



52M-58

UNION CARBIDE CORPORATION P.O. BOX 513, COLUMBIA, TENNESSEE 38402-0513
Carbon Products Division

November 30, 1987

Mr. Robert J. Mitrey, P.E.
Associate Sanitary Engineer
New York State Department of Environmental
Conservation
600 Delaware Avenue
Buffalo, NY 14202-1073

Dear Mr. Mitrey:

We are enclosing a copy of the soil and groundwater sample results from the U.S. EPA Inspection of the Solid Waste Management Facility located at the rear of 3501 Hyde Park Boulevard, Town of Niagara on August 20 and 21, 1987.

The enclosed sample results are from our split samples with the EPA collected samples.

Very truly yours,

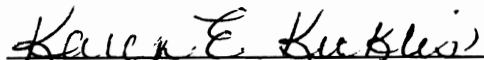
R. A. Bolton
Manager, Health, Safety
and Environmental Affairs



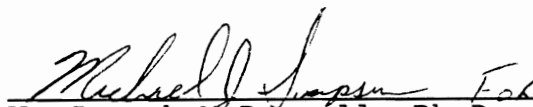
ANALYSIS OF SAMPLES COLLECTED FROM THE
UNION CARBIDE SOLID WASTE MANAGEMENT FACILITY
IN NIAGARA FALLS, NEW YORK

Report Prepared For

UNION CARBIDE CORPORATION
CARBON PRODUCTS DIVISION



Karen E. Kuklis
Project Controller



W. Joseph McDougall, Ph.D.
Technical Evaluation

September 23, 1987
AES Report CJT

COMMITMENT
TO
HONESTY - QUALITY - SERVICE

SCOPE OF WORK

At the request of Mr. Mike Balent, Advanced Environmental Services, Inc. accompanied NUS Laboratories Field Crew to the Union Carbide Solid Waste Management Facility for sampling of soil and groundwater.

Samples from three locations for soil were split by NUS. The soils were collected along the south perimeter of the landfill near a wooded, low area where there was apparent runoff. Each soil sample was collected and composited from the surface to a depth of 1-1½ feet.

The monitoring well water samples were collected after purging three to five well volumes.

Samples were drawn by stainless steel bailer and split with Advanced Environmental Services, Inc.

All samples were collected on August 20 and 21, 1987 and delivered to Advanced Environmental Services, Inc. with Chain of Custody (Appendix A).

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

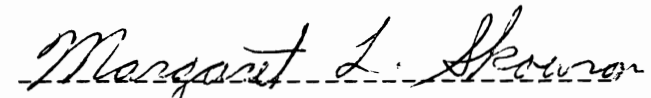
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Type of Analysis: RESULTS - WET CHEMISTRY

Client: UNION CARBIDE

A.E.S. Job Code CJT

				AES Lab No. -	14516	14517	14518
				Sample ID -	S1	S2	S3
					SOIL	SOIL	SOIL
					GRAB	GRAB	GRAB
Analytical Parameter(s)	Method No.	Ref No.	Quant. Limits	Sample Date-	8/20/87	8/20/87	8/20/87
Total Rec. Phenols (mg/kg)	420.2	3	0.5		BQL*	BQL	2.0
Total Cyanide (mg/kg)	9010/335.3	3	0.25		0.25	0.25	BQL

* Below quantifiable limits.



Margaret L. Skowron
Wet Chemistry Supervisor

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====
Type of Analysis: RESULTS - WET CHEMISTRY

Client: UNION CARBIDE

A.E.S. Job Code CJT

Analytical Parameter(s)	Method No.	Ref No.	Quant. Limits	AES Lab No. -	
				Sample ID -	Sample Date -
				14519 GW-1 WATER (BW-1 WELL) GRAB 8/20/87	14520 GW-2 WATER (OW-2) GRAB 8/21/87
Total Rec. Phenols (mg/l)	420.2	3	0.01	BQL*	BQL
Total Cyanide (mg/l)	335.3	3	0.1	0.01	BQL

* Below quantifiable limits.

Margaret L. Skowron

Margaret L. Skowron
Wet Chemistry Supervisor

AES JOB CODE *CJT*

[illegible]

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT
QUALITY CONTROL - PRECISION

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Type of Analysis: Duplicate Analysis
Units of Analysis: Milligrams/Liter or ppm
Client: UNION CARBIDE A.E.S. Job Code:CJT

Analytical Parameters	Sample No.	Original Conc.	Duplicate Conc.	Average Conc.	Range	Rel. % Difference
Total Recoverable Phenols	14516	BQL*	BQL	BQL	None	None
Total Cyanide	14519	0.01	0.01	0.01	None	None
Total Cyanide (mg/kg)	14518	BQL	BQL	BQL	None	None

Relative Percent Difference =
Range/Average X 100

* Below quantifiable limits.

ADVANCED ENVIRONMENTAL SERVICES, INC.

LABORATORY REPORT

QUALITY CONTROL - ACCURACY

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Type of Analysis: Matrix Spikes and E.P.A. Standards

Client: UNION CARBIDE A.E.S. Job Code: CJT

(Units:mg/l or ppm)

Analytical Parameters	Sample No.	Type	Observed Conc.	Original Conc.	Added Conc.	Percent Recovery*
Total Recoverable Phenols	14516	SPK	0.48	BQL**	0.50	96
Total Recoverable Phenols	179-5	EPA	0.070	0.072	---	97
Total Cyanide	14519	SPK	0.10	0.01	0.10	90
Total Cyanide	14518	SPK	0.52	BQL	0.50	104
Total Cyanide	WP586	EPA	0.50	0.50	---	100
Total Cyanide	WP586	EPA	0.46	0.50	---	92

* % Recovery=100 x ((Observed Conc. - "background" Original Conc.)/"Spike" Added Conc.)

** Below quantifiable limits.

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====
Type of Analysis: VOLATILE ORGANICS

Units Of Measure: Micrograms/Kilogram, or ppb
Client: UNION CARBIDE A.E.S. Job Code CJT

Analytical Parameter(s)	Method No.	Ref No.	Quant. Limits	AES Lab No.- Sample ID -	14516 S-1 SOIL	14517 S-2 SOIL	14518 S-3 SOIL
				Sample Date-	8/20/87	8/20/87	8/20/87
Chloromethane	624	1	10		BQL*	BQL	BQL
Vinyl Chloride	"	"	10		BQL	BQL	BQL
Chloroethane	"	"	10		BQL	BQL	BQL
Bromomethane	"	"	10		BQL	BQL	BQL
2-Chloroethyl Vinyl Ether	"	"	10		BQL	BQL	BQL
Ethylbenzene	"	"	10		BQL	BQL	BQL
Methylene Chloride	"	"	10		21	BQL	10
Chlorobenzene	"	"	10		BQL	BQL	BQL
1,1-Dichloroethylene	"	"	10		BQL	BQL	BQL
1,1-Dichloroethane	"	"	10		BQL	BQL	BQL
trans-1,2-Dichloroethylene	"	"	10		BQL	BQL	BQL
Chloroform	"	"	10		BQL	BQL	BQL
1,2-Dichloroethane	"	"	10		BQL	BQL	BQL
1,1,1-Trichloroethane	"	"	10		BQL	BQL	BQL
Carbon Tetrachloride	"	"	10		BQL	BQL	BQL
Bromodichloromethane	"	"	10		BQL	BQL	BQL
1,2-Dichloropropane	"	"	10		BQL	BQL	BQL
trans-1,3-Dichloropropene	"	"	10		BQL	BQL	BQL
Trichloroethylene	"	"	10		BQL	BQL	BQL
Benzene	"	"	10		BQL	BQL	BQL
cis-1,3-Dichloropropene	"	"	10		BQL	BQL	BQL
1,1,2-Trichloroethane	"	"	10		BQL	BQL	BQL
Dibromochloromethane	"	"	10		BQL	BQL	BQL
Bromoform	"	"	10		BQL	BQL	BQL

Susan C. Scrocchi
Gas Chromatography Supervisor

* Below quantifiable limits.

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====
Type of Analysis: VOLATILE ORGANICS

Units Of Measure: Micrograms/Liter, or ppb
Client: UNION CARBIDE A.E.S. Job Code CJT

Analytical Parameter(s)	Method No.	Ref No.	Quant. Limits	AES Lab No.- Sample ID -	14519 GW-1 BW-1 WELL WATER 8/20/87	14520 GW-2 MW-3 WELL WATER 8/20/87	14521 GW-2 OW-2 WATER 8/20/87
				Sample Date-			
Chloromethane	624	1	10		BQL*	BQL	BQL
Vinyl Chloride	"	"	10		BQL	BQL	BQL
Chloroethane	"	"	10		160	BQL	BQL
Bromomethane	"	"	10		BQL	BQL	BQL
2-Chloroethyl Vinyl Ether	"	"	10		BQL	BQL	BQL
Ethylbenzene	"	"	10		BQL	BQL	BQL
Methylene Chloride	"	"	10		BQL	BQL	BQL
Chlorobenzene	"	"	10		BQL	BQL	BQL
1,1-Dichloroethylene	"	"	10		BQL	BQL	BQL
1,1-Dichloroethane	"	"	10		BQL	BQL	BQL
trans-1,2-Dichloroethylene	"	"	10		BQL	BQL	BQL
Chloroform	"	"	10		BQL	BQL	BQL
1,2-Dichloroethane	"	"	10		BQL	BQL	BQL
1,1,1-Trichloroethane	"	"	10		BQL	BQL	BQL
Carbon Tetrachloride	"	"	10		BQL	BQL	BQL
Bromodichloromethane	"	"	10		BQL	BQL	BQL
1,2-Dichloropropane	"	"	10		BQL	BQL	BQL
trans-1,3-Dichloropropene	"	"	10		BQL	BQL	BQL
Trichloroethylene	"	"	10		BQL	BQL	BQL
Benzene	"	"	10		BQL	BQL	BQL
cis-1,3-Dichloropropene	"	"	10		BQL	BQL	BQL
1,1,2-Trichloroethane	"	"	10		BQL	BQL	BQL
Dibromochloromethane	"	"	10		BQL	BQL	BQL
Bromoform	"	"	10		BQL	BQL	BQL

* Below quantifiable limits.

Susan C. Scrocchi
Gas Chromatography Supervisor

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====

Type of Analysis: VOLATILE ORGANICS

Units Of Measure: Micrograms/Kilogram, or ppb

Client: UNION CARBIDE A.E.S. Job Code CJT

				AES Lab No.-	14516	14517	14518
				Sample ID -	S-1	S-2	S-3
					SOIL	SOIL	SOIL
Analytical	Method	Ref	Quant.				
Parameter(s)	No.	No.	Limits	Sample Date-	8/20/87	8/20/87	8/20/87
1,1,2,2-Tetrachloroethylene	624	1	10		BQL*	BQL	BQL
1,1,2,2-Tetrachloroethane	"	"	10		BQL	BQL	BQL
Toluene	"	"	10		BQL	BQL	BQL
Acrolein	"	"	100		BQL	BQL	BQL
Acrylonitrile	"	"	100		BQL	BQL	BQL

* Below quantifiable limits.

Susan C. Scrocchi
Susan C. Scrocchi
Gas Chromatography Supervisor

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====

Type of Analysis: VOLATILE ORGANICS

Units Of Measure: Micrograms/Liter, or ppb
Client: UNION CARBIDE A.E.S. Job Code CJT

Analytical Parameter(s)	Method No.	Ref No.	Quant. Limits	AES Lab No.- Sample ID -		
				BW-1 WELL WATER	MW-3 WELL WATER	OW-2 WATER
				8/20/87	8/20/87	8/20/87
1,1,2,2-Tetrachloroethylene	624	1	10	BQL*	BQL	BQL
1,1,2,2-Tetrachloroethane	"	"	10	BQL	BQL	BQL
Toluene	"	"	10	BQL	BQL	BQL
Acrolein	"	"	100	BQL	BQL	BQL
Acrylonitrile	"	"	100	BQL	BQL	BQL

* Below quantifiable limits.

Susan C. Scrocchi
Gas Chromatography Supervisor

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

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Type of Analysis: BASE/NEUTRAL EXTRACTABLES

Units Of Measure: Micrograms/Kilogram, or ppb
Client: UNION CARBIDE A.E.S. Job Code CJT

Analytical Parameter(s)	Method No.	Ref No.	Quant. Limits	AES Lab No.- Sample ID -	14516 S-1 SOIL	14517 S-2 SOIL	14518 S-3 SOIL
				Sample Date-	8/20/87	8/20/87	8/20/87
Fluorene	625	1	330		630	360	BQL*
4-Chlorophenylphenylether	"	"	330		BQL	BQL	BQL
Diphenylamine(N-Nitroso)	"	"	330		BQL	BQL	BQL
1,2-Diphenylhydrazine	"	"	330		BQL	BQL	BQL
(Azobenzene)	"	"	330		BQL	BQL	BQL
4-Bromophenylphenylether	"	"	330		BQL	BQL	BQL
Hexachlorobenzene	"	"	330		BQL	BQL	BQL
Phenanthrene	"	"	330		6,200	1,700	2,500
Anthracene	"	"	330		1,600	380	550
Di-N-Butylphthalate	"	"	330		BQL	BQL	BQL
Fluoranthene	"	"	330		14,000	3,000	4,900
Benzidine	"	"	1,600		BQL	BQL	BQL
Pyrene	"	"	330		11,200	3,100	4,300
Butylbenzylphthalate	"	"	330		BQL	BQL	BQL
Benzo(a)Anthracene	"	"	330		8,800	2,200	3,100
3,3'-Dichlorobenzidine	"	"	1,600		BQL	BQL	BQL
Chrysene	"	"	330		10,800	2,800	4,600
Bis(2-Ethylhexyl)Phthalate	"	"	330		BQL	2,000	BQL
Di-N-Octylphthalate	"	"	330		BQL	330	BQL
Benzo(b)Fluoranthene	"	"	330		11,000	3,100	5,500
Benzo(k)Fluoranthene	"	"	330		7,200	1,600	1,800
Benzo(a)Pyrene	"	"	330		12,000	3,600	5,600
Indeno(1,2,3-C,D)Pyrene	"	"	330		10,100	3,100	4,900
Dibenzo(a,h)Anthracene	"	"	330		2,200	650	1,100
Benzo(g,h,i)Perylene	"	"	330		9,100	2,900	4,800

* Below quantifiable limits.

Susan C. Scrocchi
Gas Chromatography Supervisor

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====

Type of Analysis: ACIDS

Units Of Measure: Micrograms/Kilogram, or ppb
Client: UNION CARBIDE A.E.S. Job Code CJT

	AES Lab No.-			14516	14517	14518
	Sample ID -			S-1	S-2	S-3
				SOIL	SOIL	SOIL
Analytical	Method	Ref	Quant.	Sample Date-		
Parameter(s)	No.	No.	Limits		8/20/87	8/20/87
					8/20/87	8/20/87
Phenol	625	1	330	BQL*	BQL	BQL
2-Chlorophenol	"	"	330	BQL	BQL	BQL
2-Nitrophenol	"	"	1,600	BQL	BQL	BQL
2,4-Dimethylphenol	"	"	330	BQL	BQL	BQL
p-Chloro-m-Chesol	"	"	330	BQL	BQL	BQL
2,4,6-Trichlorophenol	"	"	330	BQL	BQL	BQL
2,4-Dinitrophenol	"	"	1,600	BQL	BQL	BQL
4-Nitrophenol	"	"	1,600	BQL	BQL	BQL
4,6-Dinitro-O-Cresol	"	"	1,600	BQL	BQL	BQL
Pentachlorophenol	"	"	1,600	BQL	BQL	BQL
2,4-Dichlorophenol	"	"	330	BQL	BQL	BQL

* Below quantifiable limits.

Susan C. Scrocchi
Susan C. Scrocchi
Gas Chromatography Supervisor

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====

Type of Analysis: BASE/NEUTRAL EXTRACTABLES

Units Of Measure: Micrograms/Kilogram, or ppb
Client: UNION CARBIDE A.E.S. Job Code CJT

Analytical Parameter(s)	Method No.	Ref No.	Quant. Limits	AES Lab No.-	14516	14517	14518
				Sample ID -	S-1	S-2	S-3
				SOIL	SOIL	SOIL	SOIL
				Sample Date-	8/20/87	8/20/87	8/20/87
N-Nitrosodimethylamine	625	1	330		BQL*	BQL	BQL
Bis(2-Chloroethyl)Ether	"	"	330		BQL	BQL	BQL
1,3-Dichlorobenzene	"	"	330		BQL	BQL	BQL
1,4-Dichlorobenzene	"	"	330		BQL	BQL	BQL
1,2-Dichlorobenzene	"	"	330		BQL	BQL	BQL
Bis(2-Chloroisopropyl) Ether	"	"	330		BQL	BQL	BQL
Hexachloroethane	"	"	330		BQL	BQL	BQL
N-Nitrosodi-N-Propylamine	"	"	330		BQL	BQL	BQL
Nitrobenzene	"	"	330		BQL	BQL	BQL
Isophorone	"	"	330		BQL	BQL	BQL
Bis(2-Chloroethoxy)Methane	"	"	330		BQL	BQL	BQL
1,2,4-Trichlorobenzene	"	"	330		BQL	BQL	BQL
Naphthalene	"	"	330		BQL	BQL	BQL
Hexachlorobutadiene	"	"	330		BQL	BQL	BQL
Hexachlorocyclopentadiene	"	"	330		BQL	BQL	BQL
2-Chloronaphthalene	"	"	330		BQL	BQL	BQL
Dimethylphthalate	"	"	330		BQL	BQL	BQL
Acenaphthylene	"	"	330		BQL	BQL	BQL
2,6-Dinitrotoluene	"	"	330		BQL	BQL	BQL
Acenaphthene	"	"	330		990	BQL	480
2,4-Dinitrotoluene	"	"	330		BQL	BQL	BQL
Diethylphthalate	"	"	330		BQL	BQL	BQL

* Below quantifiable limits.

Susan C. Scrocchi
Gas Chromatography Supervisor

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====

Type of Analysis: BASE/NEUTRAL EXTRACTABLES

Units Of Measure: Micrograms/Kilogram, or ppb
Client: UNION CARBIDE A.E.S. Job Code CJT

Analytical Parameter(s)	Method No.	Ref No.	Quant. Limits	Sample Date-	AES Lab No.- Sample ID -	14519 GW-1 BW-1 WELL WATER 8/20/87	14521 GW-2 OW-2 WATER 8/20/87
N-Nitrosodimethylamine	625	1	330			BQL*	BQL
Bis(2-Chloroethyl)Ether	"	"	330			BQL	BQL
1,3-Dichlorobenzene	"	"	330			BQL	BQL
1,4-Dichlorobenzene	"	"	330			BQL	BQL
1,2-Dichlorobenzene	"	"	330			BQL	BQL
Bis(2-Chloroisopropyl) Ether	"	"	330			BQL	BQL
Hexachloroethane	"	"	330			BQL	BQL
N-Nitrosodi-N-Propylamine	"	"	330			BQL	BQL
Nitrobenzene	"	"	330			BQL	BQL
Isophorone	"	"	330			BQL	BQL
Bis(2-Chloroethoxy)Methane	"	"	330			BQL	BQL
1,2,4-Trichlorobenzene	"	"	330			BQL	BQL
Naphthalene	"	"	330			BQL	BQL
Hexachlorobutadiene	"	"	330			BQL	BQL
Hexachlorocyclopentadiene	"	"	330			BQL	BQL
2-Chloronaphthalene	"	"	330			BQL	BQL
Dimethylphthalate	"	"	330			BQL	BQL
Acenaphthylene	"	"	330			BQL	BQL
2,6-Dinitrotoluene	"	"	330			BQL	BQL
Acenaphthene	"	"	330			BQL	BQL
2,4-Dinitrotoluene	"	"	330			BQL	BQL
Diethylphthalate	"	"	330			BQL	BQL

Susan C. Scrocchi
Gas Chromatography Supervisor

* Below quantifiable limits.

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====

Type of Analysis: BASE/NEUTRAL EXTRACTABLES

Units Of Measure: Micrograms/Liter, or ppb
Client: UNION CARBIDE A.E.S. Job Code CJT

Analytical Parameter(s)	Method No.	Ref No.	Quant. Limits	AES Lab No.-		
				Sample ID -		
					14519	14521
					GW-1	GW-2
					BW-1 WELL	OW-2
					WATER	WATER
				Sample Date-	8/20/87	8/20/87
Fluorene	625	1	10		BQL*	BQL
4-Chlorophenylphenylether	"	"	10		BQL	BQL
Diphenylamine(N-Nitroso)	"	"	10		BQL	BQL
1,2-Diphenylhydrazine						
(Azobenzene)	"	"	10		BQL	BQL
4-Bromophenylphenylether	"	"	10		BQL	BQL
Hexachlorobenzene	"	"	10		BQL	BQL
Phenanthrene	"	"	10		BQL	BQL
Anthracene	"	"	10		BQL	BQL
Di-N-Butylphthalate	"	"	10		BQL	BQL
Fluoranthene	"	"	10		BQL	BQL
Benzidine	"	"	50		BQL	BQL
Pyrene	"	"	10		BQL	BQL
Butylbenzylphthalate	"	"	10		BQL	BQL
Benzo(a)Anthracene	"	"	10		BQL	BQL
3,3'-Dichlorobenzidine	"	"	30		BQL	BQL
Chrysene	"	"	10		BQL	BQL
Bis(2-Ethylhexyl)Phthalate	"	"	10		21	33
Di-N-Octylphthalate	"	"	10		BQL	BQL
Benzo(b)Fluoranthene	"	"	10		BQL	BQL
Benzo(k)Fluoranthene	"	"	10		BQL	BQL
Benzo(a)Pyrene	"	"	10		BQL	BQL
Indeno(1,2,3-C,D)Pyrene	"	"	10		BQL	BQL
Dibenzo(a,h)Anthracene	"	"	10		BQL	BQL
Benzo(g,h,i)Perylene	"	"	10		BQL	BQL

* Below quantifiable limits.

Susan C. Scrocchi
Susan C. Scrocchi
Gas Chromatography Supervisor

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====
Type of Analysis: ACIDS

Units Of Measure: Micrograms/Liter, or ppb
Client: UNION CARBIDE A.E.S. Job Code CJT

				AES Lab No.-	14519	14521
				Sample ID -	GW-1	GW-2
					BW-1 WELL	OW-2
					WATER	WATER
				Sample Date-	8/20/87	8/20/87
-----	-----	-----	-----	-----	-----	-----
Analytical	Method	Ref	Quant.			
Parameter(s)	No.	No.	Limits			
-----	-----	-----	-----	-----	-----	-----
Phenol	625	1	10		BQL*	BQL
2-Chlorophenol	"	"	10		BQL	BQL
2-Nitrophenol	"	"	50		BQL	BQL
2,4-Dimethylphenol	"	"	10		BQL	BQL
p-Chloro-m-Chesol	"	"	10		BQL	BQL
2,4,6-Trichlorophenol	"	"	10		BQL	BQL
2,4-Dinitrophenol	"	"	50		BQL	BQL
4-Nitrophenol	"	"	50		BQL	BQL
4,6-Dinitro-O-Cresol	"	"	50		BQL	BQL
Pentachlorophenol	"	"	50		BQL	BQL
2,4-Dichlorophenol	"	"	10		BQL	BQL

* Below quantifiable limits.

Susan C. Scrocchi
Gas Chromatography Supervisor

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT
QUALITY CONTROL - PRECISION

=====

Type of Analysis: Duplicate Analysis
Units of Measure: Micrograms/Kilogram, ppb
Client: UNION CARBIDE A.E.S. Job Code: CJT

Analytical Parameters	Sample Code	Original Conc.	Duplicate Conc.	Average Conc.	Range	Rel. % Difference
Acenaphthene	14516	680	1,300	990	620	63
Anthracene	14516	1,100	2,100	1,600	1,000	63
Benzo(a)Anthracene	14516	7,700	9,900	8,800	2,200	25
Benzo(b)Fluoranthene	14516	10,000	12,000	11,000	2,000	18
Benzo(k)Fluoranthene	14516	7,100	7,400	7,200	300	4
Benzo(a)Pyrene	14516	11,000	13,000	12,000	2,000	17
Benzo(g,h,i)Perylene	14516	8,300	9,900	9,100	1,600	18
Chrysene	14516	9,700	12,000	10,800	2,300	21
Dibenzo(a,h)Anthracene	14516	1,900	2,400	2,200	500	23
Fluoranthene	14516	12,000	15,000	14,000	3,000	21
Fluorene	14516	<330	630	N/A	N/A	N/A
Indeno(1,2,3-cd)Pyrene	14516	9,200	11,000	10,100	1,800	18
Phenanthrene	14516	4,400	8,100	6,200	3,700	60
Pyrene	14516	9,300	13,000	11,200	3,700	33

Relative Percent Difference =
Range/Average X 100

ADVANCED ENVIRONMENTAL SERVICES, INC.
PARAMETER TRACEABILITY REPORT
GAS CHROMATOGRAPHY DEPARTMENT

AES JOB CODE CJT

<u>ANALYST</u>	<u>ANALYTICAL METHOD</u>	<u>SAMPLE CODE</u>	<u>DATE OF ANALYSIS</u>	<u>TIME OF ANALYSIS</u>
<u>MetaTrace Inc.</u>	<u>624</u>	<u>14516,17,18,19</u>	<u>8/29/87</u>	<u>Not Available</u>
<u></u>	<u>624</u>	<u>14520,21</u>	<u>9/1/87</u>	<u>" "</u>
<u></u>	<u>625</u>	<u>14516,17</u>	<u>9/4/87</u>	<u>" "</u>
<u></u>	<u>625</u>	<u>14518</u>	<u>9/5/87</u>	<u>" "</u>
<u></u>	<u>625</u>	<u>14519,20</u>	<u>9/5/87</u>	<u>" "</u>
<u></u>	<u></u>	<u></u>	<u></u>	<u></u>
<u></u>	<u></u>	<u></u>	<u></u>	<u></u>
<u></u>	<u></u>	<u></u>	<u></u>	<u></u>

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====
Type of Analysis: PCBs AND PESTICIDES

Units Of Measure: Milligrams/Kilogram, or ppm (dry wt. basis)
Client: UNION CARBIDE A.E.S. Job Code CJT

				AES Lab No.- Sample ID -	14516 S-1 SOIL	14517 S-2 SOIL	14518 S-3 SOIL
Analytical Parameter(s)	Method No.	Ref No.	Quant. Limits	Sample Date-	8/20/87	8/20/87	8/20/87
Aldrin	8080	5	0.05		BQL*	BQL	BQL
alpha-BHC	"	"	0.05		BQL	BQL	BQL
beta-BHC	"	"	0.05		BQL	BQL	BQL
gamma-BHC	"	"	0.05		BQL	BQL	BQL
delta-BHC	"	"	0.05		BQL	BQL	BQL
Chlordane	"	"	0.50		BQL	BQL	BQL
4,4'-DDT	"	"	0.05		BQL	BQL	BQL
4,4'-DDE	"	"	0.05		BQL	BQL	BQL
4,4'-DDD	"	"	0.05		BQL	BQL	BQL
Dieldrin	"	"	0.05		BQL	BQL	BQL
alpha-Endosulfan	"	"	0.05		BQL	BQL	BQL
beta-Endosulfan	"	"	0.05		BQL	BQL	BQL
Endosulfan Sulfate	"	"	0.05		BQL	BQL	BQL
Endrin	"	"	0.05		BQL	BQL	BQL
Endrin Aldehyde	"	"	0.05		BQL	BQL	BQL
Heptachlor	"	"	0.05		BQL	BQL	BQL
Heptachlor Epoxide	"	"	0.05		BQL	BQL	BQL
PCB-1242	"	"	0.05		BQL	BQL	BQL
PCB-1254	"	"	0.05		BQL	BQL	BQL
PCB-1221	"	"	0.05		BQL	BQL	BQL
PCB-1232	"	"	0.05		BQL	BQL	BQL
PCB-1248	"	"	0.05		BQL	BQL	BQL
PCB-1260	"	"	0.05		BQL	BQL	BQL
PCB-1016	"	"	0.05		BQL	BQL	BQL
Toxaphene	"	"	0.50		BQL	BQL	BQL

* Below quantifiable limits.

Susan C. Scrocchi
Susan C. Scrocchi
Gas Chromatography Supervisor

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====

Type of Analysis: PCBs AND PESTICIDES

Units Of Measure: Micrograms/Liter, or ppb
Client: UNION CARBIDE A.E.S. Job Code CJT

Analytical Parameter(s)	Method No.	Ref No.	Quant. Limits	Sample Date-	AES Lab No.- Sample ID -	14519 GW-1 BW-1 WELL WATER 8/20/87	14521 GW-2 (OW-2) WATER 8/21/87
Aldrin	608	1	1.00			BQL*	BQL
alpha-BHC	"	"	1.00			BQL	BQL
beta-BHC	"	"	1.00			BQL	BQL
gamma-BHC	"	"	1.00			BQL	BQL
delta-BHC	"	"	1.00			BQL	BQL
Chlordane	"	"	10.0			BQL	BQL
4,4'-DDT	"	"	1.00			BQL	BQL
4,4'-DDE	"	"	1.00			BQL	BQL
4,4'-DDD	"	"	1.00			BQL	BQL
Dieldrin	"	"	1.00			BQL	BQL
alpha-Endosulfan	"	"	1.00			BQL	BQL
beta-Endosulfan	"	"	1.00			BQL	BQL
Endosulfan Sulfate	"	"	1.00			BQL	BQL
Endrin	"	"	1.00			BQL	BQL
Endrin Aldehyde	"	"	1.00			BQL	BQL
Heptachlor	"	"	1.00			BQL	BQL
Heptachlor Epoxide	"	"	1.00			BQL	BQL
PCB-1242	"	"	1.00			BQL	BQL
PCB-1254	"	"	1.00			BQL	BQL
PCB-1221	"	"	1.00			BQL	BQL
PCB-1232	"	"	1.00			BQL	BQL
PCB-1248	"	"	1.00			BQL	BQL
PCB-1260	"	"	1.00			BQL	BQL
PCB-1016	"	"	1.00			BQL	BQL
Toxaphene	"	"	10.0			BQL	BQL

Susan C. Scrocchi

Susan C. Scrocchi
Gas Chromatography Supervisor

* Below quantifiable limits.

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT
QUALITY CONTROL - PRECISION

=====

Type of Analysis: Duplicate Analysis
Units of Measure: Micrograms/Liter, or ppb
Client: UNION CARBIDE A.E.S. Job Code: CJT

Analytical Parameters	Sample Code	Original Conc.	Duplicate Conc.	Average Conc.	Range	Rel. % Difference

Aldrin	14521	<1.00	<1.00	<1.00	None	None
alpha-BHC	14521	<1.00	<1.00	<1.00	None	None
beta-BHC	14521	<1.00	<1.00	<1.00	None	None
gamma-BHC	14521	<1.00	<1.00	<1.00	None	None
delta-BHC	14521	<1.00	<1.00	<1.00	None	None
Chlordane	14521	<10.0	<10.0	<10.0	None	None
4,4'-DDT	14521	<1.00	<1.00	<1.00	None	None
4,4'-DDE	14521	<1.00	<1.00	<1.00	None	None
4,4'-DDD	14521	<1.00	<1.00	<1.00	None	None
Dieldrin	14521	<1.00	<1.00	<1.00	None	None
alpha-Endosulfan	14521	<1.00	<1.00	<1.00	None	None
beta-Endosulfan	14521	<1.00	<1.00	<1.00	None	None
Endosulfan Sulfate	14521	<1.00	<1.00	<1.00	None	None
Endrin	14521	<1.00	<1.00	<1.00	None	None
Endrin Aldehyde	14521	<1.00	<1.00	<1.00	None	None
Heptachlor	14521	<1.00	<1.00	<1.00	None	None
Heptachlor Epoxide	14521	<1.00	<1.00	<1.00	None	None
PCB-1242	14521	<1.00	<1.00	<1.00	None	None
PCB-1254	14521	<1.00	<1.00	<1.00	None	None
PCB-1221	14521	<1.00	<1.00	<1.00	None	None
PCB-1232	14521	<1.00	<1.00	<1.00	None	None
PCB-1248	14521	<1.00	<1.00	<1.00	None	None
PCB-1260	14521	<1.00	<1.00	<1.00	None	None
PCB-1016	14521	<1.00	<1.00	<1.00	None	None
Toxaphene	14521	<10.0	<10.0	<10.0	None	None

Relative Percent Difference =
Range/Average X 100

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT
QUALITY CONTROL - ACCURACY
=====

Type of Analysis: Matrix Spikes and E.P.A. Standards
Client: UNION CARBIDE A.E.S. Job Code: CJT

(Units: ug/l, or ppb)

Analytical Parameters	Sample No.	Type	Observed Conc.	Original Conc.	Added Conc.	Percent Recovery*
gamma-BHC	14521	SPK	4.32	<1.00	4.79	90

* % Recovery=100 x ((Observed Conc. - "background" Original Conc.)/"Spike" Added Conc.)

AES JOB CODE CJT

ANALYST

ANALYTICAL METHOD

SAMPLE CODE

DATE OF EXTRACTION

Patrick A'Zama

608

14521, 14519

8-27-87

8080

14516-518

9-1-87

AES JOB CODE CJT

ANALYST

ANALYTICAL METHOD

SAMPLE CODE

DATE OF ANALYSIS

TIME OF ANALYSIS

Patrick A Zama

608/8080

14516, 17, 18, 19

9/9/87

2030 - 2330

for Tiger

1008

14521

9 | 11 | 87

1700 - 1830

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====

Type of Analysis: METALS

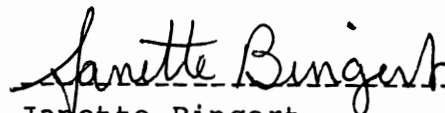
Client: UNION CARBIDE

A.E.S. Job Code CJT

(All results are in mg/kg)

				AES Lab No. -	14516	14517	14518
				Sample ID -	S-1	S-2	S-3
					SOIL	SOIL	SOIL
					GRAB	GRAB	GRAB
				Sample Date-	8/20/87	8/20/87	8/20/87
-----	-----	-----	-----	-----	-----	-----	-----
Analytical	Method	Ref	Quant.				
Parameter(s)	No.	No.	Limits				
-----	-----	-----	-----	-----	-----	-----	-----
Total Antimony (Sb)	204.2	3	2.00		BQL*	BQL	BQL
Total Arsenic (As)	206.2	3	0.50		2.20	2.90	3.40
Total Beryllium (Be)	210.2	3	0.10		1.47	1.53	1.89
Total Cadmium (Cd)	213.2	3	0.05		0.97	1.03	1.22
Total Chromium (Cr)	218.2	3	0.50		21.00	20.00	34.00
Total Copper (Cu)	220.1	3	20.0		22.0	20.0	29.0
Total Lead (Pb)	239.2	3	0.50		10.40	10.69	1.60
Total Mercury (Hg)	245.2	3	0.10		BQL	BQL	BQL
Total Mercury (Hg)	245.2	3	0.10		BQL	BQL	BQL
Total Mercury (Hg)	245.2	3	0.10		BQL	BQL	BQL
Total Nickel (Ni)	249.2	3	0.50		22.60	20.13	26.74
Total Selenium (Se)	270.2	3	0.50		BQL	BQL	BQL
Total Silver (Ag)	272.1	3	10.0		BQL	BQL	BQL
Total Thallium (Tl)	279.1	3	100		BQL	BQL	BQL
Total Zinc (Zn)	289.1	3	5.00		67.0	57.0	79.0

* Below quantifiable limits.



Janette Bingert
Atomic Spectroscopy Supervisor

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT

=====

Type of Analysis: METALS

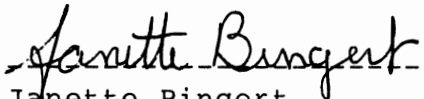
Client: UNION CARBIDE

A.E.S. Job Code CJT

(All results are in mg/l)

Analytical Parameter(s)	Method No.	Ref No.	Quant. Limits	AES Lab No. -	14519	14521
				Sample ID -	GW-1 WATER (BW-1 WELL) GRAB 8/20/87	GW-2 WATER (OW-2) GRAB 8/21/87
Total Antimony (Sb)	204.2	3	0.020		BQL*	BQL
Total Arsenic (As)	206.2	3	0.005		BQL	BQL
Total Beryllium (Be)	210.2	3	0.001		BQL	BQL
Total Cadmium (Cd)	213.2	3	0.05		0.0027	0.0031
Total Chromium (Cr)	218.2	3	0.005		BQL	0.005
Total Copper (Cu)	220.1	3	0.20		BQL	BQL
Total Lead (Pb)	239.2	3	0.005		0.078	0.232
Total Mercury (Hg)	245.1	3	0.001		BQL	BQL
Total Nickel (Ni)	249.2	3	0.005		BQL	BQL
Total Selenium (Se)	270.2	3	0.005		BQL	BQL
Total Silver (Ag)	272.1	3	0.10		BQL	BQL
Total Thallium (Tl)	279.1	3	1.00		BQL	BQL
Total Zinc (Zn)	289.1	3	0.05		8.60	27.50

* Below quantifiable limits.


Janette Bingert
Atomic Spectroscopy Supervisor

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT
QUALITY CONTROL - PRECISION

=====

Type of Analysis: Duplicate Analysis
Units of Analysis: Milligrams/Liter or ppm
Client: UNION CARBIDE A.E.S. Job Code: CJT

Analytical Parameters	Sample No.	Original Conc.	Duplicate Conc.	Average Conc.	Range	Rel. % Difference

Antimony (Sb)	14521	BQL*	BQL	BQL	None	None
Arsenic (As)	14521	BQL	BQL	BQL	None	None
Beryllium (Be)	14521	BQL	BQL	BQL	None	None
Cadmium (Cd)	14521	0.0033	0.0029	0.0031	0.0004	13
Chromium (Cr)	14521	0.005	0.005	0.005	0	0
Copper (Cu)	14521	BQL	BQL	BQL	None	None
Lead (Pb)	14521	0.232	0.232	0.232	0	0
Mercury (Hg)	14521	BQL	BQL	BQL	None	None
Nickel (Ni)	14521	BQL	BQL	BQL	None	None
Selenium (Se)	14521	BQL	BQL	BQL	None	None
Silver (Ag)	14521	BQL	BQL	BQL	None	None
Thallium (Tl)	14521	BQL	BQL	BQL	None	None
Zinc (Zn)	14521	27.50	27.50	27.50	0	0

Relative Percent Difference =
Range/Average X 100

* Below quantifiable limits.

ADVANCED ENVIRONMENTAL SERVICES, INC.
LABORATORY REPORT
QUALITY CONTROL - ACCURACY

=====

Type of Analysis: Matrix Spikes and E.P.A. Standards
Client: UNION CARBIDE A.E.S. Job Code: CJT

(Units:mg/l or ppm)

Analytical Parameters	Sample No.	Type	Observed Conc.	Original Conc.	Added Conc.	Percent Recovery*
Antimony (Sb)	14521	SPK	0.317	BQL**	0.300	106
EPA (Sb) std.	186	EPA	0.043	0.039	---	110
Arsenic (As)	14521	SPK	0.113	BQL	0.100	113
EPA (As) std.	386	EPA	0.023	0.024	---	96
Beryllium (Be)	14521	SPK	0.026	BQL	0.030	87
EPA (Be) std.		EPA	0.027	0.025	---	108
Cadmium (Cd)	14521	SPK	0.0260	0.0031	0.0250	92
EPA (Cd) std.	386	EPA	0.0057	0.0060	---	95
Chromium (Cr)	14521	SPK	0.094	0.005	0.100	89
EPA (Cr) std.	386	EPA	0.022	0.025	---	88
Copper (Cu)	14521	SPK	4.82	BQL	5.00	96
EPA (Cu) std.	386	EPA	1.06	0.99	---	107
Lead (Pb)	14521	***SPK	0.148	0.058	0.100	90
EPA (Pb) std.	386	EPA	0.024	0.025	---	96
Mercury (Hg)	14521	SPK	0.0095	BQL	0.0100	95
EPA (Hg) std.	1183	EPA	0.0055	0.0052	---	106
Nickel (Ni)	14521	SPK	0.040	BQL	0.050	80
EPA (Ni) std.	386	EPA	0.023	0.025	---	92
Selenium (Se)	14521	SPK	0.044	BQL	0.050	88
EPA (Se) std.	386	EPA	0.006	0.006	---	100
Silver (Ag)	14521	SPK	3.78	BQL	5.00	94
EPA (Ag) std.	283	EPA	2.84	3.00	---	95
Thallium (Tl)	14521	SPK	19.34	BQL	20.00	97
Independent (Tl) std.		STD	2.84	3.00	---	95
Zinc (Zn)	14521	¹ SPK	1.62	0.55	1.00	107
Independent (Zn) std.		STD	0.56	0.50	---	112

* % Recovery=100 x ((Observed Conc. - "background" Original Conc.)/"Spike" Added Conc.)

** Below quantifiable limits.

*** Spike on sample dilution factor of 4.

¹ Spike on sample dilution factor of 50.

ADVANCED ENVIRONMENTAL SERVICES, INC.
PARAMETER TRACEABILITY REPORT
ATOMIC SPECTROSCOPY DEPARTMENT

AES JOB CODE CJT

<u>ANALYST</u>	<u>ANALYTICAL METHOD</u>	<u>SAMPLE CODE</u>	<u>DATE OF ANALYSIS</u>	<u>TIME OF ANALYSIS</u>
<u>F. Scrivano</u>	<u>220.1</u>	<u>14516-19, 21</u>	<u>8/25</u>	<u>1900</u>
<u></u>	<u>272.1</u>	<u>14516-19, 21</u>	<u>8/25</u>	<u>1600</u>
<u></u>	<u>289.1</u>	<u>14516-19, 21</u>	<u>8/27</u>	<u>1300</u>
<u>P. McMahon</u>	<u>204.2</u>	<u>14516-19, 21</u>	<u>8/31</u>	<u>1900</u>
<u></u>	<u>206.2</u>	<u>14516-19, 21</u>	<u>8/27</u>	<u>2300</u>
<u></u>	<u>270.2</u>	<u>14516-19, 21</u>	<u>8/27</u>	<u>2100</u>
<u></u>	<u>218.2</u>	<u>14516-19, 21</u>	<u>9/1</u>	<u>1300</u>
<u></u>	<u>239.2</u>	<u>14516-19, 21</u>	<u>9/1</u>	<u>1600</u>

ADVANCED ENVIRONMENTAL SERVICES, INC.
PARAMETER TRACEABILITY REPORT
ATOMIC SPECTROSCOPY DEPARTMENT

AES JOB CODE CIT

<u>ANALYST</u>	<u>ANALYTICAL METHOD</u>	<u>SAMPLE CODE</u>	<u>DATE OF ANALYSIS</u>	<u>TIME OF ANALYSIS</u>
<u>P. McMahon</u>	<u>249.2</u>	<u>14516-19, 21</u>	<u>9/1</u>	<u>1900</u>
<u></u>	<u>210.2</u>	<u>14516-19, 21</u>	<u>8/25</u>	<u>1400</u>
<u></u>	<u>213.2</u>	<u>14516-19, 21</u>	<u>8/25</u>	<u>1800</u>
<u></u>	<u>245.2</u>	<u>14516-19, 21</u>	<u>8/28</u>	<u>0700</u>
<u></u>	<u>279.1</u>	<u>14516-19, 21</u>	<u>8/25</u>	<u>2000</u>
<u></u>	<u></u>	<u></u>	<u></u>	<u></u>
<u></u>	<u></u>	<u></u>	<u></u>	<u></u>
<u></u>	<u></u>	<u></u>	<u></u>	<u></u>

APPENDIX A
CHAIN OF CUSTODY RECORDS

CHAIN OF CUSTODY RECORD

PROJECT NO.

PROJECT NAME

Union Carbide Landfill

ADVANCED
ENVIRONMENTAL SERVICES INC.

SAMPLER'S SIGNATURE _____					SAMPLE TYPE	NUMBER OF CONTAINERS	REMARKS
SAMPLE NO.	SEQ. NO.	DATE	TIME	SAMPLE LOCATION			
GW-2		8/21/87	4:15 Pm	well OW-2	water - VOA;	4	
GW-2		8/21/87	4:45 Pm	" "	water	1	1 gal in Pickle jar
					TOTAL NO. OF CONTAINERS	5	

RELINQUISHED BY (Sign) 1 <i>D. Klaar</i>	DATE/TIME 8/21/87 5:20 pm	RECEIVED BY (Sign) 2 <i>[Signature]</i>	RELINQUISHED BY (Sign) 2 <i>[Signature]</i>	DATE/TIME 8/24/87 9:15 am	RECEIVED BY (Sign) 3 <i>Karen E. Kukla</i>
RELINQUISHED BY (Sign) 3 _____	DATE/TIME _____	REC'D BY MOBILE LAB (Sign) 4 _____	REL'D BY MOBILE LAB (Sign) 4 _____	DATE/TIME _____	RECEIVED BY (Sign) 5 _____
METHOD OF SHIPMENT _____		SHIPPED BY (Sign) _____	RECEIVED FOR LABORATORY (Sign) _____		DATE/TIME _____

CHAIN OF CUSTODY RECORD

PROJECT NO.

CJT

PROJECT NAME

Union Carbide Landfill

ADVANCED
ENVIRONMENTAL SERVICES INC.

SAMPLER'S
SIGNATURE

SAMPLE NO. SEQ. NO. DATE TIME SAMPLE LOCATION

SAMPLE TYPE

NUMBER OF
CONTAINERS

REMARKS

S-1	1	8/20/87		S-1	Soil	2	(500me)
S-2	2	8/20/87		S-2	Soil	2	(500me)
S-3	3	8/20/87		S-3	Soil	2	(500me)
GW-1	4	8/20/87		GW-1 (BW-1 well)	Water	5	1 pickle jar 4 vials
GW-2	5	8/20/87		GW-2	water	4	vials

TOTAL NO. OF CONTAINERS

15

RELINQUISHED BY (Sign)

1 *[Signature]*

DATE/TIME

8/20 7:00 pm

RECEIVED BY (Sign)

2 *[Signature]*

RELINQUISHED BY (Sign)

2 *[Signature]*

DATE/TIME

8/24/87 9:15 am

RECEIVED BY (Sign)

3 *[Signature]*

RELINQUISHED BY (Sign)

3

DATE/TIME

REC'D BY MOBILE LAB
(Sign)

4

REL'D BY MOBILE LAB
(Sign)

4

DATE/TIME

RECEIVED BY (Sign)

5

METHOD OF SHIPMENT

SHIPPED BY (Sign)

RECEIVED FOR LABORATORY (Sign)

DATE/TIME

ANALYTICAL METHODOLOGIES

The method numbers for each procedure are listed in the second column of the tabulated results. The source for each method is listed as a reference number in the third column. The source(s) for the Analytical Methodologies are:

- 1 - EPA 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; Final Rule and Interim Final Rule and Proposed Rule", Federal Register 49 (209), October 26, 1984.
- 2 - EPA 600/4-80-022, "Guidelines Establishing Test Procedures for the Analysis of Pollutants; Proposed Regulations, Correction", Federal Register 44 (244), December 18, 1979.
- 3 - EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", (1983).
- 4 - EPA 600/4-79-057, "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", (1982).
- 5 - EPA-SW-846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", second edition (1982).
- 6 - Standard Methods for the Examination of Water and Wastewater", 16th edition, (1985).
- 7 - New York State Institute of Toxicology Analytical Handbook, October 1982, Updated March, 1986.
- 8 - NIOSH Manual of Analytical Methods, second edition 1977.
- 9 - "The Analysis of Polychlorinated Biphenyls in Transformer Fluid and Waste Oil", EPA Environmental Monitoring and Support Laboratory draft, June 24, 1980.
- 10 - "Approved Analytical Procedures for Determining the Content of Constituents Banned from Landburial" (New York State DEC, Division of Solid and Hazardous Waste), January 1985.
- 11 - EPA 600/4-81-055, "Interim Methods for the Sampling and Analysis of Priority Pollutants in Sediments and Fish Tissue", Revised January 7, 1983.
- 12 - "Determination of Formaldehyde in the Atmosphere", Environmental Health Center, Division of Laboratories and Research, NYS Department of Health APC-29.
- 13 - "Chemical Soil Tests", Cornell University Agricultural Experiment Station, NYS College of Agricultural, Ithaca, N.Y. Bulletin 960, Revised October 1965.
- 14 - "Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter", American Society for Testing and Materials, Philadelphia, Pa., Designation: D 240-64 (Reapproved 1973).
- 15 - "Analyzing Trace Amounts of Solvents in Water" (Supelco Bulletin 816).
- 16 - "Determination of Aniline and Substituted Derivatives in Wastewater by Gas and Liquid Chromatography", (Analytical Chemistry, Vol. 55, No. 12, October 1983).