100259

WESTON SM

Appendix E

Organic Regional Data Assessment Summary

AR301458

WESTON

[ ] ACTION [X] FYI

Region III

ORGANIC REGIONAL DATA ASSESSMENT SUMMARY

CASE NO: 13230
SDG NO: CZ405
SOW: 7/87
NO. OF SAMPLES: 7

LABORATORY: ESE
DATA USER: Tom Bennett, Jr.
REVIEW COMPLETION DATE: 3/5/90
MATRIX: Water

REVIEWER: ESAT

	VOA	BNA	PEST	OTHER
1. HOLDING TIMES	O	O	O	
2. GC-MS TUNE/GC PERFORMANCE	O	O	O	
3. INITIAL CALIBRATIONS	X	X	O	
4. CONTINUING CALIBRATION	X	M	O	
5. FIELD BLANKS (F=NOT APPLICABLE)	O	O	O	
6. LABORATORY BLANKS	X	X	O	
7. SURROGATES	O	O	O	
8. MATRIX SPIKE/DUPLICATES	O	O	O	
9. REGIONAL QC (F=NOT APPLICABLE)	F	F	F	
10. INTERNAL STANDARDS	O	O		
11. COMPOUND IDENTIFICATION	O	O	O	
12. COMPOUND QUANTITATION	O	O	O	
13. SYSTEM PERFORMANCE	O	O	O	
14. OVERALL ASSESSMENT	X	M	O	

O = No problems or minor problems that do not affect data usability
X = No more than about 5% of the data points are qualified as either estimated or unusable.
M = More than about 5% of the data points are qualified as estimated.
Z = More than about 5% of the data points are qualified as unusable.
A = DPO action requested; use in conjunction with one of the above codes.

DPO ACTION ITEMS:

AREAS OF CONCERN: Documentation Attached (See following pages).

WESTON

DPO: [ ] ACTION [X] FYI

Region III

INORGANIC REGIONAL DATA ASSESSMENT SUMMARY

CASE NO: 132301
SDG NO: CZ405
SOW: 1/87
NO. OF SAMPLES: five (5)

LABORATORY: ESE
DATA USER: Tom Bennette, Jr.
REVIEW COMPLETION DATE: 3/5/90
MATRIX: Soil

REVIEWER: ESAT

	VOA	BNA	PEST	OTHER
1. HOLDING TIMES	M	M	O	
2. GC-MS TUNE/GC PERFORMANCE	O	O	O	
3. INITIAL CALIBRATIONS	X	X	O	
4. CONTINUING CALIBRATION	X	M	O	
5. FIELD BLANKS (F=NOT APPLICABLE)	O	O	O	
6. LABORATORY BLANKS	X	X	O	
7. SURROGATES	X	O	O	
8. MATRIX SPIKE/DUPLICATES	O	O	O	
9. REGIONAL QC (F=NOT APPLICABLE)	F	F	F	
10. INTERNAL STANDARDS	O	O		
11. COMPOUND IDENTIFICATION	O	O	O	
12. COMPOUND QUANTITATION	O	O	O	
13. SYSTEM PERFORMANCE	O	O	O	
14. OVERALL ASSESSMENT	X	M	O	

O = No problems or minor problems that do not affect data usability
X = No more than about 5% of the data points are qualified as either estimated or unusable.
M = More than about 5% of the data points are qualified as estimated.
Z = More than about 5% of the data points are qualified as unusable.
A = DPO action requested; use in conjunction with one of the above codes.

DPO ACTION ITEMS:

AREAS OF CONCERN: Documentation attached (See following pages).

ORGANIC REGIONAL DATA ASSESSMENT SUMMARY NOTES

CASE 13230 SDG CZ405 AQUEOUS SAMPLES

Item 3A & 4A The response factors for 2-butanone were less than 0.05 and the %RSD and %D values for several compounds exceeded precision criteria in the initial and/or continuing calibrations of volatiles. (See Table I in Appendix F).

Item 3B & 4B The %RSD and %D values for several compounds exceeded precision criteria in the semi-volatile initial and/or continuing calibrations. (See Table I in Appendix F).

Item 6A & 6B The maximum concentration of the following compounds were found in the laboratory blanks.

Compound	Concentration (ug/L)
Acetone *	9 J
1,1,2,2-Tetrachloroethane	0.51 J
Chlorobenzene	0.57 J
Bis(2-ethylhexyl)phthalate *	4 J

* Common laboratory contaminant.

Item 8B The semi-volatile analysis of sample CZ423 had one (1) out of twenty-two (22) spike recoveries outside the QC limits. (See Form II SV in Appendix F).

WESTON

ORGANIC REGIONAL DATA ASSESSMENT SUMMARY NOTES

CASE 13230 SDG CZ405 SOIL SAMPLES

Item 1A The volatiles analysis of all samples were performed ten (10) to eleven (11) days from the date of sample collection. Although no technical holding time for volatiles analysis has been established for soil samples, the technical holding time of seven (7) days for volatile aromatics in water samples has been exceeded by three (3) to four (4) days. The contractual holding time of ten (10) days was met.

Item 1B The semi-volatiles extraction of all samples were performed eight (8) to nine (9) days from the date of sample collection. Although no technical holding time for semi-volatiles analysis has been established for soil samples, the technical holding time of seven (7) days for water samples has been exceeded by one (1) to two (2) days. The contractual extraction holding time of ten (10) days was met.

Item 3A & 4A The response factors for 2-butanone were less than 0.05 and the % RSD and %D values for several compounds exceeded precision criteria in the initial and/or continuing calibrations of volatiles. (See Table I in Appendix F).

Item 3B & 4B The %RSD and %D values for several compounds exceeded precision criteria in the semi-volatile initial and/or continuing calibrations. (See Table I in Appendix F).

Item 6A & 6B The maximum concentration of the following compounds were found in the laboratory blanks.

Compound	Concentration (ug/Kg)
Acetone *	9 J
1,1,2,2-tetrachloroethane	0.51 J
Chlorobenzene	0.57 J
Bis(2-ethylhexyl)phthalate *	133 J

* Common laboratory contaminant.

Item 7C Two (2) surrogates were diluted out in the volatile analysis of sample CZ420DL. (See Form II VOA in Appendix F).

Item 8A The volatile MS/MSD analyses of sample CZ420 (medium level) had two (2) out of ten (10) spike recoveries outside the QC limits. (See Form III VOA in Appendix F).

Item 8B The volatile MS/MSD analyses of sample CZ425 (low level) had one (1) out of five (5) Relative Percent Difference (RPD) and two (2) spike recoveries outside the control limits. (See Form III VOA in Appendix F).

Item 8B The semi-volatile MS/MSD analysis of sample CZ420 (medium level) had three (3) out of eleven (11) Relative Percent Difference (RPD) and five (5) out of twenty-two (22) spike recoveries outside the QC limits. (See Form III SV in Appendix F).

Item 8B The semi-volatile analysis of sample CZ426 (low level) had one (1) out of twenty-two (22) spike recoveries outside the QC limits. (See Form III SV in Appendix F).

Item 8C The pesticide/PCB analysis of sample CZ420 had one (1) out of twelve (12) spike recoveries outside the QC limits. (See Form III pest in Appendix F).

WESTON

Appendix F

Support Documentation

TABLE I

ENVIRONMENTAL PROTECTION AGENCY REGION III
CALIBRATION OUTLIERS
VOLATILE HSL COMPOUNDS

CASE/SAS No. 13230 CONTRACTOR ESAT

Instrument# A	Init. Cal.			Cont. Cal.			Cont. Cal.			Cont. Cal.			Cont. Cal.		
DATE/TIME:	11/17/89			11/30/89/10:35			12/4/89/12:20			12/9/89/15:23			12/10/89/17:06		
	RF	%RSD	*	RF	%D	*	RF	%D	*	RF	%D	*	RF	%D	*
Chloromethane														46.5	C
Bromomethane															
Vinyl Chloride															
Chloroethane															
Methylene Chloride					112.1	C					25.1	C			
Acetone		57.2	I+												
Carbon Disulfide															
1,1-Dichloroethene															
1,1-Dichloroethane															
Total-1,2-Dichloroethene															
Chloroform															
1,2-Dichloroethane															
2-Butanone	0.033		F	0.021	35.9	F	0.028		F	0.029		F	0.025		F
1,1,1-Trichloroethane															
Carbon Tetrachloride															
Vinyl Acetate								25.1	C		51.1	C		43.2	C
Bromodichloromethane															
1,2-Dichloropropane															
cis-1,3-Dichloropropene															
Trichloroethene															
Dibromochloromethane															
1,1,2-Trichloroethane															
Benzene															
trans-1,3-Dichloropropene															
Bromoform											32.0	C		25.6	C
4-Methyl-2-Pentanone															
2-Hexanone															
Tetrachloroethene															
1,1,2,2-Tetrachloroethane															
Toluene															
Chlorobenzene															
Ethylbenzene															
Styrene															
Total Xylenes															

AFFECTED SAMPLES:					
	CZ405, CZ419	VBLK W1	VBLK W2	VBLK S2	VBLK S3
	CZ423, CZ424	CZ405	CZ422	CZ420	CZ420DL
	CZ432, VBK W1	CZ419	CZ406	CZ420MS/MSD	
	CZ423 MS/MSD	CZ423			
	CZ422, CZ406	CZ424			
	VBLK W2	CZ432			
	CZ420, CZ420DL	CZ423 MS/MSD			
	CZ420 MS/MSD				
	VBLK S2				
	VBLK S2				

Reviewer Initials/Date: 3/5/90 MH

* See last page of this table for DEFINITION OF CODES.

TABLE I

ENVIRONMENTAL PROTECTION AGENCY REGION III
CALIBRATION OUTLIERS
VOLATILE HSL COMPOUNDS

CASE/SAS No. 13230 CONTRACTOR ESAT

Instrument# A	Init. Cal.			Cont. Cal.			Cont. Cal.			Cont. Cal.			Cont. Cal.		
DATE/TIME:	12/7/89			12/8/89/9:33											
	RF	%RSD	*	RF	%D	*	RF	%D	*	RF	%D	*	RF	%D	*
Chloromethane															
Bromomethane		31.0	I												
Vinyl Chloride															
Chloroethane															
Methylene Chloride		46.3	I		87.0	C									
Acetone		40.1	I+		42.2	C+									
Carbon Disulfide															
1,1-Dichloroethene															
1,1-Dichloroethane															
Total-1,2-Dichloroethene															
Chloroform															
1,2-Dichloroethane															
2-Butanone															
1,1,1-Trichloroethane															
Carbon Tetrachloride															
Vinyl Acetate															
Bromodichloromethane															
1,2-Dichloropropane															
cis-1,3-Dichloropropene															
Trichloroethene															
Dibromochloromethane															
1,1,2-Trichloroethane															
Benzene															
trans-1,3-Dichloropropene															
Bromoform															
4-Methyl-2-Pentanone															
2-Hexanone															
Tetrachloroethene															
1,1,2,2-Tetrachloroethane															
Toluene															
Chlorobenzene															
Ethylbenzene															
Styrene															
Total Xylenes															

·AFFECTED SAMPLES:

CZ425	VBLKS1
CZ426	CZ425
CZ427	CZ426
CZ428	CZ427
CZ425MS/MSD	CZ425MS/MSD
VBLKS1	CZ428

Reviewer Initials/Date: 3/5/90 MM

* See last page of this table for DEFINITION OF CODES.

AR301466

TABLE I

ENVIRONMENTAL PROTECTION AGENCY REGION III
CALIBRATION OUTLIERS
SEMIVOLATILE HSL COMPOUNDS (Part 1 of 2)

CASE/SAS No. 13230 CONTRACTOR ESAT

Instrument# B	Init. Cal.			Cont. Cal.			Cont. Cal.			Cont. Cal.			Cont. Cal.		
DATE/TIME:	12/27/89			12/27/89 14:27			12/28/89 9:04								
	RF	%RSD	*	RF	%D	*	RF	%D	*	RF	%D	*	RF	%D	*
Phenol															
bis(2-Chloroethyl)ether															
2-Chlorophenol															
1,3-Dichlorobenzene															
1,4-Dichlorobenzene															
Benzyl alcohol															
1,2-Dichlorobenzene															
2-Methylphenol															
bis(2-Chloroisopropyl)ether															
4-Methylphenol															
N-Nitroso-di-n-propylamine															
Hexachloroethane															
Nitrobenzene															
Isophorone		32.4	I												
2-Nitrophenol															
2,4-Dimethylphenol															
Benzoic acid		37.3	I												
bis(2-Chloroethoxy)methane															
2,4-Dichlorophenol															
1,2,4-Trichlorobenzene															
Naphthalene															
4-Chloroaniline															
Hexachlorobutadiene															
4-Chloro-3-Methylphenol															
2-Methylnaphthalene															
Hexachlorocyclopentadiene								61.2	C						
2,4,6-Trichlorophenol															
2,4,5-Trichlorophenol															
2-Chloronaphthalene															
2-Nitroaniline															
Dimethylphthalate															
Acenaphthylene															
2,6-Dinitrotoluene															
3-Nitroaniline					35.1	C		44.2	C						
Acenaphthene															
2,4-Dinitrophenol								34.1	C						
4-Nitrophenol								26.2	C						

AFFECTED SAMPLES:

All Samples	SBLKW1
	CZ419
	CZ423
	CZ424
	CZ422
	CZ426
	CZ432
	CZ423MS/MSD
	CZ426MS/MSD
	CZ420
	CZ425
	CZ427
	CZ428
	CZ420MS/MSD
	SBLKS2

Reviewer Initials/Date: 3/5/90 MM

AR301467

* See last page of this table for DEFINITION OF CODES.

TABLE I

ENVIRONMENTAL PROTECTION AGENCY REGION III
CALIBRATION OUTLIERS
SEMIVOLATILE HSL COMPOUNDS (Part 2 of 2)

CASE/SAS No. 13230 CONTRACTOR ESAT

Instrument# D	Init. Cal.			Cont. Cal.			Cont. Cal.			Cont. Cal.			Cont. Cal.		
DATE/TIME:	12/27/89			12/27/89 11:27			12/28/89 9:04								
	RF	%RSD	*	RF	%D	*	RF	%D	*	RF	%D	*	RF	%D	*
Dibenzofuran															
2,4-Dinitrotoluene								25.7	C						
Diethylphthalate															
4-Chlorophenyl-phenylether															
Fluorene															
4-Nitroaniline								70.9	C						
4,6-Dinitro-2-methylphenol															
N-Nitrosodiphenylamine															
4-Bromophenyl-phenylether															
Hexachlorobenzene															
Pentachlorophenol															
Phenanthrene															
Anthracene															
Di-n-butylphthalate															
Fluoranthene															
Pyrene															
Butylbenzylphthalate															
3,3-Dichlorobenzidine								46.4	C						
Benzo(a)anthracene															
Chrysene															
bis(2-Ethylhexyl)phthalate								69.6	C						
Di-n-octylphthalate															
Benzo(b)fluoranthene															
Benzo(k)fluoranthene															
Benzo(a)pyrene															
Indeno(1,2,3-cd)pyrene															
Dibenz(a,h)anthracene															
Benzo(g,h,i)perylene								26.5	C						

AFFECTED SAMPLES:

All Samples	SBLKW1
	CZ419
	CZ423
	CZ424
	CZ422
	CZ426
	CZ423MS/MSD
	CZ426MS/MSD
	CZ432
	CZ420
	CZ425
	CZ427
	CZ428
	CZ420MS/MSD
	SBLKS2

Reviewer Initials/Date: 3/5/90 MM

* See last page of this table for DEFINITION OF CODES.

DEFINITION OF CODES USED IN TABLE I

I = %RSD exceeded 30% in the initial calibration, positive results are qualified "J", and quantitation limits are qualified "UJ".

C = %D exceeded 25% in the continuing calibration. Positive results are qulified "J", and quantitation limits are qualified "UJ".

F = RF less than 0.05 in all calibrations. All quantitation limits are qualified "R".

+ = The "B" qualifier, denoting blank contamination, supersedes the qualifier issued in this table.

L = The "L" qualifier, denoting low bias of results, supersedes the qualifier issued in this table.

R = The "R" qualifier, denoting unusuable results, supersedes the qualifier issued in this table.

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ESE . Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Instrument ID: A Calibration Date(s): 11/17/89 11/17/89

Matrix:(soil/water) WATER Level:(low/med): LOW Column:(pack/cap) PACK

Min $\overline{RRF}$ for SPCC(#) = .300 (0.250 for Bromoform) Max %RSD for CCC(*) = 30.0

LAB FILE ID: RRF20 = 85263 RRF50 = 85264
RRF100= 85265 RRF150= 85266 RRF200= 85267

COMPOUND	RRF20	RRF50	RRF100	RRF150	RRF200	$\overline{RRF}$	% RSD
Chloromethane #	2.205	2.366	1.760	1.695	1.583	1.922	17.8
Bromomethane	1.838	1.209	1.184	1.032	1.007	1.254	27.0
Vinyl Chloride *	1.539	1.408	1.108	1.131	1.090	1.255	15.4
Chloroethane	.871	.799	.695	.738	.787	.778	8.6
Methylene Chloride	.815	.645	.577	.687	.687	.682	12.7
Acetone	1.577	.726	.543	.506	.581	.787	57.2
Carbon Disulfide	3.311	3.454	3.225	3.455	3.619	3.413	4.4
1,1-Dichloroethene *	1.102	1.136	1.044	1.100	1.161	1.109	4.0
1,1-Dichloroethane #	2.721	2.780	2.666	2.659	2.702	2.705	1.9
1,2-Dichloroethene (total)	1.345	1.403	1.324	1.350	1.416	1.368	2.9
Chloroform *	3.165	3.305	3.135	3.123	3.220	3.190	[illegible]
1,2-Dichloroethane	2.966	3.006	2.842	2.821	2.862	2.899	[illegible]
2-Butanone	.047	.026	.029	.029	.035	.033	24.8
1,1,1-Trichloroethane	.617	.636	.574	.561	.613	.600	5.2
Carbon Tetrachloride	.532	.552	.508	.512	.558	.532	4.3
Vinyl Acetate	.638	.749	.795	.773	.858	.803	5.5
Bromodichloromethane	.716	.671	.685	.680	.734	.697	3.9
1,2-Dichloropropane *	.397	.376	.372	.366	.389	.380	3.4
cis-1,3-Dichloropropene	.636	.591	.602	.610	.657	.619	4.4
Trichloroethene	.382	.362	.341	.349	.386	.364	5.4
Dibromochloromethane	.525	.492	.522	.533	.576	.529	5.7
1,1,2-Trichloroethane	.365	.325	.312	.305	.329	.327	7.1
Benzene	1.133	1.069	1.014	1.010	1.075	1.060	4.9
trans-1,3-Dichloropropene	.555	.516	.519	.540	.557	.537	3.6
Bromoform	.379	.357	.391	.418	.446	.398	8.7
4-Methyl-2-Pentanone	.705	.588	.508	.513	.545	.572	14.2
2-Hexanone	.532	.401	.357	.366	.383	.408	17.5
Tetrachloroethene	.381	.361	.327	.348	.357	.355	5.6
1,1,2,2-Tetrachloroethane #	.784	.689	.634	.649	.620	.687	8.5
Toluene *	.822	.765	.726	.751	.757	.764	4.7
Chlorobenzene #	.997	.911	.893	.920	.922	.929	4.3
Ethylbenzene *	.474	.446	.442	.441	.448	.450	3.0
Styrene	1.000	.928	.942	.922	.959	.950	3.3
Xylene (total)	.573	.542	.530	.514	.536	.539	4.0
Toluene-d8	1.172	1.120	1.073	1.			3.4
Bromofluorobenzene	.673	.643	.642	.619	.639	.643	[illegible]
1,2-Dichloroethane-d4	2.380	2.443	2.344	2.311	2.361	2.368	[illegible]

FORM VI VOA

00162 Rev

Samples

VBLKW1, CZ405, CZ419, CZ423, CZ424, CZ432, CZ423 ms/msD

VBLKW2, CZ422, CZ406.

[illegible] ms/msD VBLK33 CZ420 DL

AR301470

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ESE Contract: 68-W8-0006

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Instrument ID: A Calibration Date(s): 12/ 7/89 12/ 8/89

Matrix:(soil/water) SOIL Level:(low/med): LOW Column:(pack/cap) PACK

Min $\overline{RRF}$ for SPCC(#) = .300 (0.250 for Bromoform) Max %RSD for CCC(+) = 30.0

LAB FILE ID: RRF20 = 85376 RRF50 = 85381
RRF100= 85378 RRF150= 85379 RRF200= 85380

COMPOUND	RRF20	RRF50	RRF100	RRF150	RRF200	$\overline{RRF}$	% RSD
Chloromethane #	1.351	1.726	1.172	1.588	1.745	1.516	16.4
Bromomethane	1.337	.857	1.070	.845	.561	.934	31.0
Vinyl Chloride *	1.429	1.427	1.249	1.381	.897	1.276	17.8
Chloroethane	.925	.849	.886	.841	.773	.855	6.5
Methylene Chloride	1.138	.534	.520	1.248	.510	.790	46.8
Acetone	1.701	1.126	1.800	.813	.731	1.234	40.1
Carbon Disulfide	3.013	2.907	3.112	2.964	3.083	3.012	2.7
1,1-Dichloroethene *	1.259	1.167	1.303	1.129	1.162	1.204	6.1
1,1-Dichloroethane #	2.819	2.755	2.828	2.686	2.696	2.757	2.4
1,2-Dichloroethene (total)	1.394	1.379	1.444	1.303	1.344	1.373	3.9
Chloroform *	3.147	3.092	3.148	2.935	2.990	3.062	2.1
1,2-Dichloroethane	2.711	2.761	2.736	2.660	2.624	2.698	2.1
2-Butanone	.038	.062	.077	.049	.049	.055	27.3
1,1,1-Trichloroethane	.537	.564	.584	.532	.571	.558	4.0
Carbon Tetrachloride	.472	.482	.531	.453	.492	.486	6.0
Vinyl Acetate	.483	.532	.574	.558	.542	.538	6.4
Bromodichloromethane	.595	.614	.686	.618	.630	.628	5.5
1,2-Dichloropropane *	.366	.371	.411	.366	.370	.377	5.0
cis-1,3-Dichloropropene	.605	.618	.683	.617	.614	.627	5.0
Trichloroethene	.349	.359	.391	.337	.344	.356	5.9
Dibromochloromethane	.379	.433	.494	.461	.456	.445	9.6
1,1,2-Trichloroethane	.321	.325	.334	.303	.291	.315	5.5
Benzene	1.062	1.033	1.144	.986	.999	1.045	6.0
trans-1,3-Dichloropropene	.502	.534	.567	.532	.519	.531	4.8
Bromoform	.364	.341	.386	.379	.364	.366	4.7
4-Methyl-2-Pentanone	.709	.903	.793	.768	.692	.773	10.9
2-Hexanone	.543	.637	.667	.536	.482	.573	13.4
Tetrachloroethene	.343	.342	.380	.308	.316	.338	8.4
1,1,2,2-Tetrachloroethane #	.794	.853	.865	.798	.738	.810	6.3
Toluene *	.809	.776	.874	.749	.732	.788	7.1
Chlorobenzene #	.932	.910	1.021	.880	.871	.923	6.5
Ethylbenzene *	.460	.450	.511	.435	.433	.458	6.9
Styrene	.932	.927	1.059	.920	.909	.949	6.5
Xylene (total)	.526	.519	.596	.505	.504	.530	7.2
Toluene-d8	1.137	1.106	1.255	1.073	1.001	1.114	8.[illegible]
Bromofluorobenzene	.609	.607	.683	.6[illegible]			7.0
1,2-Dichloroethane-d4	2.186	2.246	2.241	2.1[illegible]			2.7

Samples
CZ425 - CZ428, CZ425 MS/MSD

AR301471

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Instrument ID: A Calibration Date: 11/30/89 Time: 10:35

Lab File ID: SS357 Init. Calib. Date(s): 11/17/89 11/17/89

Matrix:(soil/water) WATER Level:(low/med): LOW Column:(pack/cap) PACK

Min RRF50 for SPCC(#) = .300 (0.250 for Bromoform) Max %D for CCC(*) = 25.

COMPOUND	RRF	RRF50	%D	
Chloromethane	1.922	1.867	2.9	#
Bromomethane	1.254	1.552	23.8	
Vinyl Chloride	1.255	1.383	10.2	*
Chloroethane	.778	.802	3.0	
Methylene Chloride	.682	1.447	112.1	
Acetone	.787	.591	24.9	
Carbon Disulfide	3.413	3.114	8.8	
1,1-Dichloroethene	1.109	1.078	2.8	*
1,1-Dichloroethane	2.705	2.687	.7	#
1,2-Dichloroethene (total)	1.368	1.285	6.0	
Chloroform	3.190	3.188	.1	*
1,2-Dichloroethane	2.899	2.915	.6	
2-Butanone	.033	.021	35.9	
1,1,1-Trichloroethane	.600	.596	.8	
Carbon Tetrachloride	.532	.518	2.7	
Vinyl Acetate	.803	.640	20.3	
Bromodichloromethane	.697	.674	3.3	
1,2-Dichloropropane	.380	.368	3.0	*
cis-1,3-Dichloropropene	.619	.593	4.2	
Trichloroethene	.364	.345	5.3	
Dibromochloromethane	.529	.506	4.4	
1,1,2-Trichloroethane	.327	.315	3.8	
Benzene	1.060	1.019	3.9	
trans-1,3-Dichloropropene	.537	.518	3.7	
Bromoform	.398	.364	8.5	
4-Methyl-2-Pentanone	.572	.504	11.9	
2-Hexanone	.408	.392	4.0	
Tetrachloroethene	.355	.334	6.0	
1,1,2,2-Tetrachloroethane	.687	.622	9.4	#
Toluene	.764	.732	4.2	*
Chlorobenzene	.929	.883	4.9	#
Ethylbenzene	.450	.421	6.6	*
Styrene	.950	.882	7.2	
Xylene (total)	.539	.492	8.8	
Toluene-d8	1.113	1.167	4.8	
Bromofluorobenzene	.643	.674	4.8	
1,2-Dichloroethane-d4	2.368	2.585	9.1	

Samples

VBLK W1
CZ405
CZ419
CZ423
CZ424
CZ432
CZ423 MS/M

FORM VII VOA

AR301472

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 12230 SAS No.: SDG No.: CZ405

Instrument ID: A Calibration Date: 12/ 4/89 Time: 17:20

Lab File ID: SS370 Init. Calib. Date(s): 11/17/89 11/17/89

Matrix:(soil/water) WATER Level:(low/med): LOW Column:(pack/cap) PACK

Min RRFSO for SPCC(#) = .300 (0.250 for Bromoform) Max %D for CCC(*) = 25.0

COMPOUND	RRF	RRFSO	%D
Chloromethane #	1.922	1.582	17.7 #
Bromomethane	1.254	1.497	19.4
Vinyl Chloride *	1.255	1.363	8.6 *
Chloroethane	.778	.807	3.7
Methylene Chloride	.682	.713	4.6
Acetone	.787	.866	10.1
Carbon Disulfide	3.413	3.083	9.7
1,1-Dichloroethene *	1.109	1.134	2.3 *
1,1-Dichloroethane #	2.705	2.762	2.1 #
1,2-Dichloroethene (total)	1.368	1.339	2.1
Chloroform *	3.190	3.428	7.5 *
1,2-Dichloroethane	2.899	3.218	11.0
2-Butanone	.033	.028	17.4
1,1,1-Trichloroethane	.600	.642	7.0
Carbon Tetrachloride	.532	.578	8.7
Vinyl Acetate	.803	.601	25.1
Bromodichloromethane	.697	.732	5.0
1,2-Dichloropropane *	.380	.372	2.1 *
cis-1,3-Dichloropropene	.619	.611	1.3
Trichloroethene	.364	.355	2.6
Dibromochloromethane	.529	.537	1.4
1,1,2-Trichloroethane	.327	.333	1.9
Benzene	1.060	1.035	2.3
trans-1,3-Dichloropropene	.537	.538	.1
Bromoform	.398	.399	.3
4-Methyl-2-Pentanone	.572	.555	2.9
2-Hexanone	.408	.413	1.1
Tetrachloroethene	.355	.336	5.3
1,1,2,2-Tetrachloroethane #	.687	.677	1.5 #
Toluene *	.754	.739	3.3 *
Chlorobenzene #	.929	.893	3.9 #
Ethylbenzene *	.450	.445	1.3 *
Styrene	.950	.959	.9
Xylene (total)	.539	.534	.8
Toluene-d8	1.113	1.088	2.3
Bromofluorobenzene	.643	.672	4.4
1,2-Dichloroethane-d4	2.368	2.	

Samples
VBLKW2
CZ422
CZ406

FORM VII VOA

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Instrument ID: A Calibration Date: 12/ 8/89 Time: 9:39

Lab File ID: 65383 Init. Calib. Date(s): 12/ 7/89 12/ 8/89

Matrix:(soil/water) SOIL Level:(low/med): LOW Column:(pack/cap) PACK

Min RRF50 for SPCC(#) = .300 (0.250 for Bromoform) Max %D for CCC(*) = 25.

COMPOUND	RRF	RRF50	%D	Samples
Chloromethane #	1.516	1.377	9.2 #	VBLKS1
Bromomethane	.934	.828	11.4	CZ425
Vinyl Chloride *	1.276	1.246	2.4 *	CZ426
Chloroethane	.855	.894	4.6	CZ427
Methylene Chloride	.790	1.478	87.0	CZ428
Acetone	1.234	1.817	47.2	CZ425MS/MS
Carbon Disulfide	3.012	3.297	9.5	
1,1-Dichloroethene *	1.204	1.352	12.3 *	
1,1-Dichloroethane #	2.757	2.937	6.5 #	
1,2-Dichloroethene (total)	1.373	1.484	8.1	
Chloroform *	3.062	3.259	6.4 *	
1,2-Dichloroethane	2.638	2.818	4.4	
2-Butanone	.055	.056	1.8	
1,1,1-Trichloroethane	.558	.568	1.8	
Carbon Tetrachloride	.486	.499	2.6	
Vinyl Acetate	.538	.539	.2	
Bromodichloromethane	.628	.655	4.2	
1,2-Dichloropropane *	.377	.390	3.4 *	
cis-1,3-Dichloropropene	.627	.637	1.6	
Trichloroethene	.356	.369	3.5	
Dibromochloromethane	.445	.469	5.5	
1,1,2-Trichloroethane	.315	.327	3.9	
Benzene	1.045	1.082	3.5	
trans-1,3-Dichloropropene	.531	.530	.0	
Bromoform	.366	.371	1.2	
4-Methyl-2-Pentanone	.773	.800	3.5	
2-Hexanone	.573	.607	6.0	
Tetrachloroethene	.338	.354	4.9	
1,1,2,2-Tetrachloroethane #	.810	.839	3.6 #	
Toluene *	.788	.820	4.1 *	
Chlorobenzene #	.923	.957	3.7 #	
Ethylbenzene *	.458	.479	4.6 *	
Styrene	.949	.989	4.2	
Xylene (total)	.530	.558	5.2	
Toluene-d8	1.114	1.181	6.0	
Bromofluorobenzene	.613	.6		
1,2-Dichloroethane-d4	2.186	2.2		

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Instrument ID: A Calibration Date: 12/ 9/89 Time: 15:23

Lab File ID: 85397 Init. Calib. Date(s): 11/17/89 11/17/89

Matrix:(soil/water) SOIL Level:(low/med): MED Column:(pack/cap) PACK

Min RRF50 for SPCC(#) = .300 (0.250 for Bromoform) Max %D for CCC(*) = 25.

COMPOUND	RRF	RRF50	%D	
Chloromethane	1.922	1.786	7.1	#
Bromomethane	1.254	1.122	10.5	
Vinyl Chloride	1.253	1.398	11.3	*
Chloroethane	.778	.808	3.8	
Methylene Chloride	.682	.511	25.1	
Acetone	.787	.695	11.7	
Carbon Disulfide	3.413	2.743	19.6	
1,1-Dichloroethene	1.109	1.120	1.0	*
1,1-Dichloroethane	2.705	2.688	.7	#
1,2-Dichloroethene (total)	1.388	1.323	3.3	
Chloroform	3.190	3.088	3.3	*
1,2-Dichloroethane	2.899	2.716	6.3	
2-Butanone	.033	.029	12.8	
1,1,1-Trichloroethane	.600	.580	6.7	
Carbon Tetrachloride	.532	.459	13.7	
Vinyl Acetate	.803	.393	51.1	
Bromodichloromethane	.697	.616	11.7	
1,2-Dichloropropane	.380	.366	3.7	*
cis-1,3-Dichloropropene	.619	.611	1.3	
Trichloroethene	.364	.349	4.2	
Dibromochloromethane	.529	.415	21.5	
1,1,2-Trichloroethane	.327	.292	10.9	
Benzene	1.060	1.007	5.0	
trans-1,3-Dichloropropene	.537	.499	7.0	
Bromoform	.398	.271	32.0	
4-Methyl-2-Pentanone	.572	.454	20.6	
2-Hexanone	.408	.375	8.1	
Tetrachloroethene	.355	.324	8.8	
1,1,2,2-Tetrachloroethane	.687	.617	10.2	#
Toluene	.764	.745	2.6	*
Chlorobenzene	.929	.898	3.3	#
Ethylbenzene	.450	.437	2.9	*
Styrene	.950	.916	3.6	
Xylene (total)	.539	.512	5.0	
Toluene-d8	1.113	1.061	4.7	
Bromofluorobenzene	.643	.605	6.0	
1,2-Dichloroethane-d4	2.368	2.219	6.3	

Samples
VBLKS2
CZ420
CZ420 MS

FORM VII VOA

1/87 Re

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Instrument ID: A Calibration Date: 12/10/89 Time: 18:06

Lab File ID: 85409 Init. Calib. Date(s): 11/17/89 11/17/89

Matrix:(soil/water) SOIL Level:(low/med): MED Column:(pack/cap) PACK

Min RRF50 for SPCC(#) = .300 (0.250 for Bromoform) Max %D for CCC(*) = 25.0%

Samples
VBLK S3
CZ420 DL

COMPOUND		RRF	RRF50	%D	
Chloromethane	#	1.922	1.028	46.5	#
Bromomethane		1.254	1.426	13.7	
Vinyl Chloride	*	1.255	1.353	7.8	*
Chloroethane		.778	.929	19.2	
Methylene Chloride		.682	.512	24.9	
Acetone		.787	.630	19.9	
Carbon Disulfide		3.413	3.069	10.1	
1,1-Dichloroethene	*	1.109	1.255	13.2	*
1,1-Dichloroethane	#	2.705	2.915	7.8	#
1,2-Dichloroethene (total)		1.368	1.443	5.5	
Chloroform	*	3.190	3.297	3.4	*
1,2-Dichloroethane		2.899	2.974	2.6	
2-Butanone		.033	.025	24.8	
1,1,1-Trichloroethane		.600	.598	.3	
Carbon Tetrachloride		.532	.515	3.2	
Vinyl Acetate		.803	.416	48.2	
Bromodichloromethane		.697	.634	9.0	
1,2-Dichloropropane	*	.380	.382	.5	*
cis-1,3-Dichloropropene		.619	.640	3.4	
Trichloroethene		.364	.373	2.4	
Dibromochloromethane		.529	.433	18.2	
1,1,2-Trichloroethane		.327	.322	1.7	
Benzene		1.060	1.065	.5	
trans-1,3-Dichloropropene		.537	.569	5.8	
Bromoform		.398	.296	25.6	
4-Methyl-2-Pentanone		.572	.530	7.4	
2-Hexanone		.408	.419	2.8	
Tetrachloroethene		.355	.361	1.7	
1,1,2,2-Tetrachloroethane	#	.687	.694	.9	#
Toluene	*	.764	.818	7.0	*
Chlorobenzene	#	.929	.971	4.6	#
Ethylbenzene	*	.450	.473	5.0	*
Styrene		.950	.970	2.0	
Xylene (total)		.539	.540	.2	
Toluene-d8		1.113	1.144	2.8	
Bromofluorobenzene		.643	.640	.6	
1,2-Dichloroethane-d4		2.368	?		

6B

SEMIVOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ESE

Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Instrument ID: B Calibration Date(s): 12/27/89 12/27/89

Min RRF for SPCC(#) = .050

Max %RSD for CCC(*) = 30.0

LAB FILE ID: RRF20 = 13850 RRF50 = 13851
RRF80 = 13852 RRF120= 13853 RRF160= 13854

COMPOUND	RRF20	RRF50	RRF80	RRF120	RRF160	RRF	% RSD
Phenol *	1.150	1.466	1.352	1.600	1.048	1.323	17.1
bis(2-Chloroethyl)ether	1.109	1.222	1.202	1.298	1.193	1.205	5.6
2-Chlorophenol	1.142	1.270	1.232	1.345	1.244	1.246	5.9
1,3-Dichlorobenzene	1.296	1.368	1.380	1.403	1.291	1.347	3.8
1,4-Dichlorobenzene *	1.372	1.415	1.417	1.447	1.348	1.400	2.8
Benzyl alcohol	.419	.678	.671	.747	.686	.640	19.9
1,2-Dichlorobenzene	1.234	1.280	1.291	1.306	1.179	1.258	4.1
2-Methylphenol	.864	1.051	.964	1.130	1.016	1.005	9.9
bis(2-Chloroisopropyl)ether	.446	.548	.539	.582	.535	.530	9.5
4-Methylphenol	.758	1.043	.975	1.196	1.078	1.010	16.0
N-Nitroso-di-n-propylamine #	.616	.803	.759	.907	.862	.789	14.2#
Hexachloroethane	.554	.579	.570	.568	.533	.561	3.2
Nitrobenzene	.234	.278	.282	.310	.307	.282	10.8
Isophorone	.494	.556	.552	.547	.201	.470	32.4
2-Nitrophenol *	.141	.180	.174	.191	.178	.173	10.8*
2,4-Dimethylphenol	.234	.275	.266	.282	.267	.265	6.9
Benzoic acid	.037	.075	.110	.115	.108	.089	37.3
bis(2-Chloroethoxy)methane	.320	.382	.369	.379	.298	.350	10.9
2,4-Dichlorophenol *	.174	.223	.228	.241	.228	.219	11.8*
1,2,4-Trichlorobenzene	.238	.250	.251	.245	.243	.245	2.2
Naphthalene	.971	1.014	.928	.829	.767	.902	11.3
4-Chloroaniline	.257	.348	.373	.355	.348	.336	13.5
Hexachlorobutadiene *	.105	.101	.106	.098	.099	.102	3.4*
4-Chloro-3-methylphenol *	.152	.198	.235	.225	.214	.205	15.9*
2-Methylnaphthalene	.510	.594	.562	.544	.520	.546	6.2
Hexachlorocyclopentadiene #	.265	.275	.267	.319	.317	.289	9.5#
2,4,6-Trichlorophenol	.253	.294	.304	.396	.415	.332	21.0
2,4,5-Trichlorophenol	.214	.266	.291	.283	.253	.261	11.7
2-Chloronaphthalene	1.012	1.118	1.067	1.183	1.172	1.111	6.5
2-Nitroaniline	.191	.224	.248	.257	.255	.235	12.0
Dimethylphthalate	1.025	1.017	.803	.759	.685	.858	18.1
Acenaphthylene	1.758	1.843	1.810	1.813	1.811	1.807	1.7
2,6-Dinitrotoluene	.259	.248	.207	.203	.186	.221	14.2
3-Nitroaniline	.275	.237	.218	.190	.173	.218	18.4
Acenaphthene *	1.101	1.188	1.174	1.229	1.181	1.175	3.9*
2,4-Dinitrophenol #	.068	.094	.097	.106	.109	.095	17.2#
4-Nitrophenol #	.059	.057	.068	[illegible]	[illegible]	.063	8.3#

11 Samples

FORM VI SV-1 1/87 Rev.

AR301477

6C

SEMIVOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Instrument ID: B Calibration Date(s): 12/27/89 12/27/89

Min $\overline{RRF}$ for SPCC(#) = .050 Max %RSD for CCC(*) = 30.0

LAB FILE ID: RRF20 = 13850 RRF50 = 13851
RRF80 = 13852 RRF120= 13853 RRF160= 13854

COMPOUND	RRF20	RRF50	RRF80	RRF120	RRF160	$\overline{RRF}$	% RSD
Dibenzofuran	1.348	1.434	1.470	1.251	1.448	1.390	6.5
2,4-Dinitrotoluene	.311	.268	.242	.208	.220	.250	16.4
Diethylphthalate	1.071	.931	.851	.768	.763	.877	14.7
4-Chlorophenyl-phenylether	.449	.441	.482	.403	.380	.431	9.2
Fluorene	1.040	1.083	1.127	.878	.824	.990	13.4
4-Nitroaniline	.145	.097	.102	.120	.123	.118	16.3
4,6-Dinitro-2-methylphenol	.091	.094	.110	.120	.121	.107	13.3
N-Nitrosodiphenylamine (1) *	.641	.609	.568	.505	.464	.557	13.1
4-Bromophenyl-phenylether	.143	.175	.164	.163	.158	.160	7.2
Hexachlorobenzene	.152	.168	.164	.164	.159	.162	4.0
Pentachlorophenol *	.064	.079	.091	.096	.095	.085	15.9
Phenanthrene	.925	1.071	1.095	1.178	1.063	1.066	[illegible]
Anthracene	.852	.989	.976	.958	.916	.938	[illegible]
Di-n-butylphthalate	1.066	1.206	1.245	1.258	1.211	1.197	6.4
Fluoranthene *	.803	.882	.871	.952	.958	.893	7.2
Pyrene	1.226	1.381	1.342	1.345	1.240	1.307	5.3
Butylbenzylphthalate	.670	.751	.763	.811	.759	.751	6.8
3,3'-Dichlorobenzidine	.155	.175	.167	.229	.232	.192	18.9
Benzo(a)anthracene	.887	.992	.962	1.059	.972	.975	6.4
Chrysene	.876	.932	.908	.952	.876	.909	3.7
bis(2-Ethylhexyl)phthalate	.921	1.048	1.077	1.156	1.083	1.057	8.1
Di-n-octylphthalate *	1.866	2.480	2.646	2.900	2.781	2.535	16.0
Benzo(b)fluoranthene	.990	1.280	1.198	1.524	1.504	1.299	17.1
Benzo(k)fluoranthene	1.140	1.229	1.269	1.262	1.100	1.200	6.3
Benzo(a)pyrene *	.878	1.052	1.027	1.153	1.074	1.037	9.7
Indeno(1,2,3-cd)pyrene	.510	.615	.601	.543	.500	.554	9.5
Dibenzo(a,h)anthracene	.490	.616	.581	.583	.529	.560	8.9
Benzo(g,h,i)perylene	.559	.638	.617	.553	.446	.562	13.3
Nitrobenzene-d5	.247	.275	.277	.292	.280	.274	6.0
2-Fluorobiphenyl	1.093	1.237	1.167	1.262	1.249	1.202	5.9
Terphenyl-d14	.794	.911	.874	.941	.871	.878	6.3
Phenol-d5	.945	1.196	1.105	1.300	.661	1.041	23.9
2-Fluorophenol	.672	.818	.814	.872	.824	.800	9.4
2,4,6-Tribromophenol	.094	.082	.064	.071	.070	.076	15.7

(1) Cannot be separated from Diphenylamine

All Samples

AR301478

FORM VI SV-2 1/87 Rev

7B

SEMIVOLATILE CONTINUING CALIBRATION CHECK

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Instrument ID: B Calibration Date: 12/27/89 Time: 14:27

Lab File ID: 13855 Init. Calib. Date(s): 12/27/89 12/27/89

Min RRF50 for SPCC(#) = .050 Max %D for CCC(*) = 25.0%

COMPOUND	RRF	RRF50	%D		Samples
Phenol	1.323	1.389	5.0	*	SBLKW1
bis(2-Chloroethyl)ether	1.205	1.216	.9		CZ419
2-Chlorophenol	1.246	1.298	4.1		CZ423
1,3-Dichlorobenzene	1.347	1.365	1.3		
1,4-Dichlorobenzene	1.400	1.429	2.1	*	CZ424
Benzyl alcohol	.640	.709	10.8		CZ422
1,2-Dichlorobenzene	1.258	1.289	2.4		CZ426
2-Methylphenol	1.005	1.084	7.9		CZ432
bis(2-Chloroisopropyl)ether	.530	.518	2.2		CZ423 MS/MS.
4-Methylphenol	1.010	1.070	5.9		CZ426 MS/MS.
N-Nitroso-di-n-propylamine	.789	.777	1.6	#	
Hexachloroethane	.561	.586	4.5		
Nitrobenzene	.282	.283	.1		
Isophorone	.470	.539	14.7		
2-Nitrophenol	.173	.177	2.4	*	
2,4-Dimethylphenol	.265	.262	.9		
Benzoic acid	.089	.078	12.4		
bis(2-Chloroethoxy)methane	.350	.376	7.5		
2,4-Dichlorophenol	.219	.223	1.7	*	
1,2,4-Trichlorobenzene	.245	.245	.0		
Naphthalene	.902	1.002	11.1		
4-Chloroaniline	.336	.347	3.4		
Hexachlorobutadiene	.102	.100	1.4	*	
4-Chloro-3-methylphenol	.205	.208	1.5	*	
2-Methylnaphthalene	.546	.566	3.7		
Hexachlorocyclopentadiene	.289	.274	5.0	#	
2,4,6-Trichlorophenol	.332	.303	8.8		
2,4,5-Trichlorophenol	.261	.281	7.6		
2-Chloronaphthalene	1.111	1.123	1.1		
2-Nitroaniline	.235	.237	1.1		
Dimethylphthalate	.858	.920	7.2		
Acenaphthylene	1.807	1.889	4.5		
2,6-Dinitrotoluene	.221	.247	11.8		
3-Nitroaniline	.218	.295	35.1		
Acenaphthene	1.175	1.206	2.7	*	
2,4-Dinitrophenol	.095	.090	5.5	#	
4-Nitrophenol	.063	.06[illegible]	[illegible]	#	

7C

SEMIVOLATILE CONTINUING CALIBRATION CHECK

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Instrument ID: B Calibration Date: 12/27/89 Time: 14:27

Lab File ID: 13855 Init. Calib. Date(s): 12/27/89 12/27/89

Min RRF50 for SPCC(#) = .050 Max %D for CCC(*) = 25.0

COMPOUND	RRF	RRF50	%D	Samples
Dibenzofuran	1.390	1.485	6.8	SBLKW1
2,4-Dinitrotoluene	.250	.259	3.7	CZ419
Diethylphthalate	.877	.943	7.6	CZ423
4-Chlorophenyl-phenylether	.431	.481	11.7	CZ424
Fluorene	.990	1.129	14.0	CZ422
4-Nitroaniline	.118	.132	12.7	CZ426
4,6-Dinitro-2-methylphenol	.107	.110	2.0	CZ432
N-Nitrosodiphenylamine (1) *	.557	.621	11.4 *	CZ423 MS/MS
4-Bromophenyl-phenylether	.160	.162	1.3	CZ426 MS/MS
Hexachlorobenzene	.162	.170	5.1	
Pentachlorophenol *	.085	.081	4.0 *	
Phenanthrene	1.066	1.219	14.3	
Anthracene	.938	.983	4.7	
Di-n-butylphthalate	1.197	1.282	7.1	
Fluoranthene *	.893	.891	.3 *	
Pyrene	1.307	1.364	4.4	
Butylbenzylphthalate	.751	.806	7.4	
3,3'-Dichlorobenzidine	.192	.205	6.9	
Benzo(a)anthracene	.975	1.009	3.5	
Chrysene	.909	.952	4.8	
bis(2-Ethylhexyl)phthalate	1.057	1.110	5.0	
Di-n-octylphthalate *	2.535	2.744	8.2 *	
Benzo(b)fluoranthene	1.299	1.307	.6	
Benzo(k)fluoranthene	1.200	1.299	8.3	
Benzo(a)pyrene *	1.037	1.066	2.8 *	
Indeno(1,2,3-cd)pyrene	.554	.586	5.8	
Dibenzo(a,h)anthracene	.560	.590	5.3	
Benzo(g,h,i)perylene	.562	.612	8.8	
Nitrobenzene-d5	.274	.280	1.9	
2-Fluorobiphenyl	1.202	1.262	5.0	
Terphenyl-d14	.878	.903	2.8	
Phenol-d5	1.041	1.140	9.4	
2-Fluorophenol	.800	.789	1.4	
2,4,6-Tribromophenol	.076	.105	38.1	

(1) Cannot be separated from Diphenylam

7B

SEMIVOLATILE CONTINUING CALIBRATION CHECK

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Instrument ID: B Calibration Date: 12/28/89 Time: 9:04

Lab File ID: 13856 Init. Calib. Date(s): 12/27/89 12/27/89

Min RRF50 for SPCC(#) = .050 Max %D for CCC(*) = 25.0%

COMPOUND	RRF	RRF50	%D		Samples
Phenol *	1.323	1.451	9.6	*	CZ420
bis(2-Chloroethyl)ether	1.205	1.233	2.3		CZ425
2-Chlorophenol	1.246	1.275	2.3		CZ427
1,3-Dichlorobenzene	1.347	1.354	.5		CZ428
1,4-Dichlorobenzene *	1.400	1.440	2.9	*	CZ420 ms/msD
Benzyl alcohol	.640	.683	6.7		SBLKS2
1,2-Dichlorobenzene	1.258	1.257	.7		
2-Methylphenol	1.005	.944	6.1		
bis(2-Chloroisopropyl)ether	.530	.527	.6		
4-Methylphenol	1.010	1.034	2.4		
N-Nitroso-di-n-propylamine #	.789	.720	8.7	#	
Hexachloroethane	.561	.528	5.9		
Nitrobenzene	.282	.271	4.0		
Isophorone	.470	.516	9.9		
2-Nitrophenol *	.173	.174	.7	*	
2,4-Dimethylphenol	.265	.254	3.9		
Benzoic acid	.089	.109	22.2		
bis(2-Chloroethoxy)methane	.350	.362	3.6		
2,4-Dichlorophenol *	.219	.222	1.5	*	
1,2,4-Trichlorobenzene	.245	.247	.5		
Naphthalene	.902	.995	10.3		
4-Chloroaniline	.336	.326	3.0		
Hexachlorobutadiene *	.102	.102	.7	*	
4-Chloro-3-methylphenol *	.205	.218	6.3	*	
2-Methylnaphthalene	.546	.537	1.6		
Hexachlorocyclopentadiene #	.289	.112	61.2	#	
2,4,6-Trichlorophenol	.332	.314	5.5		
2,4,5-Trichlorophenol	.261	.298	13.8		
2-Chloronaphthalene	1.111	1.089	2.0		
2-Nitroaniline	.235	.249	6.0		
Dimethylphthalate	.858	.988	15.1		
Acenaphthylene	1.807	1.858	2.8		
2,6-Dinitrotoluene	.221	.271	22.7		
3-Nitroaniline	.218	.315	44.2		
Acenaphthene *	1.175	1.209	2.9	*	
2,4-Dinitrophenol #	.095	.127	34.1	#	
4-Nitrophenol #	.063	.079	26.2	#	

7C

SEMIVOLATILE CONTINUING CALIBRATION CHECK

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Instrument ID: B Calibration Date: 12/28/89 Time: 9:04

Lab File ID: 13856 Init. Calib. Date(s): 12/27/89 12/27/89

Min RRF50 for SPCC(#) = .050 Max %D for CCC(*) = 25.0%

COMPOUND	RRF	RRF50	%D	
Dibenzofuran	1.390	1.508	8.5	
2,4-Dinitrotoluene	.250	.314	25.7	
Diethylphthalate	.877	1.092	24.5	
4-Chlorophenyl-phenylether	.431	.477	10.6	
Fluorene	.990	1.160	17.1	
4-Nitroaniline	.118	.201	70.9	
4,6-Dinitro-2-methylphenol	.107	.127	18.0	
N-Nitrosodiphenylamine (1)	.557	.692	24.2	*
4-Bromophenyl-phenylether	.160	.160	.1	
Hexachlorobenzene	.162	.157	3.1	
Pentachlorophenol	.085	.095	12.1	*
Phenanthrene	1.066	1.051	1.4	
Anthracene	.938	.986	5.1	
Di-n-butylphthalate	1.197	1.273	6.4	
Fluoranthene	.893	.942	5.5	*
Pyrene	1.307	1.473	12.7	
Butylbenzylphthalate	.751	.833	10.9	
3,3'-Dichlorobenzidine	.192	.281	46.4	
Benzo(a)anthracene	.975	.977	.3	
Chrysene	.909	.950	4.6	
bis(2-Ethylhexyl)phthalate	1.057	1.792	69.6	
Di-n-octylphthalate	2.535	3.082	21.6	*
Benzo(b)fluoranthene	1.299	1.335	2.8	
Benzo(k)fluoranthene	1.200	1.329	10.7	
Benzo(a)pyrene	1.037	1.052	1.5	*
Indeno(1,2,3-cd)pyrene	.554	.430	22.4	
Dibenzo(a,h)anthracene	.560	.440	21.4	
Benzo(g,h,i)perylene	.562	.414	26.5	
Nitrobenzene-d5	.274	.282	2.8	
2-Fluorobiphenyl	1.202	1.226	2.0	
Terphenyl-d14	.878	.944	7.5	
Phenol-d5	1.041	1.148	10.2	
2-Fluorophenol	.800	.815	1.9	
2,4,6-Tribromophenol	.076	.103	34.8	

Samples
CZ420
CZ425
CZ427
CZ428
CZ420 MS/MS.
SBLKS2

(1) Cannot be separated from Diphenylamine

FORM VIII SV-2 1/87 Rev.

SOIL VOLATILE SURROGATE RECOVERY

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Level:(low/med) MED

	EPA SAMPLE NO.	S1 (TOL)#	S2 (BFB)#	S3 (DCE)#	OTHER	TOT OUT
1	VBLKS1	93	95	95		0
2	CZ420	93	83	82		0
3	CZ420MS	86	85	81		0
4	CZ420MSD	85	88	80		0
5	VBLKS2	84	85	86		0
6	CZ420 DL	69 D	73 D	70		0
7						
8						
9						
10						
11						
12						
13						
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25						
26						
27						
28						
29						
30						

		QC LIMITS
S1 (TOL)	= Toluene-d8	(81-117)
S2 (BFB)	= Bromofluorobenzene	(74-121)
S3 (DCE)	= 1,2-Dichloroethane-d4	(70-121)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

FORM II VOA-2 /87 Rev.

3B

SOIL VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix Spike - EPA Sample No.: CZ425 Level:(low/med) LOW

COMPOUND	SPIKE ADDED (UG/KG)	SAMPLE CONCENTRATION (UG/KG)	MS CONCENTRATION (UG/KG)	MS % REC #	QC LIMITS REC.
1,1-Dichloroethene	103.	0.	98.	95	59-172
Trichloroethene	103.	0.	104.	101	62-137
Benzene	103.	0.	99.	96	66-142
Toluene	103.	0.	100.	97	59-139
Chlorobenzene	103.	176.	340.	159 *	60-133

COMPOUND	SPIKE ADDED (UG/KG)	MSD CONCENTRATION (UG/KG)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	103.	90.	87	9	22	59-172
Trichloroethene	103.	112.	109	7	24	62-137
Benzene	103.	105.	102	6	21	66-142
Toluene	103.	102.	99	2	21	59-139
Chlorobenzene	103.	384.	201 *	24 *	21	60-133

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

* Values outside of QC limits

RPD: 1 out of 5 outside limits
Spike Recovery: 2 out of 10 outside limits

COMMENTS:

FORM III VOA-2 - 1/87 Rev.

AR301484

SE

SOIL VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix Spike - EPA Sample No.: CZ420 Level:(low/med) MED

COMPOUND	SPIKE ADDED (UG/KG)	SAMPLE CONCENTRATION (UG/KG)	MS CONCENTRATION (UG/KG)	MS % REC #	QC LIMITS REC.
1,1-Dichloroethene	15700.	0.	10718.	68	59-172
Trichloroethene	15700.	0.	11424.	73	62-137
Benzene	15700.	437.	11102.	68	66-142
Toluene	15700.	0.	9847.	63	59-139
Chlorobenzene	15700.	190390.	305462.	733 *	60-133

COMPOUND	SPIKE ADDED (UG/KG)	MSD CONCENTRATION (UG/KG)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	15700.	10894.	69	2	22	59-172
Trichloroethene	15700.	11738.	75	3	24	62-137
Benzene	15700.	11424.	70	3	21	66-142
Toluene	15700.	9894.	63	0	21	59-139
Chlorobenzene	15700.	317350.	809 *	10	21	60-133

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: 2 out of 10 outside limits

COMMENTS:

FORM III VOA-2 1/87 Rev.

3D

SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix Spike - EPA Sample No.: CZ420 Level:(low/med) MED

COMPOUND	SPIKE ADDED (UG/KG)	SAMPLE CONCENTRATION (UG/KG)	MS CONCENTRATION (UG/KG)	MS % REC #	QC LIMITS REC.
Phenol	502386.	0.	179790.	36	26- 90
2-Chlorophenol	502386.	0.	285701.	57	25-102
1,4-Dichlorobenzene	251193.	3584108.	3191635.	0 *	28-104
N-Nitroso-di-n-prop.(1)	251193.	0.	105750.	42	41-126
1,2,4-Trichlorobenzene	251193.	2336434.	3111749.	309 *	38-107
4-Chloro-3-methylphenol	502386.	0.	210737.	42	26-103
Acenaphthene	251193.	0.	168318.	67	31-137
4-Nitrophenol	502386.	0.	42980.	9 *	11-114
2,4-Dinitrotoluene	251193.	0.	135772.	54	28- 89
Pentachlorophenol	502386.	0.	143527.	29	17-109
Pyrene	251193.	0.	220887.	88	35-142

COMPOUND	SPIKE ADDED (UG/KG)	MSD CONCENTRATION (UG/KG)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Phenol	502386.	163216.	32	10	35	26- 90
2-Chlorophenol	502386.	245948.	49	15	50	25-102
1,4-Dichlorobenzene	251193.	4141413.	222 *	1152 *	27	28-104
N-Nitroso-di-n-prop.(1)	251193.	102493.	41	3	38	41-126
1,2,4-Trichlorobenzene	251193.	4042757.	679 *	75 *	23	38-107
4-Chloro-3-methylphenol	502386.	225300.	45	7	33	26-103
Acenaphthene	251193.	166383.	66	1	19	31-137
4-Nitrophenol	502386.	86973.	17	68 *	50	11-114
2,4-Dinitrotoluene	251193.	150891.	60	11	47	28- 89
Pentachlorophenol	502386.	135097.	27	6	47	17-109
Pyrene	251193.	221217.	88	0	36	35-142

(1) N-Nitroso-di-n-propylamine

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

* Values outside of QC limits

RPD: 3 out of 11 outside limits
Spike Recovery: 5 out of 22 outside limits

COMMENTS:

3D

SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix Spike - EPA Sample No.: CZ426 Level:(low/med) LOW

COMPOUND	SPIKE ADDED (UG/KG)	SAMPLE CONCENTRATION (UG/KG)	MS CONCENTRATION (UG/KG)	MS % REC #	QC LIMITS REC.
Phenol	14961.	0.	11528.	77	26- 90
2-Chlorophenol	14961.	0.	10844.	72	25-102
1,4-Dichlorobenzene	7481.	191.	4728.	61	28-104
N-Nitroso-di-n-prop.(1)	7481.	0.	5205.	70	41-126
1,2,4-Trichlorobenzene	7481.	0.	5531.	74	38-107
4-Chloro-3-methylphenol	14961.	0.	12585.	84	26-103
Acenaphthene	7481.	0.	5898.	79	31-137
4-Nitrophenol	14961.	0.	14491.	97	11-114
2,4-Dinitrotoluene	7481.	0.	6594.	88	28- 89
Pentachlorophenol	14961.	0.	9401.	63	17-109
Pyrene	7481.	137.	6977.	91	35-142

COMPOUND	SPIKE ADDED (UG/KG)	MSD CONCENTRATION (UG/KG)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Phenol	14961.	12656.	85	9	35	26- 90
2-Chlorophenol	14961.	12225.	82	12	50	25-102
1,4-Dichlorobenzene	7481.	5231.	67	11	27	28-104
N-Nitroso-di-n-prop.(1)	7481.	5664.	76	8	38	41-126
1,2,4-Trichlorobenzene	7481.	5993.	80	8	23	38-107
4-Chloro-3-methylphenol	14961.	13835.	92	9	33	26-103
Acenaphthene	7481.	5882.	79	0	19	31-137
4-Nitrophenol	14961.	12273.	82	17	50	11-114
2,4-Dinitrotoluene	7481.	7961.	106 *	19	47	28- 89
Pentachlorophenol	14961.	10017.	67	6	47	17-109
Pyrene	7481.	7353.	96	5	36	35-142

(1) N-Nitroso-di-n-propylamine

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

* Values outside of QC limits

RPD: 0 out of 11 outside limits
Spike Recovery: 1 out of 22 outside limits

COMMENTS:

3C

WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix Spike - EPA Sample No.: CZ423

COMPOUND	SPIKE ADDED (UG/L)	SAMPLE CONCENTRATION (UG/L)	MS CONCENTRATION (UG/L)	MS % REC #	QC LIMITS REC.
Phenol	200.	0.	74.	37	12- 89
2-Chlorophenol	200.	0.	123.	62	27-123
1,4-Dichlorobenzene	100.	0.	54.	54	36- 97
N-Nitroso-di-n-prop.(1)	100.	0.	57.	57	41-116
1,2,4-Trichlorobenzene	100.	0.	60.	60	39- 98
4-Chloro-3-methylphenol	200.	0.	142.	71	23- 97
Acenaphthene	100.	0.	73.	73	46-118
4-Nitrophenol	200.	0.	113.	57	10- 80
2,4-Dinitrotoluene	100.	0.	93.	93	24- 96
Pentachlorophenol	200.	0.	102.	51	9-103
Pyrene	100.	0.	91.	91	26-127

COMPOUND	SPIKE ADDED (UG/L)	MSD CONCENTRATION (UG/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Phenol	200.	81.	41	9	42	12- 89
2-Chlorophenol	200.	139.	69	12	40	27-123
1,4-Dichlorobenzene	100.	63.	63	15	28	36- 97
N-Nitroso-di-n-prop.(1)	100.	68.	68	16	38	41-116
1,2,4-Trichlorobenzene	100.	69.	69	13	28	39- 98
4-Chloro-3-methylphenol	200.	154.	77	8	42	23- 97
Acenaphthene	100.	80.	80	10	31	46-118
4-Nitrophenol	200.	122.	61	7	50	10- 80
2,4-Dinitrotoluene	100.	98.	98 *	5	38	24- 96
Pentachlorophenol	200.	104.	52	2	50	9-103
Pyrene	100.	94.	94	3	31	26-127

(1) N-Nitroso-di-n-propylamine

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

* Values outside of QC limits

RPD: 0 out of 11 outside limits
Spike Recovery: 1 out of 22 outside limits

COMMENTS:

AR301488

3F

SOIL PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix Spike - EPA Sample No.: CZ420 Level:(low/med) MED

COMPOUND	SPIKE ADDED (UG/KG)	SAMPLE CONCENTRATION (UG/KG)	MS CONCENTRATION (UG/KG)	MS % REC #	QC LIMITS REC.
Gamma-BHC	4610.21	.00	4900.32	106	46-127
Heptachlor	4610.21	.00	3952.98	86	35-130
Aldrin	4610.21	.00	4342.86	94	34-132
Dieldrin	11525.52	.00	10400.18	90	31-134
Endrin	11525.52	.00	13020.65	113	42-139
4,4'-DDT	11525.52	.00	11771.84	102	23-134

COMPOUND	SPIKE ADDED (UG/KG)	MSD CONCENTRATION (UG/KG)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Gamma-BHC	4652.89	5918.11	127	18	50	46-127
Heptachlor	4652.89	4874.74	105	20	31	35-130
Aldrin	4652.89	5189.05	112	17	43	34-132
Dieldrin	11632.24	12632.97	109	18	38	31-134
Endrin	11632.24	16252.58	140 *	21	45	42-139
4,4'-DDT	11632.24	14671.12	126	21	50	23-134

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

* Values outside of QC limits

RPD: 0 out of 6 outside limits
Spike Recovery: 1 out of 12 outside limits

COMMENTS:

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ423MS

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 85365

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec. 100. Date Analyzed: 11/30/89

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	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	5.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene		
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		
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene		
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		
108-90-7	Chlorobenzene		
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene		
1330-20-7	Xylene (total)		

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FORM I VOA 1/87 Rev.

AR301490

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ423MSD

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 85366

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec. 100. Date Analyzed: 11/30/89

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	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	5.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene		
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		
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene		
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		
108-90-7	Chlorobenzene		
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene (total)		

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ425MS

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 5.000 (g/mL) G Lab File ID: 85387

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec. 5% Date Analyzed: 12/ 8/89

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	21.	U
74-83-9	Bromomethane	21.	U
75-01-4	Vinyl Chloride	21.	U
75-00-3	Chloroethane	21.	U
75-09-2	Methylene Chloride	7.	J
67-64-1	Acetone	78.	B
75-15-0	Carbon Disulfide	10.	U
75-35-4	1,1-Dichloroethene		
75-34-3	1,1-Dichloroethane	10.	U
540-59-0	1,2-Dichloroethene (total)	10.	U
67-66-3	Chloroform	10.	U
107-06-2	1,2-Dichloroethane	10.	U
78-93-3	2-Butanone	22.	
71-55-6	1,1,1-Trichloroethane	10.	U
56-23-5	Carbon Tetrachloride	10.	U
108-05-4	Vinyl Acetate	21.	U
75-27-4	Bromodichloromethane	10.	U
78-87-5	1,2-Dichloropropane	10.	U
10061-01-5	cis-1,3-Dichloropropene	10.	U
79-01-6	Trichloroethene		
124-48-1	Dibromochloromethane	10.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene		
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	21.	U
591-78-6	2-Hexanone	21.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene		
108-90-7	Chlorobenzene		
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylene (total)	[illegible]	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: ESE

Lab Code: ESE

Case No.: 13230

Contract: 68-WE

Matrix: (soil/water) SOIL

SAS No.:

Sample wt/vol: 5.000 (g/mL) G

Lab Sam

Level: (low/med) LOW

Lab File

% Moisture: not dec. 51.

Date Rece

Column: (pack/cap) PACK

Date Anal

Dilution F

CAS NO.	COMPOUND	CONCENTRATION UNI (ug/L or ug/Kg) U	
74-87-3	Chloromethane	1	
74-83-9	Bromomethane	1	
75-01-4	Vinyl Chloride	1	
75-00-3	Chloroethane	10	
75-09-2	Methylene Chloride	22.	
67-64-1	Acetone	10.	
75-15-0	Carbon Disulfide	10.	
75-35-4	1,1-Dichloroethene	21.	
75-34-3	1,1-Dichloroethane	10.	
540-59-0	1,2-Dichloroethene (total)	10.	
67-66-3	Chloroform	10.	
107-06-2	1,2-Dichloroethane	10.	
78-93-3	2-Butanone	10.	
71-55-6	1,1,1-Trichloroethane	10.	
56-23-5	Carbon Tetrachloride	10.	
108-05-4	Vinyl Acetate	10.	
75-27-4	Bromodichloromethane	10.	
78-87-5	1,2-Dichloropropane	10.	
10061-01-5	cis-1,3-Dichloropropene	10.	
79-01-6	Trichloroethene	21.	U
124-48-1	Dibromochloromethane	21.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene	10.	U
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene	10.	U
108-90-7	Chlorobenzene	10.	U
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylene (total)	10.	U

AR301493

FORM I-VOA

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA Sample No.

CZ420MS

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 4.000 (g/mL) G Lab File ID: 35401

Level: (low/med) MED Date Received: 11/30/89

% Moisture: not dec. 80. Date Analyzed: 12/ 9/89

Column: (pack/cap) PACK Dilution Factor: ~~100.00~~ 2.00 DAK 1/23/90

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	6300.	U
74-83-9	Bromomethane	6300.	U
75-01-4	Vinyl Chloride	6300.	U
75-00-3	Chloroethane	6300.	U
75-09-2	Methylene Chloride	3100.	U
67-64-1	Acetone	2800.	J
75-15-0	Carbon Disulfide	3100.	U
75-35-4	1,1-Dichloroethene		
75-34-3	1,1-Dichloroethane	3100.	U
540-59-0	1,2-Dichloroethene (total)	3100.	U
67-66-3	Chloroform	3100.	U
107-06-2	1,2-Dichloroethane	3100.	U
78-93-3	2-Butanone	6300.	U
71-55-6	1,1,1-Trichloroethane	3100.	U
56-23-5	Carbon Tetrachloride	3100.	U
108-05-4	Vinyl Acetate	6300.	U
75-27-4	Bromodichloromethane	3100.	U
78-87-5	1,2-Dichloropropane	3100.	U
10061-01-5	cis-1,3-Dichloropropene	3100.	U
79-01-6	Trichloroethene		
124-48-1	Dibromochloromethane	3100.	U
79-00-5	1,1,2-Trichloroethane	3100.	U
71-43-2	Benzene		
10061-02-6	trans-1,3-Dichloropropene	3100.	U
75-25-2	Bromoform	3100.	U
108-10-1	4-Methyl-2-Pentanone	6300.	U
591-78-6	2-Hexanone	6300.	U
127-18-4	Tetrachloroethene	3100.	U
79-34-5	1,1,2,2-Tetrachloroethane	3100.	U
108-88-3	Toluene		
108-90-7	Chlorobenzene		
100-41-4	Ethylbenzene	3100.	U
100-42-5	Styrene	3100.	U
1330-20-7	Xylene (total)	3100.	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO

CI420MST

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CI405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 4.000 (g/mL) G Lab File ID: 85402

Level: (low/med) MED Date Received: 11/30/85

% Moisture: not dec. 80. Date Analyzed: 12/ 9/85

Column: (pack/cap) PACK Dilution Factor: ~~1.00~~ 2.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	6300.	U
74-83-9	Bromomethane	6300.	U
75-01-4	Vinyl Chloride	6300.	U
75-00-3	Chloroethane	6300.	U
75-09-2	Methylene Chloride	3100.	U
67-64-1	Acetone	6300.	U
75-15-0	Carbon Disulfide	3100.	U
75-35-4	1,1-Dichloroethene		
75-34-3	1,1-Dichloroethane	3100.	U
540-59-0	1,2-Dichloroethene (total)	3100.	U
67-66-3	Chloroform	3100.	U
107-06-2	1,2-Dichloroethane	3100.	U
78-93-3	2-Butanone	6300.	U
71-55-6	1,1,1-Trichloroethane	3100.	U
56-23-5	Carbon Tetrachloride	3100.	U
108-05-4	Vinyl Acetate	6300.	U
75-27-4	Bromodichloromethane	3100.	U
78-87-5	1,2-Dichloropropane	3100.	U
10061-01-5	cis-1,3-Dichloropropene	3100.	U
79-01-6	Trichloroethene		
124-48-1	Dibromochloromethane	3100.	U
79-00-5	1,1,2-Trichloroethane	3100.	U
71-43-2	Benzene		
10061-02-6	trans-1,3-Dichloropropene	3100.	U
75-25-2	Bromoform	3100.	U
108-10-1	4-Methyl-2-Pentanone	6300.	U
591-78-6	2-Hexanone	6300.	U
127-18-4	Tetrachloroethene	3100.	U
79-34-5	1,1,2,2-Tetrachloroethane	3100.	U
108-88-3	Toluene		
108-90-7	Chlorobenzene		
100-41-4	Ethylbenzene	3100.	U
100-42-5	Styrene	3100.	U
1330-20-7	Xylene (total)		

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO

CZ423MS

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 1000.0 (g/mL) ML Lab File ID: 22204

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec. 100. dec.____ Date Extracted: 12/ 4/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol		
111-44-4	bis(2-Chloroethyl)ether	10.	U
95-57-8	2-Chlorophenol		
541-73-1	1,3-Dichlorobenzene	10.	U
106-46-7	1,4-Dichlorobenzene		
100-51-6	Benzyl alcohol	10.	U
95-50-1	1,2-Dichlorobenzene	10.	U
95-48-7	2-Methylphenol	10.	U
108-60-1	bis(2-Chloroisopropyl)ether	10.	U
106-44-5	4-Methylphenol	10.	U
621-64-7	N-Nitroso-di-n-propylamine		
67-72-1	Hexachloroethane	10.	U
98-95-3	Nitrobenzene	10.	U
78-59-1	Isophorone	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
65-85-0	Benzoic acid	50.	U
111-91-1	bis(2-Chloroethoxy)methane	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
120-82-1	1,2,4-Trichlorobenzene		
91-20-3	Naphthalene	10.	U
106-47-8	4-Chloroaniline	10.	U
87-68-3	Hexachlorobutadiene	10.	U
59-50-7	4-Chloro-3-methylphenol		
91-57-6	2-Methylnaphthalene	10.	U
77-47-4	Hexachlorocyclopentadiene	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	50.	U
91-58-7	2-Chloronaphthalene	10.	U
88-74-4	2-Nitroaniline	50	U
131-11-3	Dimethylphthalate		
208-96-8	Acenaphthylene	10.	
606-20-2	2,6-Dinitrotoluene	10.	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ423MS

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 1000.0 (g/mL) ML Lab File ID: 22204

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec. 100. dec._____ Date Extracted: 12/ 4/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-09-2	3-Nitroaniline	50.	U
83-32-9	Acenaphthene		
51-28-5	2,4-Dinitrophenol	50.	U
100-02-7	4-Nitrophenol		
132-64-9	Dibenzofuran	10.	U
121-14-2	2,4-Dinitrotoluene		
84-66-2	Diethylphthalate	10.	U
7005-72-3	4-Chlorophenyl-phenylether	10.	U
86-73-7	Fluorene	10.	U
100-01-6	4-Nitroaniline	50.	U
534-52-1	4,6-Dinitro-2-methylphenol	50.	U
86-30-6	N-Nitrosodiphenylamine (1)	10.	U
101-55-3	4-Bromophenyl-phenylether	10.	U
118-74-1	Hexachlorobenzene	10.	U
87-86-5	Pentachlorophenol		
85-01-8	Phenanthrene	10.	U
120-12-7	Anthracene	10.	U
84-74-2	Di-n-butylphthalate	10.	U
206-44-0	Fluoranthene	10.	U
129-00-0	Pyrene		
85-68-7	Butylbenzylphthalate	10.	U
91-94-1	3,3'-Dichlorobenzidine	20.	U
56-55-3	Benzo(a)anthracene	10.	U
218-01-9	Chrysene	10.	U
117-81-7	bis(2-Ethylhexyl)phthalate	5.	BJ
117-84-0	Di-n-octylphthalate	10.	U
205-99-2	Benzo(b)fluoranthene	10.	U
207-08-9	Benzo(k)fluoranthene	10.	U
50-32-8	Benzo(a)pyrene	10.	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.	U
53-70-3	Dibenzo(a,h)anthracene	10.	U
191-24-2	Benzo(g,h,i)perylene	10.	U

(1) - Cannot be separated from diphenylamine

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ423MSD

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 1000.0 (g/mL) ML Lab File ID: 22205

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec. 100. dec.____ Date Extracted: 12/ 4/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-09-2	3-Nitroaniline	50.	U
83-32-9	Acenaphthene		
51-28-5	2,4-Dinitrophenol	50.	U
100-02-7	4-Nitrophenol		
132-64-9	Dibenzofuran	10.	U
121-14-2	2,4-Dinitrotoluene		
84-66-2	Diethylphthalate	10.	U
7005-72-3	4-Chlorophenyl-phenylether	10.	U
86-73-7	Fluorene	10.	U
100-01-6	4-Nitroaniline	50.	U
534-52-1	4,6-Dinitro-2-methylphenol	50.	U
86-30-6	N-Nitrosodiphenylamine (1)	10.	U
101-55-3	4-Bromophenyl-phenylether	10.	U
118-74-1	Hexachlorobenzene	10.	U
87-86-5	Pentachlorophenol		
85-01-8	Phenanthrene	10.	U
120-12-7	Anthracene	10.	U
84-74-2	Di-n-butylphthalate	10.	U
206-44-0	Fluoranthene	10.	U
129-00-0	Pyrene		
85-68-7	Butylbenzylphthalate	10.	U
91-94-1	3,3'-Dichlorobenzidine	20.	U
56-55-3	Benzo(a)anthracene	10.	U
218-01-9	Chrysene	10.	U
117-81-7	bis(2-Ethylhexyl)phthalate	5.	BJ
117-84-0	Di-n-octylphthalate	10.	U
205-99-2	Benzo(b)fluoranthene	10.	U
207-08-9	Benzo(k)fluoranthene	10.	U
50-32-8	Benzo(a)pyrene	10.	U
193-39-5	Indeno(1,2,3-cd)pyrene		
53-70-3	Dibenzo(a,h)anthracene		
191-24-2	Benzo(g,h,i)perylene	10.	U

(1) - Cannot be separated from diphenylamine

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ423MSD

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 1000.0 (g/mL) ML Lab File ID: 22205

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec. 100. dec._____ Date Extracted: 12/ 4/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol		
111-44-4	bis(2-Chloroethyl)ether	10.	U
95-57-8	2-Chlorophenol		
541-73-1	1,3-Dichlorobenzene	10.	U
106-46-7	1,4-Dichlorobenzene		
100-51-6	Benzyl alcohol	10.	U
95-50-1	1,2-Dichlorobenzene	10.	U
95-48-7	2-Methylphenol	10.	U
108-60-1	bis(2-Chloroisopropyl)ether	10.	U
106-44-5	4-Methylphenol	10.	U
621-64-7	N-Nitroso-di-n-propylamine		
67-72-1	Hexachloroethane	10.	U
98-95-3	Nitrobenzene	10.	U
78-59-1	Isophorone	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
65-85-0	Benzoic acid	50.	U
111-91-1	bis(2-Chloroethoxy)methane	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
120-82-1	1,2,4-Trichlorobenzene		
91-20-3	Naphthalene	10.	U
106-47-8	4-Chloroaniline	10.	U
87-68-3	Hexachlorobutadiene	10.	U
59-50-7	4-Chloro-3-methylphenol		
91-57-6	2-Methylnaphthalene	10.	U
77-47-4	Hexachlorocyclopentadiene	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	50.	U
91-58-7	2-Chloronaphthalene	10.	U
88-74-4	2-Nitroaniline	50.	U
131-11-3	Dimethylphthalate	10.	U
208-96-8	Acenaphthylene	10.	U
606-20-2	2,6-Dinitrotoluene		

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ426MS

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 22211

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec. 55. dec.____ Date Extracted: 12/ 6/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/28/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 2.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol		
111-44-4	bis(2-Chloroethyl)ether	1500.	U
95-57-8	2-Chlorophenol		
541-73-1	1,3-Dichlorobenzene	1500.	U
106-46-7	1,4-Dichlorobenzene		
100-51-6	Benzyl alcohol	1500.	U
95-50-1	1,2-Dichlorobenzene	1500.	U
95-48-7	2-Methylphenol	1500.	U
108-60-1	bis(2-Chloroisopropyl)ether	1500.	U
106-44-5	4-Methylphenol	1500.	U
621-64-7	N-Nitroso-di-n-propylamine		
67-72-1	Hexachloroethane	1500.	U
98-95-3	Nitrobenzene	1500.	U
78-59-1	Isophorone	1500.	U
88-75-5	2-Nitrophenol	1500.	U
105-67-9	2,4-Dimethylphenol	1500.	U
65-85-0	Benzoic acid	7000.	U
111-91-1	bis(2-Chloroethoxy)methane	1500.	U
120-83-2	2,4-Dichlorophenol	1500.	U
120-82-1	1,2,4-Trichlorobenzene		
91-20-3	Naphthalene	1500.	U
106-47-8	4-Chloroaniline	1500.	U
87-68-3	Hexachlorobutadiene	1500.	U
59-50-7	4-Chloro-3-methylphenol		
91-57-6	2-Methylnaphthalene	1500.	U
77-47-4	Hexachlorocyclopentadiene	1500.	U
88-06-2	2,4,6-Trichlorophenol	1500.	U
95-95-4	2,4,5-Trichlorophenol	7000.	U
91-58-7	2-Chloronaphthalene	1500.	U
88-74-4	2-Nitroaniline	7000.	U
131-11-3	Dimethylphthalate	1500.	U
208-96-8	Acenaphthylene		
606-20-2	2,6-Dinitrotoluene	1500.	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ426MS

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 22211

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec. 55. dec.____ Date Extracted: 12/ 6/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/28/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 2.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	7000.	U
83-32-9	Acenaphthene		
51-28-5	2,4-Dinitrophenol	7000.	U
100-02-7	4-Nitrophenol		
132-64-9	Dibenzofuran	1500.	U
121-14-2	2,4-Dinitrotoluene		
84-66-2	Diethylphthalate	1500.	U
7005-72-3	4-Chlorophenyl-phenylether	1500.	U
86-73-7	Fluorene	1500.	U
100-01-6	4-Nitroaniline	7000.	U
534-52-1	4,6-Dinitro-2-methylphenol	7000.	U
86-30-6	N-Nitrosodiphenylamine (1)	1500.	U
101-55-3	4-Bromophenyl-phenylether	1500.	U
118-74-1	Hexachlorobenzene	1500.	U
87-86-5	Pentachlorophenol		
85-01-8	Phenanthrene	1500.	U
120-12-7	Anthracene	1500.	U
84-74-2	Di-n-butylphthalate	1500.	U
206-44-0	Fluoranthene	110.	J
129-00-0	Pyrene		
85-68-7	Butylbenzylphthalate	1500.	U
91-94-1	3,3'-Dichlorobenzidine	3000.	U
56-55-3	Benzo(a)anthracene	1500.	U
218-01-9	Chrysene	1500.	U
117-81-7	bis(2-Ethylhexyl)phthalate	110.	BJ
117-84-0	Di-n-octylphthalate	1500.	U
205-99-2	Benzo(b)fluoranthene	1500.	U
207-08-9	Benzo(k)fluoranthene	1500.	U
50-32-8	Benzo(a)pyrene	1500.	U
193-39-5	Indeno(1,2,3-cd)pyrene	1500.	U
53-70-3	Dibenzo(a,h)anthracene	1500.	U
191-24-2	Benzo(g,h,i)perylene		

(1) - Cannot be separated from diphenylamine

AR301501

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ426MSD

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 22212

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec. 55. dec.____ Date Extracted: 12/ 6/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/28/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 2.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol		
111-44-4	bis(2-Chloroethyl)ether	210.	J
95-57-8	2-Chlorophenol		
541-73-1	1,3-Dichlorobenzene	1500.	U
106-46-7	1,4-Dichlorobenzene		
100-51-6	Benzyl alcohol	1500.	U
95-50-1	1,2-Dichlorobenzene	1500.	U
95-48-7	2-Methylphenol	1500.	U
108-60-1	bis(2-Chloroisopropyl)ether	1500.	U
106-44-5	4-Methylphenol	1500.	U
621-64-7	N-Nitroso-di-n-propylamine		
67-72-1	Hexachloroethane	1500.	U
98-95-3	Nitrobenzene	1500.	U
78-59-1	Isophorone	1500.	U
88-75-5	2-Nitrophenol	1500.	U
105-67-9	2,4-Dimethylphenol	1500.	U
65-85-0	Benzoic acid	7000.	U
111-91-1	bis(2-Chloroethoxy)methane	1500.	U
120-83-2	2,4-Dichlorophenol	1500.	U
120-82-1	1,2,4-Trichlorobenzene		
91-20-3	Naphthalene	1500.	U
106-47-8	4-Chloroaniline	1500.	U
87-68-3	Hexachlorobutadiene	1500.	U
59-50-7	4-Chloro-3-methylphenol		
91-57-6	2-Methylnaphthalene	1500.	U
77-47-4	Hexachlorocyclopentadiene	1500.	U
88-06-2	2,4,6-Trichlorophenol	1500.	U
95-95-4	2,4,5-Trichlorophenol	7000.	U
91-58-7	2-Chloronaphthalene	1500.	U
88-74-4	2-Nitroaniline		U
131-11-3	Dimethylphthalate		U
208-96-8	Acenaphthylene	1500.	U
606-20-2	2,6-Dinitrotoluene	1500.	U

AR301502

00434

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE No.

CZ426MSD

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 22212

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec. 55. dec.____ Date Extracted: 12/ 6/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/28/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 2.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	7000.	U
83-32-9	Acenaphthene		
51-28-5	2,4-Dinitrophenol	7000.	U
100-02-7	4-Nitrophenol		
132-64-9	Dibenzofuran	1500.	U
121-14-2	2,4-Dinitrotoluene		
84-66-2	Diethylphthalate	1500.	U
7005-72-3	4-Chlorophenyl-phenylether	1500.	U
86-73-7	Fluorene	1500.	U
100-01-6	4-Nitroaniline	7000.	U
534-52-1	4,6-Dinitro-2-methylphenol	7000.	U
86-30-6	N-Nitrosodiphenylamine (1)	1500.	U
101-55-3	4-Bromophenyl-phenylether	1500.	U
118-74-1	Hexachlorobenzene	1500.	U
87-86-5	Pentachlorophenol		
85-01-8	Phenanthrene	1500.	U
120-12-7	Anthracene	1500.	U
84-74-2	Di-n-butylphthalate	1500.	U
206-44-0	Fluoranthene	110.	J
129-00-0	Pyrene		
85-68-7	Butylbenzylphthalate	1500.	U
91-94-1	3,3'-Dichlorobenzidine	3000.	U
56-55-3	Benzo(a)anthracene	1500.	U
218-01-9	Chrysene	1500.	U
117-81-7	bis(2-Ethylhexyl)phthalate	190.	BJ
117-84-0	Di-n-octylphthalate	1500.	U
205-99-2	Benzo(b)fluoranthene	1500.	U
207-08-9	Benzo(k)fluoranthene	1500.	U
50-32-8	Benzo(a)pyrene	1500.	U
193-39-5	Indeno(1,2,3-cd)pyrene	1500.	U
53-70-3	Dibenzo(a,h)anthracene	1500.	U
191-24-2	Benzo(g,h,i)perylene	1500.	U

(1) - Cannot be separated from diphenylamine

AR301503

00435

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ420MS

Contract: 68-W8-0008

Lab Name: ESE

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 1.000 (g/mL) G Lab File ID: 22226

Level: (low/med) MED Date Received: 11/30/89

% Moisture: not dec. 60. dec._____ Date Extracted: 12/ 8/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/28/89

GPC Cleanup: (Y/N) N pH: 6.2 Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	500000.	U
111-44-4	bis(2-Chloroethyl)ether		
95-57-8	2-Chlorophenol	97000.	J
541-73-1	1,3-Dichlorobenzene		
106-46-7	1,4-Dichlorobenzene	500000.	U
100-51-6	Benzyl alcohol	190000.	J
95-50-1	1,2-Dichlorobenzene	500000.	U
95-48-7	2-Methylphenol	500000.	U
108-60-1	bis(2-Chloroisopropyl)ether	500000.	U
106-44-5	4-Methylphenol		
621-64-7	N-Nitroso-di-n-propylamine	500000.	U
67-72-1	Hexachloroethane	500000.	U
98-95-3	Nitrobenzene	500000.	U
78-59-1	Isophorone	500000.	U
88-75-5	2-Nitrophenol	500000.	U
105-67-9	2,4-Dimethylphenol	2400000.	U
65-85-0	Benzoic acid	500000.	U
111-91-1	bis(2-Chloroethoxy)methane	500000.	U
120-83-2	2,4-Dichlorophenol		
120-82-1	1,2,4-Trichlorobenzene	500000.	U
91-20-3	Naphthalene	500000.	U
106-47-8	4-Chloroaniline	500000.	U
87-68-3	Hexachlorobutadiene		
59-50-7	4-Chloro-3-methylphenol	500000.	U
91-57-6	2-Methylnaphthalene	500000.	U
77-47-4	Hexachlorocyclopentadiene	500000.	U
88-06-2	2,4,6-Trichlorophenol	2400000.	U
95-95-4	2,4,5-Trichlorophenol	500000.	U
91-58-7	2-Chloronaphthalene	2400000.	U
88-74-4	2-Nitroaniline	500000.	U
131-11-3	Dimethylphthalate	500000.	U
208-96-8	Acenaphthylene		
606-20-2	2,6-Dinitrotoluene		

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ420MSD

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 1.000 (g/mL) G Lab File ID: 22227

Level: (low/med) MED Date Received: 11/30/89

% Moisture: not dec. 60. dec._____ Date Extracted: 12/ 8/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/28/89

GPC Cleanup: (Y/N) N pH: 6.2 Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	2400000.	U
83-32-9	Acenaphthene		
51-28-5	2,4-Dinitrophenol	2400000.	U
100-02-7	4-Nitrophenol		
132-64-9	Dibenzofuran	500000.	U
121-14-2	2,4-Dinitrotoluene		
84-66-2	Diethylphthalate	500000.	U
7005-72-3	4-Chlorophenyl-phenylether	500000.	U
86-73-7	Fluorene	500000.	U
100-01-6	4-Nitroaniline	2400000.	U
534-52-1	4,6-Dinitro-2-methylphenol	2400000.	U
86-30-6	N-Nitrosodiphenylamine (1)	500000.	U
101-55-3	4-Bromophenyl-phenylether	500000.	U
118-74-1	Hexachlorobenzene	500000.	U
87-86-5	Pentachlorophenol		
85-01-8	Phenanthrene	500000.	U
120-12-7	Anthracene	500000.	U
84-74-2	Di-n-butylphthalate	500000.	U
206-44-0	Fluoranthene	500000.	U
129-00-0	Pyrene		
85-68-7	Butylbenzylphthalate	500000.	U
91-94-1	3,3'-Dichlorobenzidine	1000000.	U
56-55-3	Benzo(a)anthracene	500000.	U
218-01-9	Chrysene	500000.	U
117-81-7	bis(2-Ethylhexyl)phthalate	500000.	U
117-84-0	Di-n-octylphthalate	500000.	U
205-99-2	Benzo(b)fluoranthene	500000.	U
207-08-9	Benzo(k)fluoranthene	500000.	U
50-32-8	Benzo(a)pyrene	500000.	U
193-39-5	Indeno(1,2,3-cd)pyrene	500000.	U
53-70-3	Dibenzo(a,h)anthracene	500000.	U
191-24-2	Benzo(g,h,i)perylene	500000.	U

(1) - Cannot be separated from diphenylamine

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ423MS

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 1000. (g/mL)ML Lab File ID: ACZWS20

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec.100. dec. 0. Date Extracted: 12/ 4/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	Alpha-BHC	.050	U
319-85-7	Beta-BHC	.050	U
319-86-8	Delta-BHC	.050	U
58-89-9	Gamma-BHC	.17	S
76-44-8	Heptachlor	.15	S
309-00-2	Aldrin	.18	S
1024-57-3	Heptachlor Epoxide	.050	U
959-98-8	Endosulfan I	.050	U
60-57-1	Dieldrin	.47	S
72-55-9	4,4'-DDE	.100	U
72-20-8	Endrin	.48	S
33213-65-9	Endosulfan II	.100	U
72-54-8	4,4'-DDD	.100	U
1031-07-8	Endosulfan Sulfate	.100	U
50-29-3	4,4'-DDT	.47	S
72-43-5	Methoxychlor	.50	U
53494-70-5	Endrin Ketone	.100	U
5103-71-9	Alpha Chlordane	.50	U
5103-74-2	Gamma Chlordane	.50	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	.50	U
11104-28-2	Aroclor-1221	.50	U
11141-16-5	Aroclor-1232	.50	U
53469-21-9	Aroclor-1242	.50	U
12672-29-6	Aroclor-1248	.50	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ426MS

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 30. (g/mL) G Lab File ID: ACZWS27

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec. 55. dec. 0. Date Extracted: 12/ 6/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) Y pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	Alpha-BHC	36.	U
319-85-7	Beta-BHC	36.	U
319-86-8	Delta-BHC	36.	U
58-89-9	Gamma-BHC	120.	S
76-44-8	Heptachlor	100.	S
309-00-2	Aldrin	120.	S
1024-57-3	Heptachlor Epoxide	36.	U
959-98-8	Endosulfan I	36.	U
60-57-1	Dieldrin	310.	S
72-55-9	4,4'-DDE	72.	U
72-20-8	Endrin	390.	S
33213-65-9	Endosulfan II	72.	U
72-54-8	4,4'-DDD	72.	U
1031-07-8	Endosulfan Sulfate	72.	U
50-29-3	4,4'-DDT	340.	S
72-43-5	Methoxychlor	360.	U
53494-70-5	Endrin Ketone	72.	U
5103-71-9	Alpha Chlordane	360.	U
5103-74-2	Gamma Chlordane	360.	U
8001-35-2	Toxaphene	720.	U
12674-11-2	Aroclor-1016	360.	U
11104-28-2	Aroclor-1221	360.	U
11141-16-5	Aroclor-1232	360.	U
53469-21-9	Aroclor-1242	360.	U
12672-29-6	Aroclor-1248	360.	U
11097-69-1	Aroclor-1254	720.	U
11096-82-5	Aroclor-1260	720.	U

AR301509

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ420MS

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 1. (g/mL) G Lab File ID: ACZWS34

Level: (low/med) MED Date Received: 11/30/89

% Moisture: not dec. 60. dec. 0. Date Extracted: 12/ 8/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 6.2 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	Alpha-BHC	280.	U
319-85-7	Beta-BHC	280.	U
319-86-8	Delta-BHC	280.	U
58-89-9	Gamma-BHC	4900.	S
76-44-8	Heptachlor	4000.	S
309-00-2	Aldrin	4300.	S
1024-57-3	Heptachlor Epoxide	280.	U
959-98-8	Endosulfan I	280.	U
60-57-1	Dieldrin	10000.	S
72-55-9	4,4'-DDE	550.	U
72-20-8	Endrin	13000.	S
33213-65-9	Endosulfan II	550.	U
72-54-8	4,4'-DDD	550.	U
1031-07-8	Endosulfan Sulfate	550.	U
50-29-3	4,4'-DDT	12000.	S
72-43-5	Methoxychlor	2800.	U
53494-70-5	Endrin Ketone	550.	U
5103-71-9	Alpha Chlordane	2800.	U
5103-74-2	Gamma Chlordane	2800.	U
8001-35-2	Toxaphene	5500.	U
12674-11-2	Aroclor-1016	2800.	U
11104-28-2	Aroclor-1221	2800.	U
11141-16-5	Aroclor-1232	2800.	U
53469-21-9	Aroclor-1242	2800.	U
12672-29-6	Aroclor-1248	2800.	U
11097-69-1	Aroclor-1254	5500.	U
11096-82-5	Aroclor-1260	5500.	U

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ423MSD

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 1000. (g/mL)ML Lab File ID: ACZWS21

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec.100. dec. 0. Date Extracted: 12/ 4/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	Alpha-BHC	.050	U
319-85-7	Beta-BHC	.050	U
319-86-8	Delta-BHC	.050	U
58-89-9	Gamma-BHC	.17	S
76-44-8	Heptachlor	.16	S
309-00-2	Aldrin	.18	S
1024-57-3	Heptachlor Epoxide	.050	U
959-98-8	Endosulfan I	.050	U
60-57-1	Dieldrin	.48	S
72-55-9	4,4'-DDE	.100	U
72-20-8	Endrin	.48	S
33213-65-9	Endosulfan II	.100	U
72-54-8	4,4'-DDD.	.100	U
1031-07-8	Endosulfan Sulfate	.100	U
50-29-3	4,4'-DDT	.48	S
72-43-5	Methoxychlor	.50	U
53494-70-5	Endrin Ketone	.100	U
5103-71-9	Alpha Chlordane	.50	U
5103-74-2	Gamma Chlordane	.50	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	.50	U
11104-28-2	Aroclor-1221	.50	U
11141-16-5	Aroclor-1232	.50	U
53469-21-9	Aroclor-1242	.50	U
12672-29-6	Aroclor-1248	.50	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ426MSD

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 30. (g/mL) G Lab File ID: ACZWS28

Level: (low/med) LOW Date Received: 11/29/89

% Moisture: not dec. 55. dec. 0. Date Extracted: 12/ 6/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) Y pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	Alpha-BHC	36.	U
319-85-7	Beta-BHC	36.	U
319-86-8	Delta-BHC	36.	U
58-89-9	Gamma-BHC	87.	S
76-44-8	Heptachlor	75.	S
309-00-2	Aldrin	83.	S
1024-57-3	Heptachlor Epoxide	36.	U
959-98-8	Endosulfan I	36.	U
60-57-1	Dieldrin	230.	S
72-55-9	4,4'-DDE	72.	U
72-20-8	Endrin	280.	S
33213-65-9	Endosulfan II	72.	U
72-54-8	4,4'-DDD	72.	U
1031-07-8	Endosulfan Sulfate	72.	U
50-29-3	4,4'-DDT	240.	S
72-43-5	Methoxychlor	360.	U
53494-70-5	Endrin Ketone	72.	U
5103-71-9	Alpha Chlordane	360.	U
5103-74-2	Gamma Chlordane	360.	U
8001-35-2	Toxaphene	720.	U
12674-11-2	Aroclor-1016	360.	U
11104-28-2	Aroclor-1221	360.	U
11141-16-5	Aroclor-1232	360.	U
53469-21-9	Aroclor-1242	360.	U
12672-29-6	Aroclor-1248	360.	U
11097-69-1	Aroclor-1254	720.	U
11096-82-5	Aroclor-1260	720.	U

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CZ420MSD

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 1. (g/mL) G Lab File ID: ACZWS35

Level: (low/med) MED Date Received: 11/30/89

% Moisture: not dec. 60. dec. 0. Date Extracted: 12/ 8/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 6.2 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	Alpha-BHC	280.	U
319-85-7	Beta-BHC	280.	U
319-86-8	Delta-BHC	280.	U
58-89-9	Gamma-BHC	5900.	S
76-44-8	Heptachlor	4900.	S
309-00-2	Aldrin	5200.	S
1024-57-3	Heptachlor Epoxide	280.	U
959-98-8	Endosulfan I	280.	U
60-57-1	Dieldrin	13000.	S
72-55-9	4,4'-DDE	560.	U
72-20-8	Endrin	16000.	S
33213-65-9	Endosulfan II	560.	U
72-54-8	4,4'-DDD	560.	U
1031-07-8	Endosulfan Sulfate	560.	U
50-29-3	4,4'-DDT	15000.	S
72-43-5	Methoxychlor	2800.	U
53494-70-5	Endrin Ketone	560.	U
5103-71-9	Alpha Chlordane	2800.	U
5103-74-2	Gamma Chlordane	2800.	U
8001-35-2	Toxaphene	5600.	U
12674-11-2	Aroclor-1016	2800.	U
11104-28-2	Aroclor-1221	2800.	U
11141-16-5	Aroclor-1232	2800.	U
53469-21-9	Aroclor-1242	2800.	U
12672-29-6	Aroclor-1248	2800.	U
11097-69-1	Aroclor-1254	5600.	U
11096-82-5	Aroclor-1260	5600.	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VBLKW1

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 85358

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec. 100. Date Analyzed: 11/30/89

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	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	5.	U
67-64-1	Acetone	9.	J
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

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKW1

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 85358

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec. 100. Date Analyzed: 11/30/89

Column: (pack/cap) PACK 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
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VBLKW2

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 85371

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec. 100. Date Analyzed: 12/ 4/89

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	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	5.	U
67-64-1	Acetone	10.	U
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		
1330-20-7	Xylene (total)		

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1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKW2

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 85371

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec. 100. Date Analyzed: 12/ 4/89

Column: (pack/cap) PACK 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
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VBLKS1

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 5.000 (g/mL) G Lab File ID: SS384

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec. 0. Date Analyzed: 12/ 8/99

Column: (pack/cap) PACK Dilution Factor: 1.00

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	5.	U
67-64-1	Acetone	2.	J
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)		U

1B

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

VBLK3:

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 5.000 (g/mL) G Lab File ID: 85384

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec. 0. Date Analyzed: 12/ 8/89

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

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

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VBLKS12

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 4.000 (g/mL) G Lab File ID: 85399

Level: (low/med) MED Date Received: 0/ 0/ 0

% Moisture: not dec. 0. Date Analyzed: 12/ 9/89

Column: (pack/cap) PACK Dilution Factor: ~~100.00~~ 2.07

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

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2500.	U
74-83-9	Bromomethane	2500.	U
75-01-4	Vinyl Chloride	2500.	U
75-00-3	Chloroethane	2500.	U
75-09-2	Methylene Chloride	1300.	U
67-64-1	Acetone	2500.	U
75-15-0	Carbon Disulfide	1300.	U
75-35-4	1,1-Dichloroethene	1300.	U
75-34-3	1,1-Dichloroethane	1300.	U
540-59-0	1,2-Dichloroethene (total)	1300.	U
67-66-3	Chloroform	1300.	U
107-06-2	1,2-Dichloroethane	1300.	U
78-93-3	2-Butanone	2500.	U
71-55-6	1,1,1-Trichloroethane	1300.	U
56-23-5	Carbon Tetrachloride	1300.	U
108-05-4	Vinyl Acetate	2500.	U
75-27-4	Bromodichloromethane	1300.	U
78-87-5	1,2-Dichloropropane	1300.	U
10061-01-5	cis-1,3-Dichloropropene	1300.	U
79-01-6	Trichloroethene	1300.	U
124-48-1	Dibromochloromethane	1300.	U
79-00-5	1,1,2-Trichloroethane	1300.	U
71-43-2	Benzene	1300.	U
10061-02-6	trans-1,3-Dichloropropene	1300.	U
75-25-2	Bromoform	1300.	U
108-10-1	4-Methyl-2-Pentanone	2500.	U
591-78-6	2-Hexanone	2500.	U
127-18-4	Tetrachloroethene	1300.	U
79-34-5	1,1,2,2-Tetrachloroethane	1300.	U
108-88-3	Toluene	1300.	U
108-90-7	Chlorobenzene	1300.	U
100-41-4	Ethylbenzene		
100-42-5	Styrene		
1330-20-7	Xylene (total)	1300.	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKS12

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 4.000 (g/mL) G Lab File ID: 85399

Level: (low/med) MED Date Received: 0/ 0/ 0

% Moisture: not dec. 0. Date Analyzed: 12/ 9/89

Column: (pack/cap) PACK Dilution Factor: ~~100.00~~ 2.00

CONCENTRATION UNITS:
Number TICs found: 0 (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VBLKS~~23~~

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 4.000 (g/mL) G Lab File ID: 85410

Level: (low/med) MED Date Received: 0/ 0/ 0

% Moisture: not dec. 0. Date Analyzed: 12/10/89

Column: (pack/cap) PACK Dilution Factor: ~~50.00~~ 1.00 mg 3/7

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	1300.	U
74-83-9	Bromomethane	1300.	U
75-01-4	Vinyl Chloride	1300.	U
75-00-3	Chloroethane	1300.	U
75-09-2	Methylene Chloride	630.	U
67-64-1	Acetone	1300.	U
75-15-0	Carbon Disulfide	630.	U
75-35-4	1,1-Dichloroethene	630.	U
75-34-3	1,1-Dichloroethane	630.	U
540-59-0	1,2-Dichloroethene (total)	630.	U
67-66-3	Chloroform	630.	U
107-06-2	1,2-Dichloroethane	630.	U
78-93-3	2-Butanone	1300.	U
71-55-6	1,1,1-Trichloroethane	630.	U
56-23-5	Carbon Tetrachloride	630.	U
108-05-4	Vinyl Acetate	1300.	U
75-27-4	Bromodichloromethane	630.	U
78-87-5	1,2-Dichloropropane	630.	U
10061-01-5	cis-1,3-Dichloropropene	630.	U
79-01-6	Trichloroethene	630.	U
124-48-1	Dibromochloromethane	630.	U
79-00-5	1,1,2-Trichloroethane	630.	U
71-43-2	Benzene	630.	U
10061-02-6	trans-1,3-Dichloropropene	630.	U
75-25-2	Bromoform	630.	U
108-10-1	4-Methyl-2-Pentanone	1300.	U
591-78-6	2-Hexanone	1300.	U
127-18-4	Tetrachloroethene	630.	U
79-34-5	1,1,2,2-Tetrachloroethane	64.	J
108-88-3	Toluene	630.	U
108-90-7	Chlorobenzene	71	J
100-41-4	Ethylbenzene		
100-42-5	Styrene	630.	U
1330-20-7	Xylene (total)	630.	U

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FORM I VOA

1/87 Rev

00170

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKS3 DFR 1/3/90

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 4.000 (g/mL) G Lab File ID: 85410

Level: (low/med) MED Date Received: 0/ 0/ 0

% Moisture: not dec. 0. Date Analyzed: 12/10/89

Column: (pack/cap) PACK Dilution Factor: ~~50.00~~ 1.00 mg 31

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLKW1

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 1000.0 (g/mL) ML Lab File ID: 22201

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec. 100. dec._____ Date Extracted: 12/ 4/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol	10.	U
111-44-4	bis(2-Chloroethyl)ether	10.	U
95-57-8	2-Chlorophenol	10.	U
541-73-1	1,3-Dichlorobenzene	10.	U
106-46-7	1,4-Dichlorobenzene	10.	U
100-51-6	Benzyl alcohol	10.	U
95-50-1	1,2-Dichlorobenzene	10.	U
95-48-7	2-Methylphenol	10.	U
108-60-1	bis(2-Chloroisopropyl)ether	10.	U
106-44-5	4-Methylphenol	10.	U
621-64-7	N-Nitroso-di-n-propylamine	10.	U
67-72-1	Hexachloroethane	10.	U
98-95-3	Nitrobenzene	10.	U
78-59-1	Isophorone	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
65-85-0	Benzoic acid	50.	U
111-91-1	bis(2-Chloroethoxy)methane	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
120-82-1	1,2,4-Trichlorobenzene	10.	U
91-20-3	Naphthalene	10.	U
106-47-8	4-Chloroaniline	10.	U
87-68-3	Hexachlorobutadiene	10.	U
59-50-7	4-Chloro-3-methylphenol	10.	U
91-57-6	2-Methylnaphthalene	10.	U
77-47-4	Hexachlorocyclopentadiene	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	50.	U
91-58-7	2-Chloronaphthalene	10.	U
88-74-4	2-Nitroaniline		
131-11-3	Dimethylphthalate	10.	U
208-96-8	Acenaphthylene	10.	U
606-20-2	2,6-Dinitrotoluene	10.	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLKW1

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 1000.0 (g/mL) ML Lab File ID: 22201

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec. 100. dec._____ Date Extracted: 12/ 4/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-09-2	3-Nitroaniline	50.	U
83-32-9	Acenaphthene	10.	U
51-28-5	2,4-Dinitrophenol	50.	U
100-02-7	4-Nitrophenol	50.	U
132-64-9	Dibenzofuran	10.	U
121-14-2	2,4-Dinitrotoluene	10.	U
84-66-2	Diethylphthalate	10.	U
7005-72-3	4-Chlorophenyl-phenylether	10.	U
86-73-7	Fluorene	10.	U
100-01-6	4-Nitroaniline	50.	U
534-52-1	4,6-Dinitro-2-methylphenol	50.	U
86-30-6	N-Nitrosodiphenylamine (1)	10.	U
101-55-3	4-Bromophenyl-phenylether	10.	U
118-74-1	Hexachlorobenzene	10.	U
87-86-5	Pentachlorophenol	50.	U
85-01-8	Phenanthrene	10.	U
120-12-7	Anthracene	10.	U
84-74-2	Di-n-butylphthalate	10.	U
206-44-0	Fluoranthene	10.	U
129-00-0	Pyrene	10.	U
85-68-7	Butylbenzylphthalate	10.	U
91-94-1	3,3'-Dichlorobenzidine	20.	U
56-55-3	Benzo(a)anthracene	10.	U
218-01-9	Chrysene	10.	U
117-81-7	bis(2-Ethylhexyl)phthalate	4.	J
117-84-0	Di-n-octylphthalate	10.	U
205-99-2	Benzo(b)fluoranthene	10.	U
207-08-9	Benzo(k)fluoranthene	10.	U
50-32-8	Benzo(a)pyrene	10.	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.	U
53-70-3	Dibenzo(a,h)anthracene	10.	U
191-24-2	Benzo(g,h,i)perylene	10.	U

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

SBLKW1

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 1000.0 (g/mL) ML Lab File ID: 22201

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec. 100. dec._____ Date Extracted: 12/ 4/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 7.0 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
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FORM I SV-TIC 1/87 Rev.

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLKS1

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 22209

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec. 0. dec._____ Date Extracted: 12/ 6/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	330.	U
111-44-4	bis(2-Chloroethyl)ether	330.	U
95-57-8	2-Chlorophenol	330.	U
541-73-1	1,3-Dichlorobenzene	330.	U
106-46-7	1,4-Dichlorobenzene	330.	U
100-51-6	Benzyl alcohol	330.	U
95-50-1	1,2-Dichlorobenzene	330.	U
95-48-7	2-Methylphenol	330.	U
108-60-1	bis(2-Chloroisopropyl)ether	330.	U
106-44-5	4-Methylphenol	330.	U
621-64-7	N-Nitroso-di-n-propylamine	330.	U
67-72-1	Hexachloroethane	330.	U
98-95-3	Nitrobenzene	330.	U
78-59-1	Isophorone	330.	U
88-75-5	2-Nitrophenol	330.	U
105-67-9	2,4-Dimethylphenol	330.	U
65-85-0	Benzoic acid	1700.	U
111-91-1	bis(2-Chloroethoxy)methane	330.	U
120-83-2	2,4-Dichlorophenol	330.	U
120-82-1	1,2,4-Trichlorobenzene	330.	U
91-20-3	Naphthalene	330.	U
106-47-8	4-Chloroaniline	330.	U
87-68-3	Hexachlorobutadiene	330.	U
59-50-7	4-Chloro-3-methylphenol	330.	U
91-57-6	2-Methylnaphthalene	330.	U
77-47-4	Hexachlorocyclopentadiene	330.	U
88-06-2	2,4,6-Trichlorophenol	330.	U
95-95-4	2,4,5-Trichlorophenol	1700.	U
91-58-7	2-Chloronaphthalene	330.	U
88-74-4	2-Nitroaniline	1700.	U
131-11-3	Dimethylphthalate	330.	U
208-96-8	Acenaphthylene		U
606-20-2	2,6-Dinitrotoluene		U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLKS1

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 22209

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec. 0. dec._____ Date Extracted: 12/ 6/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	1700.	U
83-32-9	Acenaphthene	330.	U
51-28-5	2,4-Dinitrophenol	1700.	U
100-02-7	4-Nitrophenol	1700.	U
132-64-9	Dibenzofuran	330.	U
121-14-2	2,4-Dinitrotoluene	330.	U
84-66-2	Diethylphthalate	330.	U
7005-72-3	4-Chlorophenyl-phenylether	330.	U
86-73-7	Fluorene	330.	U
100-01-6	4-Nitroaniline	1700.	U
534-52-1	4,6-Dinitro-2-methylphenol	1700.	U
86-30-6	N-Nitrosodiphenylamine (1)	330.	U
101-55-3	4-Bromophenyl-phenylether	330.	U
118-74-1	Hexachlorobenzene	330.	U
87-86-5	Pentachlorophenol	1700.	U
85-01-8	Phenanthrene	330.	U
120-12-7	Anthracene	330.	U
84-74-2	Di-n-butylphthalate	330.	U
206-44-0	Fluoranthene	330.	U
129-00-0	Pyrene	330.	U
85-68-7	Butylbenzylphthalate	330.	U
91-94-1	3,3'-Dichlorobenzidine	670.	U
56-55-3	Benzo(a)anthracene	330.	U
218-01-9	Chrysene	330.	U
117-81-7	bis(2-Ethylhexyl)phthalate	83.	J
117-84-0	Di-n-octylphthalate	330.	U
205-99-2	Benzo(b)fluoranthene	330.	U
207-08-9	Benzo(k)fluoranthene	330.	U
50-32-8	Benzo(a)pyrene	330.	U
193-39-5	Indeno(1,2,3-cd)pyrene	330.	U
53-70-3	Dibenzo(a,h)anthracene		
191-24-2	Benzo(g,h,i)perylene	330.	

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

SBLKS1

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 30.0 (g/mL) G Lab File ID: 22209

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec. 0. dec._____ Date Extracted: 12/ 6/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

Number TICs found: 1

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

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	- -	UNKNOWN Methyl Ketone	3.32	300.	J A
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1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLKS2

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 1.000 (g/mL) G Lab File ID: 22224

Level: (low/med) MED Date Received: 0/ 0/ 0

% Moisture: not dec. 0. dec.____ Date Extracted: 12/ 8/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/28/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	20000.	U
111-44-4	bis(2-Chloroethyl)ether	20000.	U
95-57-8	2-Chlorophenol	20000.	U
541-73-1	1,3-Dichlorobenzene	20000.	U
106-46-7	1,4-Dichlorobenzene	20000.	U
100-51-6	Benzyl alcohol	20000.	U
95-50-1	1,2-Dichlorobenzene	20000.	U
95-48-7	2-Methylphenol	20000.	U
108-60-1	bis(2-Chloroisopropyl)ether	20000.	U
106-44-5	4-Methylphenol	20000.	U
621-64-7	N-Nitroso-di-n-propylamine	20000.	U
67-72-1	Hexachloroethane	20000.	U
98-95-3	Nitrobenzene	20000.	U
78-59-1	Isophorone	20000.	U
88-75-5	2-Nitrophenol	20000.	U
105-67-9	2,4-Dimethylphenol	20000.	U
65-85-0	Benzoic acid	96000.	U
111-91-1	bis(2-Chloroethoxy)methane	20000.	U
120-83-2	2,4-Dichlorophenol	20000.	U
120-82-1	1,2,4-Trichlorobenzene	20000.	U
91-20-3	Naphthalene	20000.	U
106-47-8	4-Chloroaniline	20000.	U
87-68-3	Hexachlorobutadiene	20000.	U
59-50-7	4-Chloro-3-methylphenol	20000.	U
91-57-6	2-Methylnaphthalene	20000.	U
77-47-4	Hexachlorocyclopentadiene	20000.	U
88-06-2	2,4,6-Trichlorophenol	20000.	U
95-95-4	2,4,5-Trichlorophenol	96000.	U
91-58-7	2-Chloronaphthalene	20000.	U
88-74-4	2-Nitroaniline	96000.	U
131-11-3	Dimethylphthalate		
208-96-8	Acenaphthylene		
606-20-2	2,6-Dinitrotoluene	20000.	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLKS2

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 1.000 (g/mL) G Lab File ID: 22224

Level: (low/med) MED Date Received: 0/ 0/ 0

% Moisture: not dec. 0. dec._____ Date Extracted: 12/ 8/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/28/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	96000.	U
83-32-9	Acenaphthene	20000.	U
51-28-5	2,4-Dinitrophenol	96000.	U
100-02-7	4-Nitrophenol	96000.	U
132-64-9	Dibenzofuran	20000.	U
121-14-2	2,4-Dinitrotoluene	20000.	U
84-66-2	Diethylphthalate	20000.	U
7005-72-3	4-Chlorophenyl-phenylether	20000.	U
86-73-7	Fluorene	20000.	U
100-01-6	4-Nitroaniline	96000.	U
534-52-1	4,6-Dinitro-2-methylphenol	96000.	U
86-30-6	N-Nitrosodiphenylamine (1)	20000.	U
101-55-3	4-Bromophenyl-phenylether	20000.	U
118-74-1	Hexachlorobenzene	20000.	U
87-86-5	Pentachlorophenol	96000.	U
85-01-8	Phenanthrene	20000.	U
120-12-7	Anthracene	20000.	U
84-74-2	Di-n-butylphthalate	20000.	U
206-44-0	Fluoranthene	20000.	U
129-00-0	Pyrene	20000.	U
85-68-7	Butylbenzylphthalate	20000.	U
91-94-1	3,3'-Dichlorobenzidine	40000.	U
56-55-3	Benzo(a)anthracene	20000.	U
218-01-9	Chrysene	20000.	U
117-81-7	bis(2-Ethylhexyl)phthalate	20000.	U
117-84-0	Di-n-octylphthalate	20000.	U
205-99-2	Benzo(b)fluoranthene	20000.	U
207-08-9	Benzo(k)fluoranthene	20000.	U
50-32-8	Benzo(a)pyrene	20000.	U
193-39-5	Indeno(1,2,3-cd)pyrene	20000.	U
53-70-3	Dibenzo(a,h)anthracene	20000.	U
191-24-2	Benzo(g,h,i)perylene	20000.	U

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

SBLKS2

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 1.000 (g/mL) G Lab File ID: 22224

Level: (low/med) MED Date Received: 0/ 0/ 0

% Moisture: not dec. 0. dec.____ Date Extracted: 12/ 8/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/28/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

Number TICs found: 0

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

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PBLKW1

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) WATER Lab Sample ID:

Sample wt/vol: 1000. (g/mL)ML Lab File ID: ACZWS14

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec.100. dec. 0. Date Extracted: 12/ 4/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 12/26/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	Alpha-BHC	.050	U
319-85-7	Beta-BHC	.050	U
319-86-8	Delta-BHC	.050	U
58-89-9	Gamma-BHC	.050	U
76-44-8	Heptachlor	.050	U
309-00-2	Aldrin	.050	U
1024-57-3	Heptachlor Epoxide	.050	U
959-98-8	Endosulfan I	.050	U
60-57-1	Dieldrin	.100	U
72-55-9	4,4'-DDE	.100	U
72-20-8	Endrin	.100	U
33213-65-9	Endosulfan II	.100	U
72-54-8	4,4'-DDD	.100	U
1031-07-8	Endosulfan Sulfate	.100	U
50-29-3	4,4'-DDT	.100	U
72-43-5	Methoxychlor	.50	U
53494-70-5	Endrin Ketone	.100	U
5103-71-9	Alpha Chlordane	.50	U
5103-74-2	Gamma Chlordane	.50	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	.50	U
11104-28-2	Aroclor-1221	.50	U
11141-16-5	Aroclor-1232	.50	U
53469-21-9	Aroclor-1242	.50	U
12672-29-6	Aroclor-1248	.50	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

AR301533

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PBLKS1

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 30. (g/mL) G Lab File ID: ACZWS23

Level: (low/med) LOW Date Received: 0/ 0/ 0

% Moisture: not dec. 0. dec. 0. Date Extracted: 12/ 6/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) Y pH: 8.1 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	Alpha-BHC	16.	U
319-85-7	Beta-BHC	16.	U
319-86-8	Delta-BHC	16.	U
58-89-9	Gamma-BHC	16.	U
76-44-8	Heptachlor	16.	U
309-00-2	Aldrin	16.	U
1024-57-3	Heptachlor Epoxide	16.	U
959-98-8	Endosulfan I	16.	U
60-57-1	Dieldrin	32.	U
72-55-9	4,4'-DDE	32.	U
72-20-8	Endrin	32.	U
33213-65-9	Endosulfan II	32.	U
72-54-8	4,4'-DDD	32.	U
1031-07-8	Endosulfan Sulfate	32.	U
50-29-3	4,4'-DDT	32.	U
72-43-5	Methoxychlor	160.	U
53494-70-5	Endrin Ketone	32.	U
5103-71-9	Alpha Chlordane	160.	U
5103-74-2	Gamma Chlordane	160.	U
8001-35-2	Toxaphene	320.	U
12674-11-2	Aroclor-1016	160.	U
11104-28-2	Aroclor-1221	160.	U
11141-16-5	Aroclor-1232	160.	U
53469-21-9	Aroclor-1242	160.	U
12672-29-6	Aroclor-1248	160.	U
11097-69-1	Aroclor-1254	320.	U
11096-82-5	Aroclor-1260	320.	U

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PBLKS2

Lab Name: ESE Contract: 68-W8-0008

Lab Code: ESE Case No.: 13230 SAS No.: SDG No.: CZ405

Matrix: (soil/water) SOIL Lab Sample ID:

Sample wt/vol: 1. (g/mL) G Lab File ID: ACZWS32

Level: (low/med) MED Date Received: 0/ 0/ 0

% Moisture: not dec. 0. dec. 0. Date Extracted: 12/ 8/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/27/89

GPC Cleanup: (Y/N) N pH: 8.1 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	Alpha-BHC	120.	U
319-85-7	Beta-BHC	120.	U
319-86-8	Delta-BHC	120.	U
58-89-9	Gamma-BHC	120.	U
76-44-8	Heptachlor	120.	U
309-00-2	Aldrin	120.	U
1024-57-3	Heptachlor Epoxide	120.	U
959-98-8	Endosulfan I	120.	U
60-57-1	Dieldrin	230.	U
72-55-9	4,4'-DDE	230.	U
72-20-8	Endrin	230.	U
33213-65-9	Endosulfan II	230.	U
72-54-8	4,4'-DDD	230.	U
1031-07-8	Endosulfan Sulfate	230.	U
50-29-3	4,4'-DDT	230.	U
72-43-5	Methoxychlor	1200.	U
53494-70-5	Endrin Ketone	230.	U
5103-71-9	Alpha Chlordane	1200.	U
5103-74-2	Gamma Chlordane	1200.	U
8001-35-2	Toxaphene	2300.	U
12674-11-2	Aroclor-1016	1200.	U
11104-28-2	Aroclor-1221	1200.	U
11141-16-5	Aroclor-1232	1200.	U
53469-21-9	Aroclor-1242	1200.	U
12672-29-6	Aroclor-1248	1200.	U
11097-69-1	Aroclor-1254	2300.	U
11096-82-5	Aroclor-1260	2300.	U

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
CENTRAL REGIONAL LABORATORY
839 BESTGATE ROAD
ANNAPOLIS, MARYLAND 21401
(301) 266-9180

DATE : March 13, 1990

SUBJECT: Organic Data Validation for the Standard Chlorine Site
SAS 5093C Task 1

FROM : Theresa A. Simpson TAS
Region III ESAT DPO (3ES23)

TO : Bob Guarni
Regional Project Manager (3HW25)

THRU : Patricia J. Krantz, Chief TAS for
Quality Assurance Branch (3ES23)

Attached is the organic data review for the Standard Chlorine Site (SAS 5093C Task 1) completed by the Region III Environmental Services Assistance Team (ESAT) contractor under the direction of Region III ESD.

If you have any questions regarding this review, please call me.

Attachment

cc: Dave Basko VERSAR, Langhorne
Elaine Spiewak (3HW14) (w/o attachments)

TID File: 03900117 Task 1219

WESTON
MANAGERS DESIGNERS CONSULTANTS
2568A RIVA ROAD
SUITE 300
ANNAPOLIS, MD 21401
PHONE: 301-266-9887

DATE: 27 FEBRUARY 1990

SUBJECT: ORGANIC DATA VALIDATION FOR SAS 5093C-TASK 1
Site: STANDARD CHLORINE

FROM: DOUG McINNES
ORGANIC DATA REVIEWER

TO: TERRY SIMPSON
ESAT DEPUTY PROJECT OFFICER

THRU: RICHARD DRESSER
ESAT TEAM MANAGER

OVERVIEW

SAS 5093C-TASK 1 consisted of six (6) samples submitted to RMT Laboratories, Inc., for total organic carbon (TOC) analysis. Included in these samples were five (5) soil samples, and one (1) aqueous equipment rinsate blank. Samples 5093C-TASK 1-1 and 5093C-TASK 1-4 are a field duplicate pair. The samples were analyzed as a Contract Laboratory Program (CLP) Special Analytical Service (SAS).

SUMMARY

All samples were successfully analyzed for total organic carbon. All instrument and method sensitivities were according to the SAS contract, with the exception of the quantitation limit.

NOTES

- One pair of field duplicate samples (5093C-TASK 1-1 and -4) were collected and analyzed. In addition, one of the field duplicate samples (5093C-TASK 1-1) was analyzed as a laboratory duplicate. The results for the various samples were 34000, 30000, and 30000, respectively. The relative percent difference (RPD) between the sample and laboratory duplicate was twelve (12), while the percent relative standard deviation (%RSD) for all three data points was seven (7).

DEL. 302 834-4536
NJ. 201 997-1700
TWX 510-666-1629
STD CLOR DECI

STANDARD CHLORINE OF DELAWARE, INC.

GOVERNOR LEA ROAD ● P.O BOX 319 ● DELAWARE CITY, DELAWARE 19706

August 28, 1990

Mr. Dilip R. Hansalia
Environmental Engineer
Division of Air & Waste Mgt.
DNREC
715 Grantham Lane
New Castle, DE 19720

RE: Standard Chlorine of Delaware RI/FS
Pump Test Workplan

Dear Mr. Hansalia:

In response to your July 7, 1990 letter, please find enclosed laboratory results from a sample collected from Star Enterprise Well OR-6A. This package includes the following:

1. Full CLP run for priority pollutants.

2. Analyses of benzene, chlorobenzenes, and derivatives.

3. Analyses for pH specific conductance and iron.

Please advise me of your comments on these results and if we may proceed to conduct the pump tests as planned. Once I have received your approval to proceed, I will schedule the pump tests and advise you when it will occur.

Please feel free to contact me if you have any questions.

Sincerely,

Robert J. Touhey, P.E.
Assistant Vice President
Environmental Affairs

RJT/dab
Enclosures

cc: A. R. Sinibaldi
T. E. Pierson
B. Guarni-US EPA w/encl.

- There was one exception to the quality control limits set by the SAS request, as noted in the narrative included by the laboratory. The quantitation limit was increased from 10 mg/Kg to 100 mg/Kg by the laboratory, due to the high concentration of total organic carbon (TOC) in the samples, and also as per the specifications supplied by the instrument manufacturer. Due to this increase in quantitation limit, the method blanks associated with the samples are in excess of the QC limit set by the SAS, but are within the increased detection limit. Again, due to the high concentration of the samples, the blank results have no effect on the quality of the sample data. The reviewer confirmed this exception with the Region III Central Regional Laboratory since there was no telephone log documenting EPA approval of the exception. (See Appendix E).

All data for SAS 5093C-TASK 1 were reviewed in accordance with the Functional Guidelines for Evaluating Organic Analyses with Modifications for use within Region III, and with modifications from the SAS request for this case. The text of this report addresses only those problems affecting usability.

ATTACHMENTS

1) Appendix A - Glossary of Data Qualifiers
2) Appendix B - Data Summary. These include:
   (a) All positive results for target compounds with qualifier codes where applicable.
   (b) All unusable detection limits (qualified "R").
3) Appendix C - Results as Reported by the Laboratory for All Target Compounds
4) Appendix D - Organic Regional Data Assessment Summary
5) Appendix E - Support Documentation

DCN - DM002A07

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Appendix A

Glossary of Data Qualifiers

GLOSSARY OF DATA QUALIFIER CODES (ORGANIC)

CODES RELATING TO IDENTIFICATION
(confidence concerning presence or absence of compounds):

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

(NO CODE) = Confirmed identification.

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

N = Tentative identification. Consider present. Special methods may be needed to confirm its presence or absence in future sampling efforts.

CODES RELATED TO QUANTITATION
(can be used for both positive results and sample quantitation limits):

J = Analyte present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

OTHER CODES

Q = No analytical result.

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Appendix B

Data Summary Forms

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TOC DATA SUMMARY

Site Name: Hellertown Manufacturing

Case Number: SAS 5096C-TASK 1 SAMPLING DATE: 11/15/89

Soil Samples (mg/Kg)

Sample Number	Site	TOC	Notes
5093C-TASK 1-1	SR-11	34000	Duplicate of -4
5093C-TASK 1-2	SR-12	28000	
5093C-TASK 1-3	SR-13	30000	
5093C-TASK 1-4	SR-14	30000	Duplicate of -1
5093C-TASK 1-5	SR-6	31000	

Water Sample (mg/L)

Sample Number	Site	TOC	Notes
5093C-TASK 1-6	BB-5	100 U*	Equipment Blank

* - 100 mg/L or mg/Kg is the quantitation limit used by the laboratory. (See the note in the narrative report).

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Appendix C

Results as Reported by the Laboratory
for all Target Compounds

RMT INC.
LABORATORIES

JAN 1990

CLIENT: VIAR & CO.
RMT PROJECT #: 91328.00
RMT WORK ORDER #: 891130-9132800

SAS CONTRACT #: 5093-C, Task I-01
REPORT DATA: 12/28/89
SAMPLE COLLECTOR: CLIENT

SAS No.	Date Collected	Station ID	Total Organic Carbon(mg/kg dry wt.)	
5093C-01	11/28/89	SR-11	34000	
5093C-01 DUPLICATE	11/28/89	SR-11	30000	12% RPD
5093C-02	11/28/89	SR-12	28000	
5093C-03	11/27/89	SR-13	30000	
5093C-04	11/28/89	SR-14	30000	
5093C-05	11/29/89	SR-6	31000	

SAS No.	Date Collected	Station ID	Total Organic Carbon(mg/L)	
5093C-06	11/27/89	BB-5	<100 *	
Certified Standard		ERA9925	495.5	7% RPD
Method (ICB) Blank			<100 *	

* Water sample analyzed by defined method for soils.

Alan Doughty, Ph.D., Laboratory Director

744 Heartland Trail, P. O. Box 8923, Madison, WI 53708-8923 Ph: (608)831-4444

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Appendix D

Organic Regional Data Assessment Summary

WESTON

DPO: [ ] ACTION [X] FYI

Region III

ORGANIC REGIONAL DATA ASSESSMENT SUMMARY

CASE NO: 5093C-TASK 1
SDG NO: SDG 5093C-TASK 1-1
SOW: N/A
NO. OF SAMPLES: 1

LABORATORY: RMT, Inc.
DATA USER: PAT CHURILLA
REVIEW COMPLETION DATE: 02/27/90
MATRIX: WATER

REVIEWER: ESAT

	VOA	BNA	PEST	OTHER
1. HOLDING TIMES				O
2. GC-MS TUNE/GC PERFORMANCE				F
3. INITIAL CALIBRATIONS				O
4. CONTINUING CALIBRATION				O
5. FIELD BLANKS (F=NOT APPLICABLE)				O
6. LABORATORY BLANKS				O
7. SURROGATES				F
8. MATRIX SPIKE/DUPLICATES				F
9. REGIONAL QC (F=NOT APPLICABLE)				F
10. INTERNAL STANDARDS				F
11. COMPOUND IDENTIFICATION				O
12. COMPOUND QUANTITATION				O
13. SYSTEM PERFORMANCE				O
14. OVERALL ASSESSMENT				O

O = No problems or minor problems that do not affect data usability
X = No more than about 5% of the data points are qualified as either estimated or unusable.
M = More than about 5% of the data points are qualified as estimated.
Z = More than about 5% of the data points are qualified as unusable.
A = DPO action requested; use in conjunction with one of the above codes.

DPO ACTION ITEMS:

AREAS OF CONCERN:

DOCUMENTATION ATTACHED (See Following Pages) AR301547

WESTON

DPO: [ ] ACTION [X] FYI

Region III

ORGANIC REGIONAL DATA ASSESSMENT SUMMARY

CASE NO: 5093C-TASK 1
SDG NO: SDG 5093C-TASK 1-1
SOW: N/A
NO. OF SAMPLES: 5

LABORATORY: RMT, Inc.
DATA USER: PAT CHURILLA
REVIEW COMPLETION DATE: 02/27/90
MATRIX: SOIL

REVIEWER: ESAT

	VOA	BNA	PEST	OTHER
1. HOLDING TIMES				O
2. GC-MS TUNE/GC PERFORMANCE				F
3. INITIAL CALIBRATIONS				O
4. CONTINUING CALIBRATION				O
5. FIELD BLANKS (F=NOT APPLICABLE)				O
6. LABORATORY BLANKS				O
7. SURROGATES				F
8. MATRIX SPIKE/DUPLICATES				F
9. REGIONAL QC (F=NOT APPLICABLE)				F
10. INTERNAL STANDARDS				F
11. COMPOUND IDENTIFICATION				O
12. COMPOUND QUANTITATION				O
13. SYSTEM PERFORMANCE				O
14. OVERALL ASSESSMENT				O

O = No problems or minor problems that do not affect data usability
X = No more than about 5% of the data points are qualified as either estimated or unusable.
M = More than about 5% of the data points are qualified as estimated.
Z = More than about 5% of the data points are qualified as unusable.
A = DPO action requested; use in conjunction with one of the above codes.

DPO ACTION ITEMS:

AREAS OF CONCERN:

DOCUMENTATION ATTACHED (See AR301548 s)

ORGANIC REGIONAL DATA ASSESSMENT SUMMARY NOTES
SAS 5093C-TASK 1 (water sample)

Item 6A - There was one exception to the quality control limits set by the SAS request, as noted in the narrative included by the laboratory. The quantitation limit was increased from 10 mg/L to 100 mg/L by the laboratory, due to the high concentration of total organic carbon (TOC) in the samples, and also as per the specifications supplied by the instrument manufacturer. Due to this increase in quantitation limit, the method blanks associated with the samples are in excess of the QC limit set by the SAS, but are within the increased detection limit. Again, due to the high concentration of the samples, the blank results have no effect on the quality of the sample data. The reviewer confirmed this exception with the Region III Central Regional Laboratory since there was no telephone log documenting EPA approval of the exception. (See Appendix D).

WESTON

ORGANIC REGIONAL DATA ASSESSMENT SUMMARY NOTES
SAS 5093C-TASK 1 (soil samples)

Item 6A - There was one exception to the quality control limits set by the SAS request, as noted in the narrative included by the laboratory. The quantitation limit was increased from 10 mg/Kg to 100 mg/Kg by the laboratory, due to the high concentration of total organic carbon (TOC) in the samples, and also as per the specifications supplied by the instrument manufacturer. Due to this increase in quantitation limit, the method blanks associated with the samples are in excess of the QC limit set by the SAS, but are within the increased detection limit. Again, due to the high concentration of the samples, the blank results have no effect on the quality of the sample data. The reviewer confirmed this exception with the Region III Central Regional Laboratory since there was no telephone log documenting EPA approval of the exception. (See Appendix D).

Item 14A - One pair of field duplicate samples (5093C-TASK 1-1 and -4) were collected and analyzed. In addition, one of the field duplicate samples (5093C-TASK 1-1) was analyzed as a laboratory duplicate. The results for the various samples were 34000, 30000, and 30000, respectively. The relative percent difference (RPD) between the sample and laboratory duplicate was twelve (12), while the percent relative standard deviation (%RSD) for all three data points was seven (7).

DCN - DM002A08

WESTON SM

Appendix E

Support Documentation

RMT INC.
LABORATORIES

NARRATIVE
SAS CONTRACT 5093-C, Task 1
December 28, 1989

Five soil samples and one equipment blank were received by RMT Laboratories for Total Organic Carbon (TOC) analysis on November 30, 1989. The samples were identified as follows:

SAS No.	Field Sample No.	Date Received
5093C-01	SR-11	11/30/89
5093C-02	SR-12	11/30/89
5093C-03	SR-13	11/30/89
5093C-04	SR-14	11/30/89
5093C-05	SR-6	11/30/89
5093C-06	BB-5	11/30/89

Analyses for Total Organic Carbon were performed on a Dohrmann DC-80 Total Organic Carbon Anlyzer using EPA/CE-81-1, Method 1, as provided, with the following exceptions.

Soil samples were dried and acidified in a container separate from the combustion boat. Since the aliquot size needed for analyses was unknown, it was deemed impractical to prepare the samples in the manner described in the EPA method.

The method calls for a sample size of 0.2 - 0.5 grams. The DC-80 operations manual recommends using a sample size of 10 - 50 mg. Actual analyses were performed on aliquots of less than 10 mg in order to properly quantify the samples.

The detection limit for these analyses is 100 mg/kg as per the DC-80 manufacturers specifications rather than the 10 mg/kg called for in EPA/CE-81-1, Method 1.

Jeffrey S. Hearhart
Jeff Hearhart
Group Leader, Wet Chemistry

COMPUTATION SHEET

RMT INC.

SHEET 1 OF 1

Suite 124 1406 East Washington Avenue Madison, WI 53703 (608) 255-2134 FAX: (608) 255-0234

PROJECT / PROPOSAL NAME	PREPARED By:	Date:	CHECKED By:	Date:	PROJECT/PROPOSAL NO.
Viap & Co 91328.00	SSC	12-18-89			5093-C Task 1

Sample Number	B Sample Wt (mg) Vol (µl)	Instrument Reading	A Reading Minus System Blank	(A)(40)/B	RESULT		Final Result Mg/Kg dry wt
System BLK	40 µl	6.119					
Sys BLK	40 µl	3.576					
Sys BLK	40 µl	2.124	$\bar{x}$ =	2.867	2.9		
Sys BLK	40 µl	1.168					
Sys BLK	40 µl	1.350					
ICV	40 µl	2000	1997.1	(1997.1)40 / 40	1997.1	1997.1/2000	100%
ICB	40 µl ~~1350~~	7.382 ~~1350~~	4.515 ~~-1.55~~	(-1.55)(40) / 40	4.515 ~~-1.55~~		<100
ERA 9925 10 X	40 µl	498.4	495.5			495.5/460	108%
45193 5093C-06	40 µl	21.04	18.14	(18.14)(40) / 40	18.14	18	<100 mg/L
45188 5093C-01	3.0 mg	2587	2584.1	(2584.1)(40) / 3.0	34,454.7		34,000
45188 Dup 5093C-01 Dup	3.0 mg	2245	2242.1	(2242.1)(40) / 3.0	29,894.7		30,000 12% RPD
45189 5093C-02	3.0 mg	2135	2132.1	(2132.1)(40) / 3.0	28,428		28,000
45190 5093C-03	3.5 mg	2654	2651.1	(2651.1)(40) / ~~3.40~~ 3.5	30,298.3		30,000
45191 5093C-04	3.0 mg	2291	2288.1	(2288.1)(40) / 3.0	30,508		30,000
45192 5093C-05	2.9 mg	2238	2235.1	(2235.1)(40) / 2.9	30,828.9		31,000

RECEIVED FEB 27 1990 DJM

AR301553

SELFTEST
NO ERRORS

1 TOC 550.3
ACNORMAM LOW SUD

CAL -- 40 UL
CAL AVE 550.3
CAL ADJ 1999

1 TOC 1953

CAL -- 40 UL
CAL ADJ 1999

1 TOC 2000 ICV

2 TOC 131.4 Void

3 TOC 6.119 Sys BLK

4 TOC 3.576 Sys BLK

5 TOC 2.124 SYS BLK

6 TOC 1.168 SYS BLK

7 TOC 1.350 SYS BLK

8 TOC 7.382 ICB

9 TOC 498.4 ERA 9985 10X

10 TOC 21.04 5093C-06 45193

11 TOC 4055 5093C-01 45988 5.4mg

12 TOC 2587 5093C-01 3.0mg

13 TOC 2245 5093C-01 DUP 3.0 mg

14 TOC 2135 5093-C-02

15 TOC 2654 5093C-03

16 TOC 2291 5093C-04

17 TOC 2239 5093C-05

18 TOC 1903 CCV

19 TOC 89.74 CCB

AR301554

SEMGTEST

PROJECT _____ Continued From Page _____

10-18-89 STOC Sample prep JSB

RMT #	EPA #	Prep Step	Notes	Time of Prep
45188	5093C-01	acidify & dry @70°C	No exceptions noted	9:45 a.m.
45188 Dup	5093C-01			
45189	5093C-02			
45190	5093C-03			
45191	5093C-04			
45192	5093C-05			
45193	5093C-06	Water - no prep. add sparge before analysis		

Std Samples will be dried, acidified and re-dried in porcelain dishes and wt-aliquots will be analyzed.

10-18-89 STOC analyzed JSB

Calibrate with 40 ml of 2000 ppm XHP (Mallinckrodt lot 6704 KDKN prepared on 10-25-89 by JME)

run 5 system blanks #1 6.119 #2 3.576 #3 2.124 #4 1.188 #5 1.350

Tot 5 = 2.867 2.9 ppb 2sd fig — subtract from all readings

ICV (TV=2000) 2000-2.9/2000 = 100%

ICB 7.38 - 2.9 = 4.48, <100

EPA 9925 10X Concentration 4998.4 - 2.9/160 = 108%

45193	5093C-06	21.04 - 2.9 = 18.14, <100		
45188	5093C-01	5.4 mg	>4000	repeat at smaller aliquot
45188	5093C-01	3.0 mg	2587	(2587-2.9)(40)/3.0 = 34,454
45188 Dup	5093C-01 Dup	3.0 mg	2245	(2245-2.9)(40)/3.0 = 29,894.7
45189	5093C-02	3.0 mg	2135	(2135-2.9)(40)/3.0 = 28,428
45190	5093C-03	3.5 mg	2654	(2654-2.9)(40)/3.5 = 30,298.3
45191	5093C-04	3.0 mg	2291	(2291-2.9)(40)/3.0 = 30,508
45192	5093C-05	2.9	2238	(2238-2.9)(40)/2.9 = 30,828.9
CCV		40 ml	1903	(1903-2.9)(40)/40 — 5%
CCB		40 ml	89.74	(89.74-2.9)(40)/40 = 86.84 <100

No analytical problems encountered

Continued on Page

Read and Understood By AR301555

SAS 529

U.S. Environmental Protection Agency
CLP Sample Management Office
209 Madison Street, Alexandria, VA 22313
PHONE: (703) 557-2490 or FTS 557-2490

SAS Number

SPECIAL ANALYTICAL SERVICES
Regional Request

☐ Regional Transmittal

☐ Telephone Request

A. EPA Region and Client: EPA Region III

B. Regional Representative: Colleen K. Walling

C. Telephone Number: (301) 266-9180

D. Date of Request: Nov 1, 1989

Faxed to SMO 11-10-89

E. Site Name: Stauffer Chemical of Delaware, Delaware City, Delaware

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delay in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. Description of analytical service requested:
   Analysis of Six low conc. sediment/soil samples for Total Organic Carbon (TOC) by EPA/CE-81-1 page 3-73 to 3-76 Method 1 (attached).

2. Definition and number of work units involved (specify whether whole samples or fractions; whether organics or inorganics; whether aqueous or soil and sediments; and whether low, medium, or high concentration):
   Five low conc. sediment samples for the above plus 1 duplicate(s) plus 1 method blank(s) for a total of ___ work units.

3. Program (specify whether Superfund (Remedial or Enforcement), RCRA, NPDES, etc.), Justification for analysis and Site Account Number:
   Superfund; RI/FS Superfund Enforcement, RP-RI/FS
   Account Number: AR301556 overnight OTGB03.NPH6

SAS Approved By (signature):

Date:

4. Estimated date(s) of collection: Nov. 13 – Nov 22, 1989

11

5. Estimated date(s) and method of shipment:

Overnight carrier.

6. Approximate number of days results required after lab receipt of samples:

Analysis within 20 days of receipt of last sample(s).
Data package within 45 days of laboratory receipt of last sample.

7. Analytical protocol required (attach copy if other than a protocol currently used in this program):

Method 1 found on page 3-73 to 3-76 in "Procedures for Handling and Chemical Analysis of Sediment and Water Samples", Technical Report EPA/CE-81-1, R.H. Plumb, Jr., 1981. Method attached.

8. Special technical instructions (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):

Perform duplicate analysis on one of every 20 samples or fraction thereof. Standardize instrument according to manufacturer's instructions.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain-of-Custody documentation, etc.). If not completed, format of results will be left to program discretion.

Narrative description of process utilized and description of problems encountered, analyst logbook pages, weights and volumes used, raw data, calculations, data sheets, SAS packing list and chain of custody forms.
see also addendum 1

10. Other (use additional sheets or attach supplementary information, as needed):

11. Name of sampling/shipping contact:

Phone: Brad Staub

(215) 741-42

AR301557

12. Data Requirements

Parameter	Detection Limit	Precision Desired (+ or - Concentration)
TOC	10 mg/kg	

13. QC Requirements

Audits Required	Frequency of Audits	Limits (Percent or Concentration)
Duplicate(s)	1/20 or fraction thereof	±35% RPD
Method Blank(s)	1/20 or fraction thereof	<10 mg/kg
TOC CERTIFIED STD	1/analytical run	± 30% RPD

14. Action Required if Limits are Exceeded

Duplicate(s): reanalyze the sample and duplicate one additional time each and report bothe sets of data.

Method Blank(s): reanalyze all samples after corrective action has been taken to reduce the blank contamination to less than the method detection limit cited above.

15. Request prepared by: Patricia Guy

Date: November 3, 1989

16. Request reviewed by (CRL use only): Laurie Brown (pr CKW)

Date: 11-10-89

Please return this request to the Sample Management Office as soon as possible to expedite processing of your request for special analytical services. Should you have any questions or need any assistance, please contact representative at the Sample Management Office.

ADDENDUM 1

Data package must include: all raw data, all instrument and/or equipment calibration results, calculations, blank results, duplicate results, chain of custody forms, SAS request forms, SAS packing list(s) or traffic report(s), copy of airbill(s), and copies of analyst's logbooks(signed by analyst) with date and time of sample preparation and analysis.

The cover page and all sample report forms MUST be labled with the complete EPA sample number as it appears on chain of custody and CLP paperwork.

The case narrative must document all problems encountered and the subsequent resolutions. List instrumentation and methods employed for analysis. Also, note whether samples were preserved or not and the procedure utilized in preservation. EPA QC reference samples, or equivalent reference samples must be identified as to source and lot number. Documentation of "true" value and associated 95 % confidence limits must be provided for any reference samples used.

Procedures for Sediment Samples (S1D, S3)

Method 1: Sample Ignition

Apparatus

Induction furnace such as the Leco WR-12, Dohrmann DC-50, Coleman CH analyzer, or Perkin Elmer 240 elemental analyzer

Combustion boats

Microbalance

Desiccator

Reagents

10 percent hydrochloric acid: mix 100 ml concentrated HCl with 900 ml distilled water.

Copper oxide fines.

Benzoic acid.

Procedure

Dry at 70°C and grind the sediment sample.

Weigh a combustion boat and record the weight. Place 0.2 to 0.5 g homogenized sediment in the combustion boat and reweigh. Combustion boats should not be handled with the bare hand during this process.

If total carbon or inorganic carbon is to be determined, Cupric oxide fines may be added to the sample to assist in combustion. Combust the sample in an induction furnace. Record the result as total carbon.

If organic carbon is to be determined, treat a known weight of dried sediment with several drops of 10 percent HCl. Wait until the effervescing is completed and add more acid. Continue this process until the incremental addition of acid causes no further effervescence. Do not add too much acid at one time as this may cause loss of sample due to frothing.

Dry the sample at 70°C and place in a desi[illegible] and weigh. Cupric oxide fines, combust the sample in an induction furnace, and record the result as organic carbon.

Calculations

The carbon content of the sample can be calculated as:

$$\%C = \frac{\text{weight of tube (after-before)}}{\text{sample weight}} \times 27.29$$

Derivation of factor:

$$27.29 = \frac{12.011 \text{ (molecular weight carbon)}}{44.011 \text{ (molecular weight carbon dioxide)}} \times 100\%$$

When the total sample results are used, the result is percent carbon in the sample. When acid-treated samples are used, the result is percent organic carbon. Inorganic carbon is calculated as total carbon minus organic carbon.

Method 2: Differential Combustion[4,5]

Apparatus

Sargent programmed microcombustion apparatus or equivalent

Microbalance

Procedure

Air dry the sediment sample. Using a mortar and pestle, grind the sample to pass a 100-mesh screen.

Combust a known weight of sediment at a programmed heating rate of 300° to 950°C in 10 min and then maintain 950°C for 20 min. Trap the CO_2 in ascarite and record the weight as total carbon. A sample size should be selected that will produce 25 to 50 mg CO_2.

Weigh a second portion of the dried sediment. Combust this sample at a programmed rate of 300° to 650°C in 10 min and maintain 650°C for 20 min. Trap the CO_2 in ascarite and record the weight as organic carbon.

Calculations

The total carbon concentration, C_t, of the sample (in mg/g) is calculated as follows:

$$C_t = \frac{(x_t)\left(\frac{12}{44}\right)}{(g)}$$

where

x_t = [illegible] evolved at 950°C

AR301561

g = weight of sample combusted, g

The organic carbon, C_o, concentration of the sample (in mg/g) is calculated as follows:

$$C_o = \frac{(x_o)\ (\frac{12}{44})}{(g)}$$

where

x_o = weight of CO_2 evolved at 650°C, mg

g = weight of sample combusted, g

Inorganic carbon, C_I, (in mg/g) is calculated as:

$$C_I = C_t - C_o$$

Method 3: Wet Combustion[4,8]

A third method has been used for carbon in sediments. This is based on the oxidation of the sample with dichromate and back titration of the sample with ferrous ammonium sulfate. References are provided for the procedure but details are not given. The procedure is similar to the chemical oxygen demand test which is not specific for carbon. The wet combustion method is a redox procedure and any reduced chemicals in the sediment samples (ferrous iron, manganous manganese, sulfide) will react with the dichromate. Therefore, this procedure is not recommended unless other instrumentation is not available.

AR301562

References

1. U. S. Environmental Protection Agency. "Manual of Methods for Chemical Analysis of Water and Wastes." Methods Development and Quality Assurance Research Laboratory, National Environmental Research Center; Cincinnati, Ohio. 298 p. (1974).

2. U. S. Environmental Protection Agency. "Methods for Chemical Analysis of Water and Wastes." Environmental Monitoring and Support Laboratory, Office of Research and Development, EPA; Cincinnati, Ohio (1979).

3. Giovannini, G., Poggio, G., and Sequi, P. "Use of an Automatic CHN Analyzer to Determine Organic and Inorganic Carbon in Soils." Unpublished Report, Laboratory of Soil Chemistry, via Corridoni, Pisa, Italy. 9 p. (1975).

4. Konrad, J. G., Chesters, G., and Keeney, D. R. "Determination of Organic- and Carbonate-Carbon in Freshwater Lake Sediments by a Microcombustion Procedure." J. Thermal Analysis 2:199-208 (1970).

5. Kemp, A. L. W. "Organic Matter in the Sediments of Lakes Ontario and Erie." Proc. 12th Conference Great Lakes Research 12:237-249 (1969).

6. Environment Canada. "Analytical Methods Manual," Inland Waters Directorate, Water Quality Branch; Ottawa, Canada (1974).

7. American Public Health Association. Standard Methods for the Examination of Water and Wastewater. APHA; New York, New York. 1193 p. (1976).

8. Gaudette, H. E., Flight, W. R., Toner, L., and Folger, D. W. "An Inexpensive Titration Method for the Determination of Organic Carbon in Recent Sediments." J. Sed. Petrology 44:249-253 (1974).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
CENTRAL REGIONAL LABORATORY
839 BESTGATE ROAD
ANNAPOLIS, MARYLAND 21401
(301) 266-9180

DATE : March 21, 1990

SUBJECT: Inorganic Data Validation for the Standard Chlorine Site
SAS 5093C Task 2

FROM : Theresa A. Simpson TAS
Region III ESAT DPO (3ES23)

TO : Bob Guarni
Regional Project Manager (3HW25)

THRU : Patricia J. Krantz, Chief TAS for
Quality Assurance Branch (3ES23)

Attached is the inorganic data review for the Standard Chlorine Site (SAS 5093C Task 2) completed by the Region III Environmental Services Assistance Team (ESAT) contractor under the direction of Region III ESD.

If you have any questions regarding this review, please call me.

Attachment

cc: Dave Basko VERSAR
Elaine Spiewak (3HW14) (w/o attachments)

TID File: 03900117 Task 1256

WESTON
MANAGERS DESIGNERS/CONSULTANTS
2568A RIVA ROAD
SUITE 300
ANNAPOLIS, MD 21401
PHONE: 301-266-9887

DATE: 5 MARCH 1990

SUBJECT: DETERMINATION OF GRAIN SIZE DATA VALIDATION FOR SAS CASE 5093C TASK 2
SITE: STANDARD CHLORINE

FROM: PETE CHAPMAN
SENIOR DATA REVIEWER

MARSHA BURRELL
SENIOR DATA REVIEWER

TO: TERRY SIMPSON
ESAT DEPUTY PROJECT OFFICER

THRU: RICHARD D. DRESSER
ESAT TEAM MANGER

OVERVIEW

SAS Case 5093C Task 2 consisted of five (5) sediment samples be analyzed for the determination of grain size. The sample were analyzed using ASTM D422 "Methods for Particle - Size Analysis of Soils" and prepared by using ASTM D421-58 "Dry Preparation of Soil Samples for Particle - Size Analysis and Determination of Soil Constants". The samples were analyzed as a Contract Laboratory Program (CLP) Special Analytical Service (SAS).

SUMMARY

The analytical and gravimetric data for the set of soil/sediment samples meet the requirements of the SAS request. No problems occurred that would qualify the data.

NOTES

The following documentation was submitted as part of the data package: analytical results; bench data sheets for the sieve analysis and the hydrometer analysis of the material passing through the sieves and equipment calibration results.

INFORMATION REGARDING REPORT CONTENT

These data were reviewed according to the original SAS request documents which accompanied the data sets to be reviewed.

ATTACHMENTS

TABLE I	DATA SUMMARY FORM
APPENDIX A	RESULTS REPORTED BY LABORATORY
APPENDIX B	DPO REPORT
APPENDIX C	SUPPORT DOCUMENTATION

PC002A12.STA

WESTON

TABLE 1

DATA SUMMARY FORM

Site Name: Standard Chlorine
SAS #: 5093C Task 2
Date(s) Sampled : 11/28-29/89

Sample		Grain Size Result (% passed)						
		Sieve No.				Hydrometer (Particle Size)		
Identification	Location	10	40	60	200	.018mm	.006mm	.001mm
5093C - 01	SR - 11	100	99.8	99.2	98.2	83.0	60.6	36.1
5093C - 02	SR - 12	100	99.8	99.6	98.6	85.1	54.5	27.9
5093C - 03	SR - 13	100	99.0	97.4	93.0	71.5	36.5	20.0
5093C - 04	SR - 14	100	99.8	99.4	98.4	84.2	60.0	35.8
5093C - 05	SB - 6	100	99.8	99.0	95.4	79.7	50.9	26.2

AR301567

WESTON SM

Appendix A

RESULTS REPORTED BY LABORATORY

NUS CORPORATION
Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205
412-747-2500

REMIT TO:
NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-0

LABORATORY ANALYSIS REPORT

CLIENT NAME: SAMPLE MANAGEMENT OFFICE
ADDRESS: 209 MADISON STREET, SUITE 200
ALEXANDRIA, VA 22314-

NUS CLIENT NO: 1045 0003
VENDOR NO: 07440801
WORK ORDER NO: 55830

REPORT DATE: 01/18/90

ATTENTION: MAKA GROGGARD
CC:

SAMPLE IDENTIFICATION: SAS# 5093C-01
NUS SAMPLE NO: P0128483
DATE SAMPLED : 28-NOV-89
DATE RECEIVED: 30-NOV-89
APPROVED BY: Joanne C. Simanic

TEST	DETERMINATION	RESULT	UNIT
T45	G. S. - SIEVE & HYDROMETER		
	a. Sieve No. 10	100.0	% Passed
	b. Sieve No. 40	99.8	% Passed
	c. Sieve No. 60	99.2	% Passed
	d. Sieve No. 200	98.2	% Passed
	e. Particle Size .018mm	83.0	% Passed
	f. Particle Size .006mm	60.6	% Passed
	g. Particle Size .001mm	36.1	% Passed

COMMENTS:

CLIENT DUPLICATE

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205
412-747-2500

REMIT TO:
NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-0

LABORATORY ANALYSIS REPORT

CLIENT NAME: SAMPLE MANAGEMENT OFFICE
ADDRESS: 209 MADISON STREET, SUITE 200
ALEXANDRIA, VA 22314-

NUS CLIENT NO: 1045 0003
VENDOR NO: 07440801
WORK ORDER NO: 55830

REPORT DATE: 01/18/90

ATTENTION: MAKA GROGARD
CC:

SAMPLE IDENTIFICATION: SAS# 5093C-02
NUS SAMPLE NO: P0128484
DATE SAMPLED : 29-NOV-89
DATE RECEIVED: 30-NOV-89
APPROVED BY: Joanne C. Simanic

TEST	DETERMINATION	RESULT	UNIT
T45	G. S. - SIEVE & HYDROMETER		
	a. Sieve No. 10	100.0	% Passed
	b. Sieve No. 40	99.8	% Passed
	c. Sieve No. 60	99.6	% Passed
	d. Sieve No. 200	98.6	% Passed
	e. Particle Size .018mm	85.1	% Passed
	f. Particle Size .006mm	54.5	% Passed
	g. Particle Size .001mm	27.9	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
6350 Campbells Run Road
Pittsburgh, PA 15205
412-747-2500

REMIT TO:
NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-0

LABORATORY ANALYSIS REPORT

CLIENT NAME: SAMPLE MANAGEMENT OFFICE
ADDRESS: 209 MADISON STREET, SUITE 200
ALEXANDRIA, VA 22314-

NUS CLIENT NO: 1045 0003
VENDOR NO: 07440801
WORK ORDER NO: 55830

REPORT DATE: 01/18/90

ATTENTION: MAKA GROGARD
CC:

SAMPLE IDENTIFICATION: SAS# 5093C-03
NUS SAMPLE NO: F0128485
DATE SAMPLED : 27-NOV-89
DATE RECEIVED: 30-NOV-89
APPROVED BY: Joanne C. Simanic

TEST	DETERMINATION	RESULT	UNIT
T45	G. S. - SIEVE & HYDROMETER		
	a. Sieve No. 10	100.0	% Passed
	b. Sieve No. 40	99.0	% Passed
	c. Sieve No. 60	97.4	% Passed
	d. Sieve No. 200	93.0	% Passed
	e. Particle Size .019mm	71.5	% Passed
	f. Particle Size .006mm	36.5	% Passed
	g. Particle Size .001mm	20.0	% Passed

COMMENTS:

AR301571

CLIENT DUPLICATE

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205
412-747-2500

REMIT TO:
NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-

LABORATORY ANALYSIS REPORT

CLIENT NAME: SAMPLE MANAGEMENT OFFICE
ADDRESS: 209 MADISON STREET, SUITE 200
ALEXANDRIA, VA 22314-

NUS CLIENT NO: 1045 0003

REPORT DATE: 01/18/90

VENDOR NO: 07440801
WORK ORDER NO: 55830

ATTENTION: MAKA GROGARD
CC:

SAMPLE IDENTIFICATION: SAS# 5093C-04
NUS SAMPLE NO: P0128486
DATE SAMPLED : 28-NOV-89
DATE RECEIVED: 30-NOV-89
APPROVED BY: Joanne C. Simanic

TEST	DETERMINATION	RESULT	UNIT
T45	G. S. - SIEVE & HYDROMETER		
	a. Sieve No. 10	100.0	% Passed
	b. Sieve No. 40	99.8	% Passed
	c. Sieve No. 60	99.4	% Passed
	d. Sieve No. 200	98.4	% Passed
	e. Particle Size .018mm	84.2	% Passed
	f. Particle Size .006mm	60.0	% Passed
	g. Particle Size .001mm	35.8	% Passed

COMMENTS:

NUS CORPORATION

Laboratory Services Group
5350 Campbells Run Road
Pittsburgh, PA 15205
412-747-2500

REMIT TO:
NUS CORPORATION
P.O. Box 630832
Baltimore, MD 21263-

LABORATORY ANALYSIS REPORT

CLIENT NAME: SAMPLE MANAGEMENT OFFICE
ADDRESS: 209 MADISON STREET, SUITE 200
ALEXANDRIA, VA 22314-

NUS CLIENT NO: 1045 0003
VENDOR NO: 07440801
WORK ORDER NO: 55830

REPORT DATE: 01/19/90

ATTENTION: MAKA GROGARD
CC:

SAMPLE IDENTIFICATION: SAS# 5093C-05
NUS SAMPLE NO: P0128487
DATE SAMPLED : 28-NOV-89
DATE RECEIVED: 30-NOV-89
APPROVED BY: Joanne C. Simanic

TEST	DETERMINATION	RESULT	UNIT
T45	G. S. - SIEVE & HYDROMETER		
	a. Sieve No. 10	100.0	% Passed
	b. Sieve No. 40	99.8	% Passed
	c. Sieve No. 60	99.0	% Passed
	d. Sieve No. 200	95.4	% Passed
	e. Particle Size .018mm	79.7	% Passed
	f. Particle Size .008mm	50.9	% Passed
	g. Particle Size .001mm	26.2	% Passed

COMMENTS:

WESTON SM

Appendix B

DPO REPORT

WESTON

DPO: FYI

Region III

GRAIN SIZE REGIONAL DATA ASSESSMENT SUMMARY

SAS No: 5093C - Task 2
No. of Samples: 5
Matrix: Sediment
Method: Method for Particle - Size Analysis of Soils

Laboratory: NUS
Data User: Charles Sands
Review Completion: February 26, 1990

Reviewer: ESAT

		Grain Size
1.	Blank Evaluation	N/A
2.	Duplicate	N/A
3.	Sample Preparation	O
4.	Equipment Checks	O
	o Sieve Calibration o Balance Calibration	
5.	OVERALL ASSESSMENT	O

O = little or no problems that affect data usability

N/A = Not Applicable

WESTON SM

APPENDIX C

SUPPORT DOCUMENTATION

5093C-task II

SAS 578

U.S. Environmental Protection Agency
CLP Sample Management Office
209 Madison Street, Alexandria, VA 22313
PHONE: (703) 557-2490 or FTS 557-2490

SAS Number

SPECIAL ANALYTICAL SERVICES
Regional Request

☐ Regional Transmittal

☐ Telephone Request

A. EPA Region and Client: EPA Region III

B. Regional Representative: Colleen K. Walling

C. Telephone Number: (301) 266-9180

D. Date of Request: November 7, 1989

Faxed to SMO 11-10-89

E. Site Name: Standard Chlorine of Delaware, Delaware City, Delaware

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delay in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. General description of analytical service requested:

Analysis of sediment samples for the determination of grain size. Analysis to be performed ASTM Method D 422 "Methods for Particle-Size Analysis of Soils" 04.08 (Attached) - First appr in 1963, section added in July 19 All samples are of low contaminant concentration levels.

ASTM D 421 is attached for guidance in sample preparation.

ASTM = American Society for Testing and Materials 1985 Edition

2. Definition and number of work units involved (specify whether whole samples or fractions; whether organics or inorganics; whether aqueous or soil and sediments; and whether low, medium, or high concentration):

Ten low concentration sediment samples to be analyzed for grain size [illegible] environmental samples, and one field duplicate.

AR301577

3. Program (specify whether Superfund (Remedial or Enforcement), RCRA, NPDES, etc.), Justification for analysis and Site Account Number:

Superfund Enforcement: RP RI/FS Oversight OT GB03NP#6

~~OTGB03NP61~~

SAS Approved By:

4. Estimated date(s) of collection: November 13 thru November 21, 1989

5. Estimated date(s) and method of shipment: November 14 thru November 21, 1989

Federal Express ; Overnight Delivery

6. Approximate number of days results required after lab receipt of samples:

Data Package within 45 days of laboratory receipt of last sample.

7. Analytical protocol required (attach copy if other than a protocol currently used in this program): ASTM D 422-63 (Reapproved in 172). Section 2 added

ASTM D 421-58 (Section 2 added in 7/84). Reapproved in 1978.

Both methods are attached.

8. Special technical instructions (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):

Standardize instrument according to manufacturer's instructions: analytical procedures, a described in the attached method, MUST be followed even if the text merely indicates that t procedures should be followed. Report all holding times on the data sheets.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain-of-Custody documentation, etc.). If not completed, format of results will be left to program discretion. Data package must include: all instrum nd/or equipment calibration results, all raw data, calculations, blank results, duplicate res hain-of-custody forms, SAS request forms, SAS Packing Lists of Traffic Reports, copy of Airbi nd copy of analyst's logbook (signed by analyst) with date and time of sample preparation and nalysis.

see also addendum 1

10. Other (use additional sheets (AR301578 entary information, as needed):

11. Name of sampling/shipping contact: Brad Staub

Phone: (215) 741-4211

12. Data Requirements

Parameter	Detection Limit	Precision Desired (+ or − Concentration)

13. QC Requirements

Audits Required	Frequency of Audits	Limits (Percent or Concentrati
Duplicates	1/20 or 1/batch	+/- 35% RPD
Sieve calibration	1/20	see attached #2
Class S weights; balance check		as per manufacturers specifications (inclu in deliverabl

14. Action Required if Limits are Exceeded Duplicates: Reanalyze the sample duplica and report both sets of data.

15. Request prepared by: Dennis Shea (703) 750-3000 ext. 386

Date: November 7, 1989

16. Request reviewed by: Laurie Brown (per CKW)

Date: 11-10-89

Please return this request to the Sample Management Office as soon as to expedite processing of your request for special analytical services. Should you have any questions or need any assistance, please contact your Regional representative at the Sample Management Office.

ADDENDUM 1

Data package must include: all raw data, all instrument equipment calibration results, calculations, blank duplicate results, chain of custody forms, SAS requests packing list(s) or traffic report(s), copy of airbill copies of analyst's logbooks(signed by analyst) with time of sample preparation and analysis.

The cover page and all sample report forms MUST be [illegible] the complete EPA sample number as it appears on chain of [illegible] and CLP paperwork.

The case narrative must document all problems encountered subsequent resolutions. List instrumentation and [illegible] employed for analysis. Also, note whether samples were pre[illegible] or not and the procedure utilized in preservation, [illegible] reference samples, or equivalent reference samples [illegible] identified as to source and lot number. Documentation [illegible] value and associated 95 % confidence limits must be prov[illegible] any reference samples used.

AR301581

[illegible] ablished [illegible] ational Bureau [illegible] ill certify them if they meet ASTM specifications. The manufac- urer selects matched sieves to give results for a given sample that are comparable to those obtained from the manufacturer's Master Sieves. Matched sieves are the most accurate available.

ESTING SIEVES

Sieves may be checked for accuracy in several different ways (ASTM, 1966, and W. S. Tyler Co., 1967, p. 39).

Use of Standard Samples

The use of calibrated glass spheres is recommended for checking and determining the effective sieve openings. Calibrated glass spheres may be obtained from the Supply Division, National Bureau of Standards, Washington, D. C. Three standard samples are now available at $9.50 each: No. 1017, 0.050 to 0.230 mm; No. 1018, 0.210 to 0.980 mm; and No. 1019, 0.90 to 2.55 mm. Instructions are provided for using the glass spheres in calibrating sieves.

For routine checking of sieves each laboratory should maintain its own standard sample. A set of sieves should be checked periodically with a standard split of the standard sample to see if the set continues to give the same results. A new set of sieves can also be checked against the standard to see if the sets give comparable results. If they not, calibration factors can be calculated for each sieve that will make the results comparable.

Measurement Openings

Several methods of measuring openings are given in ASTM Specification [illegible]61. One method is to use a microscope and measure the openings. [illegible] nonoverlapping fields of view are selected. In each

REFERENCES

American Society for Testing Materials, 1963, Grain size analysis of soils, D422–63, pp. 203–214, in 1967 Book of ASTM Standards, Pt. 11, Philadelphia.

——, 1966, Sieves for testing purposes, E11-61, pp. 446–452, in 1966 Book of ASTM Standards, Pt. 30, Philadelphia.

Folk, R. L., 1968, Petrology of sedimentary rocks, Hemphills, Austin, Texas, 170 pp.

Jackson, M. L., L. D. Whitting, and R. P. Pennington, 1949,

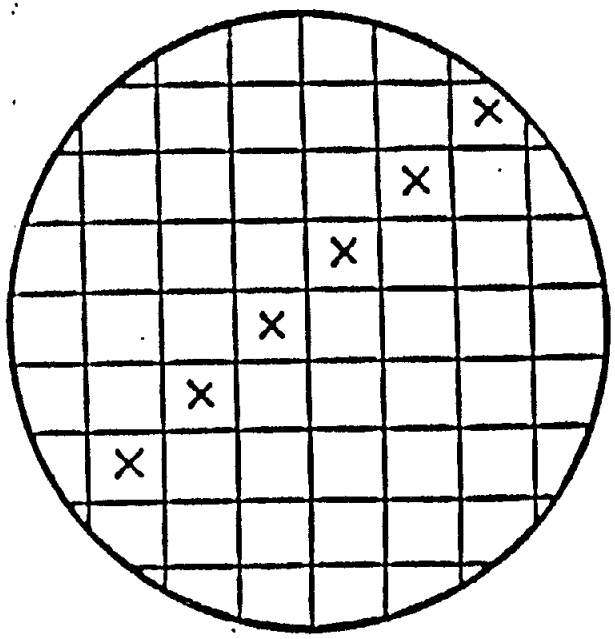

Fig. 8 Testing sieves by microscopic measurement of openings along diagonals of openings.

SIEVE ANALYSIS

ROY L. INGRAM

University of North Carolina, Chapel Hill, North Carolina

AR301582

The distribution of sizes of sedimentary particles with intermediate diameters in the range of 1/16 to 16 mm (sand and fine gravel) is most commonly determined by sieving. In the United States, the United States Standard sieves or the Tyler Standard sieves (Table 1) are used by most workers.

TABLE 1 Sieve openings

Wentworth Scale, mm	Phi Scale	$\sqrt[4]{2}$ Scale, mm	U. S. Standard[a]				Tyler[b] Mesh
			Opening, mm	Mesh	Permissable Variation		
					Average ± %	Maxi. + %	
16	[illegible]	16.000	16.0		3	6	
	[illegible]	13.454	13.5		3	6	
	[illegible]	11.314	11.2		3	6	
	[illegible]	9.514	9.51		3	6	
8	[illegible]	8.000	8.00		3	6	2½
	[illegible]	6.727	6.73		3	6	3
	[illegible]	5.657	5.66	3½	3	10	3½
	[illegible]	4.757	4.76	4	3	10	4

Wentworth Scale, mm	Phi Scale	$\sqrt[4]{2}$ Scale, mm	U. S. Standard[a]				Tyler[b] Mesh
			Opening, mm	Mesh	Permissable Variation		
					Average ± %	Maxi. + %	
4	−2.00	4.000	4.00	5	3	10	4
	−1.75	3.364	3.36	6	3	10	6
	−1.50	2.828	2.83	7	3	10	7
	−1.25	2.378	2.38	8	3	10	8
2	−1.00	2.000	2.00	10	3	10	9
	−0.75	1.682	1.68	12	3	10	10
	−0.50	1.414	1.41	14	3	10	12
	−0.25	1.189	1.19	16	3	10	14
1	0.00	1.000	1.00	18	3	15	16
	0.25	0.841	0.841	20	5	15	20
	0.50	0.707	0.707	25	5	15	24
	0.75	0.595	0.595	30	5	15	28
1/2	1.00	0.500	0.500	35	5	15	32
	1.25	0.420	0.420	40	5	25	35
	1.50	0.354	0.354	45	5	25	42
	1.75	0.297	0.297	50	5	25	48
1/4	2.00	0.250	0.250	60	5	25	60
	2.25	0.210	0.210	70	5	25	65
	2.50	0.177	0.177	80	6	40	80
	2.75	0.149	0.149	100	6	40	100
1/8	3.00	0.125	0.125	120	6	40	115
	3.25	0.105	0.105	140	6	40	150
	3.50	0.088	0.088	170	6	40	170
	3.75	0.074	0.074	200	7	60	200
1/16	4.00	0.062	0.063	230	7	60	250
	4.25	0.053	0.053	270	7	60	270
	4.50	0.044	0.044	325	7	60	325
	4.75	0.037	0.037	400	7	60	400
1/32	5.00	0.031					

[a] A.S.T.M., 1966, pp. 447–448.
[b] W. S. Tyler Co., 1967, p. 10.

Designation: D 421 – 58 (Re[redacted]ved 1978)[1]

Standard Method for DRY PREPARATION OF SOIL SAMPLES FOR PARTICLE-SIZE ANALYSIS AND DETERMINATION OF SOIL CONSTANTS[1]

This standard is issued under the fixed designation D 421; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

[1] NOTE—Section 2 was added editorially and subsequent sections renumbered in July 1984.

1. Scope

1.1 This method covers the dry preparation of soil samples as received from the field for particle-size analysis and the determination of the soil constants.

2. Applicable Document

2.1 *ASTM Standard:*

E 11 Specification for Wire-Cloth Sieves for Testing Purposes[2]

3. Apparatus

3.1 *Balance*—A balance sensitive to 0.1 g.

3.2 *Mortar*—A mortar and rubber-covered pestle suitable for breaking up the aggregations of soil particles.

3.3 *Sieves*—A series of sieves, of square mesh woven wire cloth, conforming to Specification E 11. The sieves required are as follows:

No. 4 (4.75-mm)
No. 10 (2.00-mm)
No. 40 (425-μm)

3.4 *Sampler*—A riffle sampler or sample splitter, for quartering the samples.

4. Sampling

4.1 Expose the soil sample as received from the field to the air at room temperature until dried thoroughly. Break up the aggregations thoroughly in the mortar with a rubber-covered pestle. Select a representative sample of the amount required to perform the desired tests by the method of quartering or by the use of a sampler. The amounts of material required to perform the individual tests are as follows:

4.1.1 *Particle-Size Analysis*—For the particle-size analysis, material passing a No. 10 (2.00-mm) sieve is required in amounts equal to 115 g of sandy soils and 65 g of either silt or clay soils.

4.1.2 *Tests for Soil Constants*—For the tests for soil constants, material passing the No. 40 (425-μm) sieve is required in total amount of 220 g, allocated as follows:

Test	Grams
Liquid limit	100
Plastic limit	15
Centrifuge moisture equivalent	10
Volumetric shrinkage	30
Check tests	65

5. Preparation of Test Sample

5.1 Select that portion of the air-dried sample selected for purpose of tests and record the mass as the mass of the total test sample uncorrected for hygroscopic moisture. Separate the test sample by sieving with a No. 10 (2.00-mm) sieve. Grind that fraction retained on the No. 10 sieve in a mortar with a rubber-covered pestle until the aggregations of soil particles are broken up into the separate grains. Then separate the ground soil into two fractions by sieving with a No. 10 sieve.

[1] This method is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.03 on Texture, Plasticity, and Density Characteristics of Soils.

Current edition approved Sept. 22, 1958. Originally issued 1935. Replaces D 421 – 38.

[2] *Annual Book of ASTM Standards*, Vol 14.02.

5.2 Wash that fraction retained after the second sieving free of all fine material, dry, and weigh. Record this mass as the mass of coarse material. Sieve the coarse material after being washed and dried, on the No. 4 (4.75-mm) sieve and record the mass retained on the No. 4 sieve.

6. Test Sample for Particle-Size Analysis

6.1 Mix the fractions passing the No. 10 (2.00-mm) sieve in both sieving operations thoroughly together, and by the method of quartering or the use of a sampler, select a portion weighing approximately 115 g for sandy soils and approximately [redacted] g for silt and clay soil for particle-size anal[redacted]

7. Test Sample for Soil Constants

7.1 Separate the remaining portion of the material passing the No. 10 (2.00-mm) sieve into two parts by means of a No. 40 (425-μm) sieve. Discard the fraction retained on the No. 40 sieve. Use the fraction passing the No. [redacted] determination of the soil constants.

Standard Method for
PARTICLE-SIZE ANALYSIS OF SOILS[1]

ndard is issued under the fixed designation D 422; the number immediately following the designation indicates the year of adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. cript epsilon (ε) indicates an editorial change since the last revision or reapproval.

Section 2 was added editorially and subsequent sections renumbered in July 1984.

pe

This meth covers t ıantitative de- ation of the distribut f particle sizes s. The distribution of cle sizes larger 5 µm (retained on t o. 200 sieve) is ined by sieving, wh distribution of e sizes smaller than m is determined edimentation proce ng a hydrometer re the necessary da otes 1 and 2).

E 1—Separation ma nade on the No. 4 m), No. 40 (425-µm o. 200 (75-µm) sieve of the No. 10. For wh er sieve used, the size indicated in the report.

E 2—Two types of dispersion devices are pro- (1) a high-speed mechanical stirrer, and (2) air ion. Extensive investigations indicate that air- ion devices produce a more positive dispersion ic soils below the 20-µm size and appreciably gradation on all sizes when used with sandy soils. of the definite advantages favoring air disper- s use is recommended. The results from the two f devices differ in magnitude, depending upon e, leading to marked differences in particle size ution, especially for sizes finer than 20 µm.

plicable Documents

ASTM Standards:

21 Method for Dry Preparation of Soil amples for Particle-Size Analysis and De- ermination of Soil Constants[2]

1 Specification for Wire-Cloth Sieves for Testing Purposes[3]

00 Specification for ASTM Hydrometers[4]

paratus

Balances—A balance sensitive to 0.01 g eighing the material passing a No. 10 (2.00)- sieve, and a balance sensitive to 0.1 % of ass of the sample to be weighed for weighing the material retained on a No. 10 sieve.

3.2 *Stirring Apparatus*—Either apparatus A or B may be used.

3.2.1 Apparatus A shall consist of a mechanically operated stirring device in which a suitably mounted electric motor turns a vertical shaft at a speed of not less than 10 000 rpm without load. The shaft shall be equipped with a replaceable stirring paddle made of metal, plastic, or hard rubber, as shown in Fig. 1. The shaft shall be of such length that the stirring paddle will operate not less than ¾ in. (19.0 mm) nor more than 1½ in. (38.1 mm) above the bottom of the dispersion cup. A special dispersion cup conforming to either of the designs shown in Fig. 2 shall be provided to hold the sample while it is being dispersed.

3.2.2 Apparatus B shall consist of an air-jet dispersion cup[5] (Note 3) conforming to the general details shown in Fig. 3 (Notes 4 and 5).

NOTE 3—The amount of air required by an air-jet dispersion cup is of the order of 2 ft³/min; some small air compressors are not capable of supplying sufficient air to operate a cup.

NOTE 4—Another air-type dispersion device, known as a dispersion tube, developed by Chu and Davidson at Iowa State College, has been shown to give results in those secured by the air-jet dispersion cup. When it is used, soaking of the sample can be done in the sedimentation cylinder, thus eliminating the need for transferring the slurry. When the air-dispersion tube is used, it shall be so indicated in the report.

NOTE 5—Water may condense in air lines when not in use. This water must be removed, either by using a water trap on the air line, or by blowing the water out of the line before using any of the air for dispersion purposes.

3.3 *Hydrometer*—An ASTM hydrometer, graduated to read in either specific gravity of the suspension or grams per litre of suspension, and conforming to the requirements for hydrometers 151H or 152H in Specifications E 100. Dimensions of both hydrometers are the same, the scale being the only item of difference.

3.4 *Sedimentation Cylinder*—A glass cylinder essentially 18 in. (457 mm) in height and 2½ in. (63.5 mm) in diameter, and marked for a volume of 1000 mL. The inside diameter shall be such that the 1000-mL mark is 36 ± 2 cm from the bottom on the inside.

3.5 *Thermometer*—A thermometer accurate to 1°F (0.5°C).

3.6 *Sieves*—A series of sieves, of square-mesh woven-wire cloth, conforming to the requirements of Specification E 11. A full set of sieves includes the following (Note 6):

3-in. (75-mm)	No. 10 (2.00-mm)
2-in. (50-mm)	No. 20 (850-µm)
1½-in. (37.5-mm)	No. 40 (425-µm)
1-in. (25.0-mm)	No. 60 (250-µm)
¾-in. (19.0-mm)	No. 140 (106-µm)
⅜-in. (9.5-mm)	No. 200 (75-µm)
No. 4 (4.75-mm)	

NOTE 6—A set of sieves giving uniform spacing of points for the graph, as required in Section 17, may be used if desired. This set consists of the following sieves:

3-in. (75-mm)	No. 16 (1.18-mm)
1½-in. (37.5-mm)	No. 30 (600-µm)
¾-in. (19.0-mm)	No. 50 (300-µm)
⅜-in. (9.5-mm)	No. 100 (150-µm)
No. 4 (4.75-mm)	No. 200 (75-µm)
No. 8 (2.36-mm)	

3.7 *Water Bath or Constant-Temperature Room*—A water bath or constant-temperature room for maintaining the soil suspension at a constant temperature during the hydrometer analysis. A satisfactory water tank is an insulated tank that maintains the temperature of the suspension at a convenient constant temperature at or near 68°F (20°C). Such a device is illustrated in Fig. 4. In cases where the work is performed in a room with automatically controlled constant temperature, the water bath is not necessary.

3.8 *Beaker*—A beaker of 250-mL capacity.

3.9 *Timing Device*—A watch or clock with a second hand.

4. Dispersing Agent

4.1 A solution of sodium hexametaphosphate (sometimes called sodium metaphosphate) shall be used in distilled or demineralized water, at the rate of 40 g of sodium hexametaphosphate/litre of solution (Note 7).

NOTE 7—Solutions of this salt, if acidic, slowly revert or hydrolyze back to the orthophosphate form with a resultant decrease in dispersive action. Solutions should be prepared frequently (at least once a month) or adjusted to pH of 8 or 9 by means of sodium carbonate. Bottles containing solutions should have the date of preparation marked on them.

4.2 All water used shall be either distilled or demineralized water. The water for a hydrometer test shall be brought to the temperature that is expected to prevail during the hydrometer test. For example, if the sedimentation cylinder is to be placed in the water bath, the distilled or demineralized water to be used shall be brought to the temperature of the controlled water bath; or, if the sedimentation cylinder is used in a room with controlled temperature, the water for the test shall be at the temperature of the room. The basic temperature for the hydrometer test is 68°F (20°C). Small variations of temperature do not introduce differences that are of practical significance and do not prevent the use of corrections derived as prescribed.

5. Test Sample

5.1 Prepare the test sample for mechanical analysis as outlined in Method D 421. During the preparation procedure the sample is divided into two portions. One portion contains only particles retained on the No. 10 (2.00-mm) sieve while the other portion contains only particles passing the No. 10 sieve. The mass of air-dried soil selected for purpose of tests, as prescribed in Method D 421, shall be sufficient to yield quantities for mechanical analysis as follows:

5.1.1 The size of the portion retained on the No. 10 sieve shall depend on the maximum size of particle, according to the following schedule:

Nominal Diameter of Largest Particles, in. (mm)	Approximate Minimum Mass of Portion, g
⅜ (9.5)	500
¾ (19.0)	1000

[1] This method is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.03 on Texture, Plasticity, and Density Characteristics of Soils.

Current edition approved Nov. 21, 1963. Originally published 1935. Replaces D 422 – 62.

[2] *Annual Book of ASTM Standards*, Vol 04.08.

[3] *Annual Book of ASTM Standards*, Vol 14.02.

[4] *Annual Book of ASTM Standards*, Vol 14.01.

[5] Detailed working drawings for this cup are available at a nominal cost from the American Society for Testing and Materials, 1916 Race St., Philadelphia, PA 19103. Order Adjunct No. 12-404220-00.

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.1.2 The size of the portion passing the No. sieve shall be approximately 115 g for sandy s and approximately 65 g for silt and clay s.

.2 Provision is made in Section 5 of Method 121 for weighing of the air-dry soil selected for pose of tests, the separation of the soil on the . 10 sieve by dry-sieving and washing, and the ghing of the washed and dried fraction re- ied on the No. 10 sieve. From these two sses the percentages retained and passing the . 10 sieve can be calculated in accordance h 12.1.

lote 8—A check on the mass values and the thor- hness of pulverization of the clods may be secured veighing the portion p the No. 10 sieve and ing this value to the m the washed and oven- d portion retained on . 10 sieve.

EVE ANALYSIS OF TION RETAINED ON NO. 10 (2 n) SIEVE

Procedure

.1 Separate the port tained on the No. 2.00-mm) sieve into s of fractions using 3-in. (75-mm), 2-in. nm), 1½-in. (37.5-), 1-in. (25.0-mm), (19.0-mm), ¾-in. -mm), No. 4 (4.75-mm), and No. 10 sieves, s many as may be needed depending on the ple, or upon the specifications for the mate- under test.

.2 Conduct the sieving operation by means a lateral and vertical motion of the sieve, ompanied by a jarring action in order to keep sample moving continuously over the surface he sieve. In no case turn or manipulate frag- ts in the sample through the sieve by hand. tinue sieving until not more than 1 mass % e residue on a sieve passes that sieve during in of sieving. When mechanical sieving is l, test the thoroughness of sieving by using hand method of sieving as described above.

.3 Determine the mass of each fraction on a nce conforming to the requirements of 3.1. the end of weighing, the sum of the masses ined on all th ves used should equal ely the original mass of the quantity sieved.

7. Hydrometer Test

7.1 Equations for percentages of soil remaining in suspension, as given in 16.3, are based on the use of distilled or demineralized water. A dispersing agent is used in the water, however, and the specific gravity of the resulting liquid is appreciably greater than that of distilled or demineralized water.

7.1.1 Both soil hydrometers are calibrated at 68°F (20°C), and variations in temperature from this standard temperature produce inaccuracies in the actual hydrometer readings. The amount of the inaccuracy increases as the variation from the standard temperature increases.

7.1.2 Hydrometers are graduated by the manufacturer to be read at the bottom of the meniscus formed by the liquid on the stem. Since it is not possible to secure readings of soil suspensions at the bottom of the meniscus, readings must be taken at the top and a correction applied.

7.1.3 The net amount of the corrections for the three items enumerated is designated as the composite correction, and may be determined experimentally.

7.2 For convenience, a graph or table of composite corrections for a series of 1° temperature differences for the range of expected test temperatures may be prepared and used as needed. Measurement of the composite corrections may be made at two temperatures spanning the range of expected test temperatures, and corrections for the intermediate temperatures calculated assuming a straight-line relationship between the two observed values.

7.3 *Prepare 1000 mL of liquid composed of* distilled or demineralized water and dispersing agent in the same proportion as will prevail in the sedimentation (hydrometer) test. Place the liquid in a sedimentation cyclinder and the cylinder in the constant-temperature water bath, set for one of the two temperatures to be used. When the temperature of the liquid becomes constant, insert the hydrometer, and, after a short interval to permit the hydrometer to come to the temperature of the liquid, read the hydrometer at the top of the meniscus formed on the stem. For hydrometer 151H the composite correction is the difference between this reading and one; for hy-

8. Preparation of Soil Sample

8.1 When the sample is prepared for the hydrometer test, grind out an auxiliary portion of from 10 to 15 g in a small metal or glass container, dry the sample to a constant mass in an oven at 230 ± 9°F (110 ± 5°C), and weigh again. Record the masses.

9. Dispersion of Soil Sample

9.1 When the soil is mostly of the clay and silt sizes, weigh out a sample of air-dry soil of approximately 50 g. When the soil is mostly sand the sample should be approximately 100 g.

9.2 Place the sample in the 250-mL beaker and cover with 125 mL of sodium hexametaphosphate solution (40 g/l). Stir until the soil is thoroughly wetted. Allow to soak for at least 16 h.

9.3 At the end of the soaking period, disperse the sample further, using either stirring apparatus A or B. If stirring apparatus A is used, transfer the soil - water slurry from the beaker into the special dispersion cup shown in Fig. 2, washing any residue from the beaker into the cup with distilled or demineralized water (Note 9). Add distilled or demineralized water, if necessary, so that the cup is more than half full. Stir for a period of 1 min.

Note 9—A large size syringe is a convenient device for handling the water in the washing operation. Other devices include the wash-water bottle and a hose with nozzle connected to a pressurized distilled water tank.

9.4 If stirring apparatus B (Fig. 3) is used, *remove the cover cap and connect the cup to a* compressed air supply by means of a rubber hose. A air gage must be on the line between the cup and the control valve. Open the control valve so that the gage indicates 1 psi (7 kPa) pressure (Note 10). Transfer the soil - water slurry from the beaker to the air-jet dispersion cup by washing with distilled or demineralized water. Add distilled or demineralized water, if necessary, so that the total volume in the cup is 250 mL, but no more.

Note 10—The initial air pressure of 1 psi is required to prevent the soil - water mixture from entering the air-jet chamber when the mixture is transferred to the dispersion cup.

Under	
6 in.	
Over 6	

Soils containing large percentages of mica need be dispersed for only 1 min. After the dispersion period, reduce the gage pressure to 1 psi preparatory to transfer of soil - water slurry to the sedimentation cylinder.

10. Hydrometer Test

10.1 Immediately after dispersion, transfer the soil - water slurry to the glass sedimentation cylinder, and add distilled or demineralized water until the total volume is 1000 mL.

10.2 Using the palm of the hand over the open end of the cylinder (or a rubber stopper in the open end), turn the cylinder upside down and back for a period of 1 min to complete the agitation of the slurry (Note 11). At the end of 1 min set the cylinder in a convenient location and take hydrometer readings at the following intervals of time (measured from the beginning of sedimentation), or as many as may be needed, depending on the sample or the specification for the material under test: 2, 5, 15, 30, 60, 250, and 1440 min. If the controlled water bath is used, the sedimentation cylinder should be placed in the bath between the 2- and 5-min readings.

Note 11—The number of turns during this minute should be approximately 60, counting the turn upside down and back as two turns. Any soil remaining in the bottom of the cylinder during the first few turns should be loosened by vigorous shaking of the cylinder while it is in the inverted position.

10.3 When it is desired to take a hydrometer reading, carefully insert the hydrometer about 20 to 25 s before the reading is due to approximately the depth it will have when the reading is taken. As soon as the reading is taken, carefully remove the hydrometer and place it with a spinning motion in a graduate of clean distilled or demineralized water.

Note 12—It is important to remove the hydrometer immediately after each reading. Readings shall be taken at the top of the menisc ned by the suspension around the stem, since not possible to secure readings at the bottom of the meniscus.

ve Analysis

After taking the final hydrometer read- ansfer the suspension to a No. 200 (75-μm) nd wash with tap water until the wash is clear. Transfer the material on the No. ve to a suitable container, dry in an oven ± 9°F (110 ± 5°C) and make a sieve is of the portion retained, using as many as desired, or required for the material, or he specification of the material under test.

CALCULATIONS AND REPORT

eve Analysis Values for the Portion arser than the No. 10 (2.00-mm) Sieve

Calculate the percen assing the No. e by dividing the mas ing the No. 10 y the mass of soil of ly split on the sieve, and multiplyi result by 100. tain the mass passin No. 10 sieve, t the mass retained No. 10 sieve he original mass.

To secure the total of soil passing . 4 (4.75-mm) sieve, to the mass of terial passing the No. ve the mass of ction passing the No. e and retained No. 10 sieve. To secure the total mass of ssing the ⅜-in. (9.5-mm) sieve, add to the nass of soil passing the No. 4 sieve, the of the fraction passing the ⅜-in. sieve and d on the No. 4 sieve. For the remaining continue the calculations in the same er.

To determine the total percentage pass- r each sieve, divide the total mass passing 2.2) by the total mass of sample and mul- he result by 100.

ygroscopic Moisture Correction Factor

The hydroscopic moisture correction fac- the ratio between the mass of the oven- sample and the air-dry mass before drying. number less than one, except when there ygroscopic moisture.

ercentages of Soil in Suspension

Calculate the oven-dry mass of soil used hydrometer analysis by multiplying the the percentage passing the No. 10 (2.00-mm) sieve, and multiplying the result by 100. This value is the weight W in the equation for percentage remaining in suspension.

14.3 The percentage of soil remaining in suspension at the level at which the hydrometer is measuring the density of the suspension may be calculated as follows (Note 13): For hydrometer 151H:

$$P = [(100\,000/W) \times G/(G - G_1)](R - G_1)$$

NOTE 13—The bracketed portion of the equation for hydrometer 151H is constant for a series of readings and may be calculated first and then multiplied by the portion in the parentheses.

For hydrometer 152H:

$$P = (Ra/W) \times 100$$

where:

a = correction faction to be applied to the reading of hydrometer 152H. (Values shown on the scale are computed using a specific gravity of 2.65. Correction factors are given in Table 1),

P = percentage of soil remaining in suspension at the level at which the hydrometer measures the density of the suspension,

R = hydrometer reading with composite correction applied (Section 7),

W = oven-dry mass of soil in a total test sample represented by mass of soil dispersed (see 14.2), g,

G = specific gravity of the soil particles, and

G_1 = specific gravity of the liquid in which soil particles are suspended. Use numerical value of one in both instances in the equation. In the first instance any possible variation produces no significant effect, and in the second instance, the composite correction for R is based on a value of one for G_1.

15. Diameter of Soil Particles

15.1 The diameter of a particle corresponding to the percentage indicated by a given hydrometer reading shall be calculated according to Stokes' law (Note 14), on the basis that a particle of this diameter was at the surface of the suspension at the beginning of sedimentation and had settled to the level at which the hydrometer is

2.85		0.94	
2.80		0.97	
2.75		0.98	
2.70		0.99	
2.65		1.00	
2.60		1.01	
2.55		1.02	
2.50		1.03	
2.45		1.05	

[4] For use in equation for percentage of soil remaining in suspension when using Hydrometer 152H.

TABLE 2 Values of Effective Depth Based on Hydrometer and Sedimentation Cylinder of Specified Sizes[4]

Hydrometer 151H		Hydrometer 152H			
Actual Hydrometer Reading	Effective Depth, L, cm	Actual Hydrometer Reading	Effective Depth, L, cm	Actual Hydrometer Reading	Effective Depth, L, cm
1.000	16.3	0	16.3	31	11.2
1.001	16.0	1	16.1	32	11.1
1.002	15.8	2	16.0	33	10.9
1.003	15.5	3	15.8	34	10.7
1.004	15.2	4	15.6	35	10.6
1.005	15.0	5	15.5		
1.006	14.7	6	15.3	36	10.4
1.007	14.4	7	15.2	37	10.2
1.008	14.2	8	15.0	38	10.1
1.009	13.9	9	14.8	39	9.9
1.010	13.7	10	14.7	40	9.7
1.011	13.4	11	14.5	41	9.6
1.012	13.1	12	14.3	42	9.4
1.013	12.9	13	14.2	43	9.2
1.014	12.6	14	14.0	44	9.1
1.015	12.3	15	13.8	45	8.9
1.016	12.1	16	13.7	46	8.8
1.017	11.8	17	13.5	47	8.6
1.018	11.5	18	13.3	48	8.4
1.019	11.3	19	13.2	49	8.3
1.020	11.0	20	13.0	50	8.1
1.021	10.7	21	12.9	51	7.9
1.022	10.5	22	12.7	52	7.8
1.023	10.2	23	12.5	53	7.6
1.024	10.0	24	12.4	54	7.4
1.025	9.7	25	12.2	55	7.3
1.026	9.4	26	12.0	56	7.1
1.027	9.2	27	11.9	57	7.0
1.028	8.9	28	11.7	58	6.8
1.029	8.6	29	11.5	59	6.6
1.030	8.4	30	11.4	60	6.5
1.031	8.1				
1.032	7.8				
1.033	7.6				
1.034	7.3				
1.035	7.0				
1.036	6.8				
1.037	6.5				
1.038	6.2				

[4] Values of effective depth are calculated from the equation:

$$L = L_1 + \tfrac{1}{2}[L_2 - (V_B/A)]$$

where:

L = effective depth, cm,

L_1 = distance along the stem of the hydrometer from the top of the bulb to the mark for a hydrometer reading, cm,

L_2 = overall length of the hydrometer bulb, cm,

V_B = volume of hydrometer bulb, cm³, and

A = cross-sectional area of sedimentation cylinder, cm²

Values used in calculating the values in Table 2 are as follows:

For both hydrometers, 151H and 152H:

L_2 = 14.0 cm

V_B = 67.0 cm³

A = 27.8 cm²

For hydrometer 151H:

L_1 = 10.5 cm for a reading of 1.000

= 2.3 cm for a reading of 1.031

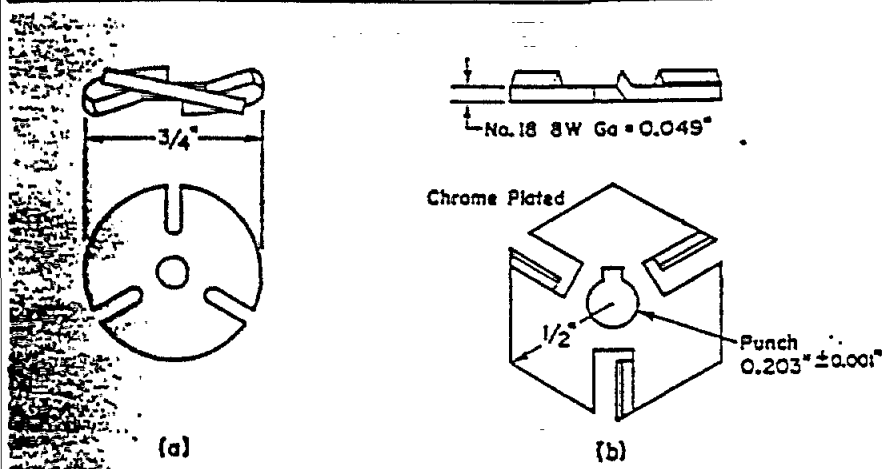
For hydrometer 152H:

L_1 = 10.5 cm for a reading of 0 g/litre

= 2.3 cm for a reading of 50 g/litre

TABLE 3 Values of K for Use in Equation for Computing Diameter of Particle in Hydrometer Analysis

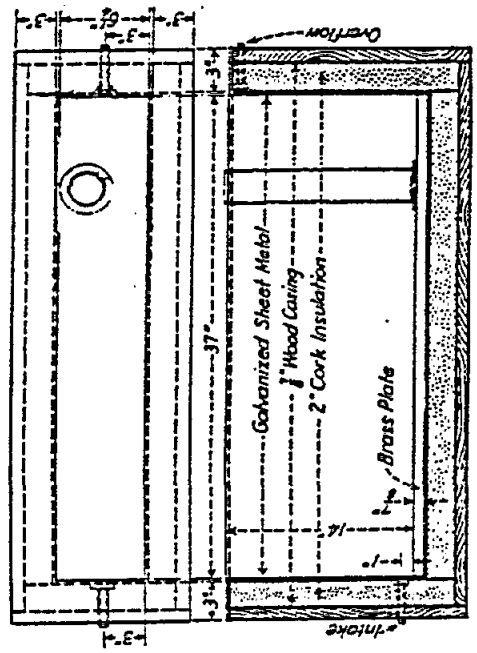
°C	Specific Gravity of Soil Particles								
	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85
16	0.01510	0.01505	0.01481	0.01457	0.01435	0.01414	0.01394	0.01374	0.01356
17	0.01511	0.01486	0.01462	0.01439	0.01417	0.01396	0.01376	0.01356	0.01338
18	0.01492	0.01467	0.01443	0.01421	0.01399	0.01378	0.01359	0.01339	0.01321
19	0.01474	0.01449	0.01425	0.01403	0.01382	0.01361	0.01342	0.1323	0.01305
20	0.01456	0.01431	0.01408	0.01386	0.01365	0.01344	0.01325	0.01307	0.01289
21	0.01438	0.01414	0.01391	0.01369	0.01348	0.01328	0.01309	0.01291	0.01273
22	0.01421	0.01397	0.01374	0.01353	0.01332	0.01312	0.01294	0.01276	0.01258
23	0.01404	0.01381	0.01358	0.01337	0.01317	0.01297	0.01279	0.01261	0.01243
24	0.01388	0.01365	0.01342	0.01321	0.01301	0.01282	0.01264	0.01246	0.01229
25	0.01372	0.01349	0.01327	0.01306	0.01286	0.01267	0.01249	0.01232	0.01215
26	0.01357	0.01334	0.01312	0.01291	0.01272	0.01253	0.01235	0.01218	0.01201
27	0.01342	0.01319	0.01297	0.01277	0.01258	0.01239	0.01221	0.01204	0.01188
28	0.01327	0.01304	0.01283	0.01264	0.01244	0.01255	0.01208	0.01191	0.01175
29	0.01312	0.01290	0.01269	0.01249	0.01230	0.01212	0.01195	0.01178	0.01162
30	0.01298	0.01276	0.01256	0.01236	0.01217	0.01199	0.01182	0.01165	0.01149



Metric Equivalents

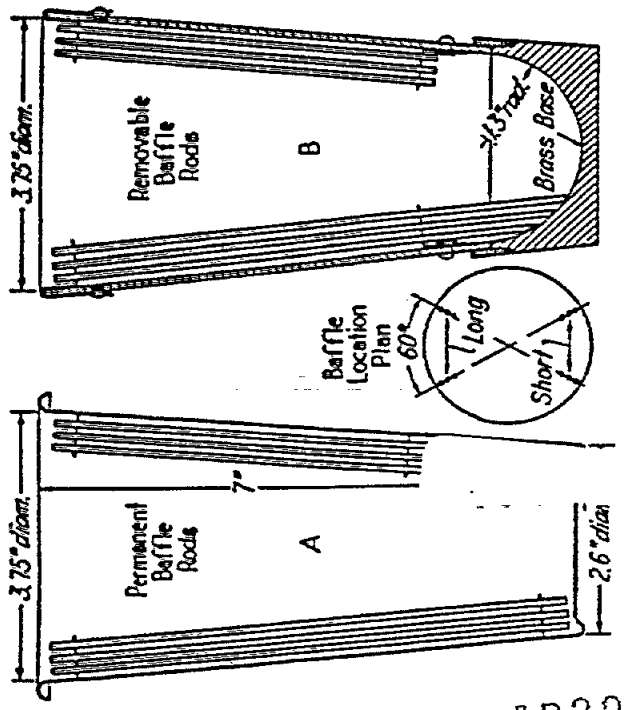
in.	0.001	0.049	0.203	½	¾
mm	0.03	1.24	5.16	12.7	19.0

FIG. 1 Detail of Stirring Paddles



Metric Equivalents

in.	¼	1	3	6¼	14	37
mm	32.2	25.4	76.2	158.2	356	940



Metric Equivalents

in.	1.3	2.6	3.75
mm	33	66	95.2

. . . 2 Dispersion Cups of Apparatus

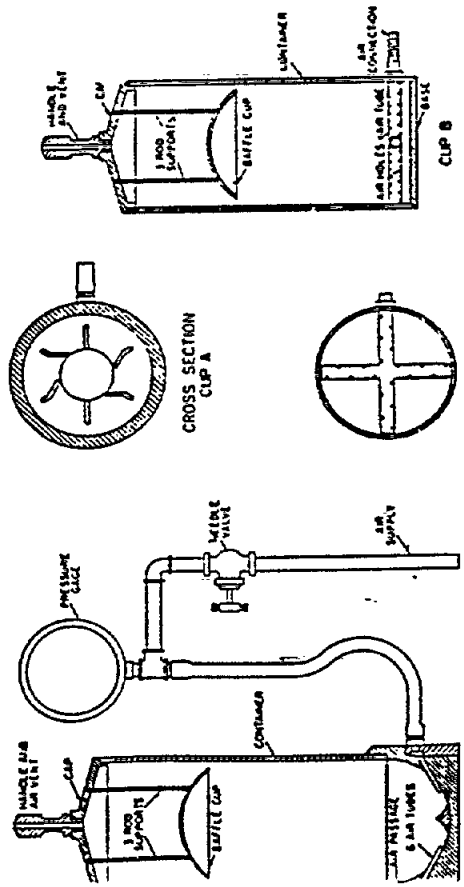


FIG. 3 Air-Jet Dispersion Cups of Apparatus B

AR301587

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
CENTRAL REGIONAL LABORATORY
839 BESTGATE ROAD
ANNAPOLIS, MARYLAND 21401
(301) 266-9180

DATE : March 1, 1990

SUBJECT: Inorganic Data Validation for the Standard Chlorine Site Case 13230

FROM : Theresa A. Simpson TAS
Region III ESAT DPO (3ES23)

TO : Bob Guarni
Regional Project Manager (3HW25)

THRU : Patricia J. Krantz, Chief TAS for
Quality Assurance Branch (3ES23)

Attached is the inorganic data review for the Standard Chlorine Site (Case 13230) completed by the Region III Environmental Services Assistance Team (ESAT) contractor under the direction of Region III ESD.

If you have any questions regarding this review, please call me.

Attachment

cc: Dave Basko VERSAR
Elaine Spiewak (3HW14) (w/o attachment)

TID File: 03900117 Task 1240

WESTON
MANAGERS DESIGNERS/CONSULTANTS
2568A RIVA ROAD
SUITE 300
ANNAPOLIS, MD 21401
PHONE: 301-266-9887

DATE: 27 FEBRUARY 1990

SUBJECT: INORGANIC DATA VALIDATION, Case 13230
SITE: STANDARD CHLORINE

FROM: MARSHA BURRELL MJB — INORGANIC DATA REVIEWER
MAHBOOBEH MECANIC MM — SENIOR DATA REVIEWER

TO: TERRY SIMPSON
ESAT DEPUTY PROJECT OFFICER

THRU: RICHARD D. DRESSER
ESAT TEAM MANAGER

OVERVIEW

The set of samples for Case 13230 contained four (4) aqueous samples and one (1) soil sample, which were analyzed through the Contract Laboratory Program (CLP) Routine Analytical Services. Included in the sample set was an aqueous field blank, an aqueou equipment blank, and one (1) field duplicate pair.

SUMMARY

All analytes were successfully analyzed in all samples. Areas of concern with respect to data usability are listed according to the seriousness of the problem.
These include:

MINOR ISSUES

The aqueous preparation blank had reported results for the Fe, Mn and Zn analytes that were >IDL. The reported results for the analytes in the affected samples which are <5X the blank concentration may be biased high and, therefore, have been qualified "B".

The ICP serial dilution exceeded the 10% control limit for the Zn analyte in the sample MCCE78. The reported result for the Zn analyte has been qualified estimated, "J".

The soil laboratory duplicate result for the Cu analyte was outside of the control limit. Therefore, the reported result for the Cu analyte in sample MCCE78 has been qualified estimated, "J".

The aqueous laboratory duplicate result for the Ni analyte was outside of the control limit. Therefore, the reported results and quantitation limits for the Ni analyte have been qualified estimated, "J" and "UJ", respectively.

The aqueous matrix spike recovery was low for the Tl analyte. The quantitation limits for this analyte may be biased low; and, therefore, have been qualified "UL".

The soil matrix spike recoveries were low for the Sb, Cu, Mn, and Se analytes. The reported results for the Sb, Mn and Se analytes may be biased low and, therefore, have been qualified "L". The reported result for Cu may be biased low; however, it has been qualified "J" due to the laboratory duplicate.

The aqueous analytical spike recoveries were low for the Se analyte in sample MCCE74 and the Tl analyte in samples MCCE41 and MCCE76. The quantitation limits for these analytes may be biased low and, therefore, have been qualified "UL".

The soil analytical spike recovery was low for the Se analyte in sample MCCE78. The quantitation limit for Se in sample MCCE78 may be biased low and, therefore, has been qualified "UL".

NOTES:

The data was reviewed in accordance with National Functional Guidelines for Evaluating Inorganic Analyses.

INFORMATION REGARDING REPORT CONTENT

Table 1A is a summary of qualifiers added to the laboratory's results during evaluation.

ATTACHMENTS

TABLE 1A	SUMMARY OF QUALIFIERS ON DATA SUMMARY AFTER DATA VALIDATION
TABLE 1B	CODES USED IN COMMENTS COLUMN
TABLE 2	GLOSSARY OF DATA QUALIFIER CODES
TABLE 3	DATA SUMMARY FORM
APPENDIX A	RESULTS REPORTED BY LABORATORY FORM I's
APPENDIX B	DPO REPORT

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TABLE 1A

SUMMARY OF QUALIFIERS ON DATA SUMMARY
AFTER DATA VALIDATION

ANALYTE	SAMPLES AFFECTED	POSITIVE VALUES	NON-DETECTED VALUES	BIAS	COMMENTS*
Sb	MCCE78	L		Low	A (37.9%)
Cu	MCCE78	J			B (51.8%) A (74.1 %)
Fe	MCCE74, MCCE77	B		High	C (12.3 ppb)
Mn	MCCE74	B		High	C (3.3 ppb)
	MCCE78	L		Low	A (67.8%)
Ni	All aqueous samples	J	UJ		B (±40.0 ppb)
Se	MCCE74		UL	Low	D (79.8%)
	MCCE78	L		Low	A (69.1%) D (78.9%)
Tl	MCCE41,MCCE76		UL	Low	A (66.0%) D (63.2-65.2%)
	MCCE74,MCCE77		UL	Low	A (66.0%)
Zn	All aqueous samples	B		High	C (8.0 ppb)
	MCCE78	J			E (44.5%)

* See explanation of comments in Table 1B

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TABLE 1B
CODES USED IN COMMENTS COLUMN

A = Due to a low matrix spike recovery (% recovery is in parentheses), the reported results and/or quantitation limits may be biased low.

B = The laboratory duplicate results were outside of the control limits ±35% for soil samples or ±CRDL for aqueous samples (relative percent difference or CRDL is in parentheses). Therefore, the quantitation limits and/or reported results are estimated.

C = The preparation blank had a result >IDL (the result is in parentheses) and the reported results were <5x the blank. The reported results may be biased high.

D = Due to a low analytical spike recovery (% recovery is in parentheses), the reported results and/or quantitation limits may be biased low.

E = The ICP Serial Dilution exceeded the ±10% control limit (the result is in parentheses). The reported results are estimated.

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TABLE 2

GLOSSARY OF DATA QUALIFIER CODES (INORGANIC)

CODES RELATED TO IDENTIFICATION
(confidence concerning presence or absence of analytes):

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

(NO CODE) = Confirmed identification.

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

CODES RELATED TO QUANTITATION
(can be used for both positive results and sample quantitation limits):

J = Analyte Present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

[] = Analyte present. As values approach the IDL the quantitation may not be accurate.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

OTHER CODES

Q = No analytical result.

AR301595

Table 3

DATA SUMMARY FORM: I N O R G A N I C S

Name: Standard Chlorine

#: 13230 Sampling Date(s): Nov 27, 1987

WATER SAMPLES (ug/L)

*Due to dilution, sample quantitation limit is affected. See dilution table for specifics.

	Sample No.	MCCE41		MCCE74		MCCE76		MCCE77													
	Dilution Factor	1.0		1.0		1.0		1.0													
	Location	SUD-18		BB-5		SWT-9		BB-10													
CRDL	ANALYTE	DUPLICATE OF MCCE76		EQUIPMENT BLANK		DUPLICATE OF MCCE41		FIELD BLANK													
200	Aluminum	[170]				233															
60	Antimony																				
10	*Arsenic	[2.1]																			
200	Barium	[69.1]				[73.0]															
5	Beryllium																				
5	*Cadmium																				
5000	Calcium	10600		[37.1]		11000															
10	*Chromium																				
50	Cobalt																				
25	Copper																				
100	Iron	1370		[16.4]	B	1420		[14.3]	B												
5	*Lead	[2.8]				[2.9]															
5000	Magnesium	6480		[56.7]		6780															
15	Manganese	243		[4.0]	B	286															
0.2	Mercury																				
40	*Nickel	[5.0]	J		UJ		UJ		UJ												
5000	Potassium	[2630]				[2760]															
5	Selenium				UL																
10	Silver	[4.8]																			
5000	Sodium	16000				16700															
10	Thallium		UL		UL		UL		UL												
50	Vanadium																				
20	Zinc	[6.9]	B	[6.0]	B	[7.6]	B	[8.1]	B												
10	*Cyanide																				

CRDL = Contract Required Detection Limit *Action Level Exists SEE NARRATIVE FOR CODE DEFINITIONS

Table 3

DATA SUMMARY FORM: I N O R G A N I C S

Name: Standard Chlorine

#: 13230 Sampling Date(s): Nov 21, 1989

SOIL SAMPLES (mg/Kg)

*Due to dilution, sample quantitation limit is affected. See dilution table for specifics.

	Sample No.	MCCE78																					
	Dilution Factor	1.0																					
	% Solids	35.5																					
	Location	SR-13																					
DL	ANALYTE																						
	Aluminum	15100																					
2	Antimony	[10.0]	L																				
	Arsenic	15.4																					
0	Barium	154																					
	Beryllium	[2.5]																					
	Cadmium																						
000	Calcium	[2890]																					
.	Chromium	55.6																					
0	Cobalt	[13.7]																					
.	Copper	46.0	J																				
0	Iron	28000																					
	*Lead	5																					
000	Magnesium	0																					
1	Manganese	5	L																				
.2	Mercury	1																					
1	Nickel	5																					
000	Potassium	00]																					
1	Selenium	7]	L																				
2	Silver																						
1000	Sodium	62]																					
2	Thallium																						
10	Vanadium	75.7																					
4	Zinc	233	J																				
2	Cyanide																						

CRDL = Contract Required Detection Limit *Action Level Exists SEE NARRATIVE FOR CODE DEFINITIONS

AR301596

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APPENDIX A

RESULTS REPORTED BY LABORATORY

FORM I'S

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MCCE41

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D9-0088

Lab Code: SKINER Case No.: 13230 SAS No.: SDG No.: MCCE41

Matrix (soil/water): WATER Lab Sample ID: 12032-01S

Level (low/med): LOW Date Received: 11/29/89

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	170.00	B		P
7440-36-0	Antimony	13.00	U		P
7440-38-2	Arsenic	2.10	B		F
7440-39-3	Barium	69.10	B		P
7440-41-7	Beryllium	2.00	U		P
7440-41-7	Cadmium	2.00	U		P
7440-70-2	Calcium	10600.00			P
7440-47-3	Chromium	5.00	U		P
7440-48-4	Cobalt	4.00	U		P
7440-50-8	Copper	6.00	U		P
7439-89-6	Iron	1370.00			P
7439-92-1	Lead	2.80	B		F
7439-95-4	Magnesium	6480.00			P
7439-96-5	Manganese	273.00			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.00	B	*	P
7440-09-7	Potassium	2630.00	B		P
7782-49-2	Selenium	2.00	U		F
7440-22-4	Silver	4.80	B		P
7440-23-5	Sodium	16000.00			P
7440-28-0	Thallium	3.00	U	NW	F
7440-62-2	Vanadium	4.00	U		P
7440-66-6	Zinc	6.90	B		P
	Cyanide	10.00	U		AS

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLOUDY Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MCCE74

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D9-0088

Lab Code: SKINER Case No.: 13230 SAS No.: SDG No.: MCCE41

Matrix (soil/water): WATER Lab Sample ID: 12032-02S

Level (low/med): LOW Date Received: 11/29/89

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	22.00	U		P
7440-36-0	Antimony	13.00	U		P
7440-38-2	Arsenic	2.00	U		F
7440-39-3	Barium	2.00	U		P
7440-41-7	Beryllium	2.00	U		P
7440-41-7	Cadmium	2.00	U		P
7440-70-2	Calcium	37.10	B		P
7440-47-3	Chromium	5.00	U		P
7440-48-4	Cobalt	4.00	U		P
7440-50-8	Copper	6.00	U		P
7439-89-6	Iron	16.40	B		P
7439-92-1	Lead	2.00	U		F
7439-95-4	Magnesium	56.70	B		P
7439-96-5	Manganese	4.00	B		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.00	U	*	P
7440-09-7	Potassium	391.00	U		P
7782-49-2	Selenium	2.00	U	W	F
7440-22-4	Silver	4.00	U		P
7440-23-5	Sodium	84.00	U		P
7440-28-0	Thallium	3.00	U	N	F
7440-62-2	Vanadium	4.00	U		P
7440-66-6	Zinc	6.00	B		P
	Cyanide	10.00	U		AS

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR

Comments:

000003

AR301599

FORM I - IN 7/88

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MCCE76

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D9-0088

Lab Code: SKINER Case No.: 13230 SAS No.: SDG No.: MCCE41

Matrix (soil/water): WATER Lab Sample ID: 12032-03S

Level (low/med): LOW Date Received: 11/29/89

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	233.00			P
7440-36-0	Antimony	13.00	U		P
7440-38-2	Arsenic	2.00	U		F
7440-39-3	Barium	73.00	B		P
7440-41-7	Beryllium	2.00	U		P
7440-41-7	Cadmium	2.00	U		P
7440-70-2	Calcium	11000.00			P
7440-47-3	Chromium	5.00	U		P
7440-48-4	Cobalt	4.00	U		P
7440-50-8	Copper	6.00	U		P
7439-89-6	Iron	1420.00			P
7439-92-1	Lead	2.90	B		F
7439-95-4	Magnesium	6780.00			P
7439-96-5	Manganese	286.00			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.00	U		P
7440-09-7	Potassium	2760.00	B		P
7782-49-2	Selenium	2.00	U		F
7440-22-4	Silver	4.00	U		P
7440-23-5	Sodium	16700.00			P
7440-28-0	Thallium	3.00	U	NW	F
7440-62-2	Vanadium	4.00	U		P
7440-66-6	Zinc	7.60	B		P
	Cyanide	10.00	U		AS

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLOUDY

Comments:

000004

AR301600

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MCCE77

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-09-0088

Lab Code: SKINER Case No.: 13230 SAS No.: SDG No.: MCCE41

Matrix (soil/water): WATER Lab Sample ID: 12032-04S

Level (low/med): LOW Date Received: 11/29/89

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	22.00	U		P
7440-36-0	Antimony	13.00	U		P
7440-38-2	Arsenic	2.00	U		F
7440-39-3	Barium	2.00	U		P
7440-41-7	Beryllium	2.00	U		P
7440-41-7	Cadmium	2.00	U		P
7440-70-2	Calcium	30.00	U		P
7440-47-3	Chromium	5.00	U		P
7440-48-4	Cobalt	4.00	U		P
7440-50-8	Copper	6.00	U		P
7439-89-6	Iron	14.30	B		P
7439-92-1	Lead	2.00	U		F
7439-95-4	Magnesium	37.00	U		P
7439-96-5	Manganese	2.00	U		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.00	U	*	P
7440-09-7	Potassium	391.00	U		P
7782-49-2	Selenium	2.00	U		F
7440-22-4	Silver	4.00	U		P
7440-23-5	Sodium	84.00	U		P
7440-28-0	Thallium	3.00	U	N	F
7440-62-2	Vanadium	4.00	U		P
7440-66-6	Zinc	8.10	B		P
	Cyanide	10.00	U		AS

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR

Comments:

000005

AR301601

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MCCE78

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D9-0088

Lab Code: SKINER Case No.: 13230 SAS No.: SDG No.: MCCE41

Matrix (soil/water): SOIL Lab Sample ID: 12032-05S

Level (low/med): LOW Date Received: 11/29/89

% Solids: 35.5

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	15100.00			P
7440-36-0	Antimony	10.00	B	N	P
7440-38-2	Arsenic	15.40			F
7440-39-3	Barium	154.00			P
7440-41-7	Beryllium	2.50	B		P
7440-41-7	Cadmium	1.10	U		P
7440-70-2	Calcium	2290.00	B		P
7440-47-3	Chromium	55.60			P
7440-48-4	Cobalt	13.70	B		P
7440-50-8	Copper	46.00		N*	P
7439-89-6	Iron	28000.00			P
7439-92-1	Lead	53.50			F
7439-95-4	Magnesium	3060.00			P
7439-96-5	Manganese	325.00		N*	P
7439-97-6	Mercury	1.40			CV
7440-02-0	Nickel	30.50			P
7440-09-7	Potassium	1200.00	B		P
7782-49-2	Selenium	1.70	B	NW	F
7440-22-4	Silver	2.20	U		P
7440-23-5	Sodium	262.00	B		P
7440-28-0	Thallium	1.40	U		F
7440-62-2	Vanadium	75.70			P
7440-66-6	Zinc	233.00		E	P
	Cyanide	2.80	U		AS

Color Before: GREY Clarity Before: Texture: FINE

Color After: GREY Clarity After: Artifacts:

Comments:

000006

AR301602

WESTON

APPENDIX B

DPO REPORT

WESTON SM

DPO: [ ] ACTION [X] FYI Region III

INORGANIC REGIONAL DATA ASSESSMENT SUMMARY

CASE NO: 13230
SDG NO: MCCE47
SOW: 7-88
NO. OF SAMPLES: 4

LABORATORY: SKINNER & SHERMAN
DATA USER: DEBORAH SZARO
REVIEW COMPLETION DATE: 2-9-90
MATRIX: AQUEOUS

REVIEWER: ESAT

	ICP	AA	Hg	CYANIDE
1. HOLDING TIMES	O	O	O	O
2. INITIAL CALIBRATIONS	O	O	O	O
3. CONTINUING CALIBRATIONS	O	O	O	O
4. FIELD BLANKS(F=NOT APPLICABLE)	O	O	O	O
5. LABORATORY BLANKS	X	O	O	O
6. ICS	O			
7. LCS	O	O		
8. DUPLICATE ANALYSIS	X	O	O	O
9. MATRIX SPIKE	O	X	O	O
10. MSA		O		
11. SERIAL DILUTION	O			
12. SAMPLE VERIFICATION	O	O	O	O
13. REGIONAL QC(F-NOT APPLICABLE)	F	F	F	F
14. OVERALL ASSESSMENT	X	X	O	O

O = No problems or minor problems that do not affect data usability
X = No more than about 5% of the data points are qualified as either estimated or unusable.
M = More than about 5% of the data points are qualified as estimated.
Z = More than about 5% of the data points are qualified as unusable.
A = DPO action requested; use in conjunction with one of the above codes.

DPO ACTION ITEMS:

AREAS OF CONCERN:

WESTON

DPO: [ ] ACTION [X] FYI

Region III

INORGANIC REGIONAL DATA ASSESSMENT SUMMARY

CASE NO: 13230
SDG NO: MCCE47
SOW: 7-88
NO. OF SAMPLES: 1

LABORATORY: SKINNER & SHERMAN
DATA USER: DEBORAH SZARO
REVIEW COMPLETION DATE: 2-9-90
MATRIX: SOIL

REVIEWER: ESAT

	ICP	AA	Hg	CYANIDE
1. HOLDING TIMES	O	O	O	O
2. INITIAL CALIBRATIONS	O	O	O	O
3. CONTINUING CALIBRATIONS	O	O	O	O
4. FIELD BLANKS(F=NOT APPLICABLE)	O	O	O	O
5. LABORATORY BLANKS	O	O	O	O
6. ICS	O			
7. LCS	O	O		
8. DUPLICATE ANALYSIS	X	O	O	O
9. MATRIX SPIKE	X	X	O	O
10. MSA		O		
11. SERIAL DILUTION	X			
12. SAMPLE VERIFICATION	O	O	O	O
13. REGIONAL QC(F-NOT APPLICABLE)	F	F	F	F
14. OVERALL ASSESSMENT	X	X	O	O

O = No problems or minor problems that do not affect data usability
X = No more than about 5% of the data points are qualified as either estimated or unusable.
H = More than about 5% of the data points are qualified as estimated.
Z = More than about 5% of the data points are qualified as unusable.
A = DPO action requested; use in conjunction with one of the above codes.

DPO ACTION ITEMS:

AREAS OF CONCERN:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
CENTRAL REGIONAL LABORATORY
839 BESTGATE ROAD
ANNAPOLIS, MARYLAND 21401
(301) 266-9180

DATE : February 22, 1990

SUBJECT: Inorganic Data Validation for the Standard Chlorine Site
Case 13304

FROM : Theresa A. Simpson TAS
Region III ESAT DPO (3ES23)

TO : Robert Guarni
Regional Project Manager (3HW25)

THRU : Patricia J. Krantz, Chief TAS for
Quality Assurance Branch (3ES23)

Attached is the inorganic data review for the Standard Chlorine Site (Case 13304) completed by the Region III Environmental Services Assistance Team (ESAT) contractor under the direction of Region III ESD.

If you have any questions regarding this review, please call me.

Attachment

cc: Dave Baska VERSAR
Elaine Spiewak (3HW14) (w/o attachments)

TID File: 03900117 Task 1257

WESTON
MANAGERS DESIGNERS.CONSULTANTS
2568A RIVA ROAD
SUITE 300
ANNAPOLIS, MD 21401
PHONE: 301-266-9887

DATE: 21 FEBRUARY 1990

SUBJECT: INORGANIC DATA VALIDATION, Case 13304
SITE: STANDARD CHLORINE

FROM: PETE CHAPMAN PC — INORGANIC DATA REVIEWER
MARSHA BURRELL MB — SENIOR DATA REVIEWER

TO: TERRY SIMPSON
ESAT DEPUTY PROJECT OFFICER

THRU: RICHARD D. DRESSER RDD
ESAT TEAM MANAGER

OVERVIEW

The set of samples for Case 13304 contained three (3) aqueous samples and one soil (1) sample which were analyzed through the Contract Laboratory Program (CLP) Routine Analytical Services. Included in the sample set was a field duplicate pair and an equipment blank.

SUMMARY

All analytes were successfully analyzed in all samples. Areas of concern with respect to data usability are listed according to the seriousness of the problem. These include:

MINOR ISSUES

The equipment blank had results >IDL for the Ca and Pb analytes. The reported results for these analytes in the affected samples which are <5x the blank concentration may be biased high and, therefore, have been qualified "B".

The pH of samples MCCE70 and MCCE75 for CN^- was <12.0. The quantitation limits may be biased low and have been qualified "UL".

The aqueous matrix spike recoveries were low (<75%) for the Mn and Ag analytes. The quantitation limits and reported results for these analytes may be biased low, and therefore, have been qualified "UL" and "L", respectively.

The soil matrix spike recovery was low (30-75%) for the Sb analyte. The quantitation limit for the Sb analyte in sample MCCR03 may be biased low and, therefore, has been qualified "UL".

The soil matrix spike recovery was high (>125%) for the Pb analyte. The reported result for sample MCCR03 may be biased high, however, the qualifier "B" denoting blank contamination supercedes the "K" qualifier.

The analytical spike recovery was low (<85%) in soil sample MCCR03 for the Se analyte. The quantitation limit may be biased low, and therefore, has been qualified "UL".

NOTES:

The data was reviewed in accordance with the National Functional Guidelines for Evaluating Inorganic Analyses.

INFORMATION REGARDING REPORT CONTENT

Table 1A is a summary of qualifiers added to the laboratory's results during evaluation.

ATTACHMENTS

TABLE 1A	SUMMARY OF QUALIFIERS ON DATA SUMMARY AFTER DATA VALIDATION
TABLE 1B	CODES USED IN COMMENTS COLUMN
TABLE 2	GLOSSARY OF DATA QUALIFIER CODES
TABLE 3	DATA SUMMARY FORM
APPENDIX A	RESULTS REPORTED BY LABORATORY FORM Is
APPENDIX B	DPO REPORT
APPENDIX C	SUPPORT DOCUMENTATION

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TABLE 1A

SUMMARY OF QUALIFIERS ON DATA SUMMARY
AFTER DATA VALIDATION

ANALYTE	SAMPLES AFFECTED	POSITIVE VALUES	NON-DETECTED VALUES	BIAS	COMMENTS*
Sb	MCCR03		UL	Low	A (55.7%)
Ca	MCCR03	B		High	B (55.9 ppb)
Pb	MCCE71	B		High	B (4.2 ppb)
	MCCR03	B		High	B (4.2 ppb) C (172%)
Mn	MCCE70, MCCE71	L	UL	Low	A (71.8%)
Se	MCCR03		UL	Low	D (84.8%)
Ag	MCCE70, MCCE71		UL	Low	A (48.7%)
CN^-	MCCE70, MCCE75		UL	Low	E (<12.0)

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TABLE 1B

CODES USED IN COMMENTS COLUMN

A = Due to a low matrix spike recovery (% recovery is in parentheses), the quantitation limits and/or reported results may be biased low.

B = The equipment blank had a result >IDL (the result is in parentheses) and the reported results were <5x the blank. The reported results may be biased high.

C = Due to a high matrix spike recovery (% recovery is in parentheses), the reported results may be biased high.

D = Due to a low analytical spike recovery (% recovery is in parentheses), the quantitation limits may be biased low.

E = The pH result was <12 for the CN^- sample. Therefore, the quantitation limits are estimated.

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TABLE 2

GLOSSARY OF DATA QUALIFIER CODES (INORGANIC)

CODES RELATED TO IDENTIFICATION
(confidence concerning presence or absence of analytes):

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

(NO CODE) = Confirmed identification.

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

CODES RELATED TO QUANTITATION
(can be used for both positive results and sample quantitation limits):

J = Analyte Present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

[] = Analyte present. As values approach the IDL the quantitation may not be accurate.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

OTHER CODES

Q = No analytical result.

Table 3

DATA SUMMARY FORM: I N O R G A N I C S

WATER SAMPLES
(ug/L)

Site Name: Standard Chlorine

Case #: 13304 Sampling Date: 12/4-7/89

+Due to dilution, sample quantitation limit is affected. See dilution table for specifics.

AR301612

CRDL	ANALYTE	MCCE70		MCCE71		MCCE75	
	Dilution Factor	1.0		1.0		1.0	
	Location	Equipment Blank		SWB-7 Filtered		SWB-7	
200	Aluminum			379			Q
60	Antimony						Q
10	*Arsenic			[9.2]			Q
200	Barium			[78.9]			Q
5	Beryllium						Q
5	*Cadmium						Q
5000	Calcium	[55.9]		27600			Q
10	*Chromium			[3.8]			Q
50	Cobalt						Q
25	Copper						Q
100	Iron	[65.6]		17700			Q
5	*Lead	4.2		8.8	B		Q
5000	Magnesium			13200			Q
15	Manganese		UL	176	L		Q
0.2	Mercury						Q
40	*Nickel						Q
5000	Potassium			6730			Q
5	Selenium						Q
10	Silver		UL		UL		Q
5000	Sodium			132000			Q
10	Thallium						Q
50	Vanadium						Q
20	Zinc	[8.8]		552			Q
10	*Cyanide		UL		Q		UL

CRDL = Contract Required Detection Limit *Action Level Exists SEE NARRATIVE FOR CODE DEFINITIONS

revised 10/88

Table 3

AR301613

DATA SUMMARY FORM: I N O R G A N I C S

SOIL SAMPLES (mg/Kg)

Name: Standard Chlorine

#: 13304 Sampling Date: 12/4-7/89

*Due to dilution, sample quantitation limit is affected. See dilution table for specifics.

	Sample No.	MCCR03																					
	Dilution Factor	1.0																					
	% Solids	90.4																					
	Location	DP-5																					
CRDL	ANALYTE																						
40	Aluminum	9780																					
12	Antimony		UL																				
2	Arsenic	[1.5]																					
40	Barium	[16.2]																					
1	Beryllium																						
1	Cadmium																						
1000	Calcium	[118.4]	B																				
2	Chromium	6.9																					
10	Cobalt	[1.9]																					
5	Copper	[3.7]																					
20	Iron	8200																					
1	*Lead	4.0	B																				
1000	Magnesium	[314]																					
3	Manganese	42.4																					
0.2	Mercury																						
8	Nickel																						
1000	Potassium	[155]																					
1	Selenium		UL																				
2	Silver																						
1000	Sodium																						
2	Thallium																						
10	Vanadium	12.7																					
4	Zinc	12.5																					
2	Cyanide																						

CRDL = Con t Required Detection Limit

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

sed 10/88

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APPENDIX A

RESULTS REPORTED BY LABORATORY

FORM I'S

INORGANIC ANALYSIS DATA SHEET

MCCE70

Lab Name: SILVER VALLEY LABS., INC Contract: 68-W8-0074

Lab Code: SILVER Case No.: 13304 SAS No.: SDG No.: MCCE71

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 12/03/89

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	21.00	U		P
7440-36-0	Antimony	26.00	U		P
7440-38-2	Arsenic	3.00	U	W	P
7440-39-3	Barium	13.00	U		P
7440-41-7	Beryllium	2.00	U		P
7440-43-9	Cadmium	4.00	U		P
7440-70-2	Calcium	55.50	B		P
7440-47-3	Chromium	3.00	U		P
7440-48-4	Cobalt	6.00	U		P
7440-50-8	Copper	6.00	U		P
7439-89-6	Iron	85.60	B		P
7439-92-1	Lead	4.20			P
7439-95-4	Magnesium	47.00	U		P
7439-96-5	Manganese	2.00	U	N	P
7439-97-6	Mercury	.20	U		CV
7440-02-0	Nickel	25.00	U		P
7440-09-7	Potassium	691.00	U		P
7782-49-2	Selenium	3.00	U	W	P
7440-22-4	Silver	3.00	U	N	P
7440-23-5	Sodium	77.00	U		P
7440-28-0	Thallium	2.00	U		P
7440-62-2	Vanadium	6.00	U		P
7440-66-6	Zinc	8.50	B		P
	Cyanide	10.00	U		C

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

EPA SAMPLE NO.

MCCE71

INORGANIC ANALYSIS DATA SHEET

Lab Name: SILVER VALLEY LABS., INC Contract: 68-W8-0074

Lab Code: SILVER Case No.: 13304 SAS No.: SDG No.: MCCE71

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 12/05/89

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	379.00			P
7440-36-0	Antimony	26.00	U		P
7440-38-2	Arsenic	9.20	B	W	F
7440-39-3	Barium	78.90	B		P
7440-41-7	Beryllium	2.00	U		P
7440-43-9	Cadmium	4.00	U		P
7440-70-2	Calcium	27600.00			P
7440-47-3	Chromium	3.90	B		P
7440-48-4	Cobalt	6.00	U		P
7440-50-8	Copper	6.00	U		P
7439-89-6	Iron	17700.00			P
7439-92-1	Lead	9.60		W	F
7439-95-4	Magnesium	13200.00			P
7439-96-5	Manganese	1760.00		N	P
7439-97-6	Mercury	.20	U		CV
7440-02-0	Nickel	25.00	U		P
7440-09-7	Potassium	6730.00			P
7782-49-2	Selenium	3.00	U	W	F
7440-22-4	Silver	3.00	U	N	P
7440-23-5	Sodium	132000.00			P
7440-28-0	Thallium	2.00	U		F
7440-62-2	Vanadium	6.00	U		P
7440-66-6	Zinc	552.00			P
	Cyanide				NR

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

AR301616

EPA SAMPLE NO.:

1

INORGANIC ANALYSIS DATA SHEET

MCCE75

Lab Name: SILVER VALLEY LABS., INC Contract: 68-WS-0074

Lab Code: SILVER Case No.: 13304 SAS No.: SDG No.: MCCE71

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 12/06/89

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide	10.00	U		C

Color Before: BROWN Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN 7/88

AR301617

EPA SAMPLE NO.:

MCCR03

INORGANIC ANALYSIS DATA SHEET

Lab Name: SILVER VALLEY LABS., INC Contract: 68-W8-0074

Lab Code: SILVER Case No.: 13204 SAS No.: SDG No.: MCCE71

Matrix (soil/water): SOIL Lab Sample ID:

Level (low/med): LOW Date Received: 12/08/89

% Solids: 90.4

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	9780.00			P
7440-36-0	Antimony	5.80	U	N	P
7440-38-2	Arsenic	1.50	B		P
7440-39-3	Barium	16.20	B		P
7440-41-7	Beryllium	.44	U		P
7440-43-9	Cadmium	.58	U		P
7440-70-2	Calcium	48.40	B		P
7440-47-3	Chromium	6.90			P
7440-48-4	Cobalt	1.90	B		P
7440-50-8	Copper	3.70	B		P
7439-89-6	Iron	8200.00			P
7439-92-1	Lead	4.00		N	P
7439-95-4	Magnesium	314.00	B		P
7439-96-5	Manganese	42.40			P
7439-97-6	Mercury	.11	U		CV
7440-02-0	Nickel	5.50	U		P
7440-09-7	Potassium	155.00	B		P
7782-49-2	Selenium	.66	U	W	P
7440-22-4	Silver	.66	U	N	P
7440-23-5	Sodium	17.00	U		P
7440-28-0	Thallium	.44	U	W	P
7440-62-2	Vanadium	12.70			P
7440-66-6	Zinc	12.50			P
	Cyanide	1.10	U		C

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: COLORLESS Clarity After: Artifacts:

Comments:

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APPENDIX B

DPO REPORT

WESTON

DPO: [ ] ACTION [X] FYI Region III

INORGANIC REGIONAL DATA ASSESSMENT SUMMARY

CASE NO: 13304
SDG NO: MCCE70
SOW: 7/88
NO. OF SAMPLES: 3

LABORATORY: Silver
DATA USER: Gerald Muth
REVIEW COMPLETION DATE: 2/14/90
MATRIX: Aqueous

REVIEWER: ESAT

	ICP	AA	Hg	CYANIDE
1. HOLDING TIMES	_O_	_O_	_O_	_O_
2. INITIAL CALIBRATIONS	_O_	_O_	_O_	_O_
3. CONTINUING CALIBRATIONS	_O_	_O_	_O_	_O_
4. FIELD BLANKS(F=NOT APPLICABLE)	_O_	_M_	_O_	_O_
5. LABORATORY BLANKS	_O_	_O_	_O_	_O_
6. ICS	_O_			
7. LCS	_O_	_O_		
8. DUPLICATE ANALYSIS	_O_	_O_	_O_	_O_
9. MATRIX SPIKE	_M_	_O_	_O_	_O_
10. MSA		_O_		
11. SERIAL DILUTION	_O_			
12. SAMPLE VERIFICATION	_O_	_O_	_O_	_O_
13. REGIONAL QC(F-NOT APPLICABLE)	_F_	_F_	_F_	_F_
14. OVERALL ASSESSMENT	_M_	_M_	_O_	_M*_

O = No problems or minor problems that do not affect data usability
X = No more than about 5% of the data points are qualified as either estimated or unusable.
M = More than about 5% of the data points are qualified as estimated.
Z = More than about 5% of the data points are qualified as unusable.
A = DPO action requested; use in conjunction with one of the above codes.

DPO ACTION ITEMS: _____

AREAS OF CONCERN: * See following page - Note #1.

INORGANIC REGIONAL DATA ASSESSMENT SUMMARY

NOTES

1. The pH of samples MCCE70 and MCCE75 for CN^- was <12.0. The quantitation limit may be biased low and have been qualified "UL".

WESTON SM

DPO: [ ] ACTION [X] FYI Region III

INORGANIC REGIONAL DATA ASSESSMENT SUMMARY

CASE NO: 13304
SDG NO: MCCE70
SOW: 7/88
NO. OF SAMPLES: 1

LABORATORY: Silver
DATA USER: Gerald Muth
REVIEW COMPLETION DATE: 2/14/90
MATRIX: Soil

REVIEWER: ESAT

	ICP	AA	Hg	CYANIDE
1. HOLDING TIMES	_O_	_O_	_O_	_O_
2. INITIAL CALIBRATIONS	_O_	_O_	_O_	_O_
3. CONTINUING CALIBRATIONS	_O_	_O_	_O_	_O_
4. FIELD BLANKS(F=NOT APPLICABLE)	_M_	_M_	_O_	_O_
5. LABORATORY BLANKS	_O_	_O_	_O_	_O_
6. ICS	_O_			
7. LCS	_O_	_O_		
8. DUPLICATE ANALYSIS	_O_	_O_	_O_	_O_
9. MATRIX SPIKE	_M_	_O_	_O_	_O_
10. MSA		_O_		
11. SERIAL DILUTION	_O_			
12. SAMPLE VERIFICATION	_O_	_O_	_O_	_O_
13. REGIONAL QC(F-NOT APPLICABLE)	_F_	_F_	_F_	_F_
14. OVERALL ASSESSMENT	_M_	_M_	_O_	_O_

O = No problems or minor problems that do not affect data usability
X = No more than about 5% of the data points are qualified as either estimated or unusable.
M = More than about 5% of the data points are qualified as estimated.
Z = More than about 5% of the data points are qualified as unusable.
A = DPO action requested; use in conjunction with one of the above codes.

DPO ACTION ITEMS: _____

AREAS OF CONCERN: _____

AR301622

WESTON

APPENDIX C

SUPPORT DOCUMENTATION

U.S. EPA - CLP

SB

POST DIGEST SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

MCCE71A

Lab Name: SILVER VALLEY LABS., INC Contract: 68-W8-0074

Lab Code: SILVER Case No.: 13304 SAS No.: SDG No.: MCCE71

Matrix: WATER Level (low/med): LOW

Concentration Units: ug/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	S	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead									NR
Magnesium									NR
Manganese		5241.89		1757.00		3500.0	99.6		P
Mercury									NR
Nickel									NR
Potassium									NR
Selenium									NR
Silver									NR
Sodium									NR
Thallium									NR
Vanadium									NR
Zinc									NR
Cyanide									

Comments:

FORM V (Part 2) - IN

U.S. EPA - CLP

5B

POST DIGEST SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

MCCR03A

Lab Name: SILVER VALLEY LABS., INC Contract: 68-WS-0074

Lab Code: SILVER Case No.: 13304 SAS No.: SDG No.: MCCE71

Matrix: SOIL Level (low/med): LOW

Concentration Units: ug/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Antimony		136.93		26.00	U	120.0	114.1		P
Arsenic									NR
Barium									NR
Beryllium									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead									NR
Magnesium									NR
Manganese									NR
Mercury									NR
Nickel									NR
Potassium									NR
Selenium									NR
Silver									NR
Sodium									NR
Thallium									NR
Vanadium									NR
Zinc									NR
Cyanide									

Comments:

FORM V (Part 2) - IN

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
CENTRAL REGIONAL LABORATORY
839 BESTGATE ROAD
ANNAPOLIS, MARYLAND 21401
(301) 266-9180

DATE : February 20, 1990

SUBJECT: Inorganic Data Validation for the Standard Chlorine Site
SAS 5093C Task III

FROM : Theresa A. Simpson
Region III ESAT DPO (3ES23)

TO : Bob Guarni
Regional Project Manager (3HW25)

THRU : Patricia J. Krantz, Chief
Quality Assurance Branch (3ES23)

Attached is the inorganic data review for the Standard Chlorine Site (SAS 5093C Task III) completed by the Region III Environmental Services Assistance Team (ESAT) contractor under the direction of Region III ESD.

If you have any questions regarding this review, please call me.

Attachment

cc: Dave Basko VERSAR
Elaine Spiewak (3HW14) (w/o attachments)

TID File: 03900117 Task 1241

WESTON
MANAGERS DESIGNERS CONSULTANTS
2568A RIVA ROAD
SUITE 300
ANNAPOLIS, MD 21401
PHONE: 301-266-9887

DATE: 14 FEBRUARY 1990

SUBJECT: INORGANIC DATA VALIDATION, SAS Case 5093C Task III
SITE: STANDARD CHLORINE

FROM: MARSHA BURRELL mb DOUG MCINNES DM
INORGANIC DATA REVIEWER SENIOR DATA REVIEWER

TO: TERRY SIMPSON
ESAT DEPUTY PROJECT OFFICER

THRU: RICHARD D. DRESSER RDD
ESAT TEAM MANAGER

OVERVIEW

SAS Case 5093C Task III consisted of four (4) aqueous samples to be analyzed for Total Hardness. This set included one (1) field duplicate pair and one (1) field blank. The samples were analyzed using EPA Method 130.2, Total Hardness (EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, March 1983). The samples were analyzed as a Contract Laboratory Program (CLP) Special Analytical Services (SAS).

SUMMARY

The titration data for this set of aqueous samples met the requirements of the SAS request. No problems ocurred that would qualify the data.

INFORMATION REGARDING REPORT CONTENT

These data were reviewed according to the original SAS request documents for sample analysis which accompanied the data sets to be reviewed.

ATTACHMENTS

TABLE 1	DATA SUMMARY FORM
APPENDIX A	RESULTS REPORTED BY LABORATORY
APPENDIX B	DPO REPORT
APPENDIX C	SAS REQUEST

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TABLE 1

DATA SUMMARY FORM

TOTAL HARDNESS

Site: Standard Chlorine

Date Sampled: November 27, 1990

Sample ID	Location	Total Hardness * (mg $CaCO_3$/L)
5093C-07 Task 3	SWT - 9	59.2
5093C-08 Task 3	BB-10 (field blank)	(0.5)
5093C-09 Task 3 (Duplicate of 5093C-07 Task III)	SWD - 18	57.9
5093C-10 Task 3	SWR - 8	73.1

(*CRDL = 10 mg. $CaCO_3$/L)

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APPENDIX A

RESULTS REPORTED BY LABORATORY

FORM I'S

INDUSTRIAL CORROSION MANAGEMENT, INC.
1152 Route 10
Randolph, NJ 07869
201-584-0330

DATA SUMMARY

SAS Solicitation # 5093C, Task III

Sample ID: SWD-18

Lab ID	SMO ID	Parameter	Result (mg/L)	MDL (mg/L)
110144	09	Hardness	57.9	0.5

Sample ID: SWR-8

Lab ID	SMO ID	Parameter	Result (mg/L)	MDL (mg/L)
110145	10	Hardness	73.1	0.5

MDL-minimum detection limit

INDUSTRIAL CORROSION MANAGEMENT, INC.
1152 Route 10
Randolph, NJ 07869
201-584-0330

DATA SUMMARY

SAS Solicitation # 5093C, Task III

Sample ID: SWT-9

Lab ID	SHO ID	Parameter	Result (mg/L)	MDL (mg/L)
110142	07	Hardness	59.2	0.5

Sample ID: SS-10

Lab ID	SHO ID	Parameter	Result (mg/L)	MDL (mg/L)
110143	08	Hardness	U	0.5

MDL-minimum detection limit

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APPENDIX B

DPO REPORT

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DPO: FYI

Region III

TOTAL HARDNESS REGIONAL DATA

ASSESSMENT SUMMARY

SAS No: 5093C Task III

Laboratory: ICM

No. of Samples: 4

Data User: Charles Sands

Matrix: Aqueous

Review Completion: 2/2/90

Method: Total Hardness
EPA Method 130.2
(Titrimetric)

Reviewer: ESAT

	Total Hardness
1. Blank Evaluation	0
2. Duplicate Analysis	0
3. LCS	0
OVERALL ASSESSMENT	0

0 = Little or no problems that affect data usability.

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APPENDIX C

SUPPORT DOCUMENTATION

SAS 985 J07J III

U.S. Environmental Protection Agency
CLP Sample Management Office
209 Madison Street, Alexandria, VA 22313
PHONE: (703) 557-2490 or FTS 557-2490

SAS Number

NOV 1989

SPECIAL ANALYTICAL SERVICES
Regional Request

☐ Regional Transmittal

☐ Telephone Request

A. EPA Region and Client: EPA Region III

B. Regional Representative: Colleen K. Walling

C. Telephone Number: (301) 266-9180

D. Date of Request: Nov-1, 1989

E. Site Name: Standard Chlorine of Delaware, Delaware City, Delaware

faxed to SMO 11-16-89

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delay in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. General description of analytical service requested:

analysis of six low conc. aqueous samples for Total Hardness using EPA method 130.2 (method attached).

2. Definition and number of work units involved (specify whether whole samples or fractions; whether organics or inorganics; whether aqueous or soil and sediments; and whether low, medium, or high concentration):

analysis of six low conc. aqueous samples for the above includes 4 environmental samples, 1 field duplicate(s) and 1 equipment

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3. Program (specify whether Superfund (Remedial or Enforcement), RCRA, NPDES, etc.), Justification for analysis and Site Account Number:

Superfund Enforcement, RP RI/FS Oversight

OTGB03NP61

SAS Approved By:

4. Estimated date(s) of collection: Nov. 13 - Nov. 22, 1989

5. Estimated date(s) and method of shipment:

6. Approximate number of days results required after lab receipt of samples:

Data package within 45 days of laboratory rec of last sample.

7. Analytical protocol required (attach copy if other than a protocol currently used in this program):

EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes (MCAWW), March 1983. Method 130.2, Hardness, Total (mg/L as $CaCO_3$) (Titrimetric, EDTA) (Method atta

8. Special technical instructions (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):

analytical procedures, as described in the attached method including all quality control procedu MUST be followed even if the text just indicates that those procedures should be followed. Report all holding times on the data sheets.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain-of-Custody documentation, etc.). If not completed, format of results will be left to program discretion.

Data package must include: all raw data, all instrument and/or equipment calibration results, calculations, blank results, duplicate results, chain of custody forms, SAS request forms, SAS packing list(s) or traffic report(s), copy of airbill(s), and copies of analyst's logbooks(signed by analyst) with date and time of sample preparation and analysis.

The cover page and all sample report forms M [illegible] with the complete EPA sample number as it appears [illegible] ody and CLP paperwork.

10. Other (use additional sheets or attach supplementary information, as needed):

The case narrative must document all problems encountered and the subsequent resolutions. List instrumentation and methods employed for analysis. Also, note whether samples were preserved or not and the procedure utilized in preservation. EPA QC reference samples, or equivalent reference samples must be identified as to source and lot number. Documentation of "true"

11. Name of sampling/shipping contact: Brad Staub

Phone: (215) 741-4211

12. Data Requirements

Parameter	Detection Limit	Precision Desired (+ or - Concentration)
Hardness	10 mg/L	± 15%

13. QC Requirements

Audits Required	Frequency of Audits	Limits (Percent or Concentration)
Duplicates (s)	1/20 or 1/batch	+/- 20% RPD
Method Blank (s)	1/20 or 1/batch	<10 mg/L
AUDIT (EPA or commercially prepared)	1/analytical run	N/A

14. Action Required if Limits are Exceeded

Duplicate(s): re-analyze the sample ~~and~~ duplicate pair and report both sets of data.

15. Reque: Method Blank(s): re-analyze all associated samples after corrective action has been taken to reduce the blank contamination to less then the method detection limit cited above. Submit all data.

16. Request reviewed by: Laurie Brown Colleen K. Walling

Date: 11-14-89 11-15-89

Please return this request to the Sample Management Office as soon as possible to expedite processing of your request for special analytical services. Should you have any questions or need any assistance, please contact your Regional representative at the Sample Management Office.

HARDNESS, Total (mg/1 as $CaCO_3$)
Method 130.2 (Titrimetric, EDTA)

STORET NO. 00900

1. Scope and Application
   1.1 This method is applicable to drinking, surface, and saline waters, domestic and industrial wastes.
   1.2 The method is suitable for all concentration ranges of hardness; however, in order to avoid large titration volumes, use a sample aliquot containing not more than 25 mg $CaCO_3$.
   1.3 Automated titration may be used.
2. Summary of Method
   2.1 Calcium and magnesium ions in the sample are sequestered upon the addition of disodium ethylenediamine tetraacetate (Na_2EDTA). The end point of the reaction is detected by means of Eriochrome Black T indicator, which has a red color in the presence of calcium and magnesium and a blue color when the cations are sequestered.
3. Sample Handling and Preservation
   3.1 Cool to 4°C, HNO_3 to pH < 2.
4. Comments
   4.1 Excessive amounts of heavy metals can interfere. This is usually overcome by complexing the metals with cyanide.
      4.1.1 Routine addition of sodium cyanide solution (Caution: deadly poison) to prevent potential metallic interference is recommended.
5. Apparatus
   5.1 Standard laboratory titrimetric equipment.
6. Reagents
   6.1 Buffer solution
      6.1.1 If magnesium EDTA is available: Dissolve 16.9 g NH_4Cl in 143 ml conc. NH_4OH in a 250 ml volumetric, add 1.25 g of magnesium salt of EDTA and dilute to the mark with distilled water. Then go to 6.1.3.
      6.1.2 If magnesium EDTA is unavailable: Dissolve 1.179 g disodium EDTA (analytical reagent grade) and 780 mg $MgSO_4 \cdot 7H_2O$ (or 644 mg $MgCl_2 \cdot 6H_2O$) in 50 ml distilled water. Add this solution to a 250 ml volumetric flask containing 16.9 g NH_4Cl and 143 ml conc. NH_4OH with mixing and dilute to the mark with distilled water.
      6.1.3 Store in a tightly stoppered plastic bottle; stable for approximately one month. Dispense with bulb operated pipet. Discard when 1 or 2 ml added to sample fails to produce a pH of 10.0 ±0.1 at end point of titration.

Approved for NPDES
Issued 1971
Editorial revision 1978 and 1982

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6.1.4 Commercially available "odorless buffers" which are more stable, may be used.

6.2 Inhibitors: For most waters inhibitors are not necessary. If interfering ions are present use one of the following:

6.2.1 Inhibitor I: NaCN powder. (Caution: extremely poisonous). Flush solutions or sample containing this down drain using large quantities of water. Make sure no acids are present which might liberate HCN gas.

6.2.2 Inhibitor II: Dissolve 5.0 g $Na_2S \cdot 9\ H_2O$ or 3.7 g $Na_2S \cdot 5\ H_2O$ in 100 ml distilled water. Exclude air with tightly fitted rubber stopper. This gives sulfide precipitates which may obscure the end point if large quantities of heavy metals are present. Deteriorates rapidly through air oxidation.

6.2.3 Inhibitor III: Dissolve 4.5 g hydroxylamine hydrochloride in 100 ml of 95% ethanol or isopropanol.

6.3 Indicator: Use a commercially available indicator such as Calmagite indicator (Mallinckrodt) or one of the formulations described below (6.3.1–6.3.3)

6.3.1 Mix 0.5 g Eriochrome Black T with 4.5 g hydroxylamine hydrochloride. Dissolve in 100 ml of 95% ethanol or isopropanol.

6.3.2 Dissolve 0.5 to 1.0 g Eriochrome Black T in an appropriate solvent such as triethanolamine or 2-methoxyethanol. Stable approximately one week.

6.3.3 Mix together 0.5 g Eriochrome Black T and 100 g NaCl.

6.4 Standard EDTA titrant, 0.02 N: Place 3.723 g analytical reagent grade disodium ethylenediamine tetraacetate dihydrate, $Na_2H_2C_{10}H_{12}O_8N_2 \cdot 2\ H_2O$ in a 1 liter volumetric flask and dilute to the mark with distilled water. Check with standard calcium solution (6.4.1) by titration (6.4.5). Store in polyethylene. Check periodically because of gradual deterioration.

6.4.1 Standard calcium solution 0.02 N: Place 1.000 g anhydrous calcium carbonate (primary standard low in metals) in a 500 ml flask. Add, a little at a time, 1 + 1 HCL (6.4.2) until all of the $CaCO_3$ has dissolved. Add 200 ml distilled water. Boil for a few minutes to expel CO_2. Cool. Add a few drops of methyl red indicator (6.4.3) and adjust to intermediate orange color by adding 3N NH_4OH (6.4.4) or 1 + 1 HCl (6.4.2) as required. Quantitatively transfer to a 1 liter volumetric flask and dilute to mark with distilled water.

6.4.2 Hydrochloric acid solution, 1 + 1.

6.4.3 Methyl red indicator: Dissolve 0.10 g methyl red in distilled water in a 100 ml volumetric flask and dilute to the mark.

6.4.4 Ammonium hydroxide solution, 3 N: Dilute 210 ml of conc. NH_4OH to 1 liter with distilled water.

6.4.5 Standardization titration procedure: Place 10.0 ml standard calcium solution (6.4.1) in vessel containing about 50 ml distilled water. Add 1 ml buffer solution (6.1). Add 1–2 drops indicator (6.3) or small scoop of dry indicator (6.3.3). Titrate slowly with continuous stirring until the last reddish tinge disappears; adding last

AR301639

few drops at 3–5 second intervals. At end point the color is blue. Total titration duration should be 5 minutes from the time of buffer addition.

$$N \text{ of EDTA} = \frac{0.2}{\text{ml of EDTA}}$$

6.5 Ammonium Hydroxide, 1N: Dilute 70 ml of conc. NH_4OH to 1 liter with distilled water.

7. Procedure

7.1 Pretreatment

7.1.1 For drinking waters, surface waters, saline waters, and dilutions thereof, no pretreatment steps are necessary. Proceed to 7.2.

7.1.2 For most wastewaters, and highly polluted waters, the sample must be digested as given in the Atomic Absorption Methods section of this manual, paragraphs 4.1.3 and 4.1.4. Following this digestion, proceed to 7.2.

7.2 Titration of sample-normal to high hardness:

7.2.1 Sample should require < 15 ml EDTA titrant (6.4) and titration should be completed within 5 minutes of buffer addition.

7.2.2 Place 25.0 ml sample in titration vessels, neutralize with 1N ammonium hydroxide (6.5) and dilute to about 50 ml.

7.2.3 Add 1 to 2 ml buffer solution (6.1).

7.2.4 If end point is not sharp (as determined by practice run) add inhibitor at this point (see 7.4).

7.2.5 Add 1 to 2 drops indicator solution (6.3.1 or 6.3.2) or small scoop of dried powder indicator formulation (6.3.3).

7.2.6 Titrate slowly with continuous stirring with standard EDTA titrant (6.4) until last reddish tint disappears. Solution is normally blue at end point.

7.3 Titration of sample–low hardness (less than 5 mg/l)

7.3.1 Use a larger sample (100 ml)

7.3.2 Use proportionately larger amounts of buffer, inhibitor and indicator

7.3.3 Use a microburet and run a blank using redistilled, distilled or deionized water.

7.4 To correct for interferences:

7.4.1 Some metal ions interfere by causing fading or indistinct end points. Inhibitors reduce this in accord with the scheme below for 25.0 ml samples diluted to 50 ml.

AR301640

Maximum Concentrations of Interferences Permissible with Various Inhibitors[a]

Interfering Substance	Maximum Interference Concentration mg/l		
	Inhibitor I	Inhibitor II	Inhibitor III
Aluminum	20	20	20
Barium	b	b	b
Cadmium	b	20	b
Cobalt	over 20	0.3	0[c]
Copper	over 30	20	0.3
Iron	over 30	5	20
Lead	b	20	b
Manganese (Mn^{2+})	b	1	1
Nickel	over 20	0.3	0[c]
Strontium	b	b	b
Zinc	b	200	b
Polyphosphate		10	

a Based on 25-ml sample diluted to 50 ml.
b Titrates as hardness.
c Inhibitor fails if substance is present.

7.4.2 Inhibitor I: At step 7.2.4 add 250 mg NaCN. Add sufficient buffer to achieve pH 10.0 ± 0.1 to offset alkalinity resulting from hydrolysis of sodium cyanide.

7.4.3 Inhibitor II: At step 7.2.4 add 1 ml of inhibitor II (6.2.2)

7.4.4 Inhibitor III: At step 7.2.4 add 1 ml of inhibitor III (6.2.3).

8. Calculations:

$$\text{Hardness (EDTA) mg } CaCO^3/l = \frac{A \times N \times 50{,}000}{\text{ml sample}}$$

where:
A = ml EDTA titrant (6.4)
N = normality of EDTA titrant.

AR301641

9. Precision and Accuracy

9.1 Forty-three analysts in nineteen laboratories analyzed six synthetic water samples containing exact increments of calcium and magnesium salts, with the following results:

Increment as Total Hardness mg/liter, $CaCO_3$	Precision as Standard Deviation mg/liter, $CaCO_3$	Accuracy as Bias, %	Accuracy as Bias, mg/liter, $CaCO_3$
31	2.87	−0.87	−0.003
33	2.52	−0.73	−0.24
182	4.87	−0.19	−0.4
194	2.98	−1.04	−2.0
417	9.65	−3.35	−13.0
444	9.73	−3.23	−14.3

(FWPCA Method Study 1, Mineral and Physical Analyses)

9.2 In a single laboratory (EMSL), using surface water samples at an average concentration of 194 mg $CaCO_3$/l, the standard deviation was ±3.

9.3 A synthetic unknown sample containing 610 mg/l total hardness as $CaCO_3$ contributed by 108 mg/l Ca and 82 mg/l Mg, and the following supplementary substances: 3.1 mg/l K, 19.9 mg/l Na, 241 mg/l chloride, 0.25 mg/l nitrite N, 1.1 mg/l nitrate N, 259 mg/l sulfate, and 42.5 mg/l total alkalinity (contributed by $NaHCO_3$) in distilled water was analyzed in 56 laboratories by the EDTA titrimetric method with a relative standard deviation of 2.9% and a relative error of 0.8%.

Bibliography

1. Standard Methods for the Examination of Water and Wastewater, 14th Edition, p 202, Method 309B (1975).
2. Annual Book of ASTM Standards, Part 31, "Water", Standard D 1126–67, p 161, Method B (1976).

AR301642