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Analysis
(Type of Report)

REPORT NO.: MSL-5738
ESC-UAG-86-46

JOB/PROJECT NO.: 6405

DATE: May 30, 1986

TITLE: ANALYSIS OF LULING SAMPLES

AUTHORS: S. Gibson, S. Walker and R.W. Noble

ABSTRACT: Samples from Luling were received for the analysis of PCDDs, PCDFs, 2,3,7,8-TCDD, metals, acid and base/neutral extractables, pesticides and Aroclor formulations. This report gives the results of these analyses.

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APPROVAL DATE: 5-30-86

MONS 024035

REPT. NO.: MSL-5738
ESC-UAG-86-46
AUTHORS: S. Gibson, S. Walker and R.W. Noble
TITLE: ANALYSIS OF LULING SAMPLES
COPY NO.: 9

R 1088(A)

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ANALYSIS REPORT

DATE: 22 May 1986 PROJECT NUMBER: 6405

LOG NUMBER: U-86-03-14-01 NOTEBOOK PAGE: 3353290

TO: L. Adams/ 1560

cc FILES/Kees
P. Sherman
R. Noble

Title: Analysis of Luling Samples

Procedure: See attached report

Abstract:
Samples from Luling were received for the analysis of PCDDs, PCDFs, 2,3,7,8-TCDD, metals, acid and base/neutral extractables, pesticides and Aroclor formulations. This report gives the results of these analyses.

Analysts: S. Gibson, S. Walker and R. W. Noble

ANALYST APPROVAL: Roy W. Noble
Roy W. Noble
Senior Research Chemist

ANALYSIS REPORT FOR LULING SAMPLES

INTRODUCTION

Nine soils, two sediments and four wipe samples were received for selected analyses of polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), 2,3,7,8-tetrachloro dibenzo-p-dioxin (2,3,7,8-TCDD), selected metals, acid and base/neutral extractables, pesticides and Aroclor formulations. The metals, acid and base/neutral extractables, pesticides and Aroclor formulation analyses on samples #57 and #5 were performed by Environmental Testing and Certification Corporation (ETC) of Edison, NJ. The PCDD, PCDF and 2,3,7,8-TCDD analyses were performed in our laboratories. For internal purposes the samples were assigned Log number U-86-03-14-01. For quality assurance in the analyses we performed MRC Method #07-QAQC-R3 was followed. Briefly this method requires that for every set of samples of the same matrix type a replicate sample, a low spiked sample, a high spiked sample and a method blank must be analyzed. The reports for the analyses performed by ETC are attached at the end of this report.

PREPARATION AND ANALYSIS

Soil and sediment samples of 10 g were weighed and spiked with appropriate internal standards. Wipes were spiked with carbon-13 labeled 2,3,7,8-TCDD prior to extraction. Then 15 mL of methanol (all solvents are Burdick and Jackson "distilled in glass" grade) and 150 mL of hexane are added. The samples are then shaken for 3 hours on a wrist action shaker and the hexane is decanted off. The hexane extracts were washed with 40 mL of concentrated sulfuric acid (untill clear), 20 mL of water and 40 mL of 1 N potassium hydroxide and 30 mL of water. The hexane was dried over sodium sulfate and concentrated to 3 mL.

The samples were then placed on the head of a mixed phase liquid chromatographic column consisting of (top to bottom) 2 g of silica, 4 g of silica plus 40% sulfuric acid, 1 g of silica, 2 g of silica plus 36% potassium hydroxide and 1 g of silica. The column was eluted with 50 mL of hexane which was subsequently concentrated to 3 mL. The hexane was then placed on the head of a column containing 2.5 g of Woelm basic alumina. This column was first eluted with 10 mL of 2% methylene chloride/hexane (v/v) mixture and this fraction discarded. An additional elution was made with 15 mL of a 50% methylene chloride/hexane (v/v) mixture to elute the PCDDs and PCDFs from the column.

For some of the samples it was necessary to conduct further cleanup using the EPA Option D technique in order to analyze for TCDDs. Option D involves placing the sample on top of a column containing 18% Carbopak C on Celite packed to a depth of 2 cm in

a 1.0 cm ID pipet. The column was then eluted with 1 mL of hexane, 1 mL of 1:1 cyclohexane/methylene chloride, 1 mL of 75:20:5 methylene chloride/methanol/benzene and finally 2 mL of toluene. The toluene fraction was collected to be concentrated.

All samples had 50 uL of dodecane containing tribromobiphenyl as an internal standard added to the eluant as a keeper and were then concentrated to 50 uL under a gentle stream of purified nitrogen and were submitted for GC/MS analysis. The GC/MS analysis was conducted on a Hewlett/Packard 5987 instrument. The mass spectrometer was operated in the selected ion monitoring mode analyzing for ions characteristic of the native (unlabeled) PCDDs, PCDFs and the internal standards.

RESULTS

The results of the analyses are given in Tables 1-5. Results are not corrected for recovery for the PCDD and PCDF analyses in Tables 1 and 3. Replicate analysis results for sample # 5 show a large variability due to the presence of shells in the sample causing homogeneity problems. Discussion with the customer determined that these results met their needs.

Table 1. PCDD RESULTS FOR SOIL AND SEDIMENT (in ppb)

Sample	Cl-4	Cl-5	Cl-6	Cl-7	Cl-8
Background	ND	ND	ND	0.4	1.2
Soil #5	600	0.7	3.3	1.5	3.1
Soil #5 R	7500	ND	2.2	5.3	8.9
Soil #13	0.9	ND	3.6	30	190
Soil #27	2.1	ND	ND	0.4	1.5
Soil #35	0.7	ND	0.7	1.5	21
Soil #39	0.8	ND	0.8	1.6	18
Soil #51	ND	ND	0.4	0.6	1.5
Soil #51 H	10.1	19.1	11.6	11.3	11.9
% recovery	107%	170%	103%	91%	109%
spike level	9.4	11.4	10.9	11.8	9.5
Soil #57	5.2	ND	1.4	0.8	1.4
Soil #59	4.8	ND	4.0	ND	0.2
Sediment #1	ND	ND	3.0	38	160
Sediment #1 L	1.1	1.2	3.5	29	104
% recovery	110%	100%	-a	-a	-a
spike level	1.0	1.2	1.1	1.2	1.0
Sediment #2	18	0.3	8.0	89	420
BLANK	ND	ND	ND	ND	ND
MDL	0.5	0.5	0.5	0.5	0.5

MDL method detection limit
ND none detected at method detection limit
R replicate sample
L,H low and high spiked samples
a
spike recovery can not be calculated as sample is three times the spike level.

Table 2. REPEATED PCDD RESULTS FOR SEDIMENT # 2 (in ppb)

Sample	Cl-4	Cl-5	Cl-6	Cl-7	Cl-8
Sediment # 2	15	ND	20	127	1000
Sediment # 2 R	13	ND	22	156	1500
BLANK	ND	ND	ND	ND	ND
MDL	0.5	0.5	0.5	0.5	0.5

MDL method detection limit
ND none detected at method detection limit
R replicate sample

Table 3. PCDF RESULTS FOR SOIL AND SEDIMENT (in ppb)

Sample	Cl-4	Cl-5	Cl-6	Cl-7	Cl-8
Background	ND	ND	ND	ND	ND
Soil #5	3.9	1.4	3.8	0.9	0.8
Soil #5 R	4.9	3.5	5.4	1.2	1.1
Soil #13	0.2	2.8	4.2	0.9	2.4
Soil #27	ND	ND	ND	ND	ND
Soil #35	ND	ND	<0.9	0.4	0.9
Soil #39	ND	ND	<0.6	0.4	1.0
Soil #51	ND	ND	ND	ND	ND
Soil #51 H	5.0	25	32	8.1	33
% recovery	37%	84%	64%	76%	93%
spike level	13.6	29.4	49.7	10.7	35.3
Soil #57	ND	ND	ND	ND	ND
Soil #59	ND	ND	ND	ND	ND
Sediment #1	0.2	<1.6	<1.9	0.6	2.4
Sediment #1 L	0.7	4.7	4.3	1.0	5.3
% recovery	46%	100%	82%	90%	81%
spike level	1.0	1.2	1.1	1.2	1.0
Sediment #2	<0.6	<8.2	<22	1.9	5.5
BLANK	ND	ND	ND	ND	ND
MDL	0.5	0.5	0.5	0.5	0.5

MDL method detection limit
ND none detected at method detection limit
R replicate sample
L,H low and high spiked samples

Table 4. 2378-TCDD RESULTS FOR SOIL AND SEDIMENT (in ppb)

Sample	2378-TCDD	ppb Added
Background	ND	
Soil #5	510	
Soil #5 R	7000	
Soil #13	1.8	
Soil #27	1.6	
Soil #35	0.9	
Soil #39	0.7	
Soil #51	0.1	
Soil #51 H	8.2	9.4
Soil #57	5.2	
Soil #59	2.6	
Sediment #1	ND	
Sediment #1 L	1.0	1.0
Sediment #2	16.5	
BLANK	ND	
MDL	0.2	

MDL method detection limit
ND none detected at method detection limit
R replicate sample
L,H low and high spiked samples

Table 5. 2378-TCDD RESULTS FOR WIPES (in ng)

Sample	2378-TCDD	ng Added
Auger 1 Bit	ND	
Auger 1 Handle	ND	
Auger 2 Bit	3.4	
Auger 2 Handle	ND	
High Spike	44	48
Low Spike	4.3	4.8
Blank	ND	
MDL	0.3	

MDL method detection limit
ND none detected at method detection limit

MONS 024044

Technical Report

for

MONSANTO COMPANY

800 N.LINDBERGH BLVD.

R3B

ST.LOUIS, MO 63167

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
L7194	MONSANTO COMPANY	MONCORPEMG	S	060314		

John J. Fitzgerald
Vice President
Research and Operations

TABLE OF CONTENTS

Introduction

This report contains the analytical results on your soil sample, S 86/03/14. It is designed to include comprehensive data from the entire analytical process in order to satisfy the needs of various levels of review.

The results obtained from your sample are presented in tabular format immediately following this introduction. Quality assurance data is tabulated along with the appropriate sample results for verification. Depending on the analyses ordered, the quality assurance data may include results from blank, spiked blank, spiked sample (i.e. matrix spike) and replicate sample as well as results from surrogate compound analyses. Quality assurance data for verification of proper instrument performance is also included where appropriate. The report appendices include the chain of custody record for your sample and, where appropriate, the gas chromatograms and mass spectra.

The procedures used in the analysis of the sample are described in this report's methodology section. All analytical procedures within our laboratory are performed within a strictly enforced Quality Assurance Protocol. A description of this Protocol is included in the report.

Results

Sample results, and associated quality assurance data, are always tabulated in one or more of this report's Quantitative Results Tables. The format of each table varies with the class of analysis.

Priority Pollutants

The priority pollutant compounds and elements are listed with their NPDES (National Pollution Discharge Elimination System) numbers, and the Method Detection Limit (MDL) published in the Federal Register. When a compound or element is present below its published MDL it is reported as BMDL (Below Method Detection Limit). When a compound or element is not present at any detectable concentrations it is reported as ND (Not Detected). MDL's for non-aqueous matrices are based on USEPA published MDL's but are adjusted as per sample weight. Matrix spike and replicate analyses, where included, were performed on samples randomly chosen within each quality assurance batch and are therefore not necessarily spikes and replicates of this report's sample. Surrogate compound recovery data and instrument calibration data are included in the Method Performance Data Tables.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

APR 1, 1986
QA4767

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Acid Compounds - GC/MS Analysis Data (QRO2)

Chain of Custody Data Required for ETC Data Management Summary Reports

L7194 MONSANTO COMPANY MONCORPEMB S 860314

ETC Sample No. | Company | Facility | Sample Point | Date | Time | Discover Hours

HPDES Number	Compound	Results: Sample Concen. ug/kg	Results: MDL ug/kg	QC Replicate: First ug/kg	QC Replicate: Second ug/kg	QC Blank and Spiked Blank: Blank Data ug/kg	QC Blank and Spiked Blank: Concen. Added ug/kg	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample ug/kg	QC Matrix Spike: Concen Added ug/kg	QC Matrix Spike: % Recov
1A	2-Chlorophenol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]
2A	2,4-Dichlorophenol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]
3A	2,4-Dimethylphenol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]
4A	4,6-Dinitro-o-cresol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]
5A	2,4-Dinitrophenol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]
6A	2-Nitrophenol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]
7A	4-Nitrophenol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]
8A	p-Chloro-m-cresol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]
9A	Pentachlorophenol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]
10A	Phenol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]
11A	2,4,6-Trichlorophenol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]

ETC ENVIRONMENTAL TESTING and CERTIFICATION

APR 4, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (OR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Sequence Code
L7194	MONSANTO COMPANY	MONOCROTONE 8		860314		

NPDES Number	Compound	Results		QC Duplicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen Added ug/kg	% Recov
1B	Acenaphthene	ND	63	ND	ND	ND	0	-	ND	3200	77
2B	Acenaphthylene	ND	126	ND	ND	ND	0	-	ND	3200	77
3B	Anthracene	ND	63	ND	ND	ND	0	-	ND	3200	77
4B	Benzidine	ND	1900	ND	ND	ND	0	-	ND	3200	77
5B	Benzo(a)anthracene	ND	250	ND	ND	ND	0	-	ND	3200	77
6B	Benzo(a)pyrene	ND	63	ND	ND	ND	0	-	ND	3200	77
7B	Benzo(b)fluoranthene	ND	126	ND	ND	ND	0	-	ND	3200	77
8B	Benzo(ghi)perylene	ND	126	ND	ND	ND	0	-	ND	3200	77
9B	Benzo(k)fluoranthene	ND	126	ND	ND	ND	0	-	ND	3200	77
10B	bis(2-Chloroethoxy)methane	ND	126	ND	ND	ND	0	-	ND	3200	77
11B	bis(2-Chloroethyl) ether	ND	126	ND	ND	ND	0	-	ND	3200	77
12B	bis(2-Chloroisopropyl)ether	ND	126	ND	ND	ND	0	-	ND	3200	77
13B	bis(2-Ethylhexyl)phthalate	ND	126	ND	ND	ND	0	-	ND	3200	77
14B	4-Bromophenyl phenyl ether	ND	63	ND	ND	ND	0	-	ND	3200	77
15B	Butyl benzyl phthalate	ND	126	ND	ND	ND	0	-	ND	3200	77
16B	2-Chloronaphthalene	ND	63	ND	ND	ND	0	-	ND	3200	77
17B	4-Chlorophenyl phenyl ether	ND	140	ND	ND	ND	0	-	ND	3200	77
18B	Chrysene	ND	63	ND	ND	ND	0	-	ND	3200	77
19B	Dibenzo(a,h)anthracene	ND	315	ND	ND	ND	0	-	ND	3200	77
20B	1,2-Dichlorobenzene	241	63	ND	ND	ND	0	-	ND	3200	77
21B	1,3-Dichlorobenzene	ND	63	ND	ND	ND	0	-	ND	3200	77
22B	1,4-Dichlorobenzene	ND	63	ND	ND	ND	0	-	ND	3200	77
23B	3,3'-Dichlorobenzidine	ND	1900	ND	ND	ND	0	-	ND	3200	77
24B	Diethyl phthalate	ND	126	ND	ND	ND	0	-	ND	3200	77
25B	Dimethyl phthalate	ND	126	ND	ND	ND	0	-	ND	3200	77
26B	Di-n-butyl phthalate	ND	126	ND	ND	840	0	-	ND	3200	77
27B	2,4-Dinitrotoluene	ND	126	ND	ND	ND	0	-	ND	3200	77
28B	2,6-Dinitrotoluene	ND	63	ND	ND	ND	0	-	ND	3200	77
29B	Di-n-octyl phthalate	ND	126	ND	ND	ND	0	-	ND	3200	77
30B	1,2-Diphenylhydrazine	ND	126	ND	ND	ND	0	-	ND	3200	77
31B	Fluoranthene	845	63	113	58.1	ND	0	-	ND	3200	77
32B	Fluorene	ND	63	ND	ND	ND	0	-	ND	3200	77

ETC ENVIRONMENTAL TESTING and CERTIFICATION

APR 4, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
L7194	MONSANTO COMPANY	MONCORPEND [illegible]	S	860314		

NPDES Number	Compound	Results: Sample Concen. ug/kg	Results: MDL ug/kg	QC Replicate: First ug/kg	QC Replicate: Second ug/kg	QC Blank and Spiked Blank: Blank Data ug/kg	QC Blank and Spiked Blank: Concen. Added ug/kg	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample ug/kg	QC Matrix Spike: Concen Added ug/kg	QC Matrix Spike: % Recov
330	Hexachlorobenzene	ND	63	ND	ND	ND	0	-	ND	3200	68
340	Hexachlorobutadiene	ND	36	ND	ND	ND	0	-	ND	3200	79
350	Hexachlorocyclopentadiene	ND	330	ND	ND	ND	0	-	ND	0	-
360	Hexachloroethane	ND	53	ND	ND	ND	0	-	ND	3200	79
370	Indeno(1,2,3-c,d)pyrene	ND	160	ND	ND	ND	0	-	ND	0	-
380	Isophorone	ND	73	ND	ND	ND	0	-	ND	3200	81
390	Naphthalene	ND	63	ND	ND	ND	0	-	ND	3200	77
400	Nitrobenzene	ND	63	ND	ND	ND	0	-	ND	3200	76
410	N-Nitrosodimethylamine	ND	330	ND	ND	ND	0	-	ND	0	-
420	N-Nitrosodi-n-propylamine	ND	330	ND	ND	ND	0	-	ND	3200	85
430	N-Nitrosodiphenylamine	ND	63	ND	ND	ND	0	-	ND	3200	[illegible]
440	Phenanthrene	ND	180	66.1	67.3	ND	0	-	37.4	3200	[illegible]
450	Pyrene	ND	63	90.6	42.3	ND	0	-	ND	3200	[illegible]
460	1,2,4-Trichlorobenzene	ND	63	ND	ND	ND	0	-	ND	3200	[illegible]

[illegible]

ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 1, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Priority Pollutant Metals - Analysis Data (QR05)

Chain of Custody Data Required for ETC Data Management Summary Report

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
L7194	MONSANTO COMPANY	MONCORPENG	S	860314		

NPDES Number	Compound	Results: Sample Concen. ug/kg	Results: MDL ug/kg								
	Antimony	ND	14000								
	Arsenic	6000	1000								
	Beryllium	400	100								
	Cadmium	[illegible]	400								
	Chromium	24000	1900								
	Copper	27000	2500								
	Lead	37000	6300								
	Mercury	700	100								
	Nickel	21000	1000								
	Selenium	ND	600								
	Silver	ND	1000								
	Thallium	ND	600								
	Zinc	130000	700								
	Calcium	102000000	12000								
	Iron	134000000	37000								
	Aluminum	69000000	33000								
	Manganese	611000	400								
	Barium	110000	600								
	Cobalt	4500	4100								
	Magnesium	9960000	42000								
	Sodium	370000	24000								
	Tin	[illegible]	4600								
	Vanadium	37000	2300								
	Potassium	1340000	4000								

MONS 024051

ETC ENVIRONMENTAL TESTING and CERTIFICATION

APR 2, 1986

TABLE 2: METHOD PERFORMANCE DATA
Surrogate Recovery Soil - GC/MS Data (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Disposal Hours
L7194	MONSANTO COMPANY	MONCORPENG 6		86031		0

Compound	Amount added ug	% Recovery	Control Limits * Lower	Control Limits * Upper
VOLATILE FRACTION				
Toluene-D8	-	-	80	100
p-Bromofluorobenzene	-	-	80	100
1,2-Dichloroethane-D4	-	-	50	100
ACID FRACTION				
Phenol-D5	100	86	20	140
2-Fluorophenol	100	90	20	140
2,4,6-Tribromophenol	100	100	10	140
BASE/NEUTRAL FRACTION				
Nitrobenzene-D5	50	76	20	140
2-Fluorobiphenyl	50	62	20	140
Terphenyl-D14	50	49	20	150

* QC Limit Control Limits

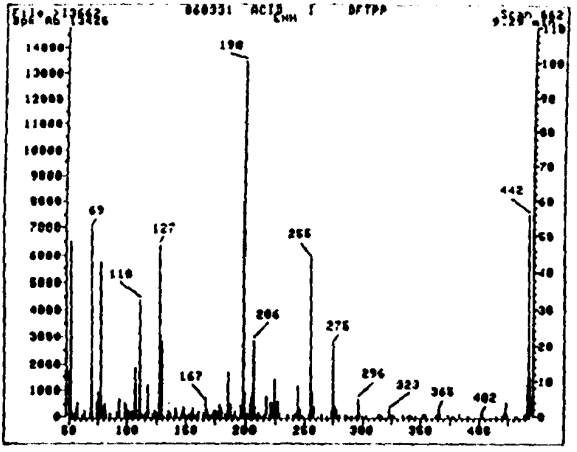


TABLE 2: METHOD PERFORMANCE DATA (QR22)

GC/MS Tuning Data - Decafluorotriphenylphosphine (DFTPP) for Acids Analysi

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	48.32	48.32	Ok
68	Less than 2% of mass 69	.95	1.81	Ok
69	(reference only)	52.22	52.22	Ok
70	Less than 2% of mass 69	.23	.43	Ok
127	40-60% of mass 198	47.25	47.25	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.94	6.94	Ok
275	10-30% of mass 198	20.47	20.47	Ok
365	Greater than 1% of mass 198	2.33	2.33	Ok
441	0-100% of mass 443	9.10	82.74	Ok
442	Greater than 40% of mass 198	55.89	55.89	Ok
443	17-23% of mass 442	10.99	19.67	Ok

Injection Date: 03/31/86
Injection Time: 14:59
Run No: >13662
Spectrum No: 662

Analyst: [signature]
Processor: Susan C. Sulajcic
QC Batch: QA4047
Samples: L7195,L7249,L7194,L7248, L7314,L7315,L7321,L7322

4/1/86

MONS 024053

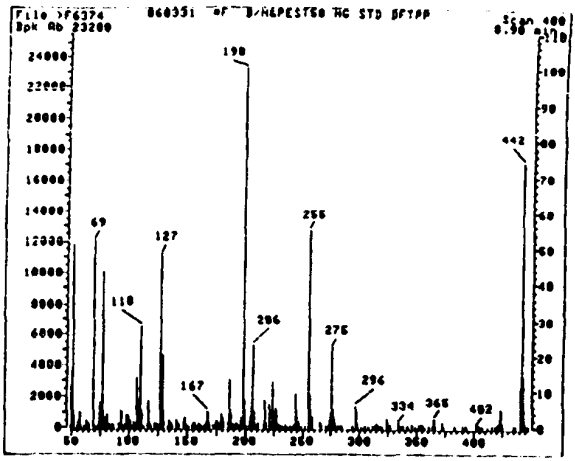


TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	50.74	50.74	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	52.21	52.21	Ok
70	Less than 2% of mass 69	.26	.50	Ok
127	40-60% of mass 198	48.40	48.40	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.32	7.32	Ok
275	10-30% of mass 198	22.40	22.40	Ok
365	Greater than 1% of mass 198	2.43	2.43	Ok
441	0-100% of mass 443	10.56	76.75	Ok
442	Greater than 40% of mass 198	74.07	74.07	Ok
443	17-23% of mass 442	13.75	18.57	Ok

Injection Date: 04/01/86 Analyst: Fred Munson
Injection Time: 00:41 Processor: Stella Chapman
Run No: >F6374 QC Batch: 6814
Spectrun No: 400 Samples: L6248-L6249, L7194-L7195, L6314-L6315, L6321-L6322.

4/3/86

MONS 024054

Methodology
for
GC/MS Analysis of Priority Pollutant Compounds

The methods employed in the GC/MS analysis for priority pollutants are established EPA methods. Rigid compliance with the instrument parameters and performance criteria of the published methods was achieved. In some cases, the precise amounts of sample used and the sample handling procedures vary with the complexity of the sample matrix. Qualitative identification of the priority pollutants was performed using the relative retention times, the relative abundance of three characteristic ions and the abundance ratios. The entire mass spectrum was reviewed to confirm each identification. Quantitative analysis of detected compounds was performed by using a response factor generated by a major characteristic ion of the specific compound and an internal standard.

Compounds, in addition to those on the priority pollutant list, were identified through a computer-aided search of the NBS-EPA spectra library. After review the identifications are included in a separate tabulation and labelled "tentatively identified".

Acid, Base/Neutral and Pesticide Priority Pollutant Compounds

For the analysis of the Acid, Base/Neutral and Pesticide priority pollutants in a soil matrix, a modification of EPA Method 625 was used. The method can be summarized as follows. A 30 gm semi-wet soil sample is soxhlet extracted with a 1:1 mixture of acetone and hexane. The acetone is thermally stripped. The remaining hexane extract is diluted to 200 ml with methylene chloride and twice extracted with an aqueous NaOH solution followed by an extraction with deionized water. The methylene chloride extract is dried and concentrated to a 1 ml final volume. This concentrate is injected into a GC/MS instrument configured for the analysis of Base/Neutral priority pollutant compounds. The remaining aqueous extracts are combined and the pH adjusted to a value less than 2. The aqueous phase is serially extracted with 3 aliquots of methylene chloride. The methylene chloride extracts are dried, concentrated to a 1 ml final volume. The concentrate is injected into a GC/MS instrument configured for the analysis of acid extractable priority pollutant compounds.

Methodology
for
Analysis of Metals

AQUEOUS

The determination of metals in aqueous samples is performed according to the methods published by EPA in "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, March, 1983, and the Federal Register, October 26, 1983. Arsenic, selenium and thallium are determined by furnace AA; silver, aluminum, barium, beryllium, boron, cadmium, calcium, chromium, copper, cobalt, iron, magnesium, manganese, molybdenum, nickel, lead, sodium, antimony, tin, titanium, vanadium, and zinc are determined by ICP emission spectrometry, except where lower levels of detection are required: in these cases (e.g. lead in groundwater monitoring samples) furnace AA is used. All furnace AA parameters are run by method of standard additions. The determination of mercury is performed by cold vapor AA.

EP TOXICITY

The determination of metals in aqueous EP Toxicity leachates is performed according to the methods published by EPA in "Test Methods for Evaluating Solid Waste" EPA SW-846, revised April, 1984 and the Federal Register, Oct. 26, 1983, 1979. Silver, arsenic, barium, cadmium, chromium, lead and selenium are determined by ICP emission spectrometry. Mercury is determined using cold vapor AA. For leachates that are organic in nature, the analyses are performed according to the methods described under OIL/SLUDGE below.

SOIL/SEDIMENT

The determination of silver, beryllium, cadmium, chromium, copper, nickel, antimony, lead, and zinc in sediment samples is performed according to methods published by EPA in "Interim Methods for the Sampling and Analysis of Priority Pollutants in Sediments and Fish Tissue", EPA 600/4-81-055, October 1980. Mercury is determined according to the sediment method published by EPA in "Method for Chemical Analysis of Water and Wastes", EPA 600/4-79-020, March 1983. Arsenic, selenium and thallium are determined by furnace AA using nitric acid in a closed decomposition vessel for sample digestion.

OIL/SLUDGE

The determination of silver, aluminum, boron, barium, beryllium, calcium, cadmium, copper, chromium, cobalt, iron, magnesium, manganese, molybdenum, sodium, nickel, lead, antimony, tin, titanium, vanadium, and zinc in sludge/petroleum-based samples is performed by ICP emission spectrometry using a magnesium nitrate dry ashing digestion technique. Arsenic, selenium and thallium are determined by furnace AA using nitric acid in a closed decomposition vessel for sample digestion. Mercury is determined by cold vapor AA using the same digestion technique.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Summary of
Quality Assurance/Quality Control Procedures (QA/QC)

ETC bases its quality assurance protocols on the following government guidelines:

- "Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA-600/4-79-019, March 1979;
- National Enforcement Investigation Center Policies, and Procedures manual; EPA-330/9/79/001-R, October 1979;
- the recommended guidelines for EPA Methods 624 and 625. (Federal Register, December 3, 1979; updated on October 26, 1984);
- "Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samples," EPA 600/8-80-038, June 1980;
- "Determination of 2,3,7,8-TCDD in Soil and Sediment" EPA, Region VII, Kansas City, September 1983;
- Organic Analysis: Multi-media, Multi Concentration-IFB WA84-A267; and
- Dioxin Analysis:Soil/Sediment Matrix; Multi-Concentration; Selected Ion Monitoring with Jar Extretion Procedure-IFB WA84-A002

However, we have modified our protocols to provide a higher level of QA/QC than the guidelines require. For example, we analyze a higher than required number of quality control samples and we pay especially careful attention to the certification of the "reference standard" compounds we use in analysis. Below are listed the key QA/QC elements for the methods we used.

Analysis of Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry

- Each batch of 13 samples consists of 9 customer samples (at a maximum), one blank sample, one spiked blank, one spiked sample and one replicate sample. This amounts to a 30% quality control factor.
- Three surrogate compounds are added to each sample in the batch of 13.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on bromofluorobenzene (BFB) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of Volatile Organic Priority Pollutant "standards" at a minimum of 3 different concentrations and using a mixture of 3 internal standards at a constant concentration.
- The calibration curve is verified with a mixture of priority pollutant standards every day. If the response factors vary greater than 25%, the instrument must be recalibrated.

Analysis of Organic Compounds Extracted in Acid or Base/Neutral Solutions by Gas Chromatography/Mass Spectrometry

- Each batch of 20 samples consists of 16 customer samples (at a maximum), one blank sample, one spiked blank (for water matrices), one sample spiked with the priority pollutant standard mixture and a duplicate customer sample. This amounts to a 20% quality control factor.

- Three surrogate compounds are added to each sample in the batch for Base/Neutral analysis.
- Three surrogate compounds are added to each sample in the batch for Acid analysis
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on decafluorotriphenylphosphine (DFTPP) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of standards composed of either the Organic Acid or Base/Neutral Extractable Compounds at a minimum of 3 concentrations and using five internal standards for quantitation.

Analysis of Metals

All Samples

- New standards are prepared for each batch of samples.
- Normal calibration is performed using a blank sample and four standards that have been through the sample preparation procedure. A regression analysis is used to construct the calibration curve.
- All EP Toxicity samples and all samples determined by furnace atomic absorption are calculated by the "method of additions".
- For each sample analysis that requires the use of the "method of additions" technique a three point calibration is performed using U.S. EPA "Methods for Chemical Analysis of Water and Wastes, 1979". Results are obtained using linear regression analysis. Any regression with a coefficient of correlation below 0.990 is considered suspect, necessitating review of calibration data or sample re-analysis.
- In constructing the normal calibration curves the lowest concentration levels we use are values greater than or equal to 5 times the Instrumental Detection Limit (IDL).
- All calibration standards are analyzed in duplicate, at a minimum.
- Independent reference standards are used to check the accuracy of calibration standards.
- A check standard is analyzed every ten samples to validate the normal calibration curve.
- One customer sample out of every ten is analyzed in triplicate.

Homogenous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are homogeneous, the QC program is a minimum of 25% and consists of analyzing

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 Independent reference standard,
- 4 Calibration standards (processed using the sample preparation method),
- 4 Calibration standards (without sample preparation), and
- 1 Reagent Blank

Heterogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are heterogeneous, the QC program is a minimum of 35% and consists of analyzing:

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 Replicate independent reference standards;
- 4 Calibration standards (processed using the sample preparation method);
- 1 Procedural Blank;
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank.

Analysis of Mercury

To analyze samples for mercury we group them by matrix in batches of 30 or less. Our QC program is a minimum of 30% and consists of analyzing:

- each of the 30 customer samples in duplicate;
- 3 sets of triplicate anaylses;
- 2 Replicate spikes;
- 2 Replicate independent reference standards;
- 10 Calibration standards (processed using the sample preperation method), and
- 2 Procedural Blanks.

Analysis of Pesticides, Herbicides and PCB's by Gas Chromatography

Pesticide, herbicide and PCB samples are grouped in batches of 16 customer samples or less according to the type of analysis to be performed. The QC program for each of these three types of analyses is a minimum of 20% and consists of analyzing:

- 1 procedural blank sample(a reagent blank is analyzed in the case of non-water matrices);
- 1 spiked blank sample (the spiked blank is eliminated in the case of non-water matrices);
- 1 replicate sample;
- 1 replicate spiked sample; and
- 1 known refernece QC sample for at least each 100 samples analyzed

The instrument is calibrated each run with three standards, and checked every 10 samples.

Analysis of Cyanides, Phenols, Fluoride, Chloride, Nitrate and Nitrite

- All parameters are analyzed using a Technicon Autoanalyzer II GT.
- 3 calibration standards are analyzed at the beginning and end of each batch

- Each batch (up to 80 samples) consists of analyzing one blank, one spiked blank, one duplicate and spiked sample every 20 samples, and an EPA known reference sample

Analysis of Total Organic Carbon (TOC)

TOC samples are analyzed on a daily basis with the number of samples analyzed per day dependent on the request for duplicate or quadruplicate analyses. The quality control program is designed to maintain the appropriate amount of QC and consists of the following elements:

- Daily instrument calibration
- One blank
- Standard recalibration every 10 samples
- Spiked samples at a low and high level
- Every sample is run in duplicate at a minimum

Analysis of Total Organic Halide (TOX)

- Blank reagent water for absolute carbon backround must contain less than 5 ug/l of halide (as chloride).
- Using a trichlorophenol standard, the mean adsorption efficiency must be within +/- 15% of the standard value.
- Calibration standards are run every 10 samples.
- Every sample is run in duplicate at a minimum.

Analysis of 2,3,7,8-TCDD (Dioxin) by GC/MS (SIM)

- Each sample is dosed with a known quantity of $^{13}C_{12}$-2,3,7,8-TCDD as internal standard and $^{37}Cl_4$-TCDD as surogate standard. The action limits for surrogate standard results is +/- 40% of the true value. Samples showing surrogate standard results outside of these limits are reextracted and reanalyzed.
- Two laboratory "method blanks" are run along with each set of 24 or fewer samples. The method blank is also dosed with the internal standard and surrogate standard.
- At least one per set of 24 samples is run in duplicate to determine intralaboratory precision.
- Qualitative Requirements. The following are met in order to confirm the presence of native 2,3,7,8-TCDD:

  a. Isomer specificity must be demonstrated initially and verified once per 8-hour work shift. The verification consists of injecting a mixture containing TCDD isomers which elute close to 2,3,7,8-TCDD. The 2,3,7,8-TCDD must be separated from interferring isomers, with no more than 25% valley relative to the 2,3,7,8-TCDD peak

  b. The 320/322 ratio is within the range of 0.67 to 0.87.

  c. Ions 320, 322, and 257 are all present and maximize together the signal to mean noise ratio must be 2.5 to 1 or better for all 3 ions.

  d. The retention time is equal (within 3 seconds) the retention time for the isotopically labeled 2,3,7,8-TCDD.

  e. At least one of the positives can be confirmed by obtaining partial scan spectra from mass 150 to mass 350. The partial scan guidelines are as follows:

. the 320/324 ratio should be 1.58 +/- 0.16

. the 257/259 ratio should be 1.03 +/- 0.10

. the 194/196 ratio should be 1.54 +/- 0.15

- One sample is spiked with native 2,3,7,8-TCDD at a level of 1.0 PPB (for soil) for each set of 24 or fewer samples.

- In cases where no native 2,3,7,8-TCDD is detected, the actual detection limit is estimated and reported based on a signal to noise ratio of 2.5 to 1 at ions 320 and 322.

- For each sample, the internal standard is present with at least a 10 to 1 signal to noise ratio for both mass 332 and mass 334. Also, the internal standard 332/334 ratio must be within the range of 0.67 to 0.87.

Subcontractor QA/QC

Each subcontractoer is required to maintain an appropriate level of quality control. To insure this, each subcontractor is required to submit to ETC the quality control data for all analyses it performs. This data is kept on file at ETC. In general, the amount of quality control required is one duplicate sample with one spiked sample for every ten analyses.

Chain-of-Custody

The chain-of-custody procedure is part of our quality assurance protocol. We believe our chain-of-custody record fully complies with the legal requirements of federal, state and local government agencies and of the courts of law. The record covers:

- labeling of sample bottles, packing the Sample Shuttle and transferring the Shuttle under seal to the custody of a shipper;

- outgoing shipping manifests;

- the chain-of-custody form completed by the person(s) breaking the Shuttle seal, taking the sample, resealing the Shuttle and transferring custody to a shipper;

- incoming shipping manifests;

- breaking the Shuttle's reseal;

- storing each labeled sample bottle in a secured area;

- disposition of each sample to an analyst or technician; and

- the use of the sample in each bottle in a testing procedure appropriate to the intended purpose of the sample.

The records show for each link in this process:

- the person with custody; and

- the time and date each person accepted or relinquished custody.

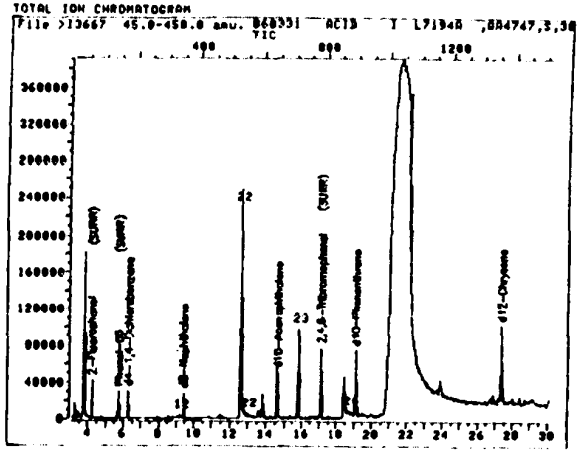
Appendix A

Mass Spectral Data
for
Quantitated Compounds

1) A total ion chromatogram for each sample analyzed by a GC/MS instrument.

2) A Quant. report used by the analyst to determine qualitative and quantitative results of the compounds present.

3) A mass spectrum and a reference spectrum for each priority pollutant compound detected in the sample.



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Misc: L7194A ,WA4747,S,30.0y,1

B1L#12

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Title: PP/ACID IDFILE
Last Calibration: 860331 14:52

Operator ID: JH2180
Quant Time: 860331 21:36
Injected at: 860331 21:03

QUANT REPORT

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Data File: >13667::07 Dilution Factor: 1.00
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Misc: L7194A ,QA4747,S,30.09,1 BTL#12

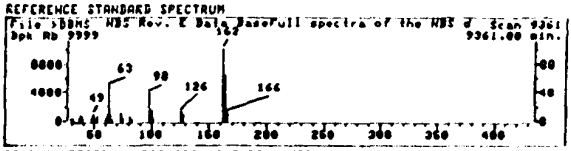
ID File: !ACID::US
Title: PP/ACID IDFILE
Last Calibration: 860331 14:52

	Compound		R.T.	Scan	Area	Conc	Units	Q
1)	*d4-1,4-Dichlorobenzene		6.27	179	12846	40.00	UG/ML	9
3)	2-Fluorophenol	(SURR)	4.19	62	21599	90.20	UG/ML	
8)	Phenol-D5	(SURR)	5.72	148	24474	86.32	UG/ML	
11)	*d8-Naphthalene		9.38	354	28886	40.00	UG/ML	
12)	2,4-Dichlorophenol		9.22	345	1723	8.51	UG/ML	9
17)	*d10-Acenaphthalene		14.62	649	20642	40.00	UG/ML	
22)	2,4,6-Trichlorophenol		12.60	535	115838	509.95	UG/ML	9
~~23)~~	~~2,4,6-Trichlorophenol~~		~~12.98~~	~~552~~	~~1797~~	~~7.91~~	~~UG/ML~~	~~9~~
~~25)~~	~~2,3,4,6-Tetrachlorophenol~~		~~15.00~~	~~715~~	~~25954~~	~~167.31~~	~~UG/ML~~	~~9~~
24)	*d10-Phenanthrene		19.07	899	80950	40.00	UG/ML	9
25)	2,4,6-Tribromophenol	(SURR)	17.06	786	22399	99.76	UG/ML	9
26)	Pentachlorophenol		18.79	883	984	3.67	UG/ML	
28)	*d12-Chrysene		27.34	1362	92208	40.00	UG/ML	10

* Compound is ISTD

MONS 024064

REFERENCE STANDARD SPECTRUM



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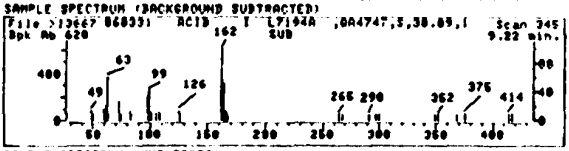

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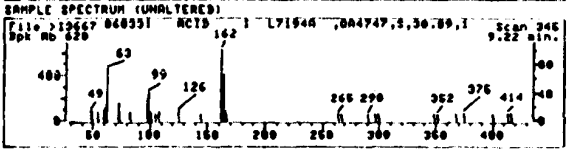

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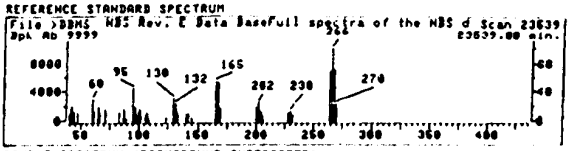
Quant Time: 860331 21:36
Injected at: 860331 21:03

BIL812

Compound No: 12
Compound Name: 2,4-Dichlorophenol
Scan Number: 345
Retention Time: 9.22 min.
Area: 1723
Concentration: 8.51 UG/ML
q-value: 90

REFERENCE STANDARD SPECTRUM



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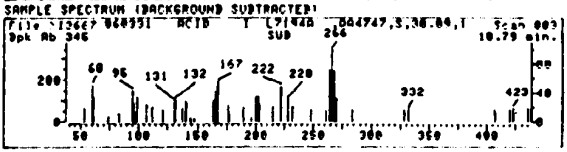

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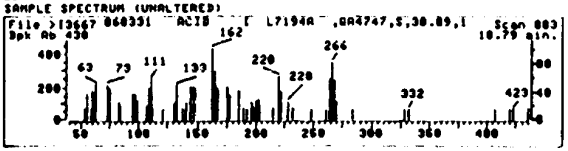

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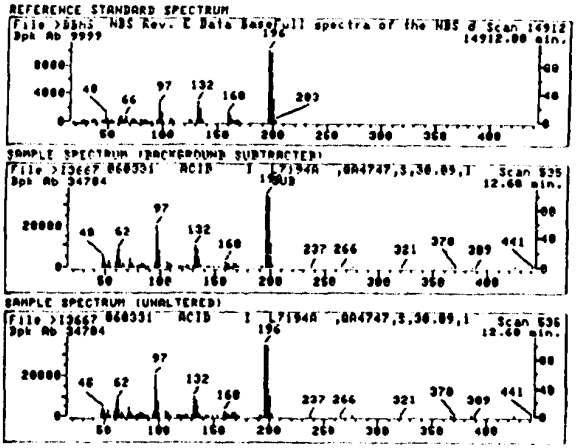
Compound No: 26
Compound Name: Pentachlorophenol
Scan Number: 883
Retention Time: 18.79 min.
Area: 984
Concentration: 3.67 UG/ML
q-value: 89



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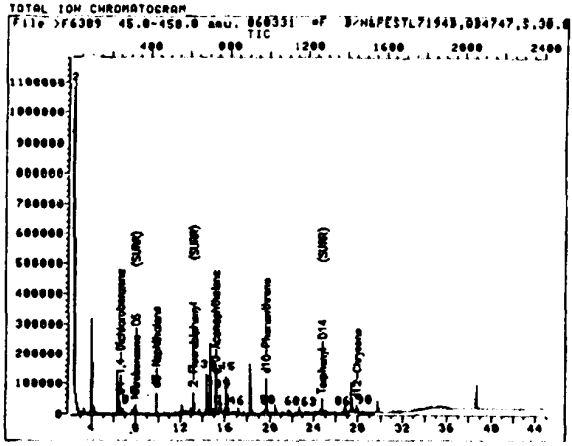
Quant Time: 860331 21:36
Injected at: 860331 21:03

Compound No: 22
Compound Name: 2,4,6-Trichlorophenol
Scan Number: 535
Retention Time: 12.60 min.
Area: 115838
Concentration: 509.95 UG/ML
q-value: 97



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Misc: L7194B,QB4747,S,30.09,1 BTL023

Id File: FBNP::US
Title: B/N+PEST ID FILE .... FOR F 850326
Last Calibration: 860401 12:03

Operator ID: RA0197
Quant Time: 860401 19:32
Injected at: 860401 18:44

QUANT REPORT

Operator ID: RA0157 Quant Rev: 5 Quant Time: 860401 19:32
Output File: ^F6389::AQ Injected at: 860401 18:44
Data File: >F6389::U2 Dilution Factor: 1.00
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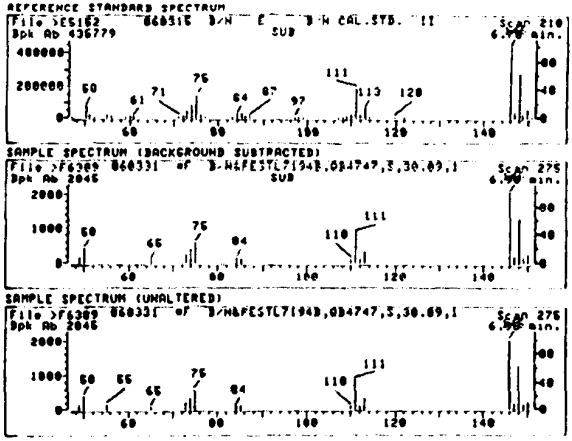
Misc: L7194B,Q84747,S,30.09,1 BTL@23

ID File: FBNP::US
Title: B/N+PEST ID FILE .... FOR F 850326
Last Calibration: 860401 12:03

	Compound		R.T.	Scan@	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene		6.50	249	19112	40.00	UG/ML	97
2)	N-Nitrosodimethylamine		~~2.27~~	~~10~~	~~3043~~	~~9.20~~	~~UG/ML~~	100
7)	1,3-Dichlorobenzene		~~6.96~~	~~275~~	~~5071~~	~~7.89~~	~~UG/ML~~	96
8)	1,4-Dichlorobenzene		~~6.96~~	~~275~~	~~5071~~	~~7.69~~	~~UG/ML~~	96
9)	1,2-Dichlorobenzene		6.96	275	5071	7.98	UG/ML	95
12)	Nitrobenzene-D5	(SURR)	7.92	329	25944	37.90	UG/ML	87
18)	*d8-Naphthalene		9.76	433	84812	40.00	UG/ML	93
19)	2-Fluorobiphenyl	(SURR)	13.13	623	63515	31.10	UG/ML	98
33)	*d10-Acenaphthalene		15.08	733	49813	40.00	UG/ML	96
39)	Dimethyl phthalate		~~14.30~~	~~689~~	~~61432~~	~~27.06~~	~~UG/ML~~	63
39)	Dimethyl phthalate		~~15.54~~	~~759~~	~~3990~~	1.76	UG/ML	66
41)	2,6-Dinitrotoluene		~~15.08~~	~~733~~	~~6658~~	~~11.79~~	UG/ML	68
41)	2,6-Dinitrotoluene		~~15.54~~	~~759~~	~~2488~~	~~4.25~~	UG/ML	46
45)	2,4-Dinitrotoluene		~~16.04~~	~~787~~	~~20652~~	~~24.74~~	UG/ML	55
46)	Diethyl phthalate		~~16.82~~	~~831~~	~~1236~~	~~.53~~	UG/ML	89
54)	*d10-Phenanthrene		19.59	987	145557	40.00	UG/ML	96
58)	Phenanthrene		~~19.66~~	~~991~~	2431	.73	UG/ML	96
59)	Anthracene		~~19.66~~	~~991~~	2431	.71	UG/ML	93
60)	Di-n-butyl phthalate		~~21.87~~	~~1116~~	~~7194~~	~~2.88~~	UG/ML	95
61)	Fluoranthene		23.36	1200	2953	1.63	UG/ML	95
63)	Pyrene		~~23.36~~	~~1200~~	~~2953~~	~~1.76~~	UG/ML	95
72)	*d12-Chrysene		27.84	1452	33477	40.00	UG/ML	100
84)	Terphenyl-D14	(SURR)	24.70	1275	49962	24.51	UG/ML	91
86)	Butyl benzyl phthalate		~~26.45~~	~~1374~~	~~1765~~	~~2.91~~	UG/ML	88
90)	bis(2-Ethylhexyl)phthalate		~~28.42~~	~~1485~~	6247	~~8.76~~	UG/ML	98

* Compound is ISTD

SCAN 4-2-86



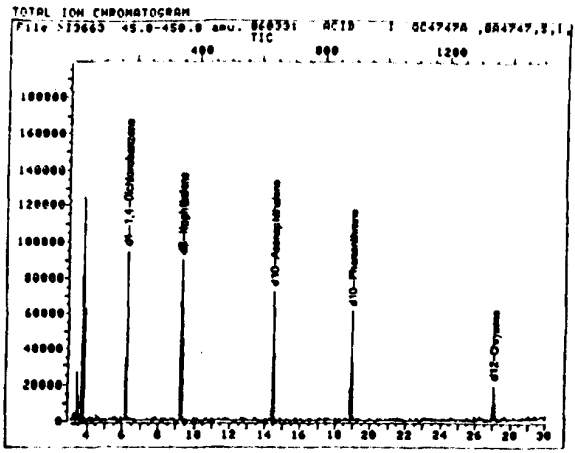
Data File: >F6389::U2
Name: 860331 #F B/N&PEST
Misc: L7194B,QB4747,S,30.09,1 BTL#33
Quant Time: 860401 19:32
Injected at: 860401 18:44

Compound No: 9
Compound Name: 1,2-Dichlorobenzene
Scan Number: 275
Retention Time: 6.96 min.
Area: 5071
Concentration: 7.98 UG/ML
q-value: 95

MONS 024070

Appendix C1

GC/MS Subsidiary Data



Data File: >I3663::U7
Name: 860331 ACID I
Misc: QC4747A ,QA4747,S,1,1

BIL# 8

Id File: IACID::US
Title: PP/ACID IDFILE
Last Calibration: 860331 14:52

Operator ID: JM2180
Quant Time: 860331 16:52
Injected at: 860331 16:19

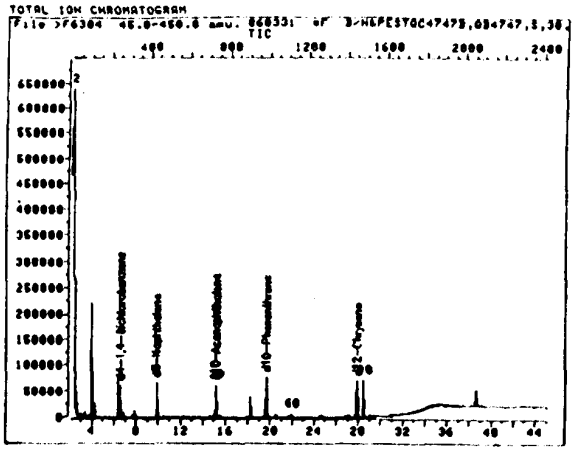
QUANT REPORT

Operator ID: JM2180 Quant Revi 5 Quant Time: 860331 16:52
Output File: ^I3663::AQ Injected at: 860331 16:19
Data File: >I3663::U7 Dilution Factor: 1.00
Name: 860331 ACID I
Misc: QC4747A ,QA4747,S,1,1 BTL# 8

ID File: IACID::US
Title: PP/ACID IDFILE
Last Calibration: 860331 14:52

	Compound	R.T.	Scan#	Area	Conc	Units
1)	*d4-1,4-Dichlorobenzene	6.17	175	39403	40.00	UG/ML
11)	*d8-Naphthalene	9.26	349	90499	40.00	UG/ML
17)	*d10-Acenaphthalene	14.46	642	34953	40.00	UG/ML
24)	*d10-Phenanthrene	18.92	893	60065	40.00	UG/ML
28)	*d12-Chrysene	27.02	1349	18515	40.00	UG/ML

* Compound is ISTD



Data File: >F6384::U2
Name: 860331 8F B/N&PEST
Misc: QC4747B,Q84747,S,30,1 BTL#18

Id File: FBNP::US
Title: B/N+PEST ID FILE .... FOR F 850326
Last Calibration: 860401 02:06

Operator ID: KU0706
Quant Time: 860401 09:56
Injected at: 860401 09:08

QUANT REPORT

Operator ID: KV0786 Quant Rev: 5 Quant Time: 860401 09:56
Output File: ^F6384::AQ Injected at: 860401 09:08
Data File: >F6384::U2 Dilution Factor: 1.00
Name: 860331 8F B/N&PEST
Misc: QC4747B,QB4747,S,30,1 BTL#18

ID File: FBNP::US
Title: B/N+PEST ID FILE .... FOR F 850326
Last Calibration: 860401 02:06

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene	6.53	249	24624	40.00	UG/ML	9
2)	N-Nitrosodimethylamine	~~2.29~~	~~10~~	~~4420~~	~~10.46~~	~~UG/ML~~	10
18)	*d8-Naphthalene	9.77	432	89791	40.00	UG/ML	9
33)	*d10-Acenaphthalene	15.08	732	41534	40.00	UG/ML	9
39)	Dimethyl phthalate	~~15.00~~	~~730~~	~~11917~~	~~6.30~~	~~UG/ML~~	6
54)	*d10-Phenanthrene	19.58	986	119392	40.00	UG/ML	9
60)	Di-n-butyl phthalate	21.89	1116	9574	3.24	UG/ML	9
72)	*d12-Chrysene	27.82	1451	98321	40.00	UG/ML	10
90)	bis(2-Ethylhexyl)phthalate	28.41	1484	53616	25.56	UG/ML	9

no PAEs found.

* Compound is ISTD

Blank 4-7-86.

MONS 024075

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY

Company: Monsanto Job No.

Address

Attention:

Sample Description:

CUSTOMER ID	DESCRIPTION	ETC #
Sample # 5	2 - 500ml (non ETC)	L7194
Sample # 57	↓	L7195

Sample(s) Relinquished by: Ram International

Time: 1:15 Date: 3/21/86

Sample(s) Received by: R Rosen

Time: 1:15 Date: 3/21/86

204 RARITAN CENTER PARKWAY • EDISON, NJ 08837 (201) 225-9600

MONS 024077

CHAIN OF CUSTODY RECORD

NRC JOB NUMBER 6405

CUSTOMER REPRESENTATIVE

P. O. CONTRACT NUMBER RQ140541X

NRC CONTRACT MANAGER Ray W. Nolte

PLANT NAME OR CODE

NRC TEAM LEADER Ray W. Nolte

(Specific information on samples is available on attached "Sample Identification Log")

Signatures	Date	Time	Remarks
Team Leader Verification of Collected Samples: Ray W. Nolte	3/14/88	1600	
Relinquished by: Ray W. Nolte Received by:	3/17/88	0900	Relinquished for shipment to ETC
Relinquished by: Received by:			
Logged-in-by:			
Received for Analysis by:			
Method of Shipment: Air Express	Number of Containers: 1		

Special Instructions (Sample preservation, security, delivery to, etc.)

Sample #5 (2 bottles)

Sample #57 (2 bottles

MONS 024078

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Departn

	Sample Number	Log Link	Sample Weight (gm)	Extract Vol. (ml) BN	Extract Vol. (ml) ACID	Comments
+	L4248	13976	30.50	1.0	1.0	PP/[illegible] SECHAL+15
+	L4249	↓	30.33	1.0	1.0	↓ ↓
	L7194	14156	30.09	1.0	1.0	PP/ON PP/ACID
	L7195	↓	31.99	1.0	1.0	↓
☆	L6314	14137	30.00	5.0	5.0	FORP/ACID FORP/BN SPECS
	L6315		30.16	1.0	1.0	
☆	L6321		31.50	5.0	5.0	
☆	L6322	↓	31.52	5.0	5.0	↓
	QC 4747		—	1.0	1.0	
	L4248 S		30.51	1.0	1.0	
	L4249 R		31.18	1.0	1.0	

QC Batch # 4747

Analysis 3.27 (See comments)

Matrix soil

Turnaround Normal

Date 3/26/86

Extraction Method:

Sep. Funnel ____

Continuous ____

Soxhlet ✓

Other ____

COMMENTS

+ L4248/49 - Refer to QC 4720 - samples redone on this batch due to label mix-up.

Log 14137: SPECSP- These are soil samp

☆ L6314, L6321, L63[illegible] had bad bad emul in The BN FRACTI[illegible] Recovery may be af[illegible] J.B.

QC UPD [illegible]

FRACTION	SPIKE Amt (ml)	Conce	Lot #
BN	1.0	100	12483
ACID	1.0	100	12346
Arochlor 1260	1.0	100	12649
Pest	1.0	100/200	12830
FORP/BN	1.0	100	12526
FORP/ACID	1.0	100	12522
Semi-VOA			

SURROGATE Amt. (ml)	Conc.	Lot #
1.0	BN: 50 ACID: 100	1284[illegible]

Set-up: Pamela y Williams 3.27.86

BN Conc.: [illegible] 3-19-86 Acid Conc.: [illegible] 3/29/86

UPD/Supervisor: [signature] 3/31

Spike/Surr. Verified: [signature] 3/27

ETC FORM 0110

MONS 024079

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 3/31/96 SHIFT
FRACTION Acid
INSTRUMENT F
TUNE FILE MTF60
SEQUENCE FILE JHF, JHI1
METHOD FILE Acid
ID FILE FA.D
ANALYST(S) J Hewitt
SUPERVISOR
BATCH #'s QM747

(PLEASE INITIAL)

CURRENT CSOS STATUS		STANDARDS UPDATED	
ACO	5.3	DATE	3/31
VPP		BY	JHewitt

STANDARD	CONC PPM	LOT NO.	LOT VOL
DFTPP	25		1
Surr Std	400		
Acid Cal Std I	60	12377	
Acid Cal Std II	200	12376	
Acid Cal Std III	300	12379	
Surr/Acid I	60	12525	
Surr/Acid II	200	12524	
Surr/Acid III	300	12523	

NAME	DATA FILE	WL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A TYPE)	PLUG YES
DFTPP	>I3655	2	—		100437		
Acid cal std III	I3656		1				
Acid cal std II	I3657		2				
Acid cal std I	I3658		3				
Surr/Acid III; 300ppm	I3659		4				
Surr/Acid I; 60ppm	I3660		5				
Surr/Acid I; 60ppm	I3661		6				
DFTPP	I3662		7				
QC4747A	I3663		8			SA	Y
L7195A	I3664		9				
L4249A	I3665		10			SA	Y
L4249AR	I3666		11				
L7194A	I3667		12				
L4248AS	I3668		13				
L4248A	I3669		14			SA	Y
L6314A	I3670		15				
L6315A	I3671		16				
L6321A	I3672		17				
L6322A	I3673		18				

ETC FORM #100

MONS 024080

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE March 31st 1986 SHIFT
FRACTION B/N
INSTRUMENT F
TUNE FILE MTF661
SEQUENCE FILE KV31
METHOD FILE BNPF
ID FILE
ANALYST(S)
SUPERVISOR
BATCH #'s G84723 (part) (...E)
G84747

(PLEASE INITIAL)

CURRENT CS06 STATUS		STANDARDS UPDATED	
ACQ		DATE	4/1/86
WIP		BY	GM

STANDARD	CONC PPM	LOT NO.	LOT VOL
Pest. IV	150	12851	
B/N III	200	12950	
B/N II	100	12946	
B/N I	60	12949	
Carbazole	300	12587	
Carbazole	100	12588	
Carbazole	60	12590	
DFTPP	25	12602	
Int. std.	400	1356	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
DFTPP - 50NG std	>F6366				I0043		
Carbazole std. 300ppm	>F6367		1				
Carbazole std. 100ppm	>F6368		2				
Carbazole std. 60ppm	>F6369		3				
B/N cal. std. II, 100ppm	>F6370		4				
B/N cal. std. I, 60ppm	>F6371		5				
B/N cal. std. III, 200ppm	>F6372		6				
B/N cal. std. IV, 150ppm	>F6373		7				
DFTPP - 50NG std	>F6374		8			OK	
L3281B	>F6375		9			G84723 PSBSIR	
L6781B	>F6376		10			PSBSIR	
L6317B	>F6377		11				
L6318B	>F6378		12				
L6320B	>F6379		13				
L5813B	>F6380		14			RBGA	
L5109B	>F6381		15				
L5110B	>F6382		16				
DCM	>F6383		17				
G84747B	>F6384		18			PBSCE S3	Y
L4249B	>F6385		19			S3	Y
L4341BR	>F6386		20				
DFTPP - 50NG std	>F6387		21				
B/N cal. std. II, 100ppm	>F6388		22			AF1260	
L7194B	>F6389		23				
L7195B	>F6390		24				

ETC FORM 0102

MONS 024081

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 4/1/86 SHIFT
FRACTION BN
INSTRUMENT F
TUNE FILE
SEQUENCE FILE
METHOD FILE
ID FILE
ANALYST(S)
SUPERVISOR
BATCH #'s

(PLEASE INITIAL)

CURRENT CSOS STATUS		STANDARDS UPDATED	
ACID		DATE	
WP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL

NAME	DATA FILE	uL INJ	ALS #	GPC	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS TIC
L4248BS	>F6391		25			AF126	
L4248B	>F6392		26			PCBSCF SB	Y
L63148	>F6393		27				
L63153	>F6394		28				
L6321B	>F6395		29				
L6322B	>F6396		30				

MONS 024082

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LL 14156

LABORATORY CHRONICLE: Metals Department

Samples L7194 , L7195

	Chemist	Date
Hg Prep	Helen C McPhee	4/24/86
AA/ICAP Prep	Joan Komarek	4/22/86

Lab Supervisor Vidya Vaidyanathan Date 4/25/86

ETC FORM 3101

MONS 024083

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Technical Report

for

MONSANTO COMPANY

800 N.LINDBERGH BLVD.

R3B

ST.LOUIS, MO 63167

Chain of Custody Data Required for ETC Data Management Summary Reports						
M2179	MONSANTO COMPANY	MONCORPENG	S	860314		
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

John J. Fitzgerald
Vice President
Research and Operations

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MONS 024084

ETC TESTING and CERTIFICATION

MAY 12, 1986
Q04747

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Pesticide/PCB Compounds - GC/MS Analysis Data (OR04)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
M2179	MONSANTO COMPANY	MONCORPEND	5	860314		

NPDES Number	Compound	Results: Sample Concen. ug/kg	Results: MDL ug/kg	QC Replicate: First ug/kg	QC Replicate: Second ug/kg	QC Blank and Spiked Blank: Blank Data ug/kg	QC Blank and Spiked Blank: Concen. Added ug/kg	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample ug/kg	QC Matrix Spike: Concen Added ug/kg	QC Matrix Spike: % Recov
1P	Aldrin	ND	63	ND	ND	ND	0	-	ND	3200	70
2P	Alpha-BHC	ND	330	ND	ND	ND	0	-	ND	3200	73
3P	Beta-BHC	ND	150	ND	ND	ND	0	-	ND	3200	64
4P	Gamma-BHC	ND	330	ND	ND	ND	0	-	ND	3200	63
5P	Delta-BHC	ND	160	ND	ND	ND	0	-	ND	3200	62
6P	Chlordane	ND	330	ND	ND	ND	0	-	ND	6560	62
7P	4,4'-DDT	ND	83	1600	1840	ND	0	-	324	3200	59
8P	4,4'-DDE	ND	190	243	322	ND	0	-	ND	3200	69
9P	4,4'-DDD	ND	160	896	3690	ND	0	-	ND	3200	74
10P	Dieldrin	ND	83	364	1060	ND	0	-	ND	3200	82
11P	Endosulfan I	ND	330	ND	ND	ND	0	-	ND	3200	73
12P	Endosulfan II	ND	330	ND	ND	ND	0	-	ND	3200	38
13P	Endosulfan sulfate	ND	190	ND	ND	ND	0	-	ND	3200	65
14P	Endrin	ND	330	ND	ND	ND	0	-	ND	3200	102
15P	Endrin aldehyde	ND	330	ND	ND	ND	0	-	ND	3200	76
16P	Heptachlor	ND	63	ND	ND	ND	0	-	ND	3200	80
17P	Heptachlor epoxide	ND	73	ND	ND	ND	0	-	ND	3200	64
18P	PCB-1242	ND	1200	ND	ND	ND	0	-	ND	0	-
19P	PCB-1254	ND	1200	ND	ND	ND	0	-	ND	0	-
20P	PCB-1221	ND	1000	ND	ND	ND	0	-	ND	0	-
21P	PCB-1232	ND	1200	ND	ND	ND	0	-	ND	0	-
22P	PCB-1248	ND	1200	ND	ND	ND	0	-	ND	0	-
23P	PCB-1260	ND	1200	ND	ND	ND	0	-	ND	0	-
24P	PCB-1016	ND	1200	ND	ND	ND	0	-	ND	3200	96
25P	Toxaphene	ND	330	ND	ND	ND	0	-	ND	0	-

MONS 024085

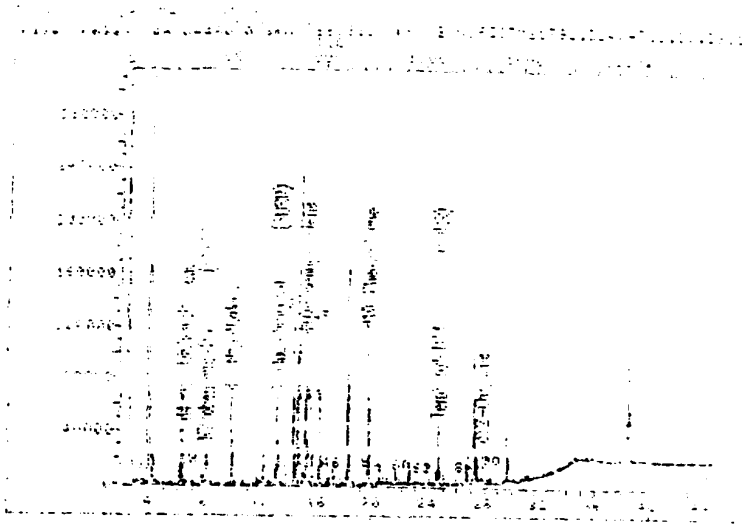
Appendix A

Mass Spectral Data for Quantitated Compounds

1) A total ion chrometogram for each sample analyzed by a GC/MS instrument.

2) A Quant. report used by the analyst to determine qualitative and quantitative results of the compounds present.

3) A mass spectrum and a reference spectrum for each priority pollutant compound detected in the sample.



Compound	R.T.	Scan#	Area	Conc	Units
[illegible]	[illegible]	19	[illegible]	[illegible]	[illegible]
[illegible]	6.96	275	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	6.96	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	453	[illegible]	[illegible]	[illegible]
[illegible]	12.10	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	14.30	615	[illegible]	[illegible]	[illegible]
[illegible]	15.50	759	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	11	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	987	145527	49	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	27.45	[illegible]	[illegible]	[illegible]	[illegible]

no PCB's found [initials] 5/12/86.

[initials] 5-12-86

MONS 024088

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Technical Report

for

MONSANTO COMPANY

800 N.LINDBERGH BLVD.

R3B

ST.LOUIS, MO 63167

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
L7195	MONSANTO COMPANY	MONCORPENS	S7	060314		

John J. Fitzgerald
Vice President
Research and Operations

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MONS 024089

TABLE OF CONTENTS

Introduction

This report contains the analytical results on your soil sample, 57 86/03/14. It is designed to include comprehensive data from the entire analytical process in order to satisfy the needs of various levels of review.

The results obtained from your sample are presented in tabular format immediately following this introduction. Quality assurance data is tabulated along with the appropriate sample results for verification. Depending on the analyses ordered, the quality assurance data may include results from blank, spiked blank, spiked sample (i.e. matrix spike) and replicate sample as well as results from surrogate compound analyses. Quality assurance data for verification of proper instrument performance is also included where appropriate. The report appendices include the chain of custody record for your sample and, where appropriate, the gas chromatograms and mass spectra.

The procedures used in the analysis of the sample are described in this report's methodology section. All analytical procedures within our laboratory are performed within a strictly enforced Quality Assurance Protocol. A description of this Protocol is included in the report.

Results

Sample results, and associated quality assurance data, are always tabulated in one or more of this report's Quantitative Results Tables. The format of each table varies with the class of analysis.

Priority Pollutants

The priority pollutant compounds and elements are listed with their NPDES (National Pollution Discharge Elimination System) numbers, and the Method Detection Limit (MDL) published in the Federal Register. When a compound or element is present below its published MDL it is reported as BMDL (Below Method Detection Limit). When a compound or element is not present at any detectable concentrations it is reported as ND (Not Detected). MDL's for non-aqueous matrices are based on USEPA published MDL's but are adjusted as per sample weight. Matrix spike and replicate analyses, where included, were performed on samples randomly chosen within each quality assurance batch and are therefore not necessarily spikes and replicates of this report's sample. Surrogate compound recovery data and instrument calibration data are included in the Method Performance Data Tables.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

APR 1 1996
QA4747

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Acid Compounds - GC/MS Analysis Data (QR02)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Grab/Composite Hours
L7196	MONSANTO COMPANY	MONSOMPENG 57		960314		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen Added ug/kg	% Recov
1A	2-Chlorophenol	[redacted]	100	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]	[redacted]	[redacted]
2V	2,4-Dichlorophenol		94					-			
3A	2,4-Dimethylphenol		94					-			
4A	4,6-Dinitro-o-cresol		750					-			
5A	2,4-Dinitrophenol		1300					-			
6A	2-Nitrophenol		110					-			
7A	4-Nitrophenol		75					-			
8A	p-Chloro-m-cresol		94					-			
9A	Pentachlorophenol		110					-			
10A	Phenol		47					-			
11A	2,4,6-Trichlorophenol		94					-			

ETC ENVIRONMENTAL TESTING and CERTIFICATION

APR 4, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
L7196	MONSANTO COMPANY	MONCORPENG	S7	060314		

NPDES Number	Compound	Results: Sample Concen. ug/kg	Results: MDL ug/kg	QC Replicate: First ug/kg	QC Replicate: Second ug/kg	QC Blank and Spiked Blank: Blank Data ug/kg	QC Blank and Spiked Blank: Concen. Added ug/kg	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample ug/kg	QC Matrix Spike: Concen. Added ug/kg	QC Matrix Spike: % Recov
1B	Acenaphthene	ND	59	ND	ND	ND	0	-	ND	3200	77
2B	Acenaphthylene	ND	110	ND	ND	ND	0	-	ND	3200	74
3B	Anthracene	ND	59	ND	ND	ND	0	-	ND	3200	77
4B	Benzidine	ND	1400	ND	ND	ND	0	-	ND	3200	0.
5B	Benzo(a)anthracene	ND	240	ND	ND	ND	0	-	ND	3200	77
6B	Benzo(a)pyrene	ND	78	ND	ND	ND	0	-	ND	3200	75
7B	Benzo(b)fluoranthene	ND	310	ND	ND	ND	0	-	ND	3200	79
8B	Benzo(ghi)perylene	ND	130	ND	ND	ND	0	-	ND	0	-
9B	Benzo(k)fluoranthene	ND	110	ND	ND	ND	0	-	ND	3200	73
10B	bis(2-Chloroethoxy)methane	ND	170	ND	ND	ND	0	-	ND	3200	78
11B	bis(2-Chloroethyl) ether	ND	180	ND	ND	ND	0	-	ND	3200	86
12B	bis(2-Chloroisopropyl)ether	ND	180	ND	ND	ND	0	-	ND	3200	70
13B	bis(2-Ethylhexyl)phthalate	ND	310	ND	ND	852	0	-	ND	3200	96
14B	4-Bromophenyl phenyl ether	ND	59	ND	ND	ND	0	-	ND	3200	72
15B	Butyl benzyl phthalate	ND	310	ND	ND	ND	0	-	ND	3200	100
16B	2-Chloronaphthalene	ND	59	ND	ND	ND	0	-	ND	3200	88
17B	4-Chlorophenyl phenyl ether	ND	130	ND	ND	ND	0	-	ND	3200	79
18B	Chrysene	ND	78	ND	ND	ND	0	-	ND	3200	79
19B	Dibenzo(a,h)anthracene	ND	310	ND	ND	ND	0	-	ND	0	-
20B	1,2-Dichlorobenzene	ND	59	ND	ND	ND	0	-	ND	3200	77
21B	1,3-Dichlorobenzene	ND	59	ND	ND	ND	0	-	ND	3200	75
22B	1,4-Dichlorobenzene	ND	140	ND	ND	ND	0	-	ND	3200	77
23B	3,3'-Dichlorobenzidine	ND	620	ND	ND	ND	0	-	ND	3200	0.
24B	Diethyl phthalate	ND	310	ND	ND	ND	0	-	ND	3200	76
25B	Dimethyl phthalate	ND	310	ND	ND	ND	0	-	ND	3200	67
26B	Di-n-butyl phthalate	ND	310	ND	ND	BMDL	0	-	ND	3200	84
27B	2,4-Dinitrotoluene	ND	180	ND	ND	ND	0	-	ND	3200	61
28B	2,6-Dinitrotoluene	ND	59	ND	ND	ND	0	-	ND	3200	64
29B	Di-n-octyl phthalate	ND	310	ND	ND	ND	0	-	ND	3200	89
30B	1,2-Diphenylhydrazine	ND	310	ND	ND	ND	0	-	ND	3200	82
31B	Fluoranthene	ND	69	113	58.1	ND	0	-	ND	3200	103
32B	Fluorene	ND	59	ND	ND	ND	0	-	ND	3200	76

ETC ENVIRONMENTAL TESTING and CERTIFICATION

APR 4, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
L7196	MONSANTO COMPANY	MONCORPEN0	67	860314		

NPDES Number	Compound	Results: Sample Concen. ug/kg	Results: MDL ug/kg	QC Replicate: First ug/kg	QC Replicate: Second ug/kg	QC Blank and Spiked Blank: Blank Data ug/kg	QC Blank and Spiked Blank: Concen. Added ug/kg	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample ug/kg	QC Matrix Spike: Concen. Added ug/kg	QC Matrix Spike: % Recov
330	Hexachlorobenzene	ND	50	ND	ND	ND	0	-	ND	3200	68
340	Hexachlorobutadiene	ND	20	ND	ND	ND	0	-	ND	3200	79
350	Hexachlorocyclopentadiene	ND	310	ND	ND	ND	0	-	ND	0	-
360	Hexachloroethane	ND	50	ND	ND	ND	0	-	ND	3200	79
370	Indeno(1,2,3-c,d)pyrene	ND	150	ND	ND	ND	0	-	ND	0	-
380	Isophorone	ND	69	ND	ND	ND	0	-	ND	3200	81
390	Naphthalene	ND	50	ND	ND	ND	0	-	ND	3200	77
400	Nitrobenzene	ND	50	ND	ND	ND	0	-	ND	3200	76
410	N-Nitrosodimethylamine	ND	310	ND	ND	ND	0	-	ND	0	-
420	N-Nitrosodi-n-propylamine	ND	310	ND	ND	ND	0	-	ND	3200	85
430	N-Nitrosodiphenylamine	ND	50	ND	ND	ND	0	-	ND	3200	82
440	Phenanthrene	ND	170	66.1	67.3	ND	0	-	37.4	3200	82
450	Pyrene	ND	50	90.6	42.2	ND	0	-	ND	3200	96
460	1,2,4-Trichlorobenzene	ND	50	ND	ND	ND	0	-	ND	3200	77

[illegible]

MONS 024094

ETC ENVIRONMENTAL TESTING and CERTIFICATION

MAY 1, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Priority Pollutant Metals - Analysis Data (QR05)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
L7196	MONSANTO COMPANY	MONCORPENG	S7	060314		

NPDES Number	Compound	Results: Sample Concen. ug/kg	Results: MDL ug/kg								
1M	Antimony	3600	14000								
2M	Arsenic	2400	2000								
3M	Beryllium	ND	1000								
4M	Cadmium	2700	1000								
5M	Chromium	13000	1000								
6M	Copper	9200	2500								
7M	Lead	100000	2000								
8M	Mercury	900	100								
9M	Nickel	8200	1000								
10M	Selenium	ND	5000								
11M	Silver	300	1000								
12M	Thallium	ND	5000								
13M	Zinc	305000	1000								
	Calcium	15900000	12000								
	Aluminum	4100000	20000								
	Iron	8170000	20000								
	Barium	111000	1000								
	Cobalt	2200	4000								
	Magnesium	2750000	4000								
	Manganese	151000	1000								
	Sodium	770000	22000								
	Tin	ND	15000								
	Vanadium	7500	2000								
	Potassium	519000	6000								

ETC ENVIRONMENTAL TESTING and CERTIFICATION

APR 2, 1986

TABLE 2: METHOD PERFORMANCE DATA
Surrogate Recovery Soil - GC/MS Data (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Expected Hours
L7106	MONSANTO COMPANY	MONCOMPENG 57		86031		0

Compound	Amount added ug	% Recovery	Control Limits # Lower	Control Limits # Upper
VOLATILE FRACTION				
Toluene-D8	-	-	50	160
p-Bromofluorobenzene	-	-	50	160
1,2-Dichloroethane-D4	-	-	50	160
ACID FRACTION				
Phenol-D5	100	83	20	140
2-Fluorophenol	100	80	20	140
2,4,6-Tribromophenol	100	113	10	140
BASE/NEUTRAL FRACTION				
Nitrobenzene-D5	50	70	20	140
2-Fluorobiphenyl	50	70	20	140
Terphenyl-D14	50	40	20	150

40 DN Control Limits

MONS 024096

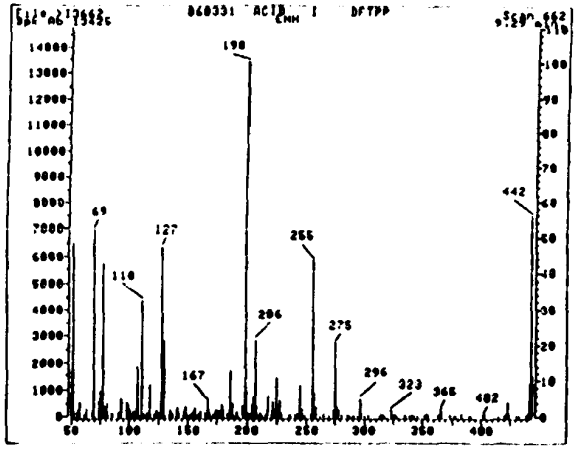


TABLE 2: METHOD PERFORMANCE DATA (QR22)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Acids Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	48.32	48.32	Ok
68	Less than 2% of mass 69	.95	1.81	Ok
69	(reference only)	52.22	52.22	Ok
70	Less than 2% of mass 69	.23	.43	Ok
127	40-60% of mass 198	47.25	47.25	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.94	6.94	Ok
275	10-30% of mass 198	20.47	20.47	Ok
365	Greater than 1% of mass 198	2.33	2.33	Ok
441	0-100% of mass 443	9.10	82.74	Ok
442	Greater than 40% of mass 198	55.89	55.89	Ok
443	17-23% of mass 442	10.99	19.67	Ok

Injection Date: 03/31/86 Analyst:
Injection Time: 14:59 Processor: Susan C. Sulzer
Run No: >13662 QC Batch: QA4747
Spectrum No: 662 Samples: L7196, L7248, L7194, L7248, L7314, L7315, L7321, L7322

4/1/86

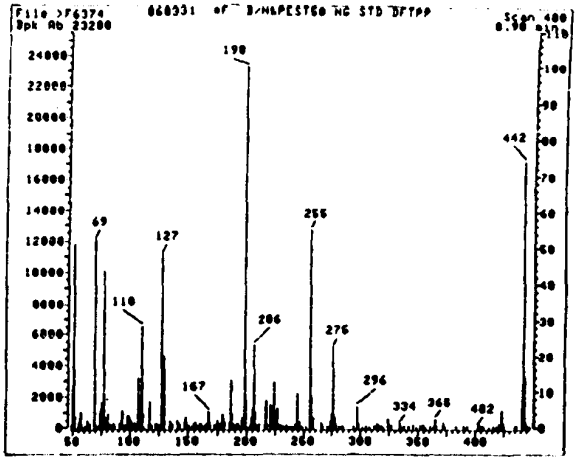


TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Date - Decafluorotriphenylphosphine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	50.74	50.74	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	52.21	52.21	Ok
70	Less than 2% of mass 69	.26	.50	Ok
127	40-60% of mass 198	48.40	48.40	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.32	7.32	Ok
275	10-30% of mass 198	22.40	22.40	Ok
365	Greater than 1% of mass 198	2.43	2.43	Ok
441	0-100% of mass 443	10.56	76.75	Ok
442	Greater than 40% of mass 198	74.07	74.07	Ok
443	17-23% of mass 442	13.75	18.57	Ok

Injection Date: 04/01/86
Injection Time: 00:41
Run No: >F6374
Spectrun No: 400

Analyst: Fred Mowrer
Processor: Sheila Carpenter
QC Batch: WQ4747
Samples: L42H8-L42H9, L79H4-L79H5, L6514-L6515, L6521-L6522.

4/3/86

MONS 024098

Methodology
for
GC/MS Analysis of Priority Pollutant Compounds

The methods employed in the GC/MS analysis for priority pollutants are established EPA methods. Rigid compliance with the instrument parameters and performance criteria of the published methods was achieved. In some cases, the precise amounts of sample used and the sample handling procedures vary with the complexity of the sample matrix. Qualitative identification of the priority pollutants was performed using the relative retention times, the relative abundance of three characteristic ions and the abundance ratios. The entire mass spectrum was reviewed to confirm each identification. Quantitative analysis of detected compounds was performed by using a response factor generated by a major characteristic ion of the specific compound and an internal standard.

Compounds, in addition to those on the priority pollutant list, were identified through a computer-aided search of the NBS-EPA spectra library. After review the identifications are included in a separate tabulation and labelled "tentatively identified".

Acid, Base/Neutral and Pesticide Priority Pollutant Compounds

For the analysis of the Acid, Base/Neutral and Pesticide priority pollutants in a soil matrix, a modification of EPA Method 625 was used. The method can be summarized as follows: A 30 gm semi-wet soil sample is soxNet extracted with a 1:1 mixture of acetone and hexane. The acetone is thermally stripped. The remaining hexane extract is diluted to 200 ml with methylene chloride and twice extracted with an aqueous NaOH solution followed by an extraction with deionized water. The methylene chloride extract is dried and concentrated to a 1 ml final volume. This concentrate is injected into a GC/MS instrument configured for the analysis of Base/Neutral priority pollutant compounds. The remaining aqueous extracts are combined and the pH adjusted to a value less than 2. The aqueous phase is serially extracted with 3 aliquots of methylene chloride. The methylene chloride extracts are dried, concentrated to a 1 ml final volume. The concentrate is injected into a GC/MS instrument configured for the analysis of acid extractable priority pollutant compounds.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Methodology for Analysis of Metals

AQUEOUS

The determination of metals in aqueous samples is performed according to the methods published by EPA in "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, March, 1983, and the Federal Register, October 26, 1983. Arsenic, selenium and thallium are determined by furnace AA; silver, aluminum, barium, beryllium, boron, cadmium, calcium, chromium, copper, cobalt, iron, magnesium, manganese, molybdenum, nickel, lead, sodium, antimony, tin, titanium, vanadium, and zinc are determined by ICP emission spectrometry, except where lower levels of detection are required. In these cases (e.g. lead in groundwater monitoring samples) furnace AA is used. All furnace AA parameters are run by method of standard additions. The determination of mercury is performed by cold vapor AA.

EP TOXICITY

The determination of metals in aqueous EP Toxicity leachates is performed according to the methods published by EPA in "Test Methods for Evaluating Solid Waste" EPA SW-846, revised April, 1984 and the Federal Register, Oct. 26, 1983, 1979. Silver, arsenic, barium, cadmium, chromium, lead and selenium are determined by ICP emission spectrometry. Mercury is determined using cold vapor AA. For leachates that are organic in nature, the analyses are performed according to the methods described under ***OIL/SLUDGE*** below.

SOIL/SEDIMENT

The determination of silver, beryllium, cadmium, chromium, copper, nickel, antimony, lead, and zinc in sediment samples is performed according to methods published by EPA in "Interim Methods for the Sampling and Analysis of Priority Pollutants in Sediments and Fish Tissue", EPA 600/4-81-055, October 1980. Mercury is determined according to the sediment method published by EPA in "Method for Chemical Analysis of Water and Wastes", EPA 600/4-79-020, March 1983. Arsenic, selenium and thallium are determined by furnace AA using nitric acid in a closed decomposition vessel for sample digestion.

OIL/SLUDGE

The determination of silver, aluminum, boron, barium, beryllium, calcium, cadmium, copper, chromium, cobalt, iron, magnesium, manganese, molybdenum, sodium, nickel, lead, antimony, tin, titanium, vanadium, and zinc in sludge/petroleum-based samples is performed by ICP emission spectrometry using a magnesium nitrate dry ashing digestion technique. Arsenic, selenium and thallium are determined by furnace AA using nitric acid in a closed decomposition vessel for sample digestion. Mercury is determined by cold vapor AA using the same digestion technique.

MONS 024100

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Summary of
Quality Assurance/Quality Control Procedures (QA/QC)

ETC bases its quality assurance protocols on the following government guidelines:

- "Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA-600/4-79-019, March 1979;
- National Enforcement Investigation Center Policies, and Procedures manual; EPA-330/9/79/001-R, October 1979;
- The recommended guidelines for EPA Methods 624 and 625. (Federal Register, December 3, 1979; updated on October 26, 1984);
- "Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samples," EPA 600/8-80-038, June 1980;

  "Determination of 2,3,7,8-TCDD in Soil and Sediment" EPA, Region VII, Kansas City, September 1983;
- Organic Analysis: Multi-media, Multi Concentration-IFB WA84-A267; and
- Dioxin Analysis Soil/Sediment Matrix; Multi-Concentration, Selected Ion Monitoring with Jar Extration Procedure-IFB WA84-A002

However, we have modified our protocols to provide a higher level of QA/QC than the guidelines require. For example, we analyze a higher than required number of quality control samples and we pay especially careful attention to the certification of the "reference standard" compounds we use in analysis. Below are listed the key QA/QC elements for the methods we used:

Analysis of Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry

- Each batch of 13 samples consists of 9 customer samples (at a maximum), one blank sample, one spiked blank, one spiked sample and one replicate sample. This amounts to a 30% quality control factor.
- Three surrogate compounds are added to each sample in the batch of 13.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on bromofluorobenzene (BFB) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of Volatile Organic Priority Pollutant "standards" at a minimum of 3 different concentrations and using a mixture of 3 internal standards at a constant concentration.
- The calibration curve is verified with a mixture of priority pollutant standards every day. If the response factors vary greater than 25%, the instrument must be recalibrated.

Analysis of Organic Compounds Extracted in Acid or Base/Neutral Solutions by Gas Chromatography/Mass Spectrometry

- Each batch of 20 samples consists of 16 customer samples (at a maximum), one blank sample, one spiked blank (for water matrices), one sample spiked with the priority pollutant standard mixture and a duplicate customer sample. This amounts to a 20% quality control factor.

- Three surrogate compounds are added to each sample in the batch for Base/Neutral analysis.
- Three surrogate compounds are added to each sample in the batch for Acid analysis
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on decafluorotriphenylphosphine (DFTPP) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of standards composed of either the Organic Acid or Base/Neutral Extractable Compounds at a minimum of 3 concentrations and using five internal standards for quantitation.

Analysis of Metals

All Samples

- New standards are prepared for each batch of samples
- Normal calibration is performed using a blank sample and four standards that have been through the sample preparation procedure. A regression analysis is used to construct the calibration curve.
- All EP Toxicity samples and all samples determined by furnace atomic absorption are calculated by the "method of additions".
- For each sample analysis that requires the use of the "method of additions" technique, a three point calibration is performed using U.S. EPA "Methods for Chemical Analysis of Water and Wastes, 1979". Results are obtained using linear regression analysis. Any regression with a coefficient of correlation below 0.990 is considered suspect, necessitating review of calibration data or sample re-analysis.
- In constructing the normal calibration curves the lowest concentration levels we use are values greater than or equal to 5 times the Instrumental Detection Limit (IDL).
- All calibration standards are analyzed in duplicate, at a minimum.
- Independent reference standards are used to check the accuracy of calibration standards.
- A check standard is analyzed every ten samples to validate the normal calibration curve.
- One customer sample out of every ten is analyzed in triplicate.

Homogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are homogeneous, the QC program is a minimum of 25% and consists of analyzing

- 3 sets of triplicate analyses;
- 2 Replicate spikes,
- 1 independent reference standard;
- 4 Calibration standards (processed using the sample preparation method);
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank

Heterogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are heterogeneous, the QC program is a minimum of 35% and consists of analyzing:

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 Replicate independent reference standards;
- 4 Calibration standards (processed using the sample preparation method);
- 1 Procedural Blank;
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank.

Analysis of Mercury

To analyze samples for mercury we group them by matrix in batches of 30 or less. Our QC program is a minimum of 30% and consists of analyzing:

- each of the 30 customer samples in duplicate;
- 3 sets of triplicate anaylses;
- 2 Replicate spikes;
- 2 Replicate independent reference standards;
- 10 Calibration standards (processed using the sample preparation method); and
- 2 Procedural Blanks.

Analysis of Pesticides, Herbicides and PCB's by Gas Chromatography

Pesticide, herbicide and PCB samples are grouped in batches of 16 customer samples or less according to the type of analysis to be performed. The QC program for each of these three types of analyses is a minimum of 20% and consists of analyzing:

- 1 procedural blank sample(a reagent blank is analyzed in the case of non-water matrices);
- 1 spiked blank sample (the spiked blank is eliminated in the case of non-water matrices);
- 1 replicate sample;
- 1 replicate spiked sample; and
- 1 known refernece QC sample for at least each 100 samples analyzed

The instrument is calibrated each run with three standards, and checked every 10 samples.

Analysis of Cyanides, Phenols, Fluoride, Chloride, Nitrate and Nitrite

- All parameters are analyzed using a Technicon Autoanalyzer II GT.
- 3 calibration standards are analyzed at the beginning and end of each batch

- Each batch (up to 80 samples) consists of analyzing one blank, one spiked blank, one duplicate and spiked sample every 20 samples, and an EPA known reference sample

Analysis of Total Organic Carbon (TOC)

TOC samples are analyzed on a daily basis with the number of samples analyzed per day dependent on the request for duplicate or quadruplicate analyses. The quality control program is designed to maintain the appropriate amount of QC and consists of the following elements:

- Daily instrument calibration
- One blank
- Standard recalibration every 10 samples
- Spiked samples at a low and high level
- Every sample is run in duplicate at a minimum

Analysis of Total Organic Halide (TOX)

- Blank reagent water for absolute carbon background must contain less than 5 ug/l of halide (as chloride).
- Using a trichlorophenol standard, the mean adsorption efficiency must be within +/- 15% of the standard value.
- Calibration standards are run every 10 samples.
- Every sample is run in duplicate at a minimum.

Analysis of 2,3,7,8-TCDD (Dioxin) by GC/MS (SIM)

- Each sample is dosed with a known quantity of $^{13}C_{12}$-2,3,7,8-TCDD as internal standard and $^{37}Cl_4$-TCDD as surogate standard. The action limits for surrogate standard results is +/- 40% of the true value. Samples showing surrogate standard results outside of these limits are reextracted and reanalyzed.
- Two laboratory "method blanks" are run along with each set of 24 or fewer samples. The method blank is also dosed with the internal standard and surrrogate standard.
- At least one per set of 24 samples is run in duplicate to determine intralaboratory precision.
- Qualitative Requirements. The following are met in order to confirm the presence of native 2,3,7,8-TCDD:

  a. Isomer specificity must be demonstrated initially and verified once per 8-hour work shift. The verification consists of injecting a mixture containing TCDD isomers which elute close to 2,3,7,8-TCDD. The 2,3,7,8-TCDD must be separated from interferring isomers, with no more than 25% valley relative to the 2,3,7,8-TCDD peak.

  b. The 320/322 ratio is within the range of 0.67 to 0.87.

  c. Ions 320, 322, and 257 are all present and maximize together the signal to mean noise ratio must be 2.5 to 1 or better for all 3 ions.

  d. The retention time is equal (within 3 seconds) the retention time for the isotopically labeled 2,3,7,8-TCDD.

  e. At least one of the positives can be confirmed by obtaining partial scan spectra from mass 150 to mass 350. The partial scan guidelines are as follows:

. the 320/324 ratio should be 1.58 +/- 0.16

. the 257/259 ratio should be 1.03 +/- 0.10

. the 194/196 ratio should be 1.54 +/- 0.15

- One sample is spiked with native 2,3,7,8-TCDD at a level of 1.0 PPB (for soil) for each set of 24 or fewer samples.

- In cases where no native 2,3,7,8-TCDD is detected, the actual detection limit is estimated and reported based on a signal to noise ratio of 2.5 to 1 at ions 320 and 322.

- For each sample, the internal standard is present with at least a 10 to 1 signal to noise ratio for both mass 332 and mass 334. Also, the internal standard 332/334 ratio must be within the range of 0.67 to 0.87.

Subcontractor QA/QC

Each subcontractor is required to maintain an appropriate level of quality control. To insure this, each subcontractor is required to submit to ETC the quality control data for all analyses it performs. This data is kept on file at ETC. In general, the amount of quality control required is one duplicate sample with one spiked sample for every ten analyses.

Chain-of-Custody

The chain-of-custody procedure is part of our quality assurance protocol. We believe our chain-of-custody record fully complies with the legal requirements of federal, state and local government agencies and of the courts of law. The record covers:

- labeling of sample bottles, packing the Sample Shuttle and transferring the Shuttle under seal to the custody of a shipper;

- outgoing shipping manifests;

- the chain-of-custody form completed by the person(s) breaking the Shuttle seal taking the sample, resealing the Shuttle and transferring custody to a shipper;

- incoming shipping manifests;

- breaking the Shuttle's reseal;

- storing each labeled sample bottle in a secured area;

- disposition of each sample to an analyst or technician; and

- the use of the sample in each bottle in a testing procedure appropriate to the intended purpose of the sample.

The records show for each link in this process:

- the person with custody; and

- the time and date each person accepted or relinquished custody.

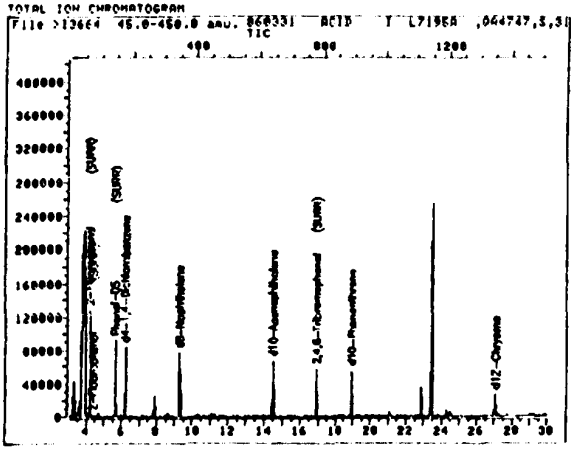
Appendix A

Mass Spectral Data for Quantitated Compounds

1) A total ion chromatogram for each sample analyzed by a GC/MS instrument.

2) A Quant. report used by the analyst to determine qualitative and quantitative results of the compounds present.

3) A mass spectrum and a reference spectrum for each priority pollutant compound detected in the sample.



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Title: PP/ACID IDFILE
Last Calibration: 860331 14:52

Operator ID: JH2180
Quant Time: 860331 17:35
Injected at: 860331 17:02

MONS 024107

QUANT REPORT

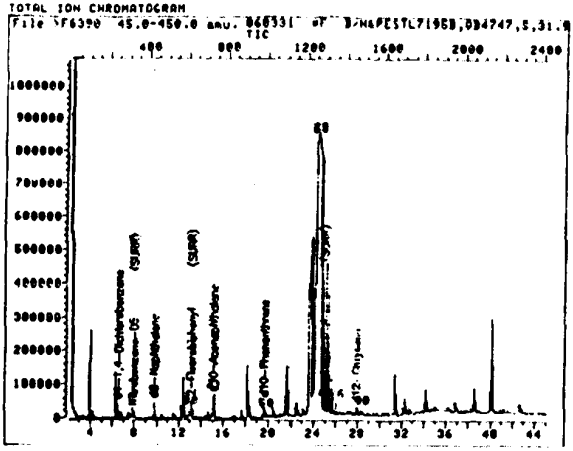
Operator ID: JM2180 Quant Rev: 5 Quant Time: 860331 17:35
Output File: ^I3664::AQ Injected at: 860331 17:02
Data File: >I3664::U7 Dilution Factor: 1.00
Name: 860331 ACID I
Misc: L7195A ,QA4747,S,31.99,1 BTL# 9

ID File: IACID::US
Title: PP/ACID IDFILE
Last Calibration: 860331 14:52

	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene		6.18	175	36478	40.00	UG/ML	9
3)	2-Fluorophenol	(SURR)	4.17	62	54499	80.15	UG/ML	9
3)	2-Fluorophenol	(SURR)	4.37	73	690	1.01	UG/ML	6
8)	Phenol-D5	(SURR)	5.63	144	66909	83.11	UG/ML	9
11)	*d8-Naphthalene		9.25	348	77959	40.00	UG/ML	9
17)	*d10-Acenaphthalene		14.46	641	32493	40.00	UG/ML	9
24)	*d10-Phenanthrene		18.91	892	55542	40.00	UG/ML	9
25)	2,4,6-Tribromophenol	(SURR)	16.89	778	17427	113.12	UG/ML	9
28)	*d12-Chrysene		27.03	1349	25131	40.00	UG/ML	10

* Compound is ISTD

MONS 024108



Data File: >F6390::U2
Name: 860331 8F B/N&PEST
Misc: L7195B,QB4747,S,31.99,1

BTL024

Id File: FBNP::US
Title: B/N+PEST ID FILE .... FOR F 850326
Last Calibration: 860401 12:05

Operator ID: RA0157
Quant Time: 860401 20:26
Injected at: 860401 19:38

MONS 024109

QUANT REPORT

Operator ID: RA0157 Quant Rev: 5 Quant Time: 860401 20:26
Output File: ^F6390::AQ Injected at: 860401 19:38
Data File: >F6390::U2 Dilution Factor: 1.00
Name: 860331 @F B/N&PEST
Misc: L7195B,QB4747,S,31.99,1 BTL@24

ID File: FBNP::US
Title: B/N-PEST ID FILE .... FOR F 850326
Last Calibration: 860401 12:03

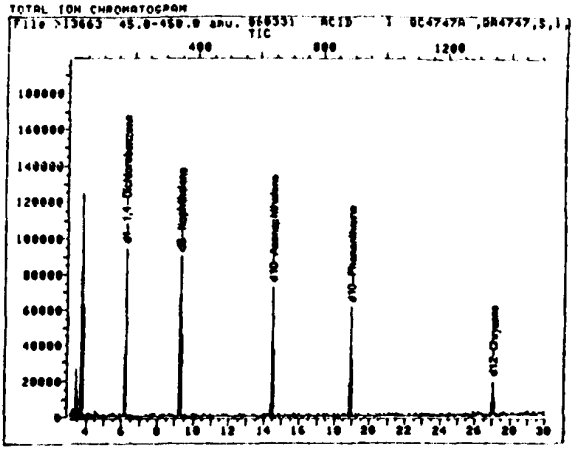
	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene		6.50	249	18099	40.00	UG/ML	96
2)	Nitrobenzene-D5	(SURR)	7.92	329	25391	39.17	UG/ML	80
8)	*d8-Naphthalene		9.76	433	73275	40.00	UG/ML	93
9)	2-Fluorobiphenyl	(SURR)	13.11	622	61804	35.03	UG/ML	97
3)	*d10-Acenaphthalene		15.08	733	46487	40.00	UG/ML	95
8)	2-Chloronaphthalene		12.99	615	1905	1.47	UG/ML	68
1)	2,6-Dinitrotoluene		15.00	733	5675	10.77	UG/ML	86
4)	*d10-Phenanthrene		19.64	990	99920	40.00	UG/ML	96
8)	Phenanthrene		19.69	993	2010	1.23	UG/ML	82
9)	Anthracene		19.69	993	2010	1.20	UG/ML	80
1)	Fluoranthene		24.20	1251	11641@	93.01	UG/ML	82
3)	Pyrene		24.20	1251	11641@	101.00	UG/ML	82
2)	*d12-Chrysene		27.84	1451	17011	40.00	UG/ML	100
5)	Endosulfan I		24.30	1252	11521	156.02	UG/ML	61
4)	Terphenyl-D14	(SURR)	24.90	1286	25927	23.90	UG/ML	94
6)	Butyl benzyl phthalate		25.99	1347	1601	5.21	UG/ML	78
0)	bis(2-Ethylhexyl)phthalate		20.25	1474	1031	4.02	UG/ML	92
0)	bis(2-Ethylhexyl)phthalate		20.41	1483	7751	20.48	UG/ML	94

* Compound is ISTD

MONS 024110

Appendix C1

GC/MS Subsidiary Data



Data File: >I3663::U7
Name: 860331 ACID I
Misc: QC4747A ,QA4747,S,1,1

BTLE 8

Id File: IACID::US
Title: PP/ACID IDFILE
Last Calibration: 860331 14:52

Operator ID: JH2180
Quant Time: 860331 16:52
Injected at: 860331 16:19

QUANT REPORT

Operator ID: JH2180
Output File: ^I3663::AQ
Data File: >I3663::U7
Name: 860331 ACID I
Misc: QC4747A ,QA4747,S,1,1

Quant Rev: 5 Quant Time: 860331 16:52
Injected at: 860331 16:19
Dilution Factor: 1.00

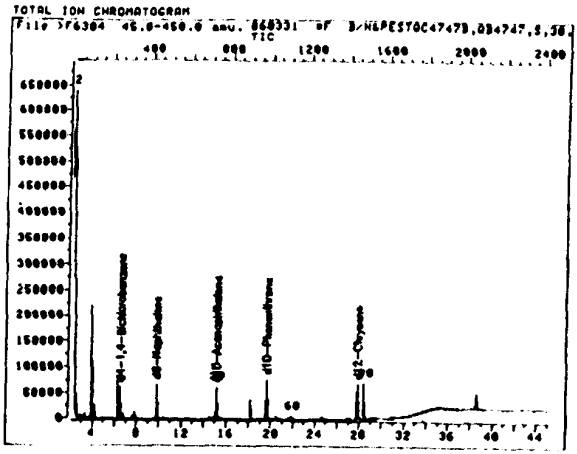
BTL# 0

ID File: IACID::US
Title: PP/ACID IDFILE
Last Calibration: 860331 14:52

	Compound	R.T.	Scan#	Area	Conc	Units
1)	*d4-1,4-Dichlorobenzene	6.17	175	39403	40.00	UG/ML
11)	*d8-Naphthalene	9.26	349	90499	40.00	UG/ML
17)	*d10-Acenaphthalene	14.46	642	34953	40.00	UG/ML
24)	*d10-Phenanthrene	18.92	893	60065	40.00	UG/ML
28)	*d12-Chrysene	27.02	1349	18515	40.00	UG/ML

* Compound is ISTD

MONS 024113



Data File: >F6384::U2
Name: 860331 @F B/N&PEST
Misc: QC4747B,QB4747,S,30,1

BTL818

Id File: FBNP::US
Title: B/N+PEST ID FILE .... FOR F 850326
Last Calibration: 860401 02:06

Operator ID: KV0786
Quant Time: 860401 09:56
Injected at: 860401 09:08

QUANT REPORT

Operator ID: KV0786 Quant Rev: 5 Quant Time: 860401 09:56
Output File: ^F6384::AQ Injected at: 860401 09:08
Data File: >F6384::U2 Dilution Factor: 1.00
Name: 860331 8F B/N&PEST
Misc: QC4747B,QB4747,S,30,1 BTL#18

ID File: FBNP::US
Title: B/N+PEST ID FILE .... FOR F 850326
Last Calibration: 860401 02:06

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene	6.53	249	24624	40.00	UG/ML	9
2)	N-Nitrosodimethylamine	~~2.29~~	~~10~~	~~4420~~	~~10.46~~	~~UG/ML~~	10
18)	*d8-Naphthalene	9.27	432	89791	40.00	UG/ML	9
33)	*d10-Acenaphthalene	15.08	732	41534	40.00	UG/ML	9
39)	Dimethyl phthalate	~~15.00~~	~~732~~	~~11917~~	~~6.30~~	~~UG/ML~~	6
54)	*d10-Phenanthrene	19.58	986	119392	40.00	UG/ML	9
60)	Di-n-butyl phthalate	21.89	1116	9574	3.24	UG/ML	9
72)	*d12-Chrysene	27.82	1451	98321	40.00	UG/ML	10
90)	bis(2-Ethylhexyl)phthalate	28.41	1484	53616	25.96	UG/ML	9

NO PCBs found.

* Compound is ISTD

Blank 4-1-86.

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY

Company: Monsanto Job No. _____

Address _____

_____

Attention: _____

Sample Description:

CUSTOMER ID	DESCRIPTION	ETC #
Sample #5	2 - 500ml (non ETC)	L7194
Sample #57	↓	L7195

Sample(s) Relinquished by: Ram International

Time: 1:15 Date: 3/21/86

Sample(s) Received by: B Bowers

Time: 1:15 Date: 3/21/86

25A RARITAN CENTER PARKWAY • EDISON, NJ 08837 (201) 225-1600

MONS 024117

CHAIN OF CUSTODY RECORD

NRC JOB NUMBER 6405

P.O. CONTRACT NUMBER RQ140542X

PLANT NAME OR CODE

CUSTOMER REPRESENTATIVE

NRC CONTRACT MANAGER Roy W. Noble

NRC TEAM LEADER Roy W. Noble

(Specific information on samples is available on attached "Sample Identification Log")

Signatures		Date	Time	Remarks
Team Leader Verification of Collected Samples: Roy W. Noble		3/14/84	1800	
Relinquished by: Roy W. Noble	Received by:	3/17/84	0900	Relinquished for shipment to ETC
Relinquished by:	Received by:			
Logged-in-by:				
Received for Analysis by:				
Method of Shipment: Air Express		Number of Containers: 1		

Special Instructions (Sample preservation, security, delivery to, etc.)

- Sample #5 (2 bottles)
- Sample #57 (2 bottles

MONS 024118

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Departr

	Sample Number	Log Link	Sample Weight (gm)	Extract Vol. (ml) BN	Extract Vol. (ml) ACID	Comments
+	L4248	13976	30.50	1.0	1.0	PP/[illegible] SEC/BN/+B
+	L4249	↓	30.33	1.0	1.0	↓ ↓
	L7194	14156	30.09	1.0	1.0	PP/BN, PP/ACID
	L7195	↓	31.99	1.0	1.0	↓
☆	L6314	14137	30.00	5.0	5.0	FORP/ACID FORP/BN SPECS
	L6315		30.16	1.0	1.0	
☆	L6321		31.50	5.0	5.0	
☆	L6322	↓	31.52	5.0	5.0	↓
	QC 4747		—	1.0	1.0	
	L4248	S	30.51	1.0	1.0	
	L4249	R	31.13	1.0	1.0	

QC Batch # 4747

Analysis 3-27 (See comments)

Matrix Soil

Turnaround Normal

Date 3/26/86

Extraction Method:

Sep. Funnel

Continuous

Soxhlet ✓

Other

COMMENTS

+ L4248/49 – Refer to QC 4720 – samples redone on this batch due to label mix-up.

Log 14137: SPECSP – These are soil samp

☆ L6314, L6321, L63: had bad bad emul in The BN Fraction Recovery may be ef.
J.B.

QC UPD [illegible]

FRACTION	SPIKE Amt (ml)	SPIKE Conc. µg/ml	SPIKE Lot #
BN	1.0	100	12683
ACID	1.0	100	12,340
Arochlor 1260	1.0	100	12,649
Pest	1.0	100/200	12,830
FORP/BN	1.0	100	12,526
FORP/ACID	1.0	100	12,522
Semi-VOA			

SURROGATE

Amt. (ml)	Conc. µg/ml	Lot #
1.0	BN: 50 ACID: 100	12846

Set-up: Pamela y Williams 3.27.86

UPD/Supervisor: [signature] 3/31

BN Conc.: [signature] 3-28-86 Acid Conc.: [signature] 3/28/86

Spike/Surr. Verified: Judi Cerekuno 3/27/8

ETC FORM #110

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 3/31/86 SHIFT
FRACTION Acid
INSTRUMENT I
TUNE FILE MTIUDF
SEQUENCE FILE JHI, JHI
METHOD FILE AcidI
ID FILE IAcid
ANALYST(S) [signature]
SUPERVISOR [signature]
BATCH #'s QC4747

(PLEASE INITIAL)

CURRENT CS06 STATUS		STANDARDS UPDATED	
ACQ	3,3 [illegible]	DATE	3/31
WIP		BY	[signature]

STANDARD	CONC PPM	LOT NO	LOT VOL
DFTPP	25		
Int Std	400		
Acid Cal Std I	60	12577	
Acid Cal Std II	100	12376	
Acid Cal Std III	200	12374	
FRP/Acid I	60	12525	
FRP/Acid II	100	12524	
FRP/Acid III	200	12523	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A TYPE)	PLUS YHI
DFTPP	>I3655	2	—		I00437		
Acid cal std III	I3656		1				
Acid cal std II	I3657		2				
Acid cal std I	I3658		3				
FRP/Acid III; 100ppm	I3659		4				
FRP/Acid II; 100ppm	I3660		5				
FRP/Acid I; 60ppm	I3661		6				
DFTPP	I3662		7				
QC4747A	I3663		8			SA	Y
L7195A	I3664		9				
L4249A	I3665		10			SA	Y
L4249AR	I3666		11				
L7194A	I3667		12				
L4249AS	I3668		13				
L4248A	I3669		14			SA	Y
L6314A	I3670		15				
L6315A	I3671		16				
L6321A	I3672		17				
L6322A	I3673		18				

ETC FORM 8102

MONS 024120

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

F 1/2

DATE Nov 31 1986 SHIFT
FRACTION B/N
INSTRUMENT F
TUNE FILE MTF [illegible]
SEQUENCE FILE KV3
METHOD FILE BNPF [illegible]
ID FILE
ANALYST(S) [illegible]
SUPERVISOR [illegible]
BATCH #'s Q84723 [illegible]
Q84747

(PLEASE INITIAL)

CURRENT CS06 STATUS	STANDARDS UPDATED
ACQ [illegible]	DATE 4/1/86
WP	BY [illegible]

STANDARD	CONC PPM	LOT NO.	LOT VOL
Pest. IV	150	12851	
B/N III	200	12950	
B/N II	100	12949	
B/N I	60	12949	
Carbazole	300	12587	
Carbazole	100	12588	
Carbazole	60	12590	
DFTPP	25	12602	
Int. std.	400	1356 [illegible]	

NAME	DATA FILE	ul INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
DFTPP - 50NG std	>F6366				I0043		
Carbazole std. 300ppm	>F6367		1				
Carbazole std. 100ppm	>F6368		2				
Carbazole std. 60ppm	>F6369		3				
B/N cal. std. II; 100ppm	>F6370		4				
B/N cal. std. I; 60ppm	>F6371		5				
B/N cal. std. III; 200ppm	>F6372		6				
B/N cal. std. IV; 150ppm	>F6373		7				
DFTPP - 50NG std.	>F6374		8			OK	
L3211B	>F6375		9			Q84723 PURSER	
L6781B	>F6376		10			PURSER [illegible]	
L6317B	>F6377		11				
L6314B	>F6378		12				
L6320B	>F6379		13				
L5813B	>F6380		14			RBGR	
L5109B	>F6381		15				
L5110B	>F6382		16				
DCM	>F6383		17				
Q84747B	>F6384		18			PURSE SB	Y
L4219B	>F6385		19			SB	Y
L4349BR	>F6386		20				
DFTPP - 50NG std.	>F6387		21				
B/N cal. std. II; 100ppm	>F6388		22			AF1260	
L7194B	>F6389		23				
L7195B	>F6390		24				

MONS 024121

19

ETC Environmental Testing and Certification

LABORATORY CHRONICLE: GC-MS Department

2/2

DATE 4/1/86 SHIFT

FRACTION BN

INSTRUMENT F

TUNE FILE

SEQUENCE FILE

METHOD FILE

ID FILE

ANALYST(S) [signature]

SUPERVISOR [signature]

BATCH #'s 86722, 23

23747

(PLEASE INITIAL)

CURRENT CS06 STATUS		STANDARDS UPDATED	
ACQ		DATE	
UNIV		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)		PLUS Y/N
L4248BS	>F6391		25			AF1260		
L4248B	>F6392		26			PCBSCF	SB	Y
L63148	>F6393		27					
L63153	>F6394		28					
L6321B	>F6395		29					
L6322B	>F6396		30					

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LL 14156

LABORATORY CHRONICLE: Metals Department

Samples L7194, L7195

	Chemist	Date
Hg Prep	Ellen C McRae	4/24/86
AA/ICAP Prep	Joan Komarek	4/23/86

Lab Supervisor Lidya Wiawer Date 4/25/86

ETC FORM 8101

MONS 024123

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Technical Report

for

MONSANTO COMPANY

800 N.LINDBERGH BLVD.

R3B

ST.LOUIS, MO 63167

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
M2180	MONSANTO COMPANY	MONCORPENG	S7	860314		

John J. Fitzgerald
Vice President
Research and Operations

This Technical Report is an INSITE™ service generated by LOCESTAR™ Data Management Software

284 RARITAN CENTER PARKWAY • EDISON, NJ 08837 (201) 225-5600

ETC TESTING and CERTIFICATION

MAY 12, 1986
Q84747

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Pesticide/PCB Compounds - GC/MS Analysis Data (OR04)

Chain of Custody Data Required for ETC Data Management Summary Reports						
M2106	MONSANTO COMPANY	MONCSRPENG	S7	860314		
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

NPDES Number	Compound	Results: Sample Concen. ug/kg	Results: MDL ug/kg	QC Replicate: First ug/kg	QC Replicate: Second ug/kg	QC Blank and Spiked Blank: Blank Data ug/kg	QC Blank and Spiked Blank: Concen. Added ug/kg	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample ug/kg	QC Matrix Spike: Concen. Added ug/kg	QC Matrix Spike: % Recov
1P	Aldrin	ND	50	ND	ND	ND	0	-	ND	3200	70
2P	Alpha-BHC	ND	310	ND	ND	ND	0	-	ND	3200	73
3P	Beta-BHC	ND	140	ND	ND	ND	0	-	ND	3200	64
4P	Gamma-BHC	ND	310	ND	ND	ND	0	-	ND	3200	63
5P	Delta-BHC	ND	97	ND	ND	ND	0	-	ND	3200	62
6P	Chlordane	ND	310	ND	ND	ND	0	-	ND	6400	[illegible]
7P	4,4'-DDT	ND	80	1500	1040	ND	0	-	324	3200	[illegible]
8P	4,4'-DDE	ND	180	243	322	ND	0	-	ND	3200	[illegible]
9P	4,4'-DDD	ND	150	[illegible]	[illegible]	ND	0	-	ND	3200	[illegible]
10P	Dieldrin	ND	70	[illegible]	[illegible]	ND	0	-	ND	3200	[illegible]
11P	Endosulfan I	ND	310	ND	ND	ND	0	-	ND	3200	[illegible]
12P	Endosulfan II	ND	310	ND	ND	ND	0	-	ND	3200	[illegible]
13P	Endosulfan sulfate	ND	100	ND	ND	ND	0	-	ND	3200	[illegible]
14P	Endrin	ND	310	ND	ND	ND	0	-	ND	3200	[illegible]
15P	Endrin aldehyde	ND	310	ND	ND	ND	0	-	ND	3200	102
16P	Heptachlor	ND	80	ND	ND	ND	0	-	ND	3200	[illegible]
17P	Heptachlor epoxide	ND	80	ND	ND	ND	0	-	ND	3200	64
18P	PCB-1242	ND	1100	ND	ND	ND	0	-	ND	0	-
19P	PCB-1254	ND	1100	ND	ND	ND	0	-	ND	0	-
20P	PCB-1221	ND	940	ND	ND	ND	0	-	ND	0	-
21P	PCB-1232	ND	1100	ND	ND	ND	0	-	ND	0	-
22P	PCB-1248	ND	1100	ND	ND	ND	0	-	ND	0	-
23P	PCB-1260	8130	1100	ND	ND	ND	0	-	ND	3200	96
24P	PCB-1016	ND	1100	ND	ND	ND	0	-	ND	0	-
25P	Toxaphene	ND	310	ND	ND	ND	0	-	ND	0	-

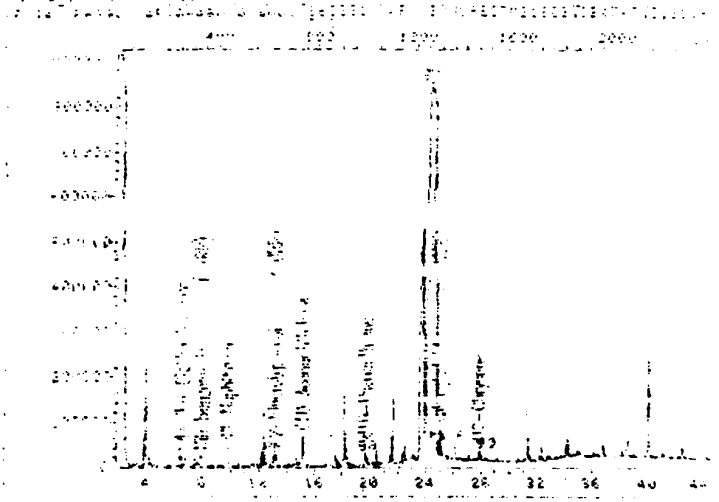
Appendix A

Mass Spectral Data for Quantitated Compounds

1) A total ion chromatogram for each sample analyzed by a GC/MS instrument.

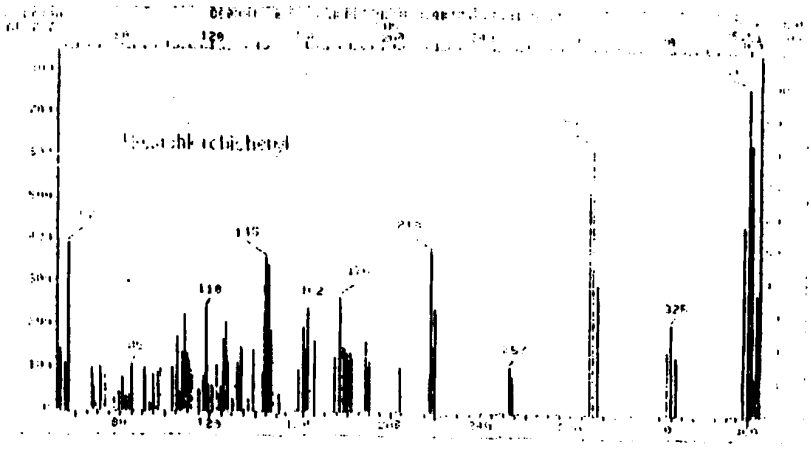
2) A Quant. report used by the analyst to determine qualitative and quantitative results of the compounds present.

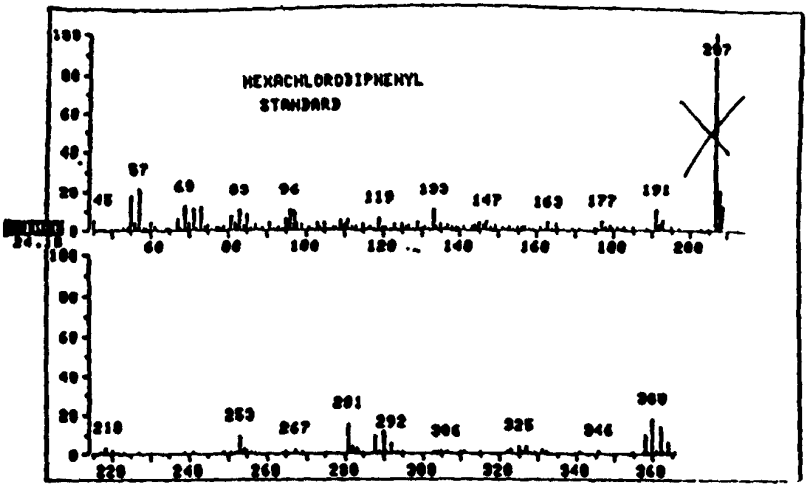
3) A mass spectrum and a reference spectrum for each priority pollutant compound detected in the sample.



PCB/1260 = 260 mg/mL

Clarp
5-12-86




HEXACHLORODIPHENYL
STANDARD
287
97
69
99
96
119
133
147
163
177
191
45
253
267
291
292
306
325
346
360
218