9613490.2817 START

0045398

B018L9-
TMA-079

TMA
Thermo Analytical Inc.

Skinner & Sherman Laboratories Inc.
300 Second Avenue
Post Office Box 521
Waltham, MA 02254-0521
(617) 890-7200

OCT 1996 RECEIVED EDMC

FEB 1992 RECEIVED OSM DMO

Federal Express 4009270226
January 27, 1992

TMA/NORCAL
2030 Wright Avenue
Richmond, CA 94804
Attention: Dan Stuermer

Quality Control Narrative

Scope

One (1) soil sample was submitted to TMA/Skinner & Sherman Laboratories, Inc. on December 11, 1991 from Westinghouse/Hanford Company. The sample was analyzed for the USEPA CLP metals and cyanide. The analysis was performed under Skinner and Sherman work order 9112092.

Methodology

The samples were prepared, analyzed and reported in accordance with the USEPA Contract Laboratory Program Statement of Work 7/88 (CLP SOW788).

Discussion

All quality control requirements were met for the samples with the following exceptions:

The antimony and selenium digestion spike recoveries exceeded the control limit requirements.

Please feel free to call if there are any questions concerning this package.

Respectfully submitted,

TMA/SKINNER & SHERMAN LABORATORIES, INC.

David N. Peterson
Assistant Laboratory Manager

9613490.2818

WESTINGHOUSE/HANFORD

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N112061 SAS No.: SDG No.: B018L9

SOW No.: 7/88

SAMPLE NUMBER:	Lab Sample ID.
B018L9	12092-01S
B018L9D	12092-01S2
B018L9S	12092-01DS

Were ICP interelement corrections applied? Yes/No YES
Were ICP background corrections applied? Yes/No YES
If yes-were raw data generated before application of background corrections? Yes/No NO

Comments:

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

Signature: KDJohnson Name: Kirk D. Johnson

Date: 1/27/92 Title: USEPA Data Manager

9613490.2819

WESTINGHOUSE/HANFORD

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NUMBER: B018L9

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N112061 SAS No.: SDG No.: B018L9

Matrix (soil/water): SOIL Lab Sample ID: 12092-01S

Level (low/med): LOW Date Received: 12/11/91

% Solids: 96.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	5760.00			P
7440-36-0	Antimony	8.90	U	N	P
7440-38-2	Arsenic	1.60	B		F
7440-39-3	Barium	94.20			P
7440-41-7	Beryllium	0.59	B		P
7440-43-9	Cadmium	0.85	B		P
7440-70-2	Calcium	9240.00			P
7440-47-3	Chromium	14.00			P
7440-48-4	Cobalt	6.60	B		P
7440-50-8	Copper	14.80			P
7439-89-6	Iron	13100.00			P
7439-92-1	Lead	3.00			F
7439-95-4	Magnesium	3040.00			P
7439-96-5	Manganese	186.00			P
7439-97-6	Mercury	0.41			CV
7440-02-0	Nickel	8.90			P
7440-09-7	Potassium	740.00	B		P
7782-49-2	Selenium	3.70	U	N	F
7440-22-4	Silver	0.76	U		P
7440-23-5	Sodium	380.00	B		P
7440-28-0	Thallium	0.37	U		F
7440-62-2	Vanadium	31.80			P
7440-66-6	Zinc	28.10			P
	Cyanide	5.10	U		AS

Color Before: GREY Clarity Before: Texture: FINE

Color After: GREY Clarity After: Artifacts: YES

Comments:
STONES

9613490.2820

TMA/Skinner & Serman Labs **SAMPLE LOG-IN**

WORKORDER 91-12-092 CLIENT HANFORD-NOR No. SAMPLES:

PROTCL CLP TURNARND 33 days 1 (Soil) (Water) (Specify Other)

COOLER TEMP: 4 oC, or NA

CUSTODIAN A. Benney SDG/BATCH N/A

CUSTODY SEAL: PRESENT/ABSENT/INTACT/NOT CLIENT CASE N1-12-061

SHIPER & # Fedex PO/CONTRACT# ↓

TAGS: PRESENT/ABSENT/NA/SEE COC CONTACT Delores Sanchez

CHAIN OF CUSTODY: PRESENT/ABSENT/NA, # N/A COMMENTS: NONE

SAMPLE CONTAINERS-INTACT/BROKEN COMMENTS

CLIENT COMMENT? YES/NO Samples contain Radioactive Material

SAMPLE LABELS AGREE WITH CHAIN OF CUSTODY INFO? YES/NO (COMMENT)

CLIENT PAPERWORK AGREES WITH SAMPLES & COC? YES /NO (COMMENT)

SHIPMENT DATES 12/11/91

LIST ANY DATE WITH PAPERWORK/SHIPMENT PROBLEMS & SPECIFY THE PROBLEM:

N/A

	CLIENT ID	MATRIX	RECEIVED	QC	TEST(S)	HOLD TIME UP
1	B018L9	SOIL	12/11/91	0.5	TM/CN	12/5/91
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						

Complete 12/11/91

AB

SUBCONTRACT: YES/NO, TO: DATE:

REVIEWED Rev. 1.4 PAGE

9613490.2821

Westinghouse Hanford Company

CHAIN OF CUSTODY

S&S

Custody Form Initiator: CM Chance / J.D. Fancher

Company Contact: J.D. Fancher

Telephone: (509)376-2081

Project Designation/Sampling Locations: 100 DR-1 Vadose Zone Sampling

Collection Date: 12-5-91

Ice Chest No.: SML-72

Field Logbook No.: WHC-N-559

Bill of Lading/Airbill No.: ~~W92-0~~ CC12-0-01

Offsite Property No.: W92-0-0011 ~~7~~

Method of Shipment: Overnight Air Delivery

Shipped to: TMA/NORCAL 2030 Wright Ave. Richmond Ca. 94804

Possible Sample Hazards/Remarks: Maintain at 4°C

Sample Identification

B018L9

~~(1)1000ml G bottle(Radiochemistry,Sr-90,~~ C-14,Tc-99)	(1)1000ml G bottle(Radiochemistry, Sr-90, C-14,Tc-99)
(1) 250ml G bottle(ICP/AA metals,Hg)	(1) 250ml G bottle(ICP/AA metals, Hg)
~~(1) 250ml aG bottle(Semi-VOA,PCB's/PEST.)~~	(1) 250ml aG bottle(Semi-VOA,PCB's/PEST.)
(1) 125ml G bottle(Cyanide)	(1) 125ml G bottle(Cyanide)
~~(1) 125ml G bottle(VOA)~~	(1) 125ml G bottle(VOA)

☑ Field Transfer of Custody

CHAIN OF POSSESSION (Sign and Print Names)

Relinquished by:	Received by:	Date/Time:
J.D. Fancher / J.D. Fancher	CM Chance / Cory Chance	12-6-91 0722
CM Chance / Cory Chance	~~12-7~~ 12-3 Kermit Blum	12-9-91 1100
12-10-91 Kermit Blum	[illegible]	12/11/91 9:30

Final Sample Disposition

Disposal Method:	Disposed by:	Date/Time:

Comments:

129

A 6000 407 (12/

9613490.2822

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector J D Fancher Date Sampled 12-5-91 Time 1355 hours

Company Contact J.D. Fancher Telephone (509) 376-2081

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
	~~1-1000ml glass~~	~~Soil~~	~~Gross alpha/beta,Gamma Spec.,Sr-90,Tc-99,C-14~~ Alpha Spec.
	1-250ml glass	Soil	ICP/AA metals, Hg(CLP)
B01BL9	~~1-250ml amber glass~~	~~Soil~~	~~Semi-VOA,PCB's/PEST.(CLP)~~
	1-125ml glass	Soil	Cyanide(CLP)
	~~1-125ml glass~~	~~Soil~~	~~VOA(CLP)~~
	1-1000ml glass	Soil	Gross alpha/beta,Gamma Spec.Sr-90,Tc-99,C-14
	1-250ml glass	Soil	ICP/AA metals, Hg(CLP)
	1-250ml glass amber	Soil	Semi-VOA,PCB's/PEST.(CLP)
	1-125ml glass	Soil	Cyanide(CLP)
	1-125ml glass	Soil	VOA(CLP)

Field Information** _____

Special Handling and/or Storage _____

Possible Sample Hazards _____

PART II: LABORATORY SECTION

Received by Kasmir Blum Title Sample Control Supervisor Date 12-9-91

Analysis Required _____

*Indicate whether sample is soil, sludge, water, etc.

**Use back of page for additional information relative to sample location.

A-6000-406 (05/90)

9613490.2823

Westinghouse Hanford Company

CHAIN OF CUSTODY

ARL1

Custody Form Initiator: CM Chance / J.D. Fancher

Company Contact: J.D. Fancher

Telephone: (509)376-2081

Project Designation/Sampling Locations: 100 DR-1 Vadose Zone Sampling

Collection Date: 12-5-91

Ice Chest No.: SML-72

Field Logbook No.: WHC-N-559

Bill of Lading/Airbill No: ~~W92-0~~ 1212-D-21

Offsite Property No.: W92-0-0017

Method of Shipment: Overnight Air Delivery

Shipped to: TMA/NORCAL 2030 Wright Ave. Richmond Ca. 94804

Possible Sample Hazards/Remarks: Maintain at 4°C

Sample Identification

B018L9

~~(1)1000ml G bottle(Radiochemistry,Sr-90,~~ C-14,Tc-99)	(1)1000ml G bottle(Radiochemistry, Sr-90, C-14,Tc-99)
~~(1) 250ml G bottle(ICP/AA metals,Hg)~~	(1) 250ml G bottle(ICP/AA metals, Hg)
(1) 250ml aG bottle(Semi-VOA,PCB's/PEST.)	(1) 250ml aG bottle(Semi-VOA,PCB's/PEST.)
~~(1) 125ml G bottle(Cyanide)~~	(1) 125ml G bottle(Cyanide)
(1) 125ml G bottle(VOA)	(1) 125ml G bottle(VOA)

☑ Field Transfer of Custody

CHAIN OF POSSESSION (Sign and Print Names)

Relinquished by:	Received by:	Date/Time:
J.D. Fancher / J.D. Fancher	CM Chance / Cory Chance	12-6-91 0722
CM Chance / Cory Chance	~~12-9~~ 12-9 Kermit Blum	12-9-91 1100
12-10-91 Kermit Blum	T Bernard	12-12-91 1000

Final Sample Disposition

Disposal Method:	Disposed by:	Date/Time:

Comments:

A 6000 407 (12/9

9613490.2824

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector S D Fancher Date Sampled 12-5-91 Time 1355 hours

Company Contact J.D. Fancher Telephone (509) 376-2081

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
	~~1-1000ml glass~~	~~Soil~~	~~Gross alpha/beta,Gamma Spec.,Sr-90,Tc-99~~,C-14
	~~1-250ml glass~~	~~Soil~~	~~ICP/AA metals, Hg(CLP)~~
B018L9	1-250ml amber glass	Soil	Semi-VOA,PCB's/PEST.(CLP)
	~~1-125ml glass~~	~~Soil~~	~~Cyanide(CLP)~~
	1-125ml glass	Soil	VOA(CLP)
	1-1000ml glass	Soil	Gross alpha/beta,Gamma Spec.Sr-90,Tc-99,C-14
	1-250ml glass	Soil	ICP/AA metals, Hg(CLP)
	1-250ml glass amber	Soil	Semi-VOA,PCB's/PEST.(CLP)
	1-125ml glass	Soil	Cyanide(CLP)
	1-125ml glass	Soil	VOA(CLP)

Field Information**

Special Handling and/or Storage

Possible Sample Hazards

PART II: LABORATORY SECTION

Received by Kermit Blum Title Sample Control Supervisor Date 12-9-91

Analysis Required

*Indicate whether sample is soil, sludge, water, etc.

**Use back of page for additional information relative to sample location.

A-6000-406 (05/90)

CASE NARRATIVE

LABORATORY : TMA/ARLI

CASE : 12-028

CONTRACT ID : WESTINGHOUSE HANFORD COMPANY

SDG RECEIPT DATE : December 09, 1991

1.0 DESCRIPTION OF CASE :

One soil sample was analyzed for TCL Volatiles, Semivolatiles and Pesticide/PCB's according to the USEPA Contract Laboratory Program (CLP) Statement of Work for Organic Analysis, Revision 2/88.

2.0 SAMPLE LIST :

WESTINGHOUSE ID	LAB ID	ANALYSIS REQUESTED	MATRIX
B018L9	A1-12-028-01A	SV & P	SOIL
B018L9 MS	A1-12-028-01B	SV & P	SOIL
B018L9 MSD	A1-12-028-01C	SV & P	SOIL
B018L9	A1-12-028-01D	V	SOIL
B018L9 MS	A1-12-028-01E	V	SOIL
B018L9 MSD	A1-12-028-01F	V	SOIL

3.0 COMMENTS :

3.1 SHIPPING AND DOCUMENTATION :

All samples were received unbroken and properly documented.

3.2 ANALYSIS :

3.2.1 VOLATILE ANALYSIS COMMENTS :

LOW LEVEL SOIL :

The sample was analyzed by heated purge within the holding time specified in the EPA CLP SOW. All of the QC results were within the limits specified in the EPA CLP SOW.

TUNES :

All the BFB tunes are injected directly into the GC/MS instrument.

3.2.2 SEMIVOLATILE ANALYSIS COMMENTS :

LOW LEVEL SOIL :

The samples were extracted and analyzed within the holding time required by the CLP SOW. The MS and MSD samples had spiking recoveries below the QC limits for N-Nitro-di-n-propylamine, 1,2,4-Trichlorobenzene and Pyrene (MS only). All of the other QC results were within the limits specified in the EPA CLP SOW.

On 1/3/92 the GC/MS was bootstrapped with 1991 as the year. The analyst has corrected and initialed the the dates on the affected quantitation reports.

3.2.3 PESTICIDE/PCB ANALYSIS COMMENTS :

SEQUENCE NOTES :

The sequence was started on 1/2/92 and was analyzed in accordance with the EPA CLP SOW. IND A and IND B were run consecutively in the sequence in several areas. The following standards were used for quantitation:

IND A	06:14	1/3/92	(B010224)
IND B	15:38	1/3/92	(B010237)
IND A	00:23	1/4/92	(B010249)
IND B	22:59	1/4/92	(B010272)
IND A	03:25	1/5/92	(B010278)
IND B	04:08	1/5/92	(B010279)

After the injection made at 14:02 on 1/2/92 the sequence was stopped to check the linearity of the sequence and to insert IND B into the ICAL. The sequence was resumed with the next injection at 16:29 on 1/2/92. The sample injected at 03:17 on 1/4/92 contained a large amount of an Aroclor which contaminated the following injections of EVAL B (B010254), IND A and IND B. After the injection made at 05:28 on 1/4/92, the sequence was stopped to perform the required maintenance to clean up the contamination.

The sequence was resumed with the next injection on IND A (B010257) at 09:28 on 1/4/92. The data for IND A met all of the QC requirements, however, was not used for quantitation and therefore not reported.

Samples analyzed under GC files B010258 - B010261, and B020266 and EVAL B under GC file B010263 were required to be re-injected because their DBC retention times were outside the QC limits.

The Nelson box that contained the data for IND A (B010264 and A010264) malfunctioned and lost the data. The sequence was interrupted between files B010264, B010265, and B010266 to determine what happened to B010264 and to perform on-time QC and re-loading of samples.

Due to the limitations of the software used to report 2/88 CLP Protocol results for Pesticide/PCB, instrument blanks can not be reported. An instrument blank was injected at 13:02 on 1/4/92 after a sample known to have Aroclors present in it, to insure that there was no carry over. On 1/5/92 three instrument blanks in a row were injected at 00:33, 01:16, and 01:59 to insure that there was no carry over from the previous sample injected at 23:46 on 1/4/92.

EVAL B analyzed after the above three blanks had a low recovery for Aldrin in the confirmation column (A010277), however, the primary column had good recovery of Aldrin.

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0004A

SAMPLE NOTES :

LOW LEVEL SOIL:

The samples were extracted and analyzed within the required CLP SOW holding times. All of the QC results were within the limits specified by the EPA CLP SOW.

We 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 in this hardcopy data package and in the computer-readable data submitted on diskette is authorized by the Laboratory Manager or his designee, as verified by the following signatures.

Nicole Roth
CLP Program Manager

Dennis D. Wells
Technical Director

9613490.2829

0005

EPA SAMPLE NO.

B018L9

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMA Case No.: 12028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A112028-01D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 1216K17

Level: (low/med) LOW Date Received: 12/09/91

% Moisture: not dec. 3 Date Analyzed: 12/16/91

Column: (pack/cap) PACK Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	16	B
67-64-1	Acetone	12	
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (Total)	5	U

9613490.2830

0006

EPA SAMPLE NO.

B018L9

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMA Case No.: 12028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A112028-01D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 1216K17

Level: (low/med) LOW Date Received: 12/09/91

% Moisture: not dec. 3 Date Analyzed: 12/16/91

Column (pack/cap) PACK Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

9613490.2831

0007

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B018L9

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 12028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A112028-01A

Sample wt/vol: 30.2 (g/mL) G Lab File ID: 0103N08

Level: (low/med) LOW Date Received: 12/09/91

% Moisture: not dec. 3 dec. Date Extracted: 12/18/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/03/92

GPC Cleanup: (Y/N) N pH: 9.8 Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	340	U
111-44-4	bis(2-Chloroethyl)Ether	340	U
95-57-8	2-Chlorophenol	340	U
541-73-1	1,3-Dichlorobenzene	340	U
106-46-7	1,4-Dichlorobenzene	340	U
100-51-6	Benzyl Alcohol	340	U
95-50-1	1,2-Dichlorobenzene	340	U
95-48-7	2-Methylphenol	340	U
108-60-1	bis(2-Chloroisopropyl)Ether	340	U
106-44-5	4-Methylphenol	340	U
621-64-7	N-Nitroso-Di-n-Propylamine	340	U
67-72-1	Hexachloroethane	340	U
98-95-3	Nitrobenzene	340	U
78-59-1	Isophorone	340	U
88-75-5	2-Nitrophenol	340	U
105-67-9	2,4-Dimethylphenol	340	U
65-85-0	Benzoic Acid	1600	U
111-91-1	bis(2-Chloroethoxy)methane	340	U
120-83-2	2,4-Dichlorophenol	340	U
120-82-1	1,2,4-Trichlorobenzene	340	U
91-20-3	Naphthalene	340	U
106-47-8	4-Chloroaniline	340	U
87-68-3	Hexachlorobutadiene	340	U
59-50-7	4-Chloro-3-methylphenol	340	U
91-57-6	2-Methylnaphthalene	340	U
77-47-4	Hexachlorocyclopentadiene	340	U
88-06-2	2,4,6-Trichlorophenol	340	U
95-95-4	2,4,5-Trichlorophenol	1600	U
91-58-7	2-Chloronaphthalene	340	U
88-74-4	2-Nitroaniline	1600	U
131-11-3	Dimethyl Phthalate	340	U
208-96-8	Acenaphthylene	340	U

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B018L9

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 12028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A112028-01A

Sample wt/vol: 30.2 (g/mL) G Lab File ID: 0103N08

Level: (low/med) LOW Date Received: 12/09/91

% Moisture: not dec. 3 dec. Date Extracted: 12/18/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/03/92

GPC Cleanup: (Y/N) N pH: 9.8 Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	1600	U
83-32-9	Acenaphthene	340	U
51-28-5	2,4-Dinitrophenol	1600	U
100-02-7	4-Nitrophenol	1600	U
132-64-9	Dibenzofuran	340	U
121-14-2	2,4-Dinitrotoluene	340	U
606-20-2	2,6-Dinitrotoluene	340	U
84-66-2	Diethylphthalate	340	U
7005-72-3	4-Chlorophenyl-phenylether	340	U
86-73-7	Fluorene	340	U
100-01-6	4-Nitroaniline	1600	U
534-52-1	4,6-Dinitro-2-methylphenol	1600	U
86-30-6	N-Nitrosodiphenylamine (1)	340	U
101-55-3	4-Bromophenyl-phenylether	340	U
118-74-1	Hexachlorobenzene	340	U
87-86-5	Pentachlorophenol	1600	U
85-01-8	Phenanthrene	340	U
120-12-7	Anthracene	340	U
84-74-2	Di-n-Butylphthalate	21	BJ
206-44-0	Fluoranthene	340	U
129-00-0	Pyrene	340	U
85-68-7	Butylbenzylphthalate	340	U
91-94-1	3,3'-Dichlorobenzidine	680	U
56-55-3	Benzo(a)anthracene	340	U
117-81-7	bis(2-Ethylhexyl)Phthalate	340	U
218-01-9	Chrysene	340	U
117-84-0	Di-n-octyl Phthalate	340	U
205-99-2	Benzo(b)fluoranthene	340	U
207-08-9	Benzo(k)fluoranthene	340	U
50-32-8	Benzo(a)pyrene	340	U
193-39-5	Indeno(1,2,3-cd)Pyrene	340	U
53-70-3	Dibenz(a,h)Anthracene	340	U
191-24-2	Benzo(g,h,i)perylene	340	U

(1) - Cannot be separated from Diphenylamine

EPA SAMPLE NO.

B018L9

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 12028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A112028-01A

Sample wt/vol: 30.2 (g/mL) G Lab File ID: 0103N08

Level: (low/med) LOW Date Received: 12/09/91

% Moisture: not dec. 3 dec. Date Extracted: 12/18/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/03/92

GPC Cleanup: (Y/N) N pH: 9.8 Dilution Factor: 1.0

Number TICs found: 9

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN HYDROCARBON	2.42	240	BJ
2.	UNKNOWN HYDROCARBON	2.55	650	BJ
3.	UNKNOWN ALKANE	2.80	140	BJ
4.	UNKNOWN ALCOHOL	3.00	13000	BJ
5.	UNKNOWN ALCOHOL	3.15	550	J
6.	UNKNOWN ALKANE	3.30	170	BJ
7.	UNKNOWN KETONE	5.00	620	BJ
8.	UNKNOWN HYDROCARBON	5.98	340	J
9.	UNKNOWN PHTHALATE	22.12	240	BJ

9613490.2834

0010

EPA SAMPLE NO.

B018L9

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 12028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A112028-01A

Sample wt/vol: 30.3 (g/mL) G Lab File ID: _____

Level: (low/med) LOW Date Received: 12/09/91

% Moisture: not dec. 3 dec. __ Date Extracted: 12/17/92

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/03/92

GPC Cleanup: (Y/N) N pH: 9.8 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	8.2	U
319-85-7	beta-BHC	8.2	U
319-86-8	delta-BHC	8.2	U
58-89-9	gamma-BHC (Lindane)	8.2	U
76-44-8	Heptachlor	8.2	U
309-00-2	Aldrin	8.2	U
1024-57-3	Heptachlor epoxide	8.2	U
959-98-8	Endosulfan I	8.2	U
60-57-1	Dieldrin	16	U
72-55-9	4,4'-DDE	16	U
72-20-8	Endrin	16	U
33213-65-9	Endosulfan II	16	U
72-54-8	4,4'-DDD	16	U
1031-07-8	Endosulfan sulfate	16	U
50-29-3	4,4'-DDT	16	U
72-43-5	Methoxychlor	82	U
53494-70-5	Endrin ketone	16	U
5103-71-9	alpha-Chlordane	82	U
5103-74-2	gamma-Chlordane	82	U
8001-35-2	Toxaphene	160	U
12674-11-2	Aroclor-1016	82	U
11104-28-2	Aroclor-1221	82	U
11141-16-5	Aroclor-1232	82	U
53469-21-9	Aroclor-1242	82	U
12672-29-6	Aroclor-1248	82	U
11097-69-1	Aroclor-1254	160	U
11096-82-5	Aroclor-1260	160	U

9613490.2835

000001

9/8/92

TMA
Thermo Analytical Inc.

TMA/Norcal
2030 Wright Avenue
P. O. Box 4040
Richmond, CA 94804-0040
(510) 235-2633 Fax No. (510) 235-0438

JUL 1992
RECEIVED
OSM DMO

June 30, 1992

SENT BY FEDERAL EXPRESS

Ref. TMA/Norcal N1-12-049-7004

Mr. John Bourgeault
Westinghouse Hanford Company
2355 Stevens Drive
Richland, WA 99352

Dear Mr. Bourgeault:

Enclosed on Attachment 1, are the gross alpha, gross beta, ^{14}C, ^{90}Sr, ^{99}Tc, and gamma scan results for the soil sample from 100-DR-1 Vadose Zone we received 9 December 1991. The QA/QC results are given in Attachments 2, 3, and 4.

Please call if you have any questions concerning this data.

Sincerely,

D. P. Kharkar

Dinkar P. Kharkar, Ph.D.
Manager, Nuclear Programs

Enclosures: Section 1 through 11
Appendices

ATTACHMENT 1 DATA TABLE

Collection date: 12/05/91

Customer I.D.	TMA/Norcal Group No. 7004	Analysis	Results pCi/g ± 2 σ	
B018L9 (soil)	1	Gross Alpha	(7.92 ± 4.82)	E+00
		Gross Beta	(13.4 ± 2.08)	E+00
		^{14}C	(-2.97 ± 13.68)	E+00
		^{90}Sr	(0.99 ± 1.01)	E+00
		^{99}Tc	(3.3 ± 2.8)	E-01
		Gamma Scan:		
		^{40}K	(9.839 ± 1.574)	E+00
		^{51}Cr	<3.474	E+01
		^{60}Co	<1.160	E-01
		^{65}Zn	<4.449	E-01
		^{134}Cs	<1.410	E-01
		^{137}Cs	(1.655 ± 1.441)	E-01
		^{226}Ra	(2.405 ± 1.469)	E-01
		^{228}Th	(6.870 ± 2.001)	E-01
		^{232}Th	(5.306 ± 4.221)	E-01

CASE NARRATIVE

1. Project Hanford 100-DR-1, Vadose Zone Soil Samples (TMA/Norcal Group No. 9566, 9568, and 7004 were processed together and the results are reported. The sample ID's are:

Customer Sample ID	TMA/Norcal Group No.	Customer Sample ID	TMA/Norcal Group No.
B018F1	9566-1	B018L9	7004-1
B018F6	9568-1		

2. The analyses reported are:

	SOIL		
Analyte	Group # & Sample #	Group # & Sample #	Group # & Sample #
Gross α	9566-1	9568-1	7004-1
Gross β	9566-1	9568-1	7004-1
^{14}C	9566-1	9568-1	7004-1
^{90}Sr	9566-1	9568-1	7004-1
^{99}Tc	9566-1	9568-1	7004-1
Gamma Scan	9566-1	9568-1	7004-1

3. Results are reported pCi/gram dry material for soil.

4. The QC samples consisting of a spike, a laboratory control sample, and a replicate were processed with each batch as shown on Table 1.

TABLE 1

Preparation Batch Samples Processed	Data Package
9566-1	- SOIL
9568-1	- SOIL
7004-1	- SOIL

QC SAMPLES PROCESSED:

Sample I.D.		Type	Analyses	Reported with Data Package
9566-2	(QC 7334)	Spike	^{90}Sr	X
9566-3	(QC 7335)	LCS	^{90}Sr	X
9566-4	(QC 7336)	Replicate	^{90}Sr	X
9566-5	(QC 7337)	Spike	Gross α,β	X
9566-6	(QC 7338)	LCS	Gross α,β	X
9566-7	(QC 7339)	Replicate	Gross α,β	X
9566-8	(QC 7340)	Spike	Gamma Scan	X
9566-9	(QC 7341)	LCS	Gamma Scan	X
9566-10	(QC 7342)	Replicate	Gamma Scan	X
9566-11	(QC 7343)	Spike	^{99}Tc	X
9566-12	(QC 7344)	LCS	^{99}Tc	X
9576-13	(QC 7345)	Replicate	^{99}Tc	X
9566-14	(QC 7346)	Spike	^{14}C	X
9566-15	(QC 7347)	LCS	^{14}C	X
9566-16	(QC 7348)	Replicate	^{14}C	X

5. Analyses, reanalyses, and reworks, etc.

Gross Alpha and Gross Beta Analyses:

The found/added ratio for the gross alpha spike was found high (1.41 ± 0.17). However, the ratio for the gross beta spike was good. The results of the laboratory control sample and the replicate for gross alpha and beta were satisfactory.

Strontium Analyses: The average yield for 3 analyses was 47%. The lowest yield was 35% and the highest was 54%. No abnormalities were encountered. The results of the spike, the Laboratory Control Sample, and the replicate were satisfactory.

Technetium-99 Analyses: The average yield for 3 analyses was 59%. The lowest yield was 36% and the highest was 75%. No abnormalities were encountered. The results of, the Laboratory Control Sample, and the replicate were satisfactory. The Found/Added ratio of the Spike was 1.46 ± 0.22.

Gamma Scan Analyses: The spike sample processed look good. The results of the spike, the laboratory control sample, and the replicate were satisfactory.

Carbon-14 Analyses: The results of the spike, the laboratory control sample, and the replicate were satisfactory. No abnormalities were encountered.

9613490.2839 000016

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector S D Fancher Date Sampled 12-5-91 Time 1355 hours

Company Contact J.D. Fancher Telephone (509) 376-2081

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
	1-1000ml glass	Soil	Gross alpha/beta, Alpha Spec. Gamma Spec., Sr-90, Tc-99, C-1
	1-250ml glass	Soil	ICP/AA metals, Hg(CLP)
B01BL9	1-250ml amber glass	Soil	Semi-VOA, PCB's/PEST.(CLP)
	1-125ml glass	Soil	Cyanide(CLP)
	1-125ml glass	Soil	VOA(CLP)
	1-1000ml glass	Soil	Gross alpha/beta, Gamma Spec. Sr-90, Tc-99, C-14
	1-250ml glass	Soil	ICP/AA metals, Hg(CLP)
	1-250ml glass amber	Soil	Semi-VOA, PCB's/PEST.(CLP)
	1-125ml glass	Soil	Cyanide(CLP)
	1-125ml glass	Soil	VOA(CLP)

Field Information**

Special Handling and/or Storage

Possible Sample Hazards

PART II: LABORATORY SECTION

Received by Kermit Blum Title Sample Control Supervisor Date 12-9-91

Analysis Required

*Indicate whether sample is soil, sludge, water, etc.

**Use back of page for additional information relative to sample location.

A-6000-406 (05/90)

9613490.2840

Westinghouse Hanford Company	CHAIN OF CUSTODY	000015

Custody Form Initiator C M Chance / J.D. Fancher

Company Contact J.D. Fancher Telephone (509)376-2081

Project Designation/Sampling Locations 100 DR-1 Vadose Zone Sampling Collection Date 12-5-91

Ice Chest No. SML-72 Field Logbook No. WHC-N-559

Bill of Lading/Airbill No. ~~W92-0~~ C12-0-21 Offsite Property No. W92-0-0017

Method of Shipment Overnight Air Delivery

Shipped to TMA/NORCAL 2030 Wright Ave. Richmond Ca. 94804

Possible Sample Hazards/Remarks Maintain at 4°C

Sample Identification

B018L9

(1)1000ml G bottle(Radiochemistry,Sr-90, C-14,Tc-99)	(1)1000ml G bottle(Radiochemistry, Sr-90, C-14,Tc-99)
(1) 250ml G bottle(ICP/AA metals,Hg)	(1) 250ml G bottle(ICP/AA metals, Hg)
(1) 250ml aG bottle(Semi-VOA,PCB's/PEST.)	(1) 250ml aG bottle(Semi-VOA,PCB's/PEST.)
(1) 125ml G bottle(Cyanide)	(1) 125ml G bottle(Cyanide)
(1) 125ml G bottle(VOA)	(1) 125ml G bottle(VOA)

☑ Field Transfer of Custody — CHAIN OF POSSESSION — (Sign and Print Names)

Relinquished by:	Received by:	Date/Time:
J.D. Fancher J.D. Fancher	CM Chance Cory Chance	12-6-91 0722
Relinquished by: CM Chance Cory Chance	Received by: ~~12-9~~ KB Kermit Blum	Date/Time: 12-9-91 1100
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Final Sample Disposition

Disposal Method:	Disposed by:	Date/Time:

Comments:

A-6000-407 (1

9613490.2841

~~Overnight Delivery~~ Courier Delivery

Contractor	OFF-SITE PROPERTY CONTROL	CONTROL NUMBER (To be obtained from PROPERTY MANAGEMENT)
Westinghouse Hanford Company		W92-0011 #R

PART I – TO BE COMPLETED BY ORIGINATOR

Department	Section	Unit
Env. Eng. & Geotech.	EFSG	Env. Charac. & Sampling

The following items are to be shipped from ☒ Contractor ☐ Vendor

Routing Air ☒ Contractor ☐ Vendor

Shipped to
TMA/NORCAL
2030 WRIGHT AVE
RICHMOND CA 94804

Off-site Custodian: Robert Fox

Full Title: Project Coordinator

Quantity	Description (Include Serial and any Government Tag Numbers)	Original Cost
41 lbs	1 Igloo SML-72 poly cooler. Contains soil samples that are double-bagged and packed in wet ice and vermiculite. Samples are nonhazardous. Sample #: B018L9	N/A

☐ Classified ☒ Unclassified ☐ Shipped Under DOE Contract ☐ Shipped Under Contractor's Use Permit Contract

Necessity for the Off-Site Use of this Property

To support drilling and sampling at 100 Areas.

Bill of Lading # PSC25098644J

CERTIFICATION OF THE RADIATION MONITORING RELEASE MUST BE SECURED THE SAME DAY THAT MATERIAL IS DELIVERED TO SHIPPING.

RM Clearance for Public Release	RM Survey No	Date
M 11	ER 111494	12-6-91

Location of Property (Area & Bldg.)	Contact	Phone
100 Area 100HR-3	J. D. Fancher	376-

Date Ready for Shipment	Cost Code to be Charged	Approximate Date This Property will be Returned
12-6-91	PB213 81241	N/

Originated By	Date	Authorized By	Date
Signature and Name of Property Control	12-6-91		12-6-9
	Custodian Date	Property Management Approval	Date

PART II – TO BE COMPLETED BY SHIPPING

Signature of Recipient	Return Order No.	Date Issued	Purchase Order No.	Date Issu
Date 12-6-91				

DISTRIBUTION

By Originator	Shipping Operation – Sign all Copies and Forward to:
White, Green, Yellow, Pink – Property Management Goldenrod – Retain	White – Property Management Yellow – Retain Green – Property Control Custodian (Issuing Off Pink – Originator

54-3000-47

FORM OF PAYMENT

Check ☐ GBL ☐ FCCOD ☐

Bill to Shipper ☒ Bill to Consignee ☐ Third Party Billing ☐

EMERY WORLDWIDE

A CF Company

SERVICES

UNITED STATES / CANADA: Same Day ☐ AM ☐ Second Day ☐ PM ☐ Saturday Delivery ☐

INTERNATIONAL: Express ☐ Preferred ☐ Standard ☐ Business Documents ☐ Customs Clearance ☐ Delivery ☐

E Shipper's Account Number: 850281585

Date: 12-06-91 Origin: PSC Shipment Number: 250986443 4

From:
WESTINGHOUSE SHIPPING DEPT (509) 376-6665
US DEPARTMENT OF ENERGY C/O
WESTINGHOUSE HANFORD
BLDG 1163
2355 STEVENS DRIVE
RICHLAND WA Canada ☐

To:
ROBERT FOX
TMA/NORCAL
2030 WRIGHT AVENUE
RICHMOND CA Canada ☐ Hold for Pick Up ☐

Tariff Dest. Gateway

Check to Shipper $

EMERY WORLDWIDE will accept Consignee's check with all risks being assumed by Shipper, including but not limited to non-payment, fraud and misrepresentation.

Customer's Reference Numbers: W81241 PB213 W92-0-0011 #18 993 3

Zip

E Consignee's Account Number

Zip: 94804

Description	Dimensions Pcs.	L	W	H	Total Pieces	Total Weight (in Lbs.)
1 IGLOO SML#72 COOLER SOIL SAMPLES B01@L9 W92-0-0011 #18	1				1	41

FOR INFORMATION OR RATES CALL 1-800 44 EMERY (1-800-443-6379)

Declared Value

Remarks: SATURDAY DELIVERY

Zip Ship ☐ For shipments within the 50 United States Shipper has the option to check this box and, by checking, agrees that the Zip Ship conditions, described in the area to the right, apply.

Mark if Emery Packaging is used: Urgent Letter 9X12 ☐ Urgent Pack 12X15 ☐

Shipper's Signature X

2509864434

International Shipments: Free Domicile ☐ Commodity Code

Third Party Account Number mandatory for Third Party Billing. E Third Party Account Number

International Customs Value

International Insurance

Base Charge

Total Transportation Charges

Other Charges/Advance at Origin ☐ OC/AO $

1-OAK 5 Sf

Terms and Conditions on Back

CONSIGNEE — PACKAGE COPY — 4

PU SHI NO. TAB

2482-0196913

000018

FORM NO. 60001-46

9613490.2843

VALIDATION SUMMARY

9613490.2844

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 0040

B018L9

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMA Case No.: 12028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A112028-01D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 1216K17

Level: (low/med) LOW Y00805 Date Received: 12/09/91

% Moisture: not dec. 3 100-HR-3 Date Analyzed: 12/16/91

Column: (pack/cap) PACK GW Drilling Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	16	~~B~~ U
67-64-1	Acetone	12	
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (Total)	5	U

8-14-
MM

9613490.2845

0041
EPA SAMPLE NO.

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

B018L9

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMA Case No.: 12028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A112028-01D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 1216K17

Level: (low/med) LOW Date Received: 12/09/91

% Moisture: not dec. 3 Date Analyzed: 12/16/91

Column (pack/cap) PACK Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

8-14-92
MM

9613490.2846

0119

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B018L9

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 12028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A112028-01A

Sample wt/vol: 30.2 (g/mL) G Lab File ID: 0103N08

Level: (low/med) LOW Date Received: 12/09/91

% Moisture: not dec. 3 dec. ____ Date Extracted: 12/18/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/03/92

GPC Cleanup: (Y/N) N pH: 9.8 Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	340	U
111-44-4	bis(2-Chloroethyl)Ether	340	U
95-57-8	2-Chlorophenol	340	U
541-73-1	1,3-Dichlorobenzene	340	U
106-46-7	1,4-Dichlorobenzene	340	U
100-51-6	Benzyl Alcohol	340	U
95-50-1	1,2-Dichlorobenzene	340	U
95-48-7	2-Methylphenol	340	U
108-60-1	bis(2-Chloroisopropyl)Ether	340	U
106-44-5	4-Methylphenol	340	U
621-64-7	N-Nitroso-Di-n-Propylamine	340	U
67-72-1	Hexachloroethane	340	U
98-95-3	Nitrobenzene	340	U
78-59-1	Isophorone	340	U
88-75-5	2-Nitrophenol	340	U
105-67-9	2,4-Dimethylphenol	340	U
65-85-0	Benzoic Acid	1600	U
111-91-1	bis(2-Chloroethoxy)methane	340	U
120-83-2	2,4-Dichlorophenol	340	U
120-82-1	1,2,4-Trichlorobenzene	340	U
91-20-3	Naphthalene	340	U
106-47-8	4-Chloroaniline	340	U
87-68-3	Hexachlorobutadiene	340	U
59-50-7	4-Chloro-3-methylphenol	340	U
91-57-6	2-Methylnaphthalene	340	U
77-47-4	Hexachlorocyclopentadiene	340	U
88-06-2	2,4,6-Trichlorophenol	340	U
95-95-4	2,4,5-Trichlorophenol	1600	U
91-58-7	2-Chloronaphthalene	340	U
88-74-4	2-Nitroaniline	1600	U
131-11-3	Dimethyl Phthalate	340	U
208-96-8	Acenaphthylene	340	U

8-17-

9613490.2847

0120

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B018L9

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 12028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A112028-01A

Sample wt/vol: 30.2 (g/mL) G Lab File ID: 0103N08

Level: (low/med) LOW Date Received: 12/09/91

% Moisture: not dec. 3 dec. ____ Date Extracted: 12/18/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/03/92

GPC Cleanup: (Y/N) N pH: 9.8 Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	1600	U
83-32-9	Acenaphthene	340	U
51-28-5	2,4-Dinitrophenol	1600	U
100-02-7	4-Nitrophenol	1600	U
132-64-9	Dibenzofuran	340	U
121-14-2	2,4-Dinitrotoluene	340	U
606-20-2	2,6-Dinitrotoluene	340	U
84-66-2	Diethylphthalate	340	U
7005-72-3	4-Chlorophenyl-phenylether	340	U
86-73-7	Fluorene	340	U
100-01-6	4-Nitroaniline	1600	U
534-52-1	4,6-Dinitro-2-methylphenol	1600	U
86-30-6	N-Nitrosodiphenylamine (1)	340	U
101-55-3	4-Bromophenyl-phenylether	340	U
118-74-1	Hexachlorobenzene	340	U
87-86-5	Pentachlorophenol	1600	U
85-01-8	Phenanthrene	340	U
120-12-7	Anthracene	340	U
84-74-2	Di-n-Butylphthalate	340 ~~21~~	~~BJ~~ UJ
206-44-0	Fluoranthene	340	U
129-00-0	Pyrene	340	U
85-68-7	Butylbenzylphthalate	340	U
91-94-1	3,3'-Dichlorobenzidine	680	U
56-55-3	Benzo(a)anthracene	340	U
117-81-7	bis(2-Ethylhexyl)Phthalate	340	U
218-01-9	Chrysene	340	U
117-84-0	Di-n-octyl Phthalate	340	U
205-99-2	Benzo(b)fluoranthene	340	U
207-08-9	Benzo(k)fluoranthene	340	U
50-32-8	Benzo(a)pyrene	340	U
193-39-5	Indeno(1,2,3-cd)Pyrene	340	U
53-70-3	Dibenz(a,h)Anthracene	340	U
191-24-2	Benzo(g,h,i)perylene	340	U

8-17 MM

(1) - Cannot be separated from Diphenylamine

9613490.2848

0121

EPA SAMPLE NO.

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

B018L9

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 12028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A112028-01A

Sample wt/vol: 30.2 (g/mL) G Lab File ID: 0103N08

Level: (low/med) LOW Date Received: 12/09/91

% Moisture: not dec. 3 dec. Date Extracted: 12/18/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/03/92

GPC Cleanup: (Y/N) N pH: 9.8 Dilution Factor: 1.0

Number TICs found: 9

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN HYDROCARBON	2.42	240	~~BJ~~ U
2.	UNKNOWN HYDROCARBON	2.55	650	~~BJ~~ U
3.	UNKNOWN ALKANE	2.80	140	~~BJ~~ U
4.	UNKNOWN ALCOHOL	3.00	13000	~~BJ~~ U
5.	UNKNOWN ALCOHOL	3.15	550	J
6.	UNKNOWN ALKANE	3.30	170	~~BJ~~ U
7.	UNKNOWN KETONE	5.00	620	~~BJ~~ U
8.	UNKNOWN HYDROCARBON	5.98	340	J
9.	UNKNOWN PHTHALATE	22.12	240	~~BJ~~ U

8-17-92
MM

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0248

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B018L9

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 12028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A112028-01A

Sample wt/vol: 30.3 (g/mL) G Lab File ID: _____

Level: (low/med) LOW Date Received: 12/09/91

% Moisture: not dec. 3 dec. __ Date Extracted: 12/17/92

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/03/92

GPC Cleanup: (Y/N) N pH: 9.8 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	8.2	U
319-85-7	beta-BHC	8.2	U
319-86-8	delta-BHC	8.2	U
58-89-9	gamma-BHC (Lindane)	8.2	U
76-44-8	Heptachlor	8.2	U
309-00-2	Aldrin	8.2	U
1024-57-3	Heptachlor epoxide	8.2	U
959-98-8	Endosulfan I	8.2	U
60-57-1	Dieldrin	16	U
72-55-9	4,4'-DDE	16	U
72-20-8	Endrin	16	U
33213-65-9	Endosulfan II	16	U
72-54-8	4,4'-DDD	16	U
1031-07-8	Endosulfan sulfate	16	U
50-29-3	4,4'-DDT	16	U
72-43-5	Methoxychlor	82	U
53494-70-5	Endrin ketone	16	U
5103-71-9	alpha-Chlordane	82	U
5103-74-2	gamma-Chlordane	82	U
8001-35-2	Toxaphene	160	U
12674-11-2	Aroclor-1016	82	U
11104-28-2	Aroclor-1221	82	U
11141-16-5	Aroclor-1232	82	U
53469-21-9	Aroclor-1242	82	U
12672-29-6	Aroclor-1248	82	U
11097-69-1	Aroclor-1254	160	U
11096-82-5	Aroclor-1260	160	U

8-17-9

9613490.2850

WESTINGHOUSE/HANFORD

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NUMBER: B018L9

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N112061 SAS No.: SDG No.: B018L9

Matrix (soil/water): SOIL Lab Sample ID: 12092-01S

Level (low/med): LOW Date Received: 12/11/91

% Solids: 96.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

12/30/92 gm

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	5760.00			P
7440-36-0	Antimony	8.90	U	N(UJ)	P
7440-38-2	Arsenic	1.60	B		F
7440-39-3	Barium	94.20			P
7440-41-7	Beryllium	0.59	B		P
7440-43-9	Cadmium	0.85	B		P
7440-70-2	Calcium	9240.00			P
7440-47-3	Chromium	14.00			P
7440-48-4	Cobalt	6.60	B		P
7440-50-8	Copper	14.80			P
7439-89-6	Iron	13100.00			P
7439-92-1	Lead	3.00			F
7439-95-4	Magnesium	3040.00			P
7439-96-5	Manganese	186.00			P
7439-97-6	Mercury	0.41			CV
7440-02-0	Nickel	8.90			P
7440-09-7	Potassium	740.00	B		P
7782-49-2	Selenium	3.70	U	N(UJ)	F
7440-22-4	Silver	0.76	U		P
7440-23-5	Sodium	380.00	B		P
7440-28-0	Thallium	0.37	U		F
7440-62-2	Vanadium	31.80			P
7440-66-6	Zinc	28.10			P
	Cyanide	5.10	U		AS

Color Before: GREY Clarity Before: Texture: FINE

Color After: GREY Clarity After: Artifacts: YES

Comments:
STONES

9613490.2851

ΓACHMENT 1 DATA TABLE

Collection date: 12/05/91

Customer I.D.	TMA/Norcal Group No. 7004	Analysis	Results pCi/g ± 2 σ	
B018L9 (soil)	1	Gross Alpha	(7.92 ± 4.82)	E+00
		Gross Beta	(13.4 ± 2.08)	E+00
		^{14}C	(-2.97 ± 13.68)	E+00
		^{90}Sr	(0.99 ± 1.01)	E+00
		^{99}Tc	(3.3 ± 2.8)	E-01
		Gamma Scan:		
		^{40}K	(9.839 ± 1.574)	E+00
		^{51}Cr	<3.474	E+01
		^{60}Co	<1.160	E-01
		^{65}Zn	<4.449	E-01
		^{134}Cs	<1.410	E-01
		^{137}Cs	(1.655 ± 1.441)	E-01
		^{226}Ra	(2.405 ± 1.469)	E-01
		^{228}Th	(6.870 ± 2.001)	E-01
		^{232}Th	(5.306 ± 4.221)	E-01

X01355
HR-3
GWDrilling
12/10/92

9613490.2852

TMA

Working Copy R — Lab = TMA

J

Analysis date UJ

ATTACHMENT 1 DATA TABLE

Collection date: 12/05/91

correct here

Customer I.D.	TMA/Norcal Group No. 7004 MDA	Analysis	date analyzed	Results pCi/g ± 2 σ		
B018L9 (soil)	1	Gross Alpha	4/27/92	(7.92 ± 4.82)	E+00	R-eff
		Gross Beta	"	(13.4 ± 2.08)	E+00	
		^{14}C	5/22/92	(-2.97 ± 13.68) UJ	E+00	R gn
		^{90}Sr	5/8/92	(0.99 ± 1.01) J	E+00	R ca
		^{99}Tc	6/15/92	(3.3 ± 2.8) J	E-01	R hold
		Gamma Scan:				
		^{40}K		(9.839 ± 1.574)	E+00	
		^{51}Cr		<3.474	E+01 U	
		^{60}Co		<1.160	E-01 U	
		^{65}Zn		<4.449	E-01 U	
		^{134}Cs		<1.410	E-01 U	
		^{137}Cs		(1.655 ± 1.441)	E-01	
		^{226}Ra		(2.405 ± 1.469)	E-01	
		^{228}Th		(6.870 ± 2.001)	E-01	
		^{232}Th		(5.306 ± 4.221)	E-01	

BB 12/10/92

Area:

RADIOLOGICAL DATA VALIDATION CHECKLIST

PROJECT: Westinghouse Hanford	REVIEWER: KA	DATE: 12/10/92
LABORATORY: TMA	CASE: N/A	SDG: B01829
SAMPLES/MATRIX: B01829 - one soil sample		

6.1 COMPLETENESS CHECKS

Begin by examining the data package for completeness. Use the checklists included in the Appendices, but also refer to the Statement of Work (SOW) for the analytical laboratory. Items specified in the SOW may supplement or take precedence over the list of items in the checklists.

Evaluation Criteria and Actions

Verify that the items listed in the SOW, if available, and the Method Specific Appendices are included in the data package. These items may be recorded in various ways, and the data package may be organized differently than this procedure, so some searching may be required. Information that pertains to a requirement that is associated with an **R** qualifier, e.g., initial calibration, is classed as major, and its lack would be a major deficiency. A minor deficiency would result from a lack of information associated with a **J** qualifier, e.g., duplicates. The validator may have to use professional judgement to classify some deficiencies.

If minor deficiencies are encountered and can not be rectified by the laboratory, then generally all affected (associated) data must be qualified as estimated (**J**). Major deficiencies that can not be rectified will require that all affected data be qualified as unusable (**R**). The validator may use other qualifiers, but their definition must be included in the data validation report. If the validator concludes that no qualification is necessary, the reason must be included in the data validation report.

Indicate whether the following articles are present. Insert a "Y" if the corresponding item is in the data packet, an "N" if it is absent, or "N/A" if the item does not apply to the analysis:

Checklist:

✓ Case Narrative
✓ Chain of Custody

6.1.A COMPLETENESS CHECKLIST FOR ANALYSES USING GAS PROPORTIONAL COUNTERS

Analysis Results

- ✓ Results Report for Sample Analyses and Reanalyses
- ✓ Raw Data (Counting Logs, Printouts, Notebook Pages)
- ✓ Calculation Sheets
- ✓ Sample Identifications
- ✓ Detector Identification
- ✓ Analysis Date and Initials of Analyst
- ✓ Amounts of Samples Prepared or Counted
- ✓ Weights of Solids Counted

Initial and Continuing Calibration

- ✓ Detector Identification
- ✓ Calibration Date(s) and Initials of Analyst
- ✓ Identification of Calibration and Check Standards including Radionuclide, Certification, Expiration Date, and Activity
- ✓ Amount of (Check) Standard Used
- ✓ Raw Data including Counts and Count Duration for Standards
- ✓ Weights of Preparations
- ✓ Efficiencies
- ✓ Weights of Carriers Added, If Applicable
- ✓ Results of Statistical Tests Used to Evaluate Instrument Reliability and Efficiency Checks
- ✓ Raw Data of Background Counts and Count Duration
- ✓ Results of Statistical Test Used to Evaluate Instrument Background
- ✓ Control Limits for Check Source and Background Counts

Blanks

- ✓ Detector Identification
- ✓ Date of Analysis
- ✓ MDA of Method
- ✓ Amounts of Reagents Used in Blank

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Radiometric and Gravimetric Yields

- ✓ Amounts (Volumes, Concentrations, Activity) of Spikes, Tracers, or Carriers Used
- ✓ Weights of Precipitates or Solids Counted
- ✓ Calculated Recoveries

Duplicates

- ✓ Detector Identification
- ✓ Date of Analysis
- ✓ Aliquots of Samples
- ✓ Weights of Solids Counted
- ✓ Count Durations
- ✓ Sample Identifications
- ✓ Calculated Precision

Laboratory Control Samples

- ✓ Detector Identification
- ✓ Date of Analysis
- ✓ Calculation of Recoveries
- ✓ Results of Analyses

6.1.B COMPLETENESS CHECKLIST FOR ANALYSES USING ALPHA SPECTROSCOPY

N.A.

Analysis Results

_____ Results Report for Sample Analyses and Reanalyses
_____ Raw Data (Spectra, Printouts, Notebook Pages)
_____ Calculation Sheets
_____ Sample Identifications
_____ Detector Identification
_____ Analysis Date and Initials of Analyst
_____ Amounts of Samples Counted (Precipitated or Deposited)

Initial and Continuing Calibration

_____ Detector Identification
_____ Calibration Date(s) and Initials of Analyst
_____ Identification of Calibration and Check Standards including Radionuclide, Certification, Expiration Date, and Activity
_____ Amount of (Check) Standard Used
_____ Raw Data including Spectra or Counts per Channel
_____ Kev/channel
_____ Count Duration for Standards
_____ Efficiencies
_____ Raw Data of Background Counts, Dates Counted, and Duration of Counts

Blanks

_____ Detector Identification
_____ Date of Analysis
_____ MDA of Method
_____ Amounts of Reagents Used in Blank

N.A.

Duplicates

_____ Detector Identification
_____ Date of Analysis
_____ Amounts of Samples Counted
_____ Count Durations
_____ Sample Identifications
_____ Calculated Precision

Radiometric and Gravimetric Yields

_____ Amounts (Volumes, Concentrations, Activity) of Spikes, Tracers, or Carriers Used
_____ Weights of Precipitates or Solids Counted
_____ Calculated Recoveries

Laboratory Control Samples

_____ Detector Identification
_____ Date of Analysis
_____ Calculation of Recoveries
_____ Results of Analyses

6.1.C COMPLETENESS CHECKLIST FOR GAMMA SPECTROSCOPY

Analysis Results

- ✓ Results Report for Sample Analyses and Reanalyses
- ✓ Raw Data (Spectra, Printouts of Counts per Channel, Notebook Pages)
- ✓ Calculation Sheets
- ✓ Sample Identifications
- ✓ Detector Identification and Counting Position
- ✓ Analysis Date and Initials of Analyst
- ✓ Amounts of Samples Counted

Initial and Continuing Calibration

- ✓ Detector Identification
- ✓ Calibration Date(s) and Initials of Analyst
- ✓ Identification of Calibration and Check Standards including Radionuclides, Certification, Expiration Date, and Activity
- ✓ Amount of (Check) Standard Used
- ✓ Raw Data including Counts and Count Duration for Standards
- ✓ Efficiencies and/or Geometry and Matrix Factors
- ✓ Raw Data of Background Counts, Count Dates, and Duration of Counts
- ✓ Kev/Channel
- ✓ FWHM

Blanks

- ✓ Detector Identification
- ✓ Date of Analysis
- ✓ MDA of Method
- ✓ Amounts of Reagents Used in Blank
- ✓ Raw Data

Duplicates

- ✓ Detector Identification
- ✓ Date of Analysis
- ✓ Amounts of Samples
- ✓ Count Durations
- ✓ Sample Identifications
- ✓ Results of Analyses and Calculated Precision
- ✓ Raw Data

Radiometric and Gravimetric Yields

- N/A Amounts (Volumes, Concentrations, Activity) of Spikes, Tracers, or Carriers Used
- ✓ Weights of Precipitates or Solids Counted
- ✓ Calculated Recoveries

Laboratory Control Samples

- ✓ Detector Identification
- ✓ Date of Analysis
- ✓ Calculation of Recoveries
- ✓ Results of Analyses

NA

6.1.D COMPLETENESS CHECKLIST - ALPHA-EMITTING RADIUM ISOTOPES USING SCINTILLATION COUNTING

Analysis Results

_____ Results Report for Sample Analyses and Reanalyses
_____ Raw Data (Gross Counts, Count Duration, Background Count, and Background Count Duration)
_____ Calculation Sheets
_____ Sample Identifications
_____ Detector Identification and Counting Position
_____ Analysis Date and Analyst Initials
_____ Sample Weight

Initial and Continuing Instrument Calibration

_____ Detector Identification
_____ Calibration Dates and Analyst Initials
_____ Identification of Calibration Standards including Radionuclides, Certification, Issue or Expiration Data and Activity
_____ Amount of Standard Used for Calibration
_____ Raw Data (Gross Counts, Count Duration, Background Count, and Background Count Duration)
_____ Routine Control Charts

Blanks

_____ Detector Identification
_____ Date of Analysis
_____ MDA of Method
_____ Amounts of Reagents Used
_____ Lot Numbers of Reagents Used
_____ Raw Data (Gross Counts, Count Duration, Background Count, and Background Count Duration)

NA

Duplicates

_____ Detector Identification
_____ Date of Analysis
_____ Sample Weight
_____ Amount of Spike for Spiked Duplicates
_____ Raw Data (Gross Counts, Count Duration, Background Counts, and Background Count Duration)

Radiometric and Gravitimetric Yields

_____ Amount of Spike Used for Spiked Samples
_____ Amount of Radium Standard Used for Radiometric Yield Determination
_____ NIST Certification for Radium Standards
_____ Calculated Radiometric Yield
_____ Weight of Carrier Added for Gravitimetric Determination
_____ Weight of Carrier Recovered for Gravitimetric Determination
_____ Calculated Gravitimetric Yields

Laboratory Control Samples

_____ Sample Identification
_____ Detector Identification
_____ Date of Analysis
_____ Calculated Recoveries
_____ Results of Analyses
_____ Sample Weight

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6.1.E COMPLETENESS CHECKLIST - RADIUM-226 USING SCINTILLATION (LUCAS) CELL COUNTING

Analysis Results

_____ Results Report for Sample Analyses and Reanalyses
_____ Raw Data (Gross Counts, Count Duration, Background Count, and Background Count Duration)
_____ Calculation Sheets
_____ Sample Identifications
_____ Scintillation (Lucas) Cell Identification
_____ Analysis Date and Analyst Initials
_____ Amounts of Samples Counted
_____ Sample Weight

Initial and Continuing Instrument Calibration

_____ Scintillation (Lucas) Cell Identification
_____ Calibration Dates and Analyst Initials
_____ Identification of Calibration Standards including Radionuclides, Certification, Issue or Expiration Date and Activity
_____ Amount of Standard Used for Calibration
_____ Raw Data (Gross Counts, Count Duration, Background Count, and Background Count Duration)
_____ Routine Control Charts

Blanks

_____ Scintillation (Lucas) Cell Identification
_____ Date of Analysis
_____ MDA of Method
_____ Amounts of Reagents Used
_____ Lot Numbers of Reagents Used
_____ Raw Data (Gross Counts, Count Duration, Background Count, and Background Count Duration)

Duplicates

_____ Scintillation (Lucas) Cell Identification
_____ Date of Analysis
_____ Sample Weight
_____ Amount of Spike for Spiked Duplicates
_____ Raw Data (Gross Counts, Count Duration, Background Counts, and Background Count Duration)

Radiometric and Gravitimetric Yields

_____ Amount of Spike Used for Spiked Samples
_____ Weight of Carrier Added for Gravitimetric Determination
_____ Weight of Carrier Recovered for Gravitimetric Determination
_____ Calculated Gravitimetric Yields

Laboratory Control Samples

_____ Sample Identification
_____ Scintillation (Lucas) Cell Identification
_____ Date of Analysis
_____ Calculated Recoveries
_____ Results of Analyses

NA

6.1.F COMPLETENESS CHECKLIST - TRITIUM USING LIQUID SCINTILLATION COUNTING

Analysis Results

_____ Results Report for Sample Analyses and Reanalyses
_____ Raw Data (Gross Counts, Count Duration, Background Count, and Background Count Duration)
_____ Calculation Sheets
_____ Sample Identifications
_____ Instrument Identification
_____ Analysis Date and Analyst Initials
_____ Sample Weight

Initial and Continuing Instrument Calibration

_____ Instrument Identification
_____ Identification of Calibration Standards including Radionuclides, Certification, Issue or Expiration Date and Activity
_____ Amount of Standard Used for Calibration
_____ Raw Data (Gross Counts, Count Duration, Background Count, and Background Count Duration)
_____ Counting Efficiency Determination Method and Results
_____ Quench Correction Method

Blanks

_____ Instrument Identification
_____ Date of Analysis
_____ MDA of Method
_____ Amounts of Reagents Used
_____ Lot Numbers of Reagents Used
_____ Raw Data (Gross Counts, Count Duration, Background Count, Background Count Duration)
_____ Tritium Levels in Background Water

NA

Duplicates

_____ Instrument Identification
_____ Date of Analysis
_____ Amounts of Samples
_____ Amount of Spike for Spiked Duplicates
_____ Raw Data (Gross Counts, Count Duration, Background Counts, and Background Count Duration)

Radiometric Yields

_____ Amount of Tritium Standard Used for Radiometric Yield Determination
_____ Radiometric Yield Calculations and Results

Laboratory Control Samples

_____ Sample Identification
_____ Instrument Identification
_____ Date of Analysis
_____ Calculated Recoveries
_____ Results of Analyses

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6.1.G COMPLETENESS CHECKLIST - FLUOROMETRIC ANALYSIS OF URANIUM

Analysis Results

_____ Results Report for Sample Analyses and Reanalyses
_____ Raw Data (Fluorometer Readings, Notebook Pages, etc.)
_____ Calculation Sheets
_____ Sample Identifications
_____ Instrument Identification
_____ Analysis Date and Analyst Initials
_____ Sample Weight

Initial and Continuing Instrument Calibration

_____ Instrument Identification
_____ Calibration Dates and Analyst Initials
_____ Identification of Calibration Standards including Certification, Expiration Date and Concentration Amount of Standards Used for Calibration
_____ Raw Data (Fluorometer Readings, Notebook Pages, etc.)

Blanks

_____ Instrument Identification
_____ Date of Analysis
_____ MDA of Method
_____ Amounts of Reagents Used
_____ Lot Numbers of Reagents Used
_____ Raw Data (Fluorometer Readings, Notebook Pages, etc.)

Duplicates

_____ Instrument Identification
_____ Date of Analysis
_____ Amounts of Samples
_____ Amount of Spike for Spiked Duplicates
_____ Raw Data (Fluorometer Readings, Notebook Pages, etc.)

N/A

Gravitimetric Yields

_____ Weight of Carrier Added for Gravitimetric Determination
_____ Weight of Carrier Recovered for Gravitimetric Determination
_____ Calculated Gravitimetric Yields

Laboratory Control Samples

_____ Sample Identification
_____ Instrument Identification
_____ Date of Analysis
_____ Calculated Recoveries
_____ Results of Analyses

6.2 HOLDING TIMES

Answer each question with a "Y" for yes, "N" for no, or an "N/A" if the inquiry is not applicable.

Evaluation Criteria and Actions

Samples shall be analyzed within the period of 5 half-lives of the radionuclide of interest or six months, whichever comes first. Samples shall be properly contained and preserved (e.g., acidified) in accordance with laboratory standard procedures, to ensure that sample integrity is maintained.

Holding times for each radionuclide are established by comparing the sampling date on the Chain of Custody form with the dates of analysis found in the data package.

Analysis date - sample date = radionuclide holding time

Have the samples been analyzed within holding time?

Yes No N/A

ACTION: If holding time or preservation requirements are not met, qualify all results > LLD as estimated detects (J) and results < LLD as estimated nondetects (UJ). Professional judgement must be used in the case of grossly exceeded holding times. The expected bias would be toward lower results and the reviewer may determine that results < LLD are unusable (R).

Tc-99 outside H.T., ∴ UJ applied

6.3 CALIBRATION

Instruments must be calibrated in accordance with laboratory standard operating procedures and/or manufacturer's instructions initially and when a detector or other major system component is changed. Frequently thereafter, less extensive continuing calibration checks, which consist of background and check source counts, must be done.

Evaluation Criteria and Actions

a. Initial Calibration

Has the instrument been calibrated within the time period specified in the laboratory standard operating procedure or manufacturer's instructions, but not less than annually?

Yes No N/A

ACTION: If the instrument was not calibrated within the specified time period qualify the associated data as unusable (R). Associated data means, in this case, results for all the analyses for each run or day during the period for which no calibration is valid.

Compare the identifications of detectors calibrated against those used for all analyses to verify that each detector used was calibrated. Has each detector in multiple counting system been calibrated?

Yes No N/A

ACTION: If any detector was not calibrated qualify all associated data as unusable (R).

Review the certifications, including identification numbers, of the standard(s). Compare the identification numbers on the certificates with identification numbers on the instrument printouts. Have NIST, NIST traceable, or equivalent certified standards must be used for calibration?

Yes No N/A

ACTION: If the standards used for calibration are not certified or traceable, or cannot be positively identified, qualify all associated data as unusable (R).

Have the standards been used before their indicated expiration dates?

Yes No N/A

ACTION: If the standards were used past their expiration dates, or past five half-lives of the radionuclide of interest if no expiration date is provided, qualify all associated data as unusable (R).

6.3.A.1 Initial Calibration - Gas Proportional Counters

Evaluation Criteria and Actions

Depending upon the type of counter/system used review the results, as applicable, of the plateau determination, amount of alpha-beta crossover, random coincidence counts, and/or energy calibration. Review the efficiency determinations and self-absorption curves. Is the amount of sample counter within the range of the self-absorption curve?

Is a self-absorption curve present for each radionuclide of interest?

Yes No N/A

Are efficiencies $\geq$20%?

Yes No N/A

ACTION: If the field and QC sample preparations are outside the range of the self-absorption curves, qualify all associated data as estimated (J). If the efficiency calculation shows less than 20 % efficiency, qualify all data as unusable (R).

6.3.A.2 Continuing Calibration - Gas Proportional Counters

Evaluation Criteria and Actions

Have chi-square or other appropriate statistical tests been performed for the counters on a routine frequency at least weekly)?

Yes No N/A

ACTION: If a chi-square test was not performed, or results of the test show non-random behavior, then qualify all data as estimated (J).

Have stability verifications (e.g., plateau(s) or response(s) to the check sources) been made after each gas change? (Specific verifications may not be needed if check sources are used daily.)

Yes No N/A

ACTION: If stability verifications were not performed qualify all data as estimated (J).

6.3.B.1 Initial Calibration - Alpha Spectroscopy

Evaluation Criteria and Actions

Does calibration of the detector system cover the energy range of interest (i.e., are the radionuclides (peaks) used for calibration identical to and/or bound the energy range of the radionuclides of interest)?

Yes No N/A

ACTION: If the energy of the alpha particle(s) of the radionuclide(s) of interest falls outside the calibrated range of the detector, qualify all results as unusable (R).

Review the calibration spectrum or printout to verify that the resolution of the detector system provides accurate identification of each peak centroid. Do the peaks have sufficient counts?

Yes No N/A

Are the peaks separate and distinct from each other?

Yes No N/A

ACTION: If the centroids of the peaks used for calibration can not be determined from the spectrum or printout qualify all results as unusable (R).

Are FWHM values $\leq$20 Kev?

Yes No N/A

ACTION: If the resolution of the system is greater than 20 kev (or corresponding number of number of channels) FWHM for any of the peaks used for calibration, qualify all results as estimated (J).

6.3.B.2 Continuing Calibration - Alpha Spectroscopy

Evaluation Criteria and Actions

Compare the efficiency obtained from the calibration to the efficiency obtained from the check source count(s) for the SDG. Are the efficiencies within 5%?

Yes No N/A

Compare the efficiency from the check source count for the SDG with the control charts. Are efficiencies within the control limits or 3 sigma?

Yes No N/A

Has the check source(s) been counted daily or as specified in the Appendices?

Yes No N/A

ACTION: If the daily check source is not performed qualify all associated results as unusable (R).

Review the result, including raw data, of all daily check source counts. Are the check source counts within the control limits provided by the laboratory, or within 3 standard deviations of the mean?

Yes No N/A

ACTION: If the check source counts are outside of the control limits, qualify all associated data as unusable (R). Associated data means here all the results for all the counts within the time period covered by the out of control counts. Use the raw data, or compare the raw data with the count log, to determine the affected time periods. Note any bias or trend in the data validation report.

Review the instrument printouts and counting logs to verify that the background counts were taken on the correct frequency. Have background counts been performed at least weekly and before and after all the field and QC samples in the SDG were taken?

Yes No N/A

ACTION: If the background counts were not performed qualify all associated results as unusable (R).

Are the background counts within control limits provided by the laboratory or within 3 standard deviations of the mean?

Yes No N/A

ACTION: If the background counts are outside of the control limits, qualify all associated data as unusable (R). Associated data means here all the results for all the field and QC samples counted within the time period covered by the out of control background counts. Use the raw data, or compare the raw data with the count log, to determine the affected time periods. Note any bias or trend in the data validation report.

ACTION: If the check source efficiency is not within the limits, qualify all associated results as unusable (R).

6.3.C Calibration - Gamma Spectroscopy

Evaluation Criteria and Actions

Review the efficiency calibration curve and/or raw data.

ACTION: If the efficiency calibration does not approximate a smooth semi-log curve, then qualify all results as unusable (R).

Verify that geometry and matrix factors were accounted for in the analyses of all field and QC samples.

ACTION: If geometry and matrix factors are not used qualify all results as unusable (R).

The calibration of the detector system must cover the energy range of interest, but at least 0 to 2 MeV. Review the energy calibration and verify that the radionuclides (peaks) used for calibration are within and/or bound the energy range of the radionuclides of interest.

ACTION: If the energy of the radionuclides falls outside the calibrated range of the detector, qualify all results as unusable (R).

Review the calibration data to verify that the resolution of the detector system is sufficient for the radionuclides of interest, i.e., that accurate identification of peak centroid can be made, and the peaks are distinct and separate from each other. A nominal value of 5 channels FWHM is used to gauge resolution.

ACTION: If the resolution of the system is greater than 5 channels FWHM for any of the peaks used for calibration, qualify all results as estimated (J).

b. Continuing Calibration

Has the check source been identified by activity and radionuclide(s)?

Yes No N/A

ACTION: If the activity and identity of the radionuclide(s) used in the check source(s) are not provided qualify all associated data as estimated (J).

6.4 BLANKS

Evaluation Criteria and Actions

A reagent (or method) blank of the same aliquot size as the samples must be processed like a sample and analyzed with each SDG on the same detectors or detector system, or a field blank must be analyzed with each SDG on the same detectors or detector system, or both. Has at least one blank been analyzed with the SDG?

Yes No N/A

ACTION: If no blanks were analyzed with the SDG, or if the blanks were not analyzed on the same detectors or detector system, qualify all the results > LLD as estimated (J).

The net blank value, i.e., the results from the analysis of the blank corrected for background, should be less than the minimum detectable activity (MDA), which is the quantity of radioactive material that can be detected in the sample at the 95% confidence level. Have contaminants been detected in the blanks?

Yes No N/A

ACTION: If contaminants are detected in any blank, associated sample results that are reported as statistically greater than background but < the minimum detectable activity (MDA), are qualified as nondetects (U). Any other sample result is qualified as an estimated detect (J) unless the sample result is 10 times the contaminant in the blank. Generally, no action is taken for radionuclides detected in a blank but not in a sample, although the validator must be vigilant for situations when a radionuclide in a blank but not in a sample may cause interference with other radionuclides of interest in the sample. Verify calculation or method of calculating the net blank value. Any blank with a negative result whose absolute value is > LLD must be carefully evaluated to determine its effect on sample data. Review all the QC data specific to the method to evaluate the possibility of false negatives.

6.5 DETECTION LIMITS AND SAMPLE RESULTS

Verify calculation or method of calculating the Lower Limit of Detection and the Minimum Detectable Activity. Methods must be equivalent to the following:

$$LLD = (4.66)\ (\text{Background Counts})^{1/2}$$

$$MDA = \frac{(4.66)\ (\text{Background Counts})^{1/2}}{(\text{Efficiency})\ (\text{Volume})\ (\text{Yield})\ (\text{Conversion Factors})}$$

Verify that all positive results (detects or results not qualified with a U) reported meet the detection limits stated in the SOW and are above the MDA for the analysis or method.

Can the detection limits (LLD and MDA) be verified? Yes No N/A 12/10/9 K.B.

Verify the calculation of sample results by examining the raw data, i.e., spectra or printouts, for counts, counting time, efficiencies, and yields or recoveries, and data transcriptions, e.g., sample volumes.

ACTION: Correct any errors on the photocopied pages of the data package and include in the data validation report. Qualify all results for which the MDA and LLD calculators cannot be verified as estimated detects (J) or estimated nondetects (UJ).

6.6 RADIOMETRIC AND GRAVIMETRIC YIELDS

Evaluation Criteria and Actions

Has at least one spike, tracer, or chemical yield been analyzed in each SDG?

Yes No N/A

ACTION: If no or an inappropriate spike, tracer, or carrier was used qualify all associated results as unusable **(R)**.

Samples identified as field blanks may not be used for spike, tracer, or chemical yield analysis. Look as chain-of-custody documents to find identifier. Has field blank been used for chemical yield analyses?

Yes No N/A

ACTION: If the field blank was used for spike, tracer, or chemical yield analysis, all other QC data must be carefully checked and professional judgement used when evaluating the data. Document if the field blank was used but don't qualify data on this alone.

Spike or tracer per cent recovery, or chemical yield must be within the control limits of 30-105 % for all radionuclides or as specified in the Appendices. If sample activity is > 4x the spike activity, recovery limits do not apply. Review the raw data for counts, activity, and aliquot of the tracer, spike, or carrier used. Have the per cent recoveries or yields been correctly calculated and reported?

Yes No N/A

Are percent recoveries within specified limits?

Yes No N/A

ACTION: Qualify associated sample results outside of the acceptable limits as estimated detects **(J)**, estimated nondetects **(UJ)**, or unusable **(R)** according to the following guidelines. Note any bias or trend in estimated results in the data validation report.

Yield (%R):	<30%	30-105%	>105%	>115%
Results < LLD:	R	acceptable	UJ	R
Results > LLD:	R	acceptable	J	R

6.6.A Radiometric Yields - Alpha Spectroscopy

Evaluation Criteria and Actions

Has tracer been used to spike each sample prior to analysis?

Yes No N/A

ACTION: If a sample did not have a tracer added, qualify the result as unusable (R).

The percent recovery of the tracer should be between 30 % and 105 %. Verify that the recovery is calculated from the applicable instrument efficiency. Check the calculation of recovery using the following formula:

% recovery = (net CPM tracer/DPM tracer added) (efficiency in DPM/CPM) (100)

Are percent recoveries within specification?

Yes No N/A

ACTION: Qualify results outside of the acceptable limits as estimated (J or UJ), or unusable (R) according to the following guidelines. Note any bias or trend in estimated results in the data validation report.

Yield (%R):	<30%	30-105%	>105%	>115%
Results < LLD:	R	acceptable	UJ	R
Results > LLD:	R	acceptable	J	R

6.7 DUPLICATE SAMPLES AND ANALYSES

Evaluation Criteria and Actions

Has at least one duplicate processing and analysis been performed for every ten samples in the SDG?

Yes No N/A

ACTION: If the number of duplicate analyses is not satisfactory then qualify all associated results as estimated (J).

Have samples identified as field blanks (look at chain-of-custody documents) been used for duplicate sample analysis?

Yes No N/A

ACTION: If the field blank was used for duplicate analysis, all other QC data must be carefully checked and professional judgement exercised when evaluating the data. Document if the field blank was used but don't qualify data on this alone.

Relative Percent Difference (RPD) between the sample and duplicate analysis of samples must be within the control limits of $\pm$ 35% for results > 5x the LLD). A control limit of $\pm$ 2x the LLD is applied if one or both of the sample values are < 5x the LLD. If both values are < LLD, no control limit is applicable. Review the data package and verify that results have been correctly calculated and reported and fall within the established control limits.

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100$$

S = first sample value (original)

D = second sample value (duplicate)

Are all RPD values within specification?

Yes No N/A

ACTION: If duplicate analysis results for a particular radionuclide are outside the specified control limits, qualify results < LLD as estimated nondetects (UJ), and results > LLD as estimated detects (J) for that radionuclide in all samples of the SDG.

6.8 LABORATORY CONTROL SAMPLE (LCS)

Laboratory Control Samples may be prepared by the same laboratory performing the analyses or by a reference laboratory or agency. Laboratory control samples are equivalent to internal or external control samples. Laboratory Control Samples, or their equivalents, may be identified as QC samples, as samples from a particular agency, or as LCS.

Evaluation Criteria and Actions

All LCS results must be within the control limits. If control limits are not provided by the laboratory then use the control limits of 80-120 %R.

$$\text{LCS \%R} = \frac{\text{LCS found}}{\text{LCS true}} \times 100$$

LCS found = concentration or activity for each radionuclide measured in the LCS

LCS true = concentration or activity of each radionuclide in the LCS

Have all LCS results been correctly calculated?

Yes No N/A

Are all LCS results within established control limits?

Yes No N/A

ACTION: Qualify affected sample results as estimated detects (J), estimated nondetects (UJ), or unusable (R) for radionuclides that are outside control limits according to the following guidelines. Affected sample results may be all results for the SDG or just the results following an out-of-control LCS.

Radionuclide %R	<50%	50-79%	>120%
Results < LLD:	R	UJ	R
Results > LLD:	R	J	R

Note any bias or trend in estimated results.

Has at least one LCS been analyzed with the SDG?

Yes No N/A

9613490.2881

ACTION: If the required LCS are not analyzed, qualify all results as estimated (J).

9613490.2882

6.9 SUMMARY

Has the laboratory conducted the analysis in accordance with the analytical SOW?

Yes No N/A

Were project-specific data quality objectives met for this analysis?

Yes No N/A