 6804 D	01/10/98	1955
28	ZZZZZ	AR1660 6805 E	01/10/98	2044

gw 01-28-98

FORM VIII PEST

8H

PESTICIDE ANALYSIS SEQUENCE

Lab Name: Recra.LabNet

Contract: 02744-064-001-9999-00

Client: LANL-REQ#4016R

GC Sample ID: 01129807

Instrument ID: 07

GC Column ID: DB608

Dates of Analyses: 01/12/98 to 01/13/98

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	ZZZZZ	INDA 6903 C	01/12/98	1814
02	ZZZZZ	INDB 5503 C	01/12/98	1903
03	ZZZZZ	AR1660 1904	01/12/98	1951
04	ZZZZZ	EVAL 2004	01/12/98	2223
05	PBLKKPLE2382	97LE2382-MB1	01/12/98	2317
06	PBLKKPLE2382 MS	97LE2382-MB1S	01/13/98	0006
07	04LA-97-0627 03	9712L920-002	01/13/98	0055
08	ZZZZZ	INDA 6903 C	01/13/98	1055
09	ZZZZZ	INDB 5503 C	01/13/98	1149
10	ZZZZZ	AR1660 1904	01/13/98	1243

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FORM VIII PEST

8H

PESTICIDE ANALYSIS SEQUENCE

Lab Name: Recra.LabNet

Contract: 02744-064-001-9999-00

Client: LANL-REQ#4016R

GC Sample ID: 01099808

Instrument ID: 08

GC Column ID: HP1701

Dates of Analyses: 01/09/98 to 01/10/98

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	ZZZZZ	EVAL 2004	01/09/98	2242
02	ZZZZZ	TOXAPH 2102	01/09/98	2332
03	ZZZZZ	AR1221 3001	01/10/98	0021
04	ZZZZZ	AR1232 2202	01/10/98	0110
05	ZZZZZ	AR1242 3101	01/10/98	0159
06	ZZZZZ	AR1248 2301	01/10/98	0248
07	ZZZZZ	AR1254 1502	01/10/98	0337
08	ZZZZZ	AR1660 1904	01/10/98	0426
09	ZZZZZ	INDA 6901 A	01/10/98	0515
10	ZZZZZ	INDA 6902 B	01/10/98	0604
11	ZZZZZ	INDA 6903 C	01/10/98	0652
12	ZZZZZ	INDA 6904 D	01/10/98	0741
13	ZZZZZ	INDA 6905 E	01/10/98	0830
14	ZZZZZ	INDB 5501 A	01/10/98	0919
15	ZZZZZ	INDB 5502 B	01/10/98	1008
16	ZZZZZ	INDB 5503 C	01/10/98	1057
17	ZZZZZ	INDB 5504 D	01/10/98	1146
18	ZZZZZ	INDB 5505 E	01/10/98	1235
19	ZZZZZ	AR1254 5401 A	01/10/98	1324
20	ZZZZZ	AR1254 5402 B	01/10/98	1413
21	ZZZZZ	AR1254 5403 C	01/10/98	1502
22	ZZZZZ	AR1254 5404 D	01/10/98	1551
23	ZZZZZ	AR1254 5405 E	01/10/98	1640
24	ZZZZZ	AR1660 6801 A	01/10/98	1728
25	ZZZZZ	AR1660 6802 B	01/10/98	1817
26	ZZZZZ	AR1660 6803 C	01/10/98	1906
27	ZZZZZ	AR1660 6804 D	01/10/98	1955
28	ZZZZZ	AR1660 6805 E	01/10/98	2044

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FORM VIII PEST

8H

PESTICIDE ANALYSIS SEQUENCE

Lab Name: Recra.LabNet

Contract: 02744-064-001-9999-00

Client: LANL-REQ#4016R

GC Sample ID: 01129808

Instrument ID: 08

GC Column ID: HP1701

Dates of Analyses: 01/12/98 to 01/13/98

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	ZZZZZ	INDA 6903 C	01/12/98	1814
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03	ZZZZZ	AR1660 1904	01/12/98	1951
04	ZZZZZ	EVAL 2004	01/12/98	2223
05	PBLKKPLE2382	97LE2382-MB1	01/12/98	2317
06	PBLKKPLE2382 MS	97LE2382-MB1S	01/13/98	0006
07	04LA-97-0627 03	9712L920-002	01/13/98	0055
08	ZZZZZ	INDA 6903 C	01/13/98	1055
09	ZZZZZ	INDB 5503 C	01/13/98	1149
10	ZZZZZ	AR1660 1904	01/13/98	1243

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FORM VIII PEST