Copy 5

11052 COPY/

Monsanto **Environmental Services Report**

1104-672

JOB/PROJECT NO.: 482.2070

DATE: 23 April 1982

TITLE: ANALYSIS OF WATER AND SEDIMENT SAMPLES FROM THE SAUGET, ILLINOIS WASTE TREATMENT PLANT

AUTHOR: Robert F. Ivory

ABSTRACT: Water and sediment samples from the Sauget, Illinois Waste Treatment Plant were analyzed for the U.S. Environmental Protection Agency's for the priority and non-priority pollutants. The results of this analyses are presented in this report.

Monsanto Research Corporation, Station B, Box 8 □ Dayton, Ohio 45407
(513) 268-3411

COPY NUMBER			ABSTRACT ONLY
1	Carl Marciante	Sauget, IL	R. K. Flitcraft/Dayton
2-3	Steven Smith	Sauget, IL	R. M. Scott/Dayton
4	R. F. Ivory	Dayton	
5	Central Files	Dayton	

ACKNOWLEDGEMENT

Contributions of the following Dayton Laboratory personnel to this project are gratefully acknowledged:

Analyses: S. A. Barksdale
A. Ford
D. R. Grothe
F. D. Hileman
B. M. Hughes
P. Hughes
S. J. Johnson
J. T. Miller
S. Mitrosky
T. Morrow
D. E. Sharp
H. M. Strickland
G. Thomas
T. E. Woosley

CONTENTS

FIGURES

FIGURES (continued)

TABLES

TABLES (continued)

TABLES (continued)

TABLES (continued)

1. INTRODUCTION

Water and sludge samples collected at the Sauget, Illinois Waste Treatment plant were submitted to the Dayton Laboratory for priority and non-priority screening analyses. All analyses were conducted in accordance with the U.S. Environmental Protection Agency's (EPA) approved procedures (1, 2, 3, 4, 5).

2. SAMPLING

Sampling was performed at the Sauget, Illinois by Waste Treatment Plant Samples were received at the Dayton Laboratory and submitted to the various analysts.

3 SAMPLE EXTRACTION AND SCREENING FOR ORGANIC POLLUTANTS

One influent, one effluent and one sediment sample from the Sauget, Illinois treatment plant were received for priority pollutant and wide scan organic analyses. A method blank, consisting of a one liter Burdick and Jackson distilled in glass organic free water, a duplicate of the effluent and a duplicate of the sediment sample were also analyzed for quality control purposes. Each water sample was spiked with 100 µg/L each of phenol-d_5, Cl_2-benzene-d_4, pyrene-d_{10} and chrysene-d_{12} before liquid liquid extraction according to the EPA Method 625 analysis protocol. The sediment sample and duplicate were spiked with the same surrogate spiking compounds, but at levels corresponding to 187 µg/g for the sediment and 145 µg/g for the sediment duplicate.

All sample extracts were screened using capillary GC/FID analysis techniques. Figure 1 shows the chromatogram from the GC/FID analysis of the surogate compound spiking standard added to each sample before extraction and Figures 2-11 show chromatograms from the analysis of the base/neutral and acid extracts from the water samples and methylene chloride extracts of the sediment and sediment duplicate. The method blank extracts were analyzed with no dilution of the extract, while the remaining water and sediment extracts required dilutions of 1:10 due to the very high levels of organic compounds present.

The laboratory data system was used to generate a summary report of extracts analyzed in Figures 4-11. Tables 1-8 show these results. They contain a retention time, an area, and an estimated concentration for each peak observed in the capillary GC/FID chromatograms (Figures 2-11). Note that very high levels of phenol-d_5 and Cl_2-benzene-d_4 are reported in the water extracts, due to other co-eluting compounds. The identity of the major

components shown in Tables 1-8 will be discussed in later sections on the analysis of priority pollutants and other organic compounds in these samples.

The total amounts of chromatographable compounds are summed at the end of each table. These totals are based upon the assumption that the FID response of the compounds are equal to the anthracene-d_{10} internal standard. Table 9 summarizes these values found from the GC/FID analysis. This table shows that there is very little difference between the influent and effluent water samples and that very good agreement is observed for the water and sediment duplicate analyses. Table 9 also shows the total amount of compounds identified from GC/MS analyses, to be discussed in a later section.

The following sections give detailed mass spectrometric results concerning the levels of priority pollutants and other organic compounds in these samples. Due to the requirement of sample dilution before analysis, only approximately 40 major components are identified in the water and sediment extracts. Also note that it is not certain what extraction efficiencies these compounds exhibit, especially in water samples containing high concentration levels of organic compounds. Therefore the levels which are reported in the following sections present lower level concentrations of compounds which are present in these samples. Other more direct analyses, such as direct aqueous sample injection, were beyond the scope of the present study.

3.1 Volatile Priority Pollutant Analyses

One organic free water sample (used as a method blank) and three water samples labelled 9:15 a.m., 10:23 p.m. and 11:15 a.m. were analyzed for the volatile priority pollutants listed in Table 10 using EPA Method 624 (1, 2). Table 12 gives the results of these analyses for those priority pollutants detected.

3.2 Extractable Organic Priority Pollutants

A method blank, an influent sample, an effluent sample, a duplicate effluent sample, a sediment sample and a duplicate sediment sample were analyzed for base/neutral, pesticide and acid extractable priority pollutants listed in Tables 10 and 11 using EPA Method 625 (1, 2) analysis protocol. Tables 13 and 14 summarize the results for those priority pollutants detected. Before extraction began, the water and sediment samples were each spiked with phenol-d_5, Cl_2-benzene-d_4, pyrene-d_{10} and chrysene-d_{12} surrogate spiking compounds. Tables 15 and 16 summarize recoveries of these compounds in the various extracts analyzed.

3.3 Wide Scan Organic Analyses

Large amounts of non-priority pollutant organic compounds were observed in the volatile and extractable organic priority pollutant analyses, given above. Table 17 gives the tentative identification of compounds and estimated amounts of detected compounds in the volatiles analysis and Tables 18 through 27 give these data for extractable compounds. Appendix A gives detailed information on the methods used for identification of non-priority pollutant extractable compounds.

3.4 Discussion of Priority Pollutant and Wide Scan Analyses

Table 9 summarizes the total concentrations of extractable organic compounds measured in water and sediment extracts from the Sauget, Illinois Water Treatment Plant. The total amounts reported in this table are calculated by three different analytical methods. The totals measured under "GC/FID" assumes all chromatographable compounds have FID responses equal to anthracene-d_{10} (used as an internal standard). The totals measured under "GC/MS-Total" assumes all chromatographable compounds have mass spectrometric responses equal to anthracene-d_{10}. The totals measured using "GC/MS-PP" are totals of all priority pollutants measured using EPA Method 625. This latter method uses authentic standards for each of the detected priority pollutants and thus are more accurate (for the priority pollutants) than either of the previous totals listed in the table. However this last total does not contain the amounts of non-priority pollutants which are present in the various sample extracts. All three base/neutral extractable water analyses show that the major organic components are not priority pollutants and thus the GC/FID and GC/MS-Total amounts are from 4 to 10 times larger than the GC/MS-PP totals. All three acid extractable water analyses show that the major organic components are the acid priority pollutants and therefore the GC/MS-PP totals for these extracts are approximately the same as the totals measured using the other two methods of analysis. The fact that the latter acid extractable analysis actually produces total amounts approximately twice that measured from GC/FID and GC/MS-Total is due to the more accurate method of quantitation for the acid priority pollutants.

4. ANALYSES FOR CHLORINATED DIBENZO-P-DIOXINS AND DIBENZOFURANS

Water samples were prepared by extracting one liter of water with 40 mL of petroleum ether by shaking for 15 minutes. The ether was removed and further cleaned up by extracting with two 50 mL washes of 1N KOH. This ether extract was dried over sodium sulfate, concentrated to 2 mL and then chromatographed on a column of silica gel, silica gel plus H_2SO_4, and silica gel plus KOH. The column was eluted with 45 mL of hexane which was again concentrated to

2 mLs. The concentrate was then chromatographed on a 2.5 gm Woelm B alumuia column. This column was first eluted with 10 Ml of 2% CH_2Cl_2/Hexane and this fraction discarded. A second elution was carried out with 15 mL of 50% CH_2Cl_2/Hexane; 300 µL of dodecane was added as a keeper. the sample was concentrated to 300 µL and submitted for GC/MS analysis.

The sludge samples were prepared in a similar manner. One gram of sludge was applied to the top of a four gram silica gel column. The sample was eluted with 30 mL of CH_2Cl_2 and the collected fraction was concentrated to 2 mL and applied to the multi stage silica column as described for the water samples. The work up then proceded in a manner comparable to the water samples.

Replicates, low and high level spiked and blanks were processed with all samples. The GC/MS analysis was carried out on a Hewlett-Packard 5985B GC/MS. A 30 meter SE-54 capillary column was used for the separation of the PCDDs and PCDFs. The mass spectrometer was operated in the selected ion monitoring mode following ions characteristic of mono through octachloro dibenzo-p-dioxins and dibenzofurans.

The results of the analyses are given in Tables 28 through 31. A pair of hexachlorodibenzo-p-dioxins (HCDDs) were found in the influent water samples (see table 28). The reproducibility of the analysis of these HCDDs was not good and no reasonable explanation can be given especially in view of the reasonable quantitative agreement of the heptachloro- and octachlorodibenzo-p-dioxin results. In certain instances interferences in the influent samples significantly raised the detection limits and this is noted as a ND (LXX) meaning none detected with a detection limit of XX.

The sludge samples were very difficult to analyze and therefore the method detection limits are quite high for both PCDDs and PCDFs. The low level spikes for several of the lower chlorinated PCDDs were not detected above the background interferences and have not been reported.

5. ANALYSIS OF OIL SAMPLE FOR PCBs

One oil sample was analyzed for low µg/mL levels of PCBs. Molecular ions of the major chlorinated biphenyl components of all Aroclor formulations were monitored using capillary GC/MS-SIM analysis techniques. Figure 12 shows the analysis of a 59 µg/mL Aroclor 1254 standard and Figure 13 shows the analysis of the oil sample. Both standard and oil were diluted 100 times before analysis. The response at 24.5 minutes is very likely due to Cl_4-biphenyl isomers. This level of Cl_4-biphenyl corresponds to 19 µg/mL, using Aroclor 1254 for calibration of the mass spectrometer response. However, the signal/noise is too low to verify what Aroclor formulation is present in this sample.

6. STATIC DAPHNIA MAGNA BIOASSAY

A static Daphnia magna bioassay was performed on a grab effluent sample obtained from the Sauget Waste Treatment Facility on March 2, 1982.

Procedures utilized for the Daphnia bioassay were based upon procedures outlined in "Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms" (EPA-600/4-78-012). Six effluent concentrations (100%, 56%, 32%, 18%, 10%, 5.6%) and a control were set-up in duplicate. Ten first instae Daphnia magna (<24 has old) were placed in each replicate concentration. Well water, which was used for dilution purposes, was adjusted to simulate the quality of the Mississippi River near Sauget, IL. (i.e., total hardness = 230; pH = 8±0).

The results of the Sauget bioassay were as follows:

Effluent concentration (%)	Percent mortality	
	24 Hours	48 Hours
100	100	100
56	100	100
32	50	90
18	0	65
10	0	30
5.6	0	35
Control	0	0

Statistical analysis of the Sauget test data by the Binomial, Moving Average, and Probit Test Methods resulted in 48-hour EC_{50} values (95% confidence limits) of 14% (0, 32), 14% (9, 18), and 11% (8, 14), respectively.

Test concentration physical characteristics during the March 17-19, 1982 bioassay are presented below:

Physical parameter	Exposure period, hrs			Effluent concentration, %
	0	24	48	
Dissolved oxygen, mg/L	8.3	3.7	3.5	100
	8.1	5.6	4.8	56
	-	-	-	32
	-	-	-	18
	-	-	-	10
	7.8	6.7	7.3	5.6
	7.6	7.4	7.7	Control

(continued)

Physical parameter	Exposure period, hrs 0	24	48	Effluent concentration, %
pH	8.3	7.8	7.6	100
	8.1	8.1	7.8	56
	-	-	-	32
	-	-	-	18
	-	-	-	10
	8.1	8.2	8.1	5.6
	8.0	8.0	7.9	Control
Conductivity, µmhos	7,200	7,150	7,200	100
	4,600	4,650	4,600	56
	-	-	-	32
	-	-	-	18
	-	-	-	10
	1,100	1,150	1,050	5.6
	600	600	700	Control
Temperature, °C	22	22	22	100
	22	22	22	56
	-	-	-	32
	-	-	-	18
	-	-	-	10
	22	22	22	5.6
	22	22	22	Control
Alkalinity, mg/L as $CaCO_3$	530			100
	312			56
	-			32
	-			18
	-			10
	224			5.6
	196			Control
Hardness, mg/L as $CaCO_3$	>500			100
	>500			56
	-			32
	-			18
	-			10
	274			5.6
	236			Control

7. EP TOXICITY TESTING OF SLUDGE

The sludge sample was extracted per the U.S. EPA RCRA procedure as shown in Figure 14. The resulting leachate was then analyzed in accordance with approved EPA analytical procedures (3, 4 and 5). Results of the metals analyses are shown in Table 32 with the applicable quality control data. Table 33 shows the herbicides and pesticides concentration found in the leachate. While not a

part of the RCRA requirements, the results for requested analysis of the leachate for cyanide and phenol concentrations are shown in Table 34 with the applicable quality control data.

8. ADDITIONAL ANALYSES OF SLUDGE SAMPLE

Additional analyses requested for the sludge sample include pH, total cyanide and its total metal content. To obtain the pH a 10 g sample of the sludge was mixed with 20 mL of distilled water and slurried. The pH of this slurry was measured to be 11.07. The total cyanide content of the sludge was determined to be <1.3 ug g (dry weight) using an EPA approved method [4]. The total metal content was determined by atomic absorption (AA) spectroscopy and an Inductivity Coupled Plasma (ICP) excitation technique. The methods used are described in Reference 4. Results of these analyses are shown in Table 35.

9. ANALYSES FOR PRIORITY AND NON-PRIORITY METAL POLLUTANTS IN WATER

In addition to the organics the EPA-designated priority pollutants include 13 metals which are to analyzed for under the protocol [1]. Four metals (arsenic, mercury, selenium and thallium) are analyzed by AA spectroscopy. All others are determined by ICP excitation technique. Results are shown in Table 36 with the applicable quality control data shown in Table 37. Table 38 lists the least observable quantites (LOQ) for metals by ICP analyses.

10. ANALYSES FOR TOTAL CYANIDE AND TOTAL PHENOL IN WATER SAMPLES

Total cyanide in the water samples was determined according to the conventional wet chemistry technique described in Reference 3. Independent standards were included with the water samples for quality assurance.

In addition to specific phenolic compounds and phenol measured by GC/MS, total phenol in the water samples were also measured by typical wet chemistry techniques [3,4]. Independent phenol standards were also analyzed for quality assurance.

The results for these analyses were shown in Table 39 with the applicable quality control data.

11. NON-PRIORITY POLLUTANT COMPOUNDS

A number of pollutants as designated by the NPDES Consolidated Permits [3] as Group A and B pollutants were analyzed for. The compound was analyzed for in accordance with approved EPA methods [4]. The results for these analyses are shown in Table 40.

12. REFERENCES

1. Draft Final Report: Sampling and Analysis Procedures for Screening of Industrial Effluents for Priority Pollutants. U.S. Environmental Protection Agency, Cincinnati, Ohio, April 1977. 145 pp.

2. EPA Guidelines Establishing Test Procedures for the Analysis of Pollutants, Proposed Regulation, Federal Register. Monday. December 3, 1979.

3. U.S. Federal Register. Book 3, Vol. 45, No. 98, Monday. May 1. 1980.

4. Standard Methods for Examination of Water and Wastewater. Fourteenth Edition. American Public Health Association. Washington, D.C., 1976. 1193 pp.

5. Manual of Methods for Chemical Analysis of Water and Wastes. EPA-625/6-76-003a (PB 259 973). U.S. Environmental Protection Agency, Cincinnati, Ohio. 319 pp.

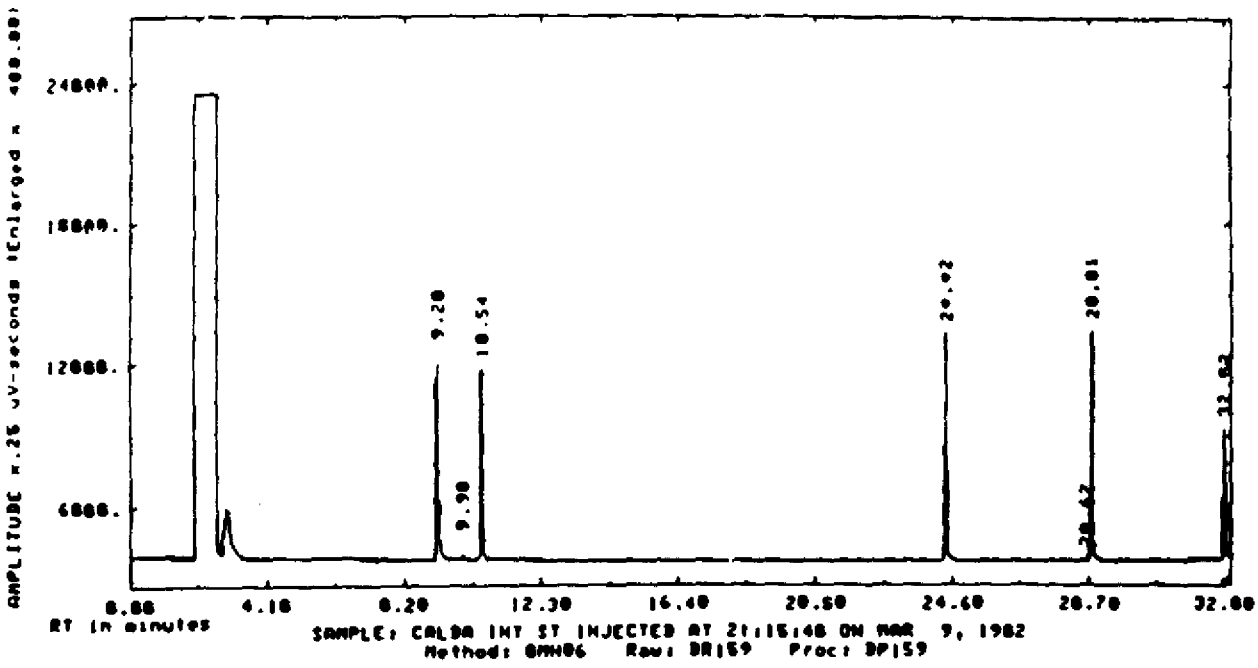


Figure 1. Capillary GC/FID chromatogram of surrogate compound spikeing standard added to each sample before extraction.

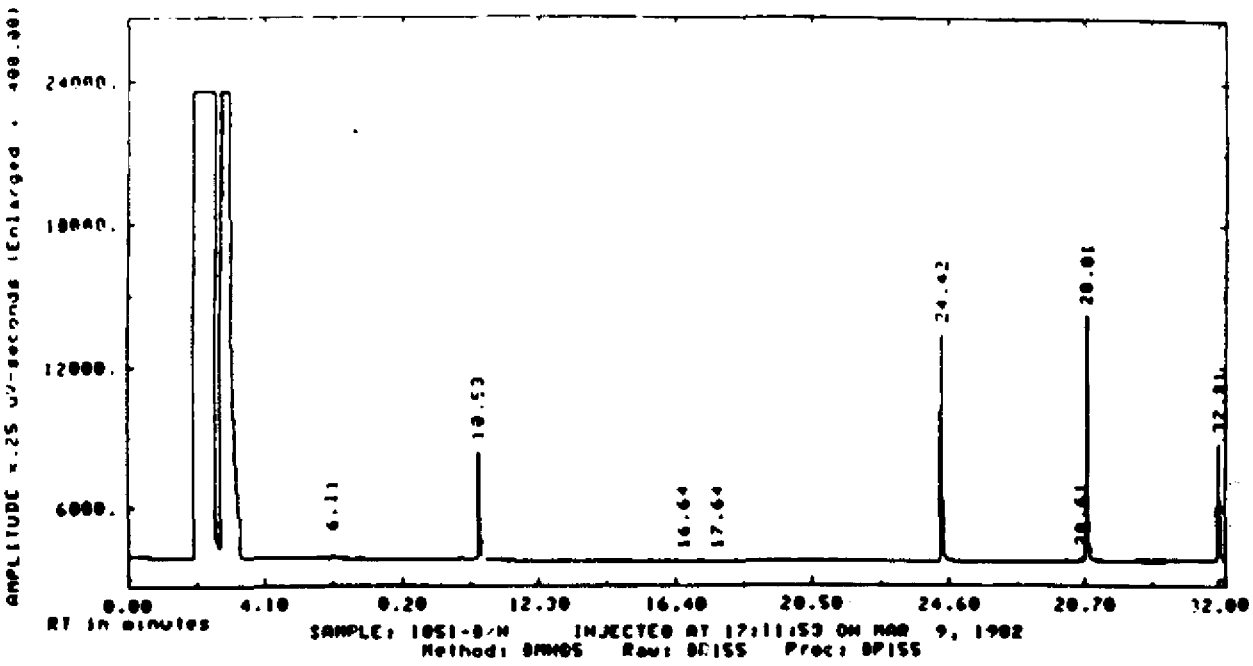


Figure 2. Capillary GC/FID chromatogram of the base/neutral extact of the method blank (Burdick and Jackson Water, distilled in glass).

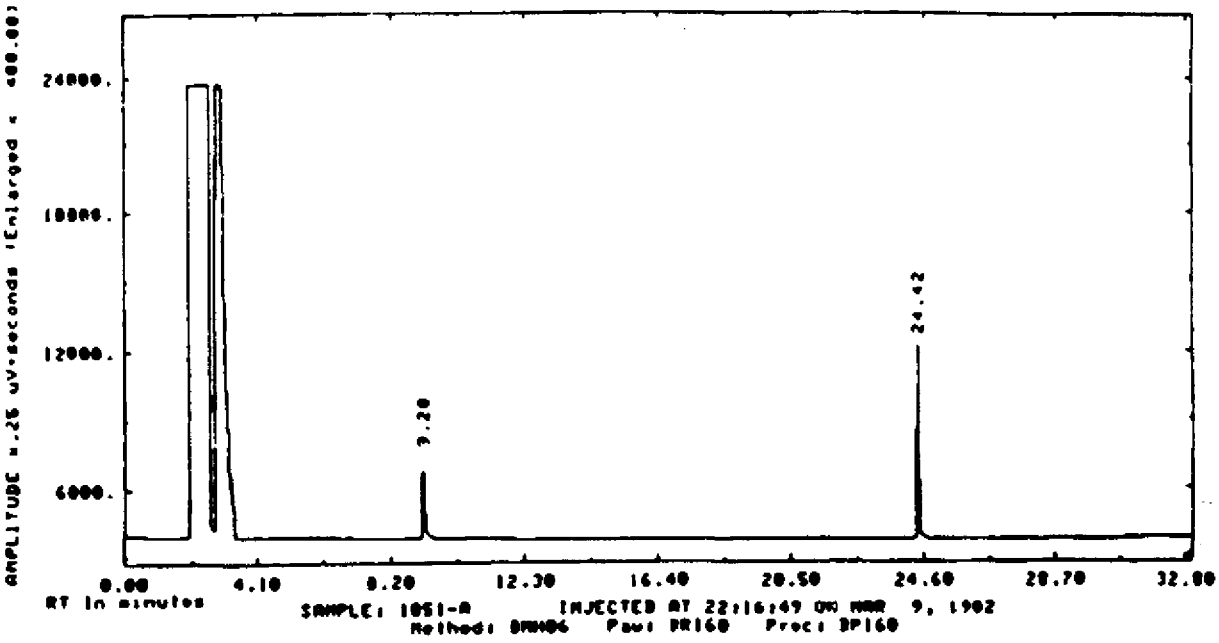


Figure 3. Capillary GC/FID chromatogram of the acid extract of the method blank (Burdick and Jackson Water, distilled in glass).

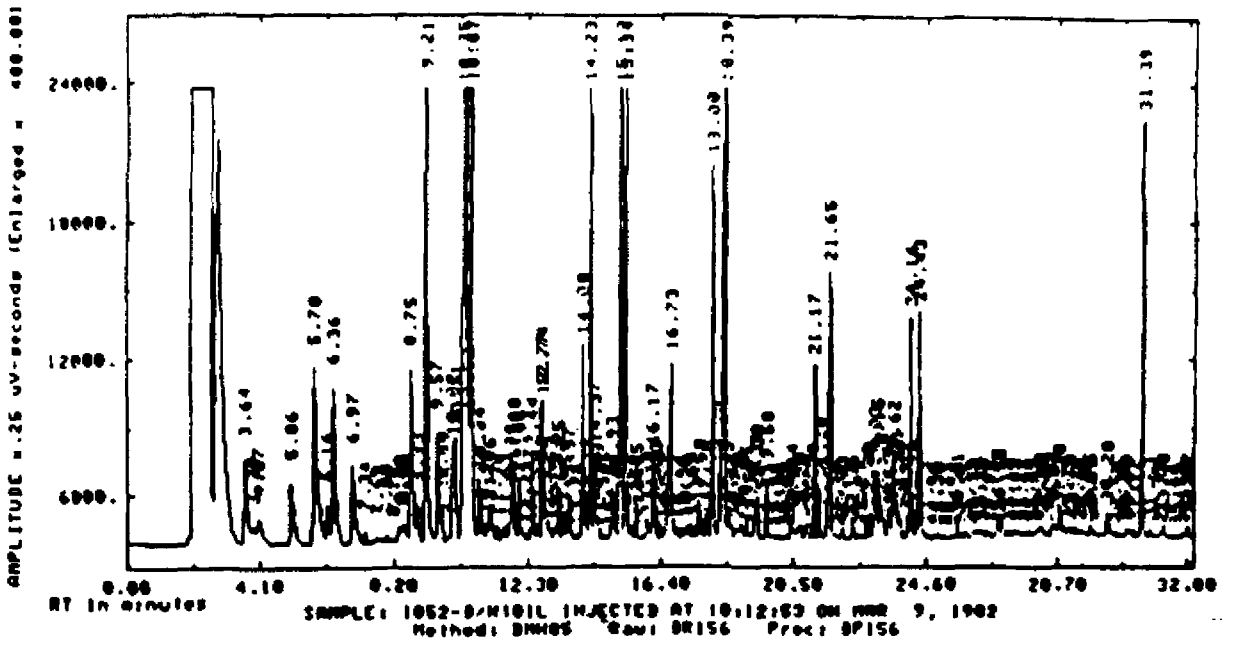


Figure 4. Capillary GC/FID chromatogram of the base/neutral extract of influent sample from Sauget, IL Treatment Plant, diluted ten times before analysis.

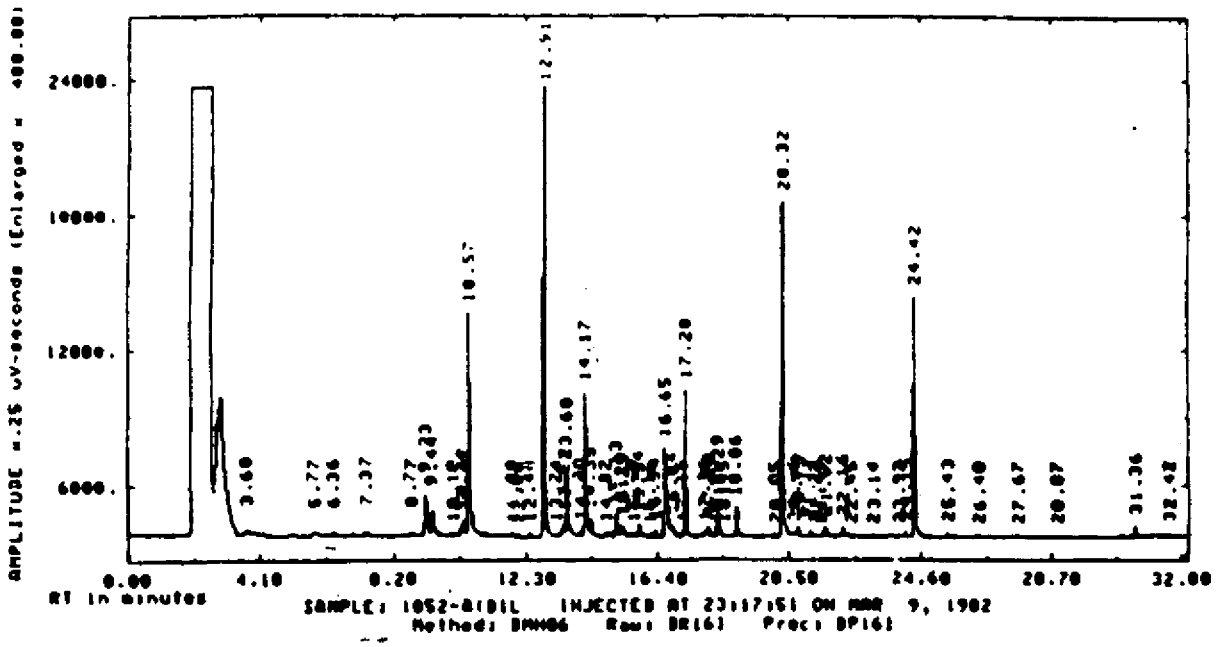


Figure 5. Capillary GC/FID chromatogram of the acid extract of the influent sample from Sauget, IL Treatment Plant, diluted ten times before analysis.

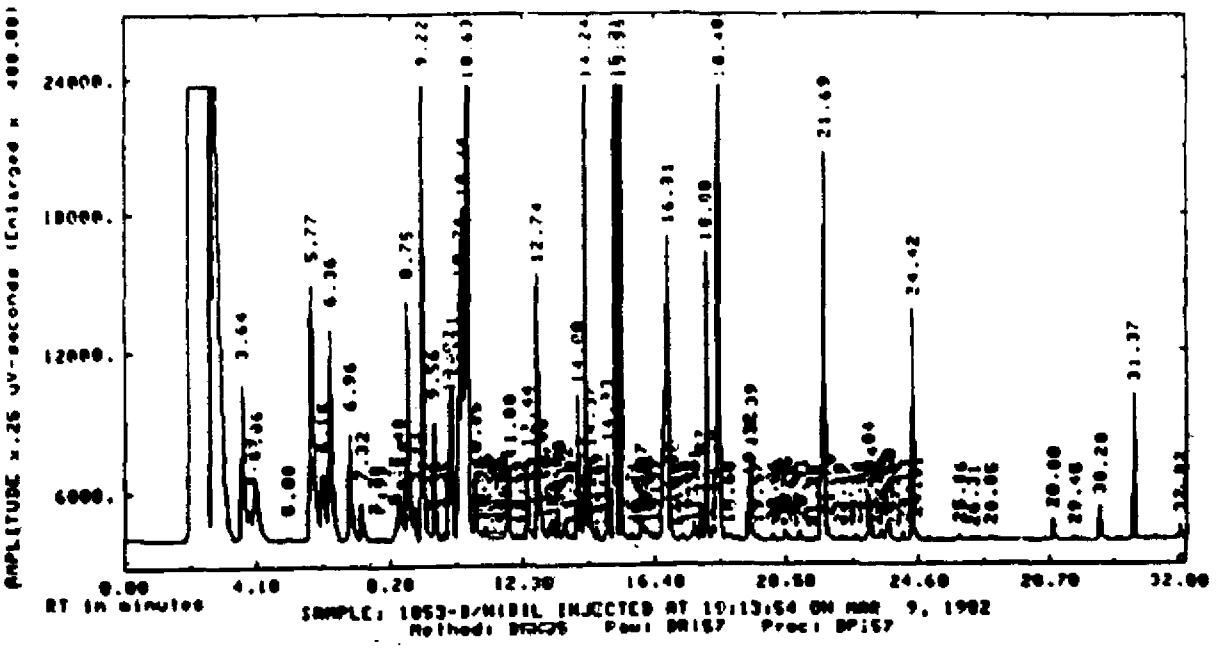


Figure 6. Capillary GC/FID chromatogram of the base/neutral extract of the effluent sample from Sauget, IL Treatment Plant, diluted ten times before analysis.

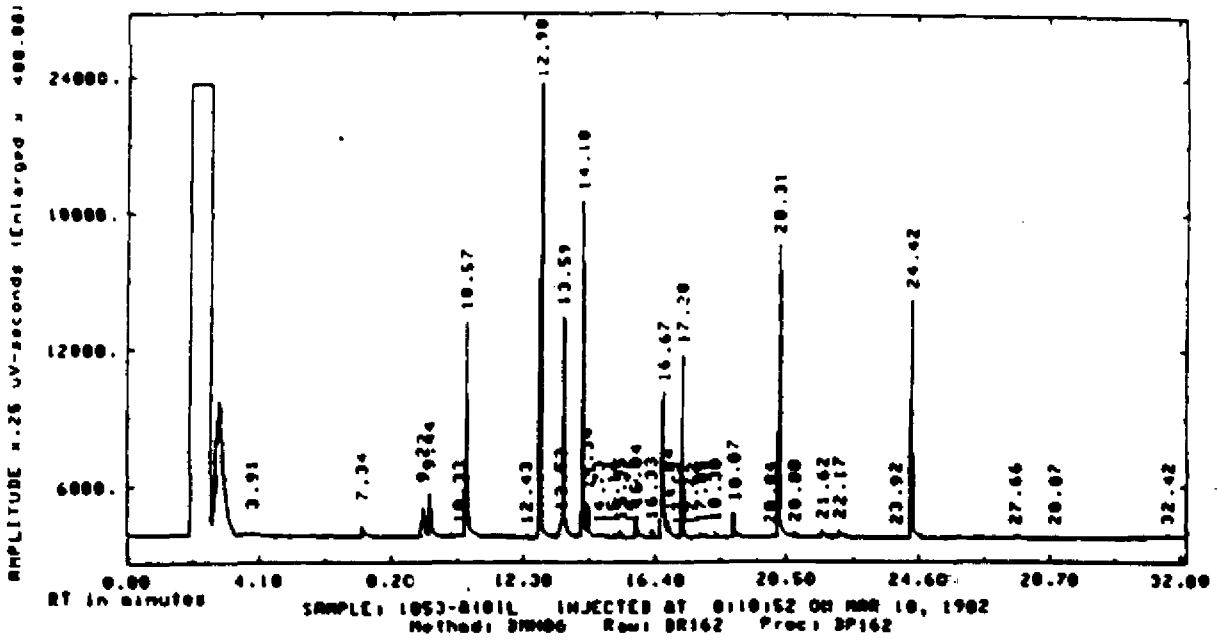


Figure 7. Capillary GC/FID chromatogram of the acid extract of the effluent sample from Sauget, IL Treatment Plant, diluted ten times before analysis.

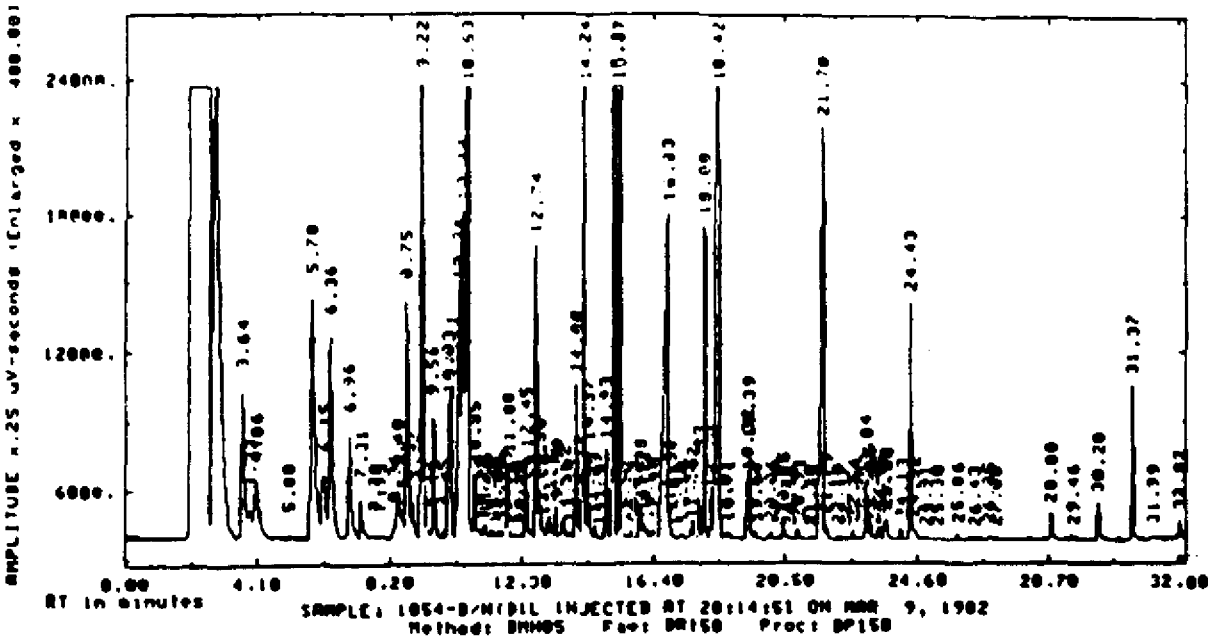


Figure 8. Capillary GC/FID chromatogram of the base/neutral extract of a duplicate effluent sample from Sauget, IL Treatment Plant, diluted ten times before analysis.

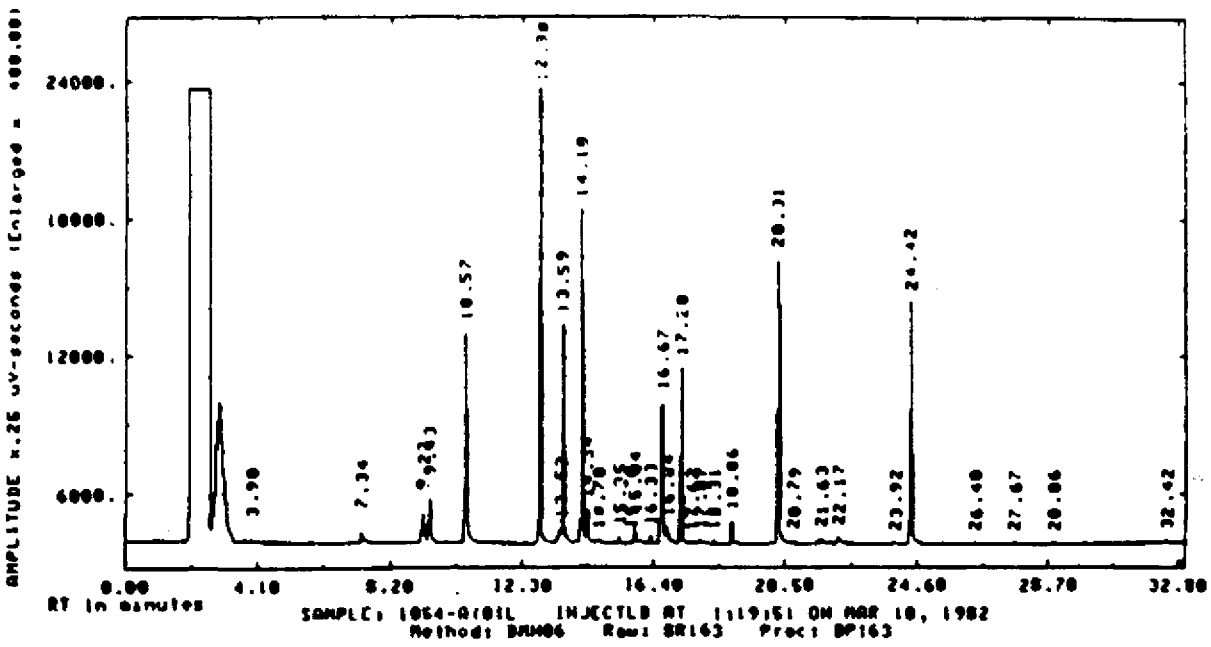


Figure 9. Capillary GC/FID chromatogram of the acid extract of a duplicate effluent sample from Sauget, IL Treatment Plant, diluted ten times before analysis.

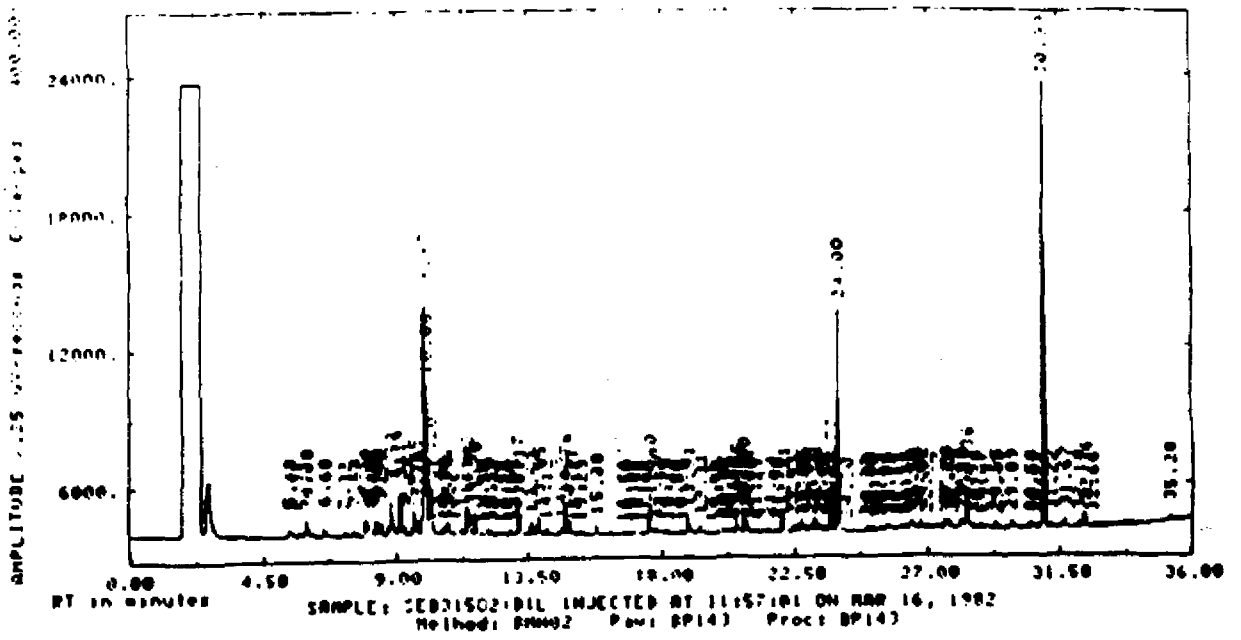


Figure 10. Capillary GC/FID chromatogram of the extract of a 1.07 g sediment sample from Sauget, IL Treatment Plant, diluted ten times before analysis.

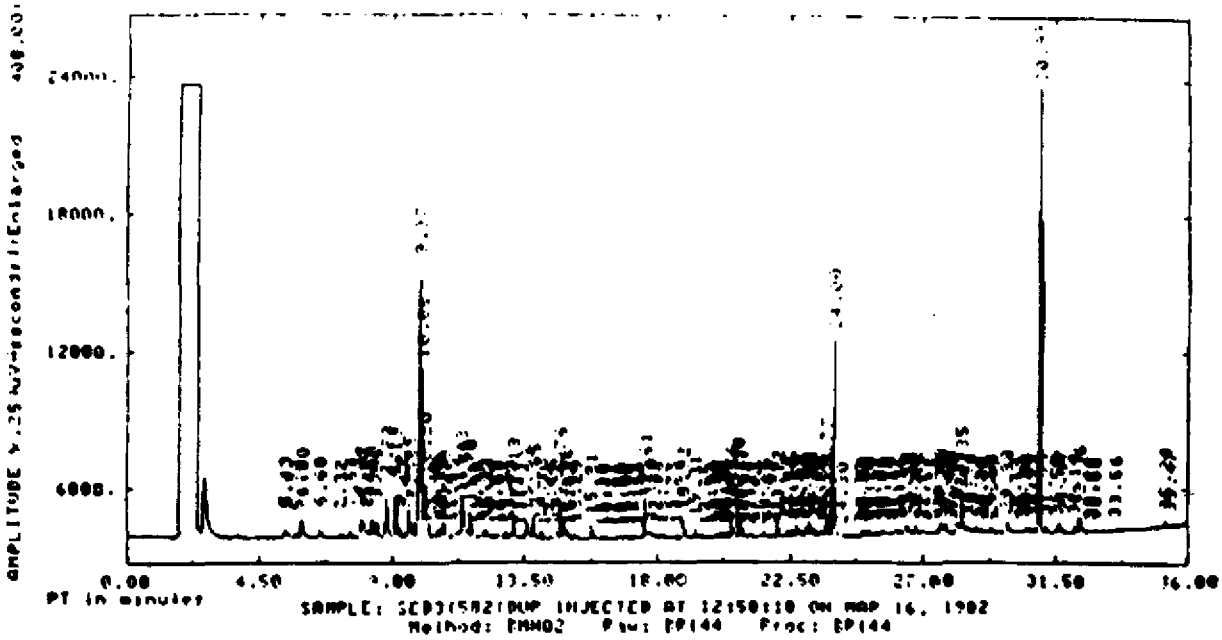


Figure 11. Capillary GC/FID chromatogram of the extract of a 1.38 g duplicate sediment sample from Sauget, IL Treatment Plant, diluted ten times before analysis.

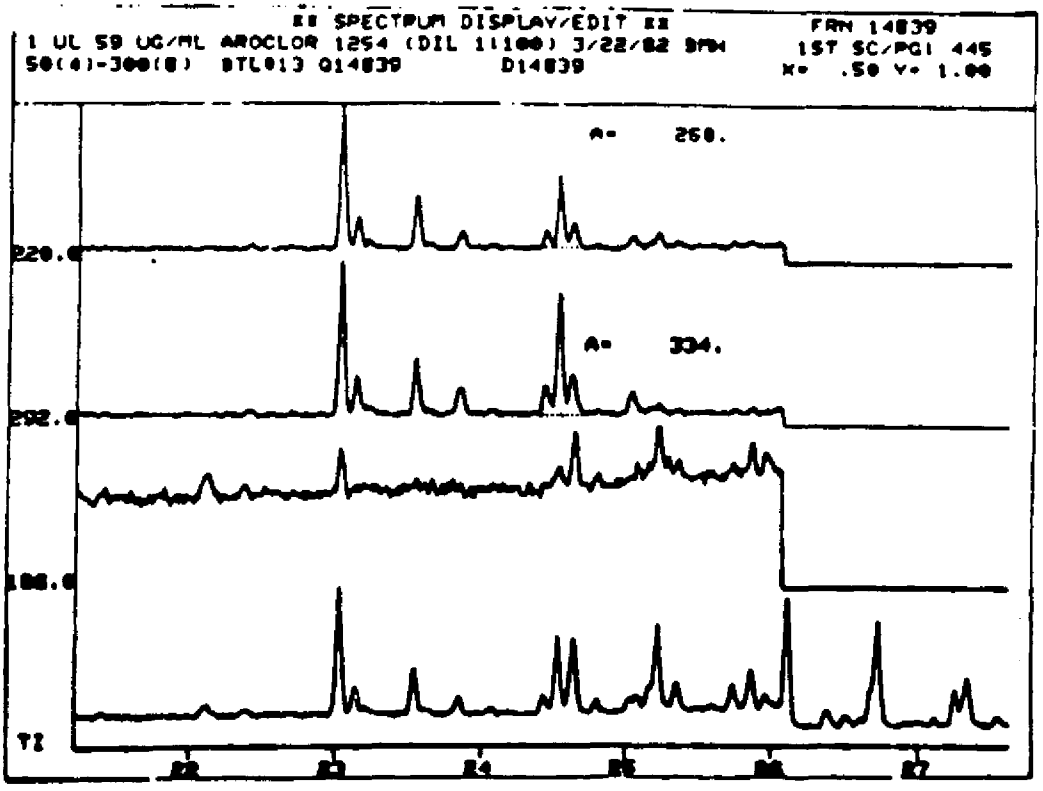


Figure 12. Analysis of 59 µg/mL Aroclor 1254 standard, using $(GC)^2$/MS-SIM analysis techniques.

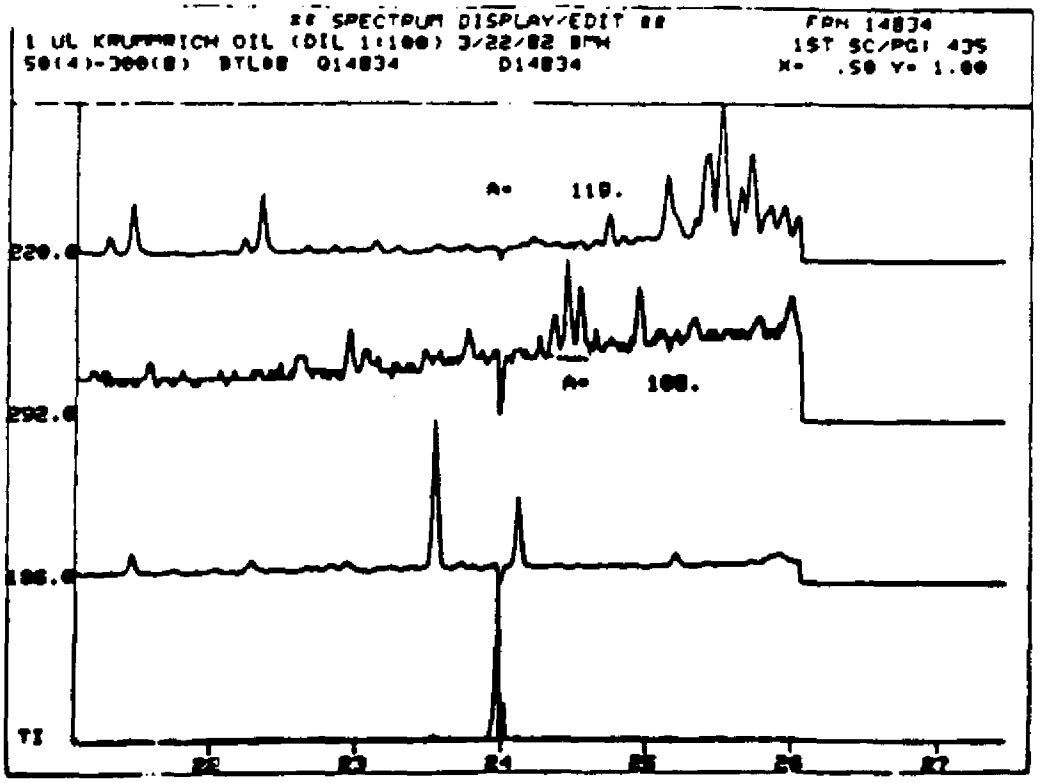


Figure 13. Analysis of an oil sample, using $(GC)^2$/MS-SIM analysis techniques.

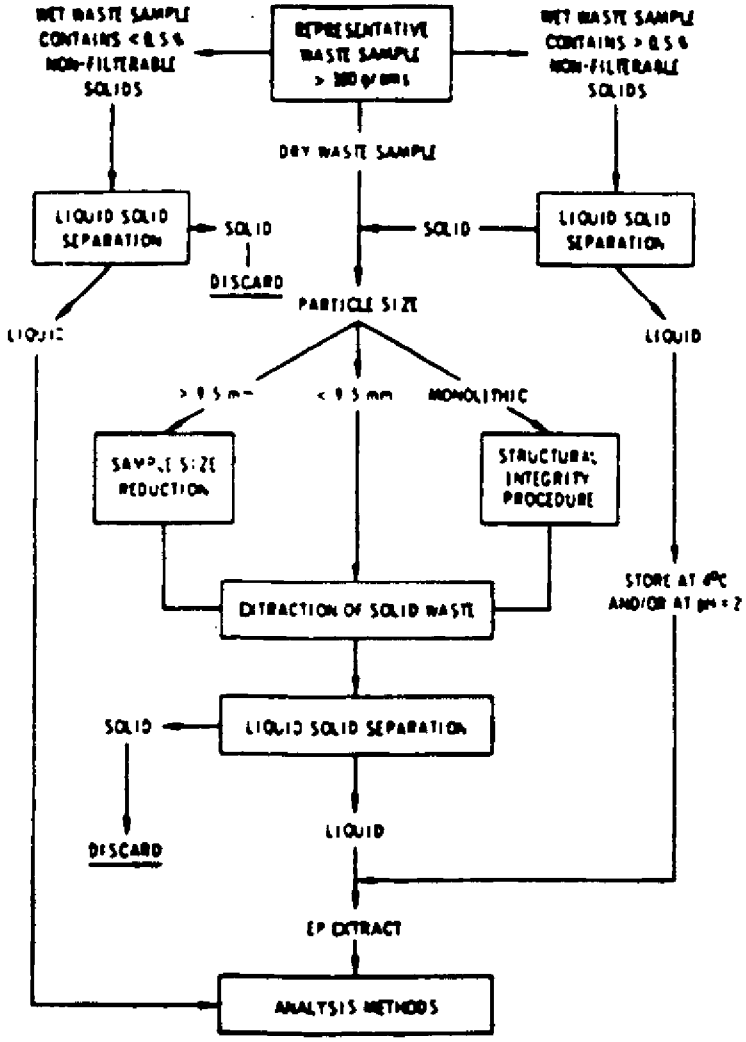


Figure 14. Extraction procedure flowchart.

TABLE 1. AMOUNT OF CHROMATOGRAPHABLE COMPOUNDS DETECTED IN THE BASE/NEUTRAL EXTRACT OF THE INFLUENT SAMPLE. DILUTED TEN TIMES BEFORE ANALYSIS

RT	AREA		ug/L	NAME
3.64	49354	BV	684.169	
3.85	[illegible]	VV	137.072	
4.07	22465	VB	312.315	
5.00	[illegible]	BB	514.780	
5.76	131334	BV	1820.87	
[illegible]	[illegible]	VV	224.231	
[illegible]	[illegible]	VV	1363.28	
[illegible]	46741	BV	647.406	
[illegible]	[illegible]	VB	51.905	
[illegible]	1037	BB	14.415	
[illegible]	2341	BV	32.504	
[illegible]	673	VB	9.356	
[illegible]	7133	BV	99.171	
[illegible]	[illegible]	VV	55.614	
8.54	9417	VV	131.053	
[illegible]	[illegible]	VV	1015.56	
[illegible]	[illegible]	VV	229.504	
9.21	[illegible]	VV	4047.99	PHENOL-D5
9.59	36402	BV	506.079	
[illegible]	[illegible]	VV	177.243	
[illegible]	1215	VB	16.857	
[illegible]	[illegible]	BV	440.887	
[illegible]	[illegible]	VV	517.656	
[illegible]	[illegible]	VV	2387.54	
10.44	210552	VV	2726.93	
10.51	20787	VV	319.585	DL2-BENZENE-D4
10.61	219464	VV	3051.13	
10.64	20164	VV	280.352	
10.98	6364	VV	88.469	
11.06	[illegible]	VV	74.550	
11.14	14611	VV	203.131	
11.36	[illegible]	VV	80.495	
11.62	[illegible]	BV	9.720	
11.80	15155	VV	210.672	
11.88	[illegible]	VV	248.651	
11.93	[illegible]	VV	20.895	
12.04	13455	VV	187.469	
12.16	2318	VV	32.221	
12.27	1081	VV	15.050	
12.34	1546	VV	21.490	
12.44	21354	VV	297.293	
12.56	4948	VV	68.790	
12.67	1879	VV	26.125	
12.74	25160	VV	349.792	

TABLE 1 (continued)

RT	AREA		ug/L	NAME
12.77	34176	VV	475.163	
12.86	12099	VV	168.210	
12.94	1917	VV	26.657	
13.06	3409	VV	47.399	
13.12	1874	VV	26.059	
13.17	4380	VV	60.868	
13.25	15459	VV	214.923	
13.38	8070	VV	112.185	
13.49	2741	VV	38.113	
13.[illegible]	17747	V[illegible]	[illegible]	
13.74	1150	VV	15.993	
13.85	1181	VV	16.416	
14.0[illegible]	[illegible]	VV	742.[illegible]	
14.13	6247	VV	114.937	
14.2[illegible]	1227[illegible]	V[illegible]	17[illegible].14	
14.37	[illegible]	VV	35[illegible].713	
14.44	2792	VV	38.824	
14.4	5354	VV	74.425	
14.5	866	VV	12.044	
14.69	373	VB	5.184	
14.74	248	BB	3.448	
14.87	2914	BV	40.506	
14.[illegible]	152[illegible]	V[illegible]	[illegible].428	
15.0	[illegible]	VV	33.3[illegible]	
15.07	1021	V[illegible]	14.206	
15.17	[illegible]	V[illegible]	4324.11	
15.24	156[illegible]	V[illegible]	2176.45	
15.41	4[illegible]	V[illegible]	60.[illegible]	
15.61	1730	VV	24.049	
15.67	[illegible]	V[illegible]	73.751	
15.87	47[illegible]	BB	6.5[illegible]	
15.92	5529	B[illegible]	76.818	
16.13	3312	[illegible]	46.065	
16.17	18095	VV	251.5[illegible]	
16.2[illegible]	6284	VV	87.3[illegible]	
16.31	3637	VV	50.557	
16.3[illegible]	2615	V[illegible]	36.3[illegible]	
16.50	2297	VV	31.936	
16.73	100647	VV	1399.25	
16.85	4740	VV	65.67[illegible]	
17.05	2317	VV	32.205	
17.10	1876	VV	26.084	
17.16	2295	VV	31.901	
17.24	3010	VV	41.842	
17.34	2760	VV	38.367	
17.47	2115	VV	29.409	
17.58	10313	VV	143.372	
17.71	263	VV	3.653	
17.80	8341	VV	115.960	
18.00	104451	VV	1452.13	
18.20	16022	VV	222.744	
18.39	360249	VV	5006.36	
18.44	7541	VV	104.835	
18.55	2783	VV	38.694	
18.61	2590	VV	36.008	
18.71	964	VV	13.398	

TABLE 1 (continued)

RT	AREA		%/%	NAME
16.8[illegible]	1864	BV	26.186	
16.9[illegible]	700	VV	9.734	
17.0[illegible]	4[illegible]	VV	67.975	
19.1[illegible]	1121	VV	15.582	
19.[illegible]	11130	VV	154.736	
19.[illegible]	12158	VV	169.026	
19.94	[illegible]	VB	8.467	
19.[illegible]	14440	BV	201.449	
19.[illegible]	1064	VV	15.075	
19.[illegible]	[illegible]	VV	4.560	
19.9[illegible]	276	VB	3.870	
20.0[illegible]	872	BV	12.117	
20.[illegible]	452	VB	6.278	
20.[illegible]	[illegible]	BV	[illegible]	
20.[illegible]	950	VV	13.429	
20.44	7[illegible]	VV	105.247	
20.[illegible]	[illegible]	VV	51.072	
20.[illegible]	4[illegible]	VV	67.774	
20.[illegible]	2[illegible]	VV	4[illegible]	
20.[illegible]	[illegible]	VV	55.0[illegible]	
20.[illegible]	1[illegible]	VV	25.244	
20.[illegible]	4[illegible]	VV	62.514	
21.0[illegible]	4[illegible]	BV	62.697	
21.[illegible]	[illegible]	VV	4[illegible]	
21.[illegible]	1[illegible]	VV	165.718	
21.24	2461	VV	34.49[illegible]	
21.[illegible]	[illegible]	VV	1571.[illegible]	
21.7[illegible]	1[illegible]	VV	17.3[illegible]	
21.[illegible]	[illegible]	BV	[illegible]	
22.0[illegible]	[illegible]	VV	31.[illegible]	
22.[illegible]	[illegible]	VB	[illegible]	
22.[illegible]	4[illegible]	BV	61.[illegible]	
22.[illegible]	1[illegible]	VV	21.[illegible]	
22.[illegible]	1[illegible]	VB	11.474	
22.[illegible]	4[illegible]	BV	63.[illegible]	
22.[illegible]	[illegible]	VV	8[illegible]	
22.[illegible]	1[illegible]	VV	251.[illegible]	
23.[illegible]	1[illegible]	VV	267.4[illegible]	
23.[illegible]	1[illegible]	VV	150.[illegible]	
23.[illegible]	[illegible]	VV	75.[illegible]	
23.[illegible]	1[illegible]	VV	141.090	
23.[illegible]	2[illegible]	VV	33.[illegible]	
23.[illegible]	2[illegible]	VV	[illegible]73.744	
23.71	[illegible]	VV	134.[illegible]	
23.76	7[illegible]	VV	105.[illegible]	
23.84	4[illegible]	VV	63.[illegible]	
23.98	3[illegible]	VB	4.302	
24.07	4[illegible]	BV	63.423	
24.16	49[illegible]	VV	[illegible]81.314	
24.24	5[illegible]	VV	76.336	
24.32	2[illegible]	VV	30.490	
24.[illegible]	7[illegible]	VV		ANTHRACENE-D10
24.69	1[illegible]	VB	17.257	
24.90	4[illegible]	BB	6.421	
25.03	1160	BV	16.407	
25.23	543	BB	7.548	
25.42	204	BV	2.835	
25.52	1138	VV	15.815	
25.61	2923	VB	40.635	
25.86	911	BV	12.667	
25.99	292	VB	4.066	

TABLE 1 (continued)

RT	AREA		ug/L	NAME
26.13	1655	BV	23.006	
26.24	964	VB	13.405	
26.35	563	BV	7.829	
26.37	542	VV	7.553	
26.56	1916	BV	26.640	
26.71	381	VB	5.396	
26.75	557	BV	7.776	
26.85	3722	VV	51.749	
26.92	3935	VB	54.705	
27.10	1556	BV	21.639	
27.24	1376	VB	19.132	
27.29	968	BV	13.455	
27.41	991	VB	13.783	
27.67	306	BB	4.254	
27.84	268	VB	3.726	
27.88	255	BB	3.545	
28.05	289	BB	4.013	
28.13	352	BB	4.894	
28.17	1994	BV	27.715	
28.25	577	VV	8.016	
28.41	1024	VV	14.241	
28.59	4378	VV	60.877	
28.64	3667	VV	50.985	
[illegible]	9655	VV	132.767	PYRENE-D10
28.94	1479	VV	20.567	
29.01	286	VV	3.973	
29.08	260	VB	3.611	
29.13	1418	BV	19.715	
29.27	1906	VV	26.498	
[illegible]	615	VV	8.555	
29.49	417	VB	5.797	
29.62	796	BV	11.067	
29.75	[illegible]	VV	[illegible]	
29.85	[illegible]	VB	17.792	
30.25	[illegible]	VB	[illegible]	
30.54	[illegible]	BV	7.6[illegible]	
30.72	461	BB	6.405	
30.86	654	VB	9.091	
30.95	200	BV	2.781	
31.01	734	VB	10.205	
31.12	1047	BV	14.562	
31.35	120008	BV	1668.95	
31.63	1457	BB	20.263	
31.67	213	BB	2.959	
31.99	518	BB	7.204	
32.01	2038	BB	28.345	
32.33	203	BB	2.822	
32.44	346	BB	4.806	
32.54	986	BV	13.706	
32.69	1767	VV	24.573	
32.82	4646	VV	107.285	CHRYSENE-D12
33.06	567	BB	7.888	
33.28	1642	BV	22.833	
33.36	532	VB	7.390	
33.56	442	BB	6.149	
34.00	484	BB	6.737	
34.22	254	BV	3.538	
34.32	251	VB	3.494	
34.48	647	BB	9.002	
34.60	666	BB	9.263	
35.24	1718	BB	23.888	

TABLE 1 (continued)

[illegible].72	708 BB	9.847
35.92	820 BB	11.397
34.42	652 BB	9.151
37.3[illegible]	1992 BB	27.497
36.77	343 BB	4.765

TOTAL AREA = 3903967 TOTAL ug/L = 84295.414

PROCESSED DATA FILE: BP154 RAW DATA FILE: BR154

NOTE: The above report is generated from the capillary GC/FID analysis of a methylene chloride extract of a basic water sample [illegible]. The retention time units are minutes; the area units are integrator counts and the component concentrations (ug/L) are calculated [illegible] using authentic standards, if the peak is named, or [illegible] assuming the [illegible] compound response is equal to the internal standard, anthracene-d10. Other deuterated compounds identified are surrogate spiking compounds which are added to the water sample before extraction [illegible]. Each spiking compound was added to produce a water concentration of 100 ug/L.

The above analysis includes all chromatographable compounds with [illegible] between 7.0 min and 34.000 (which corresponds [illegible]) and which can be extracted using the EPA Method 625 Extraction Protocol.

The identity of [illegible] priority pollutant components shown to be present in the above analysis at levels greater than 5 ug/L can be [illegible]. Further interpretation of the mass spectral data obtained from the capillary GC/MS analysis for priority pollutants is discussed in a later section.

TABLE 7. AMOUNT OF CHROMATOGRAPHABLE COMPOUNDS DETECTED IN THE ACID EXTRACT OF THE INFLUENT SAMPLE, DILUTED TEN TIMES

RT	AREA		ug/L	NAME
[illegible]	207	BB	2.776	
5.77	1151	BP	15.447	
6.5[illegible]	734	BB	9.891	
7.[illegible]	54[illegible]	BB	7.349	
8.77	830	BP	11.136	
[illegible]	1707[illegible]	BV	185.47[illegible]	PHENOL-D5
[illegible].64	10[illegible]	VB	146.408	
10.1[illegible]	1510	[illegible]	20.2[illegible]	
10.[illegible]	[illegible]	[illegible]	4[illegible]	
10.62	4[illegible]1	VV	57.515	
10.[illegible]	[illegible]	VB	[illegible]6.[illegible]	CL2-BENZENE-D4
11.3[illegible]	42[illegible]	BB	5.7[illegible]	
1[illegible]	33[illegible]	BB	4.543	
12.64	52[illegible]	BB	6.9[illegible]	
12.91	32[illegible]6	BB	443[illegible]	
13.[illegible]	204	BB	2.737	
13.5[illegible]	6[illegible]	BV	85.426	
13.6[illegible]	21[illegible]	VB	284.594	
14.06	909	BB	12.205	
14.17	3[illegible]774	BV	520.924	
14.[illegible]	4[illegible]	VB	62.195	
14.[illegible]	425	BB	5.718	
15.1[illegible]	6132	BV	82.321	
15.[illegible]	2835	VV	38.131	
15.[illegible]	2324	VB	31.219	
15.[illegible]	699	BB	9.394	
15.[illegible]4	3790	BB	50.919	
16.16	366	BB	4.912	
16.34	1361	BB	18.281	
16.[illegible]	[illegible]3417	BV	529.[illegible]	
16.64	5634	VB	75.651	
17.18	659	BV	8.850	
17.26	36620	VB	491.985	
17.64	841	BB	11.292	
17.92	2152	BB	28.915	
18.20	274	BV	3.676	
18.2[illegible]	8639	VV	116.065	
18.45	219	VB	2.949	
18.[illegible]	7506	BB	100.840	
20.05	772	BB	10.372	
20.32	120942	BB	1624.83	
20.[illegible]	525	BB	7.047	
20.79	2244	BB	30.149	
21.17	1049	BV	14.096	

TABLE 2 (continued)

RT	AREA	ug/L	NAME
21.26	344	VB	0.034
21.67	625	BB	5.715
21.82	3801	BB	31.024
[illegible]	2809	BB	37.717
22.89	392	BB	0.726
23.19	303	BB	0.060
[illegible]	301	BB	4.047
24.19	1266	BB	12.717
24.42	744	BB	ANTHRACENE-D10
25.4	7[illegible]	BB	[illegible]
[illegible]	241	BB	4.8[illegible]
27.87	450	BB	6.1[illegible]
[illegible]	[illegible]	BB	[illegible]
31.26	2734	BB	36.731
32.62	[illegible]	BB	4.16[illegible]
34.91	[illegible]	BB	3.[illegible]

TOTAL AREA = [illegible] TOTAL ug/L = 10,14.775

PROCESSED DATA FILE: BF[illegible] RAW DATA FILE: BR[illegible]

NOTE: The above report is generated from the capillary GC/FID analysis of a methylene chloride extract of an acidic water sample [illegible]. The retention time units are minutes, the area units are integrator counts and the quantitated concentrations typically are calculated by using authentic standards if the peak is readily identifiable. Otherwise the unknown compound response is equal to the internal standard, anthracene-d10. Other deuterated compounds identified are surrogate spiking compounds which are added to the water sample before extraction begins. Each spiking compound was added to produce a water concentration of 100 ug/L.

The above analysis includes all chromatographable compounds with Kovats indices between 7,000 and 34,000 (which corresponds to C7 through C36 normal hydrocarbons) and which can be extracted using the EPA Method 625 Extraction Protocol.

The results of [illegible] pollutant components shown to be present in the above analysis at levels greater than 5 ug/L can be obtained by further interpretation of the mass spectral data obtained from the capillary GC/MS analyses for priority pollutants discussed in a later section.

TABLE 3. AMOUNT OF CHROMATOGRAPHABLE COMPOUNDS IN DETECTED IN THE BASE/NEUTRAL EXTRACT OF THE EFFLUENT SAMPLE. DILUTED TEN TIMES BEFORE ANALYSIS

RT	AREA		UG/L	NAME
3.64	91344	BV	1403.01	
3.8[illegible]	18639	VV	289.476	
4.06	54441	VB	837.653	
5.0[illegible]	775	BB	11.913	
5.77	171549	BV	26[illegible].65	
6.11	4267	VB	65.267	
6.17	571	BV	8.776	
6.[illegible]	110217	VV	1695.59	
6.96	60413	VV	929.4[illegible]	
7.[illegible]	16[illegible]	VB	25[illegible].14[illegible]	
7.7[illegible]	6[illegible]	BB	9.8[illegible]	
7.99	234	BB	3.6[illegible]	
8.37	5467	BV	67.116	
8.4[illegible]	[illegible]	VV	291.918	
8.6[illegible]	1027[illegible]	VV	157.445	
8.77	10[illegible]74	VV	15[illegible]4.[illegible]	
8.[illegible]	14[illegible]	VV	2[illegible].754	
9.[illegible]	327182	VV	49[illegible].7[illegible]	PHENOL-D5
9.44	[illegible]	VB	7.762	
9.59	41406	BV	636.278	
9.97	2376	VV	36.202	
10.0[illegible]	42281	VV	649.715	
10.1[illegible]	5419[illegible]	VV	8[illegible].19[illegible]	
10.34	8[illegible]	VV	1361.[illegible]	
10.44	134[illegible]73	VV	20[illegible]9.47	
10.5[illegible]	[illegible]	VV	3[illegible].862	CL2-BENZENE-D4
10.6[illegible]	35[illegible]	VV	5451.27	
10.87	[illegible]	VV	527.640	
10.98	2[illegible]	VV	42.677	
11.07	1752	VV	26.918	
11.16	5367	VV	82.503	
11.36	2924	VV	44.937	
11.45	226	VB	3.477	
11.59	1405	BV	21.583	
11.62	910	VV	13.985	
11.79	5200	VV	79.900	
11.86	20121	VV	309.186	
12.12	708	BB	10.875	
12.27	604	VV	9.280	
12.34	1071	VV	16.460	
12.44	21866	VV	336.303	
12.58	2933	VV	45.067	
12.74	99790	VV	1533.37	
12.84	17765	VV	272.983	

TABLE 3 (continued)

RT	AREA		ug/L	NAME
13.00	3336	VV	51.262	
13.17	6851	VV	105.279	
13.25	4956	VV	76.149	
13.36	8291	VV	127.393	
13.42	9700	VV	149.182	
13.76	1292	VV	19.854	
13.85	1581	VB	24.299	
14.00	38956	BV	598.216	
14.12	7802	VV	119.881	
14.20	227062	VV	3489.04	
14.37	26385	VV	405.462	
14.57	2899	VB	44.542	
14.70	404	BB	6.206	
14.95	27135	BV	416.955	
15.21	433350	VV	6658.87	
15.34	217321	VB	3339.35	
15.71	2018	BV	31.008	
15.83	373	B-	5.734	
15.97	8204	VV	126.062	
16.11	5292	VV	81.319	
16.22	1914	VV	29.404	
16.37	2411	VB	37.047	
16.61	201574	BV	3097.70	
16.85	8871	VV	136.315	
17.05	392	VB	6.024	
17.23	2834	BB	43.549	
17.35	282	VB	4.333	
17.41	3330	BV	51.173	
17.62	10219	VV	157.023	
18.09	75132	VV	1154.51	
18.24	8938	VV	137.335	
18.46	409452	VV	6291.65	
18.65	2556	VB	39.277	
19.22	14981	BV	230.201	
19.35	22672	VV	348.381	
19.57	1161	VB	17.840	
20.16	3020	BV	46.405	
20.26	294	BB	4.514	
20.45	4617	BV	70.944	
20.64	547	VB	8.405	
20.91	2331	BB	35.820	
21.28	381	BB	5.847	
21.35	318	BB	4.890	
21.60	189673	BV	2910.52	
21.76	4509	VB	69.281	
22.19	824	BB	12.660	
22.37	957	BB	14.713	
22.64	1937	BB	29.764	
22.90	210	BB	3.227	
23.04	13551	BV	208.230	
23.14	5854	VV	89.946	
23.25	1048	VV	16.103	
23.32	446	VB	6.847	
23.44	3370	BV	51.781	
23.62	3331	VV	51.181	
23.86	6455	VV	99.183	
23.96	322	VB	4.948	
24.13	1829	BB	28.099	

TABLE 3 (continued)

RT	AREA		ug/L	NAME
26.6.	67[illegible]	PV		ANTHRACENE-D10
26.91	3505	VB	33.856	
27.84	1671	BB	22.344	
28.31	291	BB	6.472	
28.82	958	BB	10.670	
29.80	7017	BB	104.913	PYRENE-D10
30.47	607	BB	9.906	
[illegible]	[illegible]	BB	161.152	
31.37	5[illegible]	BB	600.101	
[illegible]	6[illegible]	BB	115.520	CHRYSENE-D12

TOTAL AREA = [illegible] TOTAL ug/L = 62700.205

PROCESSED DATA FILE: BR157 RAW DATA FILE: BR157

NOTE: The above report is generated from the capillary GC/MS analysis of a methylene chloride extract of a basic water sample (sm. 11). The retention time units are minutes, the area units are integrator counts and the component concentrations (ug/L) are calculated by using authentic standards, if the peak is named, it is assuming the unknown compound response is equal to the internal standard spiking amount. Other deuterated compounds identified are surrogate spiking compounds which are added to the water sample before extraction began. Each spiking compound was added to produce a water concentration of 100 ug/L.

The above analysis includes all chromatographable compounds with levels ranging between 7,000 and 34,000 (which corresponds to GC temperatures C34 normal hydrocarbons) and which can be extracted using the EPA Method 625 Extraction Protocol.

The identity of nonpriority pollutant components shown to be present in the above analysis at levels greater than 5 ug/L can be obtained. Further interpretation of the mass spectral data obtained from the capillary GC/MS analysis for priority pollutants is discussed in a later section.

TABLE 4. AMOUNTS OF CHROMATOGRAPHABLE COMPOUNDS DETECTED IN THE ACID EXTRACT OF THE EFFLUENT SAMPLE, DILUTED TEN TIMES BEFORE ANALYSIS

RT	AREA		ug/L	NAME
3.51	215	BB	2.921	
7.54	3924	BB	52.543	
9.22	[illegible]	BV	171.744	PHENOL-D5
9.44	17407	VB	232.473	
10.31	[illegible]	BB	4.46[illegible]	
10.57	64751	BB	[illegible].034	CL2-BENZENE-D4
12.4	21[illegible]	BB	2.801	
12.[illegible]	[illegible]	BB	[illegible]	
12.9[illegible]	[illegible]	B[illegible]	[illegible]	
13.[illegible]	[illegible]	VB	[illegible]	
14.15	[illegible]	B[illegible]	[illegible]	
14.28	[illegible]	VB	142.4[illegible]	
14.7[illegible]	111[illegible]	BB	14.9[illegible]	
15.18	[illegible]	BB	[illegible]	
15.[illegible]	[illegible]	BB	[illegible]	
15.71	[illegible]	BI	[illegible]	
15.94	[illegible]	BB	7[illegible].741	
16.[illegible]	[illegible]	BB	[illegible]	
16.[illegible]	[illegible]	B[illegible]	[illegible]	
16.84	[illegible]	VE	[illegible]	
17.1[illegible]	[illegible]	B[illegible]	4.4[illegible]	
17.[illegible]	[illegible]	VB	605.[illegible]	
17.62	[illegible]	BB	[illegible].941	
17.9[illegible]	1141	BB	15.2[illegible]	
18.[illegible]	15[illegible]	BB	[illegible]	
18.97	74[illegible]	B[illegible]	[illegible].282	
20.[illegible]	[illegible]	VB	[illegible].672	
20.[illegible]	97[illegible]	BB	1297.06	
20.8[illegible]	[illegible]	BB	11.857	
21.[illegible]	[illegible]	BB	[illegible]	
22.17	2[illegible]74	BB	[illegible].705	
23.9[illegible]	[illegible]	BB	4.576	
24.42	74[illegible]77	BB		$ANTHRACENE-D10
27.66	[illegible]	BB	7.9[illegible]	
28.87	[illegible]	BB	[illegible]	
32.42	[illegible]	BB	[illegible].102	

TOTAL AREA = 626072 TOTAL ug/L = 10077.671

PROCESSED DATA FILE: BF162 RAW DATA FILE: BR162

NOTE: The above report is generated from the capillary GC/FID analysis of a methylene chloride extract of an acidic water sample (pH < 2). The retention time units are minutes, the area units are integrator counts and the component concentrations (ug/L) [illegible] by assuming the unknown compound response is equal to the internal standard, anthracene-d10. Other deuterated compounds identified are surrogate spiking compounds which are added to the water sample before extraction begun. Each spiking compound was added to produce a water concentration of 100 ug/L.

The above analysis includes all chromatographable compounds with Kovats indices between 7.000 and 34.000 (which corresponds to C7 through C34 normal hydrocarbons) and which can be extracted using the EPA Method 625 Extraction Protocol.

The identity of non-priority pollutant components shown to be present in the above analysis at levels greater than 5 ug/L can be obtained by further interpretation of the mass spectral data obtained from the capillary GC/MS analysis for priority pollutants, discussed in a later section.

TABLE 5. AMOUNT OF CHROMATOGRAPHABLE COMPOUNDS DETECTED IN THE BASE/NEUTRAL EXTRACT OF THE EFFLUENT DUPLICATE SAMPLE, DILUTED TEN TIMES BEFORE ANALYSIS

RT	AREA		ug/L	NAME
3.44	86119	BV	1294.52	
3.64	16261	VV	246.361	
4.06	51396	VB	755.042	
5.0[illegible]	222	BB	3.262	
5.7[illegible]	179055	BV	2656.42	
6.15	53354	VV	783.515	
6.[illegible]	127647	VV	1878.65	
6.[illegible]	[illegible]	VV	[illegible].357	
7.31	16727	VB	249.756	
7.[illegible]	621	BB	9.121	
7.[illegible]	317	BV	4.642	
8.[illegible]	1856	BB	27.267	
8.4[illegible]	1752[illegible]	BV	257.417	
[illegible]	676[illegible]	VV	99.445	
[illegible]	1005[illegible]	VV	1476.49	
[illegible]	12567	VV	195.027	
9.22	335443	VV	4994.41	PHENOL-D5
9.44	1539	VV	22.604	
9.54	44203	VV	649.377	
9.65	2275	VV	34.835	
10.0[illegible]	42717	VV	627.544	
10.11	55457	VV	816.219	
10.34	88127	VV	1294.50	
10.44	145[illegible]	VV	2150.63	
10.51	19059	VV	309.626	CL2-BENZENE-D4
10.6[illegible]	377[illegible]16	VV	5536.62	
10.87	22167	VV	325.456	
10.91	1752	VV	26.698	
11.07	1912	VV	28.095	
11.16	5446	VV	80.057	
11.36	3101	VV	45.554	
11.50	206	VB	3.023	
11.59	227	BB	3.336	
11.65	232	BV	3.414	
11.75	4964	VV	73.222	
11.84	21175	VV	311.078	
12.12	900	BV	13.215	
12.20	293	VV	4.301	
12.27	543	VV	8.045	
12.34	1165	VV	17.109	
12.45	23032	VV	338.354	
12.57	3014	VV	44.272	
12.74	108214	VV	1589.73	
12.84	17192	VV	252.554	

TABLE 5 (continued)

RT	AREA	ug/L	NAME
13.00	3237 VV	47.549	
13.17	6261 VV	91.983	
13.25	4374 VV	64.023	
[illegible]	7547 VV	110.870	
[illegible]	5997 BV	86.096	
13.77	916 VV	13.461	
13.85	1405 VB	20.609	
14.0[illegible]	41905 BV	615.604	
14.12	8543 VV	125.497	
14.24	[illegible] VV	[illegible]	
14.37	[illegible] VV	[illegible]	
14.57	[illegible] VV	[illegible]	
14.70	[illegible] VB	11.775	
14.9[illegible]	[illegible] BV	[illegible]	
15.21	471529 VV	6927.05	
15.37	[illegible] VV	3471.05	
15.5[illegible]	542 VB	[illegible]	
15.71	2241 BB	[illegible]	
[illegible]	[illegible]	[illegible]	
15.9[illegible]	[illegible] VV	137.87[illegible]	
16.1[illegible]	[illegible] VV	85.653	
[illegible]	[illegible] VV	35.03[illegible]	
16.4[illegible]	2771 VB	40.710	
[illegible]	[illegible] BV	3416.4[illegible]	
[illegible]	[illegible] VV	124.56[illegible]	
[illegible]	[illegible] VB	[illegible]	
[illegible]	[illegible] BB	[illegible]	
[illegible]	[illegible] BV	[illegible]	
[illegible]	6254 VV	91.873	
[illegible]	[illegible] VV	[illegible]	
[illegible]	[illegible]	[illegible]	
[illegible]	[illegible] VV	14[illegible].474	
[illegible]	[illegible] VV	6747.1[illegible]	
[illegible]	[illegible] VB	4.267	
[illegible]	160[illegible] BB	23.55[illegible]	
[illegible]	1706[illegible] BV	[illegible]	
[illegible]	[illegible] VV	32[illegible].465	
[illegible]	1707 VV	25.071	
[illegible]	[illegible] VB	10.[illegible]	
20.04	1373 BB	20.166	
[illegible]	408 BB	5.993	
20.49	5307 BV	77.965	
20.65	763 VB	11.211	
20.91	2327 BB	34.179	
21.23	404 BB	5.929	
21.3[illegible]	393 BB	5.775	
21.70	217290 BV	3192.12	
21.79	5215 VB	76.616	
22.19	843 BV	12.378	
22.37	354 BB	6.194	
22.64	2526 BB	37.113	
22.90	214 BB	3.147	
23.04	15629 BV	229.596	
23.15	6809 VV	100.034	
23.25	1419 VV	20.847	
23.32	884 VV	12.984	
23.48	4465 VV	65.589	
23.61	3721 VV	54.671	

TABLE 5 (continued)

RT	AREA		ug/L	NAME
23.65	6659	VB	97.630	*
24.13	7047	BB	30.072	
24.47	6471	BV		ANTHRACENE-D10
24.93	4106	VB	61.799	
24.91	296	BB	4.344	
27.50	227	BB	3.317	
28.14	1854	BB	27.78*	
28.47	403	BB	5.904	
28.85	1054	BB	15.420	
31.06	207	BB	3.057	
36.80	8915	BB	126.961	PYRENE-D10
[illegible]	971	BB	14.28*	
[illegible]	1 [illegible]	BB	154.[illegible]	
51.57	41[illegible]	BB	60[illegible]	
51.93	370	BB	5.457	
53.62	9276	BB	137.45:	CHRYSENE-D12

TOTAL AREA = 4485726 TOTAL ug/L = 64778.95:

REQUESTED DATA FILE: BF15: RAW DATA FILE: BA15:

NOTE: The above report is generated from the capillary GC/FID analysis of a methylene chloride extract of a basic water sample (sm [illegible]). The retention time units are minutes. The area units are integrator counts and the component concentrations (ug/L) are calculated [illegible] with authentic standards. If the peak is flagged with [illegible] absolute the unknown compound response is equal to the internal standard (anthracene-d1). Other deuterated compounds identified are surrogate spiking compounds which are added to the water sample before extraction begins. Each spiking compound was added to produce a water concentration of 100 ug/L.

The above analysis includes all chromatographable compounds with Kovats indices between 7.000 and 34.000 (which corresponds to C7 through C34 normal hydrocarbons) and which can be extracted using the EPA Method 625 Extraction Protocol.

The identity of non-priority pollutant components shown to be present in the above analysis at levels greater than 5 ug/L can be obtained by further interpretation of the mass spectral data obtained from the capillary GC/MS analysis for priority pollutants discussed in a later section.

TABLE 6. AMOUNT OF CHROMATOGRAPHABLE COMPOUNDS DETECTED IN THE ACID EXTRACT OF THE EFFLUENT DUPLICATE SAMPLE, DILUTED TEN TIMES BEFORE ANALYSIS

RT	AREA		ug/L	NAME
3.90	362	BB	4.859	
7.34	3711	BB	50.750	
[illegible]	13469	BV	146.080	PHENOL-D5
9.4	17121	VB	231.126	
10.27	63098	BB	861.292	CL2-BENZENE-D4
[illegible]	261497	BB	3507.85	
13.05	6185	BV	83.041	
[illegible]	[illegible]	VB	796.523	
14.16	[illegible]	BV	1332.06	
14.24	10705	VB	143.637	
14.7	999	BB	13.06.	
[illegible]	1974	BB	25.176	
[illegible]	644	BB	8.962	
[illegible]	5611	BB	75.306	
[illegible]	1670	BB	22.411	
[illegible]	52555	BV	704.912	
[illegible]	7808	VB	104.762	
[illegible]	42655	BB	572.340	
[illegible]	530	BB	7.112	
[illegible]	945	BB	12.659	
[illegible]	847	BB	11.622	
[illegible]	7164	BB	96.445	
[illegible]	93155	BB	1254.55	
[illegible]	814	BB	10.916	
[illegible]	1902	BB	25.210	
[illegible]	2583	BB	34.799	
[illegible]	370	BB	4.966	
24.41	74017	BB		ANTHRACENE-D10
26.41	320	BB	4.294	
27.67	461	BB	6.203	
28.86	275	BB	3.681	
30.42	301	BB	4.036	

TOTAL AREA = 623134 TOTAL ug/L = 9958.256

PROCESSED DATA FILE: BA163 RAW DATA FILE: BA163

NOTE: The above report is generated from the capillary GC/FID analysis of a methylene chloride extract of an acidic water sample (pH < 2). The retention time units are minutes, the area units are integrator counts and the component concentrations (ug/L) are calculated as using authentic standards if the peak is named, or by assuming the unknown compound response is equal to the internal standard, anthracene-d10. Other deuterated compounds identified are surrogate spiking compounds which are added to the water sample before extraction began. Each spiking compound was added to produce a water concentration of 500 ug/L.

The above analysis includes all chromatographable compounds with Kovats indices between 7,000 and 34,000 (which corresponds to C7 through C34 normal hydrocarbons) and which can be extracted using the EPA Method 625 Extraction Protocol.

The identity of non-priority pollutant components shown to be present in the above analysis at levels greater than 5 ug/L can be obtained by further interpretation of the mass spectral data obtained from the capillary GC/MS analysis for priority pollutants, discussed in a later section.

TABLE 7. AMOUNT OF CHROMATOGRAPHABLE COMPOUNDS DETECTED IN THE METHYLENE CHLORIDE EXTRACT OF THE SEDIMENT SAMPLE, DILUTED TEN TIMES BEFORE ANALYSIS

RT	AREA		[illegible]	NAME
5.4[illegible]	[illegible]310	BV	30.020	
[illegible]	924	VB	13.173	
[illegible]	[illegible]	BB	11.460	
[illegible]	[illegible]	BB	9[illegible].27[illegible]	
[illegible]	2464	BB	35.0[illegible]	
[illegible]	[illegible]	BB	19.352	
[illegible]	[illegible]	B[illegible]	31.1[illegible]	
[illegible]	[illegible]66	BV	84.847	
[illegible]	4[illegible]7	VV	60.704	
[illegible]	[illegible]4	V[illegible]	[illegible]	
[illegible]	[illegible]	VB	[illegible]	
[illegible]	[illegible]	B[illegible]	64.[illegible]	
[illegible]	4[illegible]	V[illegible]	6[illegible]	
[illegible]	1442[illegible]	BV	110.455	PHENOL-D[illegible]
[illegible]	[illegible]	B[illegible]	1[illegible]	
[illegible]	2[illegible]	VV	3[illegible].312	
[illegible]	[illegible]	VB	7.607	
[illegible]	[illegible]142	BV	1[illegible].042	
[illegible]	[illegible]	VV	46.782	
[illegible]	6[illegible]51	VV	8[illegible].220	
[illegible]	4[illegible]	VV	592.074	
[illegible]	[illegible]	VV	21[illegible]	CL2-BENZENE-D4
1[illegible].44	[illegible]	VB	5.[illegible]	
[illegible]	[illegible]	BV	34.315	
[illegible]	[illegible]	[illegible]	2[illegible]	
[illegible]	[illegible]	[illegible]	[illegible].760	
[illegible]	[illegible]	V[illegible]	1[illegible]	
[illegible]	[illegible]	[illegible]	[illegible].70[illegible]	
11.[illegible]	[illegible]	[illegible]	11[illegible].417	
11.[illegible]	[illegible]	VV	87.9[illegible]	
11.[illegible]	[illegible]	V[illegible]	6[illegible].8[illegible]	
11.[illegible]	[illegible]	BB	7.5[illegible]	
11.[illegible]7	[illegible]	BV	[illegible].214	
12.10	1[illegible]	VV	2[illegible].667	
12.21	1175	VB	17.0[illegible]	
12.[illegible]	[illegible]	BB	3.661	
12.4[illegible]	217	BV	3.090	
12.54	260	VB	3.694	
12.64	335	BB	4.737	
12.74	585	VB	8.315	
12.[illegible]	215[illegible]	BV	30.71[illegible]	
1[illegible]	497	VB	7.076	
13.0[illegible]	[illegible]	BV	7.300	
13.17	7[illegible]	VV	111.03[illegible]	

TABLE 7 (continued)

RT	AREA		[illegible]	NAME
13.62	3909	BB	55.646	
13.85	5036	BV	71.632	
14.12	976	BV	13.882	
14.62	2449	VV	34.844	
14.76	8630	VV	122.770	
14.91	4648	VV	66.113	
15.11	460	VB	6.544	
15.26	1006	BB	14.306	
15.80	2486	BB	35.364	
16.44	315	BV	4.484	
16.73	252	VB	3.585	
16.88	423	BB	6.020	
16.97	514	BB	7.[illegible]	
17.0[illegible]	[illegible]	BB	5.0[illegible]	
17.20	412	BB	5.862	
17.32	200	VB	2.846	
17.42	737	BB	10.4[illegible]	
17.60	8644	BV	122.970	
17.68	1721	VV	24.470	
17.96	487	BB	6.929	
18.15	[illegible]	VB	3.394	
18.22	357	BB	5.077	
18.50	218	BB	3.104	
[illegible]	[illegible]	VB	13.646	
[illegible]	5171	BB	73.563	
[illegible]	1755	BB	24.971	
[illegible]	[illegible]	BB	4.726	
[illegible]	[illegible]	BB	4.410	
[illegible]	410	BB	5.831	
20.0[illegible]	1139	BV	16.202	
20.15	384	VB	5.460	
20.25	356	BB	5.057	
20.33	682	BB	9.709	
20.37	278	VB	3.956	
20.45	923	VV	13.135	
20.55	5041	VV	71.706	
20.70	632	VB	8.992	
20.80	4583	BV	65.154	
20.91	2271	VV	32.302	
20.95	222	VV	3.163	
21.14	366	BB	6.358	
21.21	655	BB	9.315	
21.44	1420	BB	20.200	
21.[illegible]	471	BB	6.[illegible]	
21.90	496	BB	7.054	
22.11	3490	BB	49.653	
22.42	1060	BV	15.074	
22.51	1647	VV	23.431	
22.64	1900	VV	27.037	
22.76	2946	VV	41.907	
22.86	1907	VV	27.132	
22.93	1010	VV	14.365	
23.07	2658	BV	37.813	
23.21	5136	VV	73.058	
23.33	1934	VV	27.512	
23.40	998	VV	14.185	
23.45	1329	VV	18.899	
23.5[illegible]	1865	VV	26.575	
[illegible]	864	VV	12.[illegible]93	

MONS 220657

TABLE 7 (continued)

23.37	[illegible]	VV	127.001	
23.56	[illegible]	VV	33.980	
24.00	65699	VV		ANTHRACENE-D10
24.30	450	VB	6.515	
24.9?	227	BB	3.172	
25.00	1561	BV	22.205	
25.14	1021	VV	14.517	
25.21	1226	VB	17.470	
25.37	348	BB	4.950	
25.47	732	BB	10.776	
25.6?	395	BB	5.620	
25.72	249	BB	3.541	
[illegible]	[illegible]	BB	3.709	
25.96	396	BB	5.599	
26.15	[illegible]	BB	12.296	
26.21	[illegible]	BV	[illegible]	
26.31	295	VB	4.204	
26.4?	1649	BV	23.451	
26.54	[illegible]	VV	[illegible]	
26.69	1360	VB	19.341	
26.8?	2344	BB	33.345	
27.0?	635	BB	11.863	
[illegible]	[illegible]	BB	3.?9?	
[illegible]	2977	BV	42.354	
[illegible]	[illegible]	VV	[illegible].776	
[illegible]	2106	VV	29.869	
[illegible]	460	VB	9.363	
28.12	[illegible]	BV	34.641	
[illegible]	[illegible]	VV	[illegible]	
[illegible]	[illegible]	VV	114.406	PYRENE-D10
28.54	792	VV	11.272	
28.71	334	BV	4.756	
[illegible]	1127	BV	16.0?7	
[illegible]	1257	BV	17.898	
[illegible]	[illegible]	VB	6.?14	
[illegible]	[illegible]	BB	[illegible].276	
[illegible]	1196	BV	17.045	
30.?4	746	VV	10.611	
30.61	799	VB	11.364	
[illegible]	[illegible]	BB	5.940	
[illegible]	[illegible]	BB	270?.76	
[illegible]	1075	BB	15.290	
31.47	1898	BB	26.997	
32.1?	971	BB	12.809	
32.2?	[illegible]	BB	89.627	CHRYSENE-D12
[illegible]	261	BB	4.014	
[illegible]	1421	BB	20.216	

TOTAL AREA = [illegible] TOTAL ug/g = 8540.514

[illegible] DATA FILE: BP143 RAW DATA FILE: BR143

NOTE: The above report is generated from the capillary GC/FID analysis of a methylene chloride extract of a sediment sample. The retention time units are minutes, the area units are integrator counts and the component concentrations (ug/g) are calculated by using authentic standards, if the peak is named, or by assuming the unknown compound response is equal to the internal standard, anthracene-d10. Other deuterated compounds identified are surrogate spiking compounds which are added to the sample before extraction began. Each spiking compound was added to produce a sediment concentration of 200 ug/g.

The above analysis includes all chromatographable compounds with Kovats indices between 7,000 and 34,000 (which correspond-

TABLE 7 (continued

to C7 through C34 normal hydrocarbons) and which can be extracted using methylene chloride as an extraction solvent.

The identity of non-priority pollutant components shown to be present in the above analysis at levels greater than 5 ug/g can be obtained by further interpretation of the GC/MS spectral data obtained from the capillary GC/MS analysis for priority pollutants, discussed in a later section.

TABLE 8 AMOUNT OF CHROMATOGRAPHABLE COMPOUNDS DETECTED IN THE METHYLENE CHLORIDE EXTRACT OF THE SEDIMENT DUPLICATE SAMPLE, DILUTED TEN TIMES BEFORE ANALYSIS

RT	AREA		[illegible]	NAME
5.43	2151	BV	27.474	
5.67	1149	VB	14.676	
5.80	1105	BB	18.113	
6.00	7450	BV	95.154	
6.44	2731	BV	34.874	
7.32	1453	BB	18.542	
7.64	2364	BB	30.190	
[illegible]	6737	BV	86.[illegible]	
[illegible]	514[illegible]	VV	65.766	
8.17	2[illegible]2	VV	26.885	
8.26	2215	VV	26.341	
[illegible]	7596	VV	97.050	
8.56	5927	VB	75.707	
[illegible]	16745	BV	110.967	PHENOL-D5
[illegible]	1047[illegible]	BV	12[illegible].73[illegible]	
[illegible]	[illegible]	VV	2[illegible].60[illegible]	
9.67	6[illegible]	VB	8.752	
[illegible]	10[illegible]	BV	13[illegible].772	
[illegible].77	[illegible]	VV	44.[illegible]	
[illegible]	70[illegible]	VV	894.457	
10.06	46[illegible]	VV	592.095	
10.[illegible]	246[illegible]	V[illegible]	310.957	CL2-BENZENE-D4
10.44	[illegible]	VB	4.2[illegible]	
10.[illegible]	2685	BV	34.256	
10.71	210[illegible]	VV	26.8[illegible]	
10.7[illegible]	[illegible]4	VV	[illegible]	
10.87	1[illegible]	VV	13.[illegible]15	
11.[illegible]	1,[illegible]	VB	16.050	
11.[illegible]	[illegible]	BB	4.[illegible]	
11.4[illegible]	8[illegible]	BV	113.[illegible]64	
11.52	72[illegible]9	VV	93.092	
11.7[illegible]	54[illegible]	VB	69.754	
11.[illegible]	[illegible]	BB	7.609	
[illegible]	[illegible]	BB	3.144	
12.11	1840	BV	23.477	
12.21	1471	VV	18.810	
12.45	20[illegible]	BB	2.596	
12.[illegible]	24[illegible]	BB	3.170	
12.[illegible]	374	BB	4.774	
12.92	2685	BV	34.294	
13.01	7[illegible]	VV	10.122	
13.10	751	VV	9.593	
13.1[illegible]	7[illegible]	VV	101.713	
[illegible]	[illegible]	VB	[illegible].77[illegible]	
13.4[illegible]	4[illegible]57	BV	63.30[illegible]	
13.[illegible]	5[illegible]	VB	7[illegible]	

TABLE 8 (continued)

RT	AREA	[illegible]	[illegible]
14.12	1202 BV	15.383	
14.21	205 VB	2.622	
14.44	274 BB	3.502	
14.62	2879 BV	36.771	
14.76	10467 VV	133.688	
14.92	4854 VV	61.992	
15.07	279 VB	3.822	
15.17	555 BB	7.091	
[illegible]	[illegible] BB	15.924	
15.81	3222 BB	41.153	
16.14	255 BV	3.254	
16.20	219 VB	2.803	
16.31	327 BB	4.180	
[illegible]	[illegible] BF	[illegible]	
16.74	265 BV	3.674	
16.80	269 VB	3.440	
[illegible]	537 BF	6.859	
16.97	770 BB	9.829	
17.10	419 BB	5.354	
17.23	[illegible] VB	6.351	
[illegible]	391 BB	4.996	
17.46	[illegible] BV	11.231	
17.61	[illegible] VV	133.501	
[illegible]	[illegible] VV	25.644	
17.97	543 BB	6.941	
18.22	318 BB	4.066	
[illegible]	1073 BB	13.767	
18.72	5775 BV	73.760	
[illegible]	1881 BB	24.030	
[illegible]	425 BB	5.430	
19.82	308 VB	3.941	
19.91	475 BB	6.067	
20.07	1345 BV	17.221	
20.18	531 VV	6.779	
20.26	455 VB	5.822	
20.34	795 BV	10.169	
20.38	[illegible] VB	3.695	
20.46	1023 BV	13.066	
20.54	[illegible] VV	66.519	
20.71	733 VV	9.357	
20.80	5124 VV	65.448	
20.91	[illegible] VV	32.055	
20.97	330 VB	4.221	
21.14	591 BV	7.558	
21.21	857 VB	10.970	
21.34	202 BB	2.584	
21.65	1540 BB	19.674	
21.91	443 BB	5.655	
21.99	516 BB	6.595	
22.12	3486 BB	44.578	
22.42	1113 BV	14.217	
22.52	1784 VB	22.780	
22.65	2026 BV	25.852	
22.77	3084 VV	39.448	
22.87	1947 VV	24.867	
22.92	1084 VV	13.848	
23.00	2791 BV	35.648	
23.21	5367 VV	68.555	
23.33	2038 VV	26.031	

TABLE 8 (continued)

RT	AREA		[illegible]	NAME
23.4[illegible]	982	VV	12.544	
23.46	1379	VB	17.552	
23.53	1833	BV	23.413	
23.69	872	VV	11.139	
23.77	9633	VV	123.036	
23.8[illegible]	2544	VV	32.496	
24.0[illegible]	54732	VB		ANTHRACENE-D10
24.30	561	BB	7.168	
24.5[illegible]	260	BV	3.325	
25.0[illegible]	1610	VV	20.560	
25.15	1098	VV	14.026	
[illegible]	1324	VB	16.921	
[illegible]	[illegible]	BB	6.750	
25.47	[illegible]	BB	9.444	
[illegible]	[illegible]	BB	4.824	
25.71	[illegible]	BV	3.437	
25.74	501	VV	6.394	
25.82	337	VB	4.302	
[illegible]	464	BB	5.926	
[illegible]	1448	VV	18.494	
[illegible]	719	VB	9.185	
[illegible]	[illegible]	BB	4.229	
[illegible]	1826	BV	23.327	
[illegible]	274[illegible]	VV	35.111	
[illegible]	1365	VV	17.479	
[illegible]	2544	BV	32.746	
[illegible]	[illegible]	BB	[illegible]	
[illegible]	[illegible]	BB	2.762	
[illegible]	[illegible]	VB	9.576	
[illegible]	[illegible]	BB	3.219	
[illegible]	[illegible]	BV	41.146	
[illegible]	[illegible]	[illegible]	24.343	
[illegible]	1547	VV	[illegible]	
[illegible]	[illegible]	VB	8.657	
[illegible]	516	BB	6.591	
[illegible]	2644	BV	31.763	
[illegible]	2041	VV	26.064	
[illegible]	10717	VV	107.986	PYRENE-D10
[illegible]	1141	VV	14.598	
[illegible]	310	BB	3.954	
28.87	1370	BV	17.795	
[illegible]	486	VV	6.213	
29.03	[illegible]	VB	3.052	
[illegible]	285	BB	3.643	
[illegible]	1606	BV	[illegible]	
[illegible]	[illegible]	VB	[illegible]	
[illegible]	4163	BB	53.174	
[illegible]	[illegible]	BB	3.305	
[illegible]	284	BB	3.626	
30.50	549	BB	7.016	
30.61	422	BV	5.384	
30.73	803	VB	10.257	
30.97	216876	BV	2770.02	
31.23	1623	VB	20.735	
31.35	626	BB	7.997	
31.67	1974	BV	25.216	
32.19	1562	BV	19.951	
32.36	6124	VB	108.098	CHRYSENE-D12
32.6[illegible]	260	BB	3.322	
32.77	265	BB	3.389	
[illegible]	314	BB	4.037	

TABLE 8 (continued)

32.36	392	BB	3.010
32.58	2036	BB	25.933
32.67	293	BB	3.610

TOTAL AREA = 760671 TOTAL ug/g = 8780.371

ACCESSED DATA FILE: BP144 RAW DATA FILE: BR144

NOTE: The above report is generated from the capillary GC/MS analysis of a methylene chloride extract of a sediment sample. The retention time units are minutes, the area units are integrator counts and the compound concentrations (ug/g) are calculated by using authentic standards. If the peak is named, it is assumed the unknown compound response is equal to the internal standard unless otherwise noted. Other designated compounds (surrogates) are surrogate spiking compounds which are added to the sample before extraction takes place. Each spiking compound was added to produce a sediment concentration of 200 ug/g.

The above analysis includes all chromatographable compounds with kovats indices between 7,000 and 34,000 (which corresponds to C7 through C36 normal hydrocarbons) and which can be extracted using methylene chloride as an extracting solvent.

The identification of hazardous pollutant compounds shown to be present in the above analysis at levels greater than 5 ug/g can be confirmed. Further interpretation of the mass spectral data obtained from the capillary GC/MS analysis for priority pollutants will be given in a later section.

TABLE 9. TOTAL CONCENTRATIONS OF EXTRACTABLE COMPOUNDS PRESENT IN WATER AND SEDIMENT EXTRACTS. ANALYZED USING THREE DIFFERENT METHODS

Extract identification	Total concentrations (µg/L for water sampler and µg/g for sediment samples)		
	GC/FID	GC/MS-Total	GC/MS-PP
Influent base/neutal extract	54,000	20,000	5,200
Influent acid extract	10,000	5,500	12,000
Effluent base/neutal extract	63,000	34,000	3,700
Effluent acid extract	10,000	6,800	11,200
Effluent (duplicate) base/neutal extract	65,000	36,000	3,900
Effluent (duplicate) acid extract	10,000	6,000	10,600
Sediment extract	8,500	9,700	7,810
Sediment (duplicate) extract	8,800	8,900	7,360

TABLE 10. PRIORITY POLLUTANT SCREENING LEVELS GC/MS

Compound	Screening level, µg/L
Acids:	
2-Chlorophenol	25
2-Nitrophenol	25
Phenol	25
2,4-Dimethylphenol	25
2,4-Dichlorophenol	25
2,4,6-Trichlorophenol	25
4,6-Dinitro-o-cresol	250
2,4-Dinitrophenol	250
p-Chloro-m-cresol	25
Pentachlorophenol	25
4-Nitrophenol	25
Volatiles:	
Chloromethane	10
Dichlorodifluoromethane	10
Bromomethane	10
Vinyl chloride	10
Chloroethane	10
Methylene chloride	10
Trichlorofluoromethane	10
1,1-Dichloroethylene	10
1,1-Dichloroethane	10
Trans-1,2-dichloroethylene	10
Chloroform	10
1,2-Dichloroethane	10
1,1,1-Trichloroethane	10
Carbon tetrachloride	10
Bromodichloromethane	10
Bis(chloromethyl) ether	10
1,2-Dichloropropane	10
Trans-1,3-dichloropropene	10
Trichloroethylene	10
Dibromochloromethane	10
Cis-1,3-dichloropropene	10
1,1,2-Trichloroethane	10
Benzene	10
2-Chloroethyl vinyl ether	10
Bromoform	10
Tetrachloroethylene	10
1,1,2,2-Tetrachloroethane	10
Toluene	10
Chlorobenzene	10
Direct Injectables:	
Acrolein	200
Acrylonitrile	100

Compound	Screening level, µg/L
Base/Neutrals:	
1,3-Dichlorobenzene	10
1,4-Dichlorobenzene	10
Hexachloroethane	10
1,2-Dichlorobenzene	10
Bis(2-chloroisopropyl) ether	10
Hexachlorobutadiene	10
1,2,4-Trichlorobenzene	10
Naphthalene	10
Bis(2-chloroethyl) ether	10
Hexachlorocyclopentadiene	10
Nitrobenzene	10
Bis(2-chloroethoxy) methane	10
2-Chloronaphthelene	10
Acenaphthylene	10
Acenaphthene	10
Isophorone	10
Fluorene	10
2,6-Dinitrotoluene	10
1,2-Diphenylhydrazine	10
2,4-Dinitrotoluene	10
N-nitrosodiphenylamine	10
Hexachlorobensene	10
4-Bromophenyl phenyl ether	10
Phenanthrene/anthrecene	10
Dimethyl phthalate	10
Diethyl phthalate	10
Fluoranthene	10
Pyrene	10
Di-n-butyl phthalate	10
Benzidine	10
Butyl benzyl phthalate	10
Chrysene	10
Bis(2-ethylhexyl) phthalate	10
Benz(a)anthracene	10
Benzo(b)fluoranthene	10
Benzo(k)fluoranthene	10
Benzo(a)pyrene	10
Indeno(1,2,3-cd)pyrene	25
Dibenzo(a,h)anthracene	25
Benzo(g,h,i)perylene	25
N-Nitrosodimethylamine	10
N-nitrosodi-n-propylamine	10
4-Chlorophenyl phenyl ether	10
3,3'-Dichlorobenzidine	10
Di-n-octyl phthalate	10

TABLE 11. SCREENING LEVELS FOR PESTICIDES/PCB'e EXTRACTABLE PRIORITY POLLUTANTS

Compound	Screens (ug/liter) GC/MS	GC/EC
Aldrin	10	1
e-BHC	10	1
β-BHC	10	1
y-BHC (lindane)	10	1
δ-BHC	10	1
Chlordane	10	1
4,4'-DDT	10	1
4,4'-DDE	10	1
4,4'-DDD	10	1
Dieldrin	10	1
Endosulfan I	10	1
Endosulfan II	10	1
Endosulfan sulfate	10	1
Endrin	10	1
Aroclor 1248	10	1
Aroclor 1260	10	1
Aroclor 1016	10	1
Toxaphene	10	1
Methoxychlor	10	1

TABLE 12. ANALYTICAL RESULTS FOR VOLATILE ORGANIC PRIORITY POLLUTANTS IN WATER SAMPLES, µg/L (ppb)

Analyte	Sample ID Blank	9:15 a.m.	10:23 a.m.	11:15 a.m.
Methylene chloride	ND[a]	20	80	150
1,2-trans-dichloroethylene	ND	<10	<10	<10
1,1-Dichloroethane	<10[b]	<10	<10	<10
Chloroform	ND	690	460	430
Dichlorobromomethane	ND	30	20	20
1,1,1-Trichloroethane	ND	10	20	20
Carbon tetrachloride	ND	<10	ND	ND
Trichloroethylene	ND	<10	<10	<10
Benzene	<10	5,350	6,020	5,900
Chlorodibromomethane	ND	<10	<10	<10
Tetrachloroethylene	<10	<10	<10	<10
Toluene	<10	530	710	1,000
Ethylbenzene	<10	430	480	380
Chlorobenzene	<10	2,540	2,660	2,560

[a] ND - compound not detected.

[b] "<" - compound observed, but was below screening level.

TABLE 13. ANALYTICAL RESULTS FOR EXTRACTABLE ORGANIC PRIORITY POLLUTANTS IN WATER SAMPLES, µg/L (ppb)

Analyte	Sample ID			
	Blank	Influent	Effluent	Effluent duplicate
Base/neutral				
1,3-Dichlorobenzene	ND[a]	60	70	70
1,4-Dichlorobenzene	ND	720	970	1,000
1,2-Dichlorobenzene	ND	700	1,290	1,350
Napthalene	ND[b]	530	350	380
Diethyl phthalate	<10	ND	<10	<10
Di-n-butyl phthalate	<10	10	<10	<10
Butylbenzyl phthalate	ND	2,990	1,040	1,070
Bis(2-ethylhexyl) phthalate	<10	80	<10	<10
Di-n-octyl phthalate	ND	70	ND	ND
Phenanthrene	<10	ND	<10	<10
Anthracene	<10	ND	<10	<10
Fluoranthene	<10	ND	ND	ND
Pyrene	<10	ND	ND	ND
Acid				
2-Chlorophenol	ND	160	290	260
2-Nitrophenol	ND	2,790	4,760	4,470
Phenol	<25	175	130	110
2,4-Dichlorophenol	ND	390	1,200	1,090
2,4,6-Trichlorophenol	ND	960	1,250	1,110
Pentachlorophenol	ND	30	<25	<25
4-Nitrophenol	ND	4,380	3,580	3,540

[a] ND - compound not detected.

[b] "<" - compound observed, but was below screening level.

TABLE 14. ANALYTICAL RESULTS FOR EXTRACTABLE ORGANIC PRIORITY POLLUTANTS IN SEDIMENT SAMPLES, µg/g (ppm)

Analyte	Sample ID	
	Sludge	Sludge duplicate
1,3-Dichlorobenzene	20	10
1,4-Dichlorobenzene	240	180
1,2-Dichlorobenzene	330	240
Napthalene	70	60
Di-n-butyl phthalate	30	20
Butylbenzyl phthalate	7,100	6,820
Di-n-octyl phthalate	20	30

TABLE 15. QUALITY CONTROL DATA FOR ORGANIC PRIORITY POLLUTANT ANALYSIS OF WATER SAMPLES

Spike[a]	Sample ID, percent recovery			
	Blank	Influent	Effluent	Effluent duplicate
Dichlorobenzene-d_4	66	56	88	80
Phenol-d_5	39	28	30	26
Pyrene-d_{10}	117	29	20	21
Chrysene-d_{12}	64	31	73	82

[a]Spike - 100 µg/L.

TABLE 16. QUALITY CONTROL DATA FOR ORGANIC PRIORITY POLLUTANT ANALYSIS OF SEDIMENT SAMPLE

Spike[a]	Sample ID, percent recovery	
	Sediment	Sediment duplicate
Dichlorobenzene-d_4	53	50
Phenol-d_5	53	39
Pyrene-d_{10}	53	64
Chrysene-d_{12}	49	63

[a]Spike level

Sediment - 187 µg/g
Sediment duplicate - 145 µg/g.

TABLE 17. NON-PRIORITY POLLUTANT ORGANIC COMPOUNDS DETECTED IN THREE VOLATILE SAMPLES FROM SAUGET TREATMENT PLANT

RT (min)	Tentative identification[b]	Concentration[a] (µg/L) Sample identification 9:15 a.m.	10:23 p.m.	11:15 a.m
9.9	Unknown (44, 43, 42, 41)[c]	1	1	ND[d]
13.4	Unknown (58, 43, 41, 39)	ND	4	ND
15.5	Acetone	17	13	24
17.1	Unknown (45, 43, 59)	29	70	35
20.6	Methyl ethyl ketone	1	4	8
22.0	Unknown (43, 42, 41)	8	29	10
28.9	Methyl isobutyl ketone	86	170	98
33.6	Unknown (43, 58, 57, 59)	17	18	47
36.8	Unknown (81, 43, 154, 108)	22	44	21
38.0	Benzaldehyde	55	81	33
39.5	Xylene-isomer	890	850	670

[a] Estimated concentration based on the area of the major ion of the identified compound to the major ion area of benzene-d_6, internal standard.

[b] Tentative identification, not confirmed with authentic standards.

[c] Major masses of unknown compounds are listed in parentheses according to decreasing intensitives.

[d] ND - detection limit is 1 µg/L.

TABLE 18. IDENTIFICATION OF MAJOR EXTRACTABLE ORGANIC COMPOUNDS IN THE BASE/NETURAL EXTRACT OF THE METHOD BLANK[a]

Peak No.	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Internal standard[b]				
2	21.28	Anthracene-d_{10}	309007	100	-	-
		Recovery standard[c,d]				
1	7.83	1,2-Dichlorobenzene-d_4	279584	66	100	66.0
3	25.42	Pyrene-d_{10}	425301	117	100	117.0
4	29.27	Chrysene-d_{12}	197093	64	100	64.0
		Organics detected				
		None detected				
		TOTAL CONCENTRATION				

[a]Includes all substances that were found at or above a 5% threshold on the BATCH peak identification program in the Hewlett-Packard system, corresponding to a detection of limit of 2 µg/L.

[b]Anthracene-d_{10} internal standard added immediately prior to analysis; 50 ng/L injected equivalent to 100 µg/L in original sample.

[c]Deuterated recovery standard (spike), added to original sample before extraction.

[d]Quantitated relative to area of major ion for authentic standard.

TABLE 19. IDENTIFICATION OF MAJOR EXTRACTABLE ORGANIC COMPOUNDS IN THE ACID EXTRACT OF THE METHOD BLANK[a]

Peak No	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Internal standard[b]				
2	21.28	Anthracene-d_{10}	370013	100	-	-
		Recovery standard[c,d]				
1	6.70	Phenol-d_5	39178	39	100	39
		Organics detected				
		None detected				
		TOTAL CONCENTRATION				

[a]Includes all substances that were found at or above a 5% threshold on the BATCH peak identification program in the Hewlett-Packard system, corresponding to a detection of limit of 2 µg/L.

[b]Anthracene-d_{10} internal standard added immediately prior to analysis; 50 ng/L injected equivalent to 100 µg/L in original sample.

[c]Deuterated recovery standard (spike), added to original sample before extraction.

[d]Quantitated relative to area of major ion for authentic standard.

TABLE 20. IDENTIFICATION OF MAJOR EXTRACTABLE ORGANIC COMPOUNDS IN THE BASE/NEUTRAL EXTRACT OF THE INFLUENT SAMPLE, DILUTED 1:10, NOT CORRECTED FOR BACKGROUND[a,b]

Peak No.	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Internal standard[c]				
29	21.27	Anthracene-d_{10}	353040	1000	-	-
		Recovery standard[d,e]				
		1,2-Dichlorobenzene-d_4		54	100	56.0
		Pyrene-d_{10}		29	100	29.0
		Chrysene-d_{12}		31	100	31.0
		Organics detected[f,g,h]				
1	3.22	Chlorobenzene	181167	5.1×10^2		
2	3.73	Xylene (isomer)	149084	4.2×10^2		
3	4.32	Xylene (isomer)	71867	2.0×10^2		
4	6.08	Benzaldehyde and C_3-benzene (isomer)	171284	4.9×10^2		
5	6.58	Aniline	411008	1.2×10^3		
6	6.90	C_3-benzene (isomer)	113840	3.2×10^2		
7	7.33	Dichlorobenzene (isomer)	138653	3.9×10^2		

(continued)

TABLE 20 (continued)

Peak No.	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Organics detected (continued)				
8	7.47	Unknown (111,125,154, 71)	45052	1.3×10^2		
9	7.58	C_3-benzene (isomer)	17707	50		
10	7.70	C_4-benzene (isomer)	588111	1.7×10^3		
11	7.87	Dichlorobenzene (isomer)	411639	1.2×10^3		
12	8.02	Benzyl alcohol	262696	7.4×10^2		
13	9.13	Unknown (119,121,117,93,91)	36927	1.0×10^2		
14	10.10	Chloroaniline (isomer)	145425	4.1×10^2		
15	11.23	Naphthalene and/or azulene and/or isomer	114324	3.2×10^2		
16	11.57	Unknown (91,148,163,92)	255942	7.2×10^2		
17	11.68	Chloroaniline (isomer)	42047	1.2×10^2		
18	12.20	Chloronitrobenzene (isomer)	41779	1.2×10^2		
19	12.47	Chloronitrobenzene (isomer)	995000	2.8×10^3		
20a	12.60	Chloronitrobenzene (isomer)	477200	1.4×10^3		
20b	14.1	N-phenyl formamide	165858	4.7×10^2		
21	15.18	Dichloronitrobenzene (isomer)	434779	1.2×10^3		
22	15.38	Dichloronitrobenzene (isomer)	101830	2.9×10^2		
23	15.55	Nitroaniline (isomer)	774189	2.2×10^3		
24	15.57	Nitroaniline (isomer)	12295	35		
25	15.60	Nitroaniline (isomer)	21936	62		
26	18.43	C_{10}-alkene or cycloalkane	66006	1.9×10^2		

(continued)

TABLE 20 (Continued)

Peak No.	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Organics detected (continued)				
27	18.73	Nitroaniline	172253	4.9×10^2		
28	20.28	C_8-phenol	68944	2.0×10^2		
30	24.52	Sulfur (S_8)	104131	2.9×10^2		
31	28.15	Butyl benzyl phthalate	577042	1.6×10^3		
		TOTAL CONCENTRATION[i]		20.0×10^3		

[a] For background, see method blank analysis, Table 18.

[b] Includes all substances that were found at or above a 5% threshold on the BATCH peak identification program in the Hewlett-Packard system, corresponding to a detection of limit of 100 µg/L.

[c] Anthracene-d_{10} internal standard added immediately prior to analysis; 50 mg/L injected equivalent to 1000 µg/L in original sample.

[d] Deutarated recovery standard (spike), added to original sample before extraction.

[e] Quantitatad relative to area of major ion for authentic standard.

[f] Ratimated concentration based on area of total ion relative to that of anthracene-d_{10}, internal standard.

[g] Tentative identification, not confirmed with authentic standards.

[h] Major masses of unknown compounds are listed in parentheses according to decreasing intensities. Possible molacular ions are underlined.

[i] Summation of concentrations of detected compounds, excluding standards.

TABLE 21. IDENTIFICATION OF MAJOR EXTRACTABLE ORGANIC COMPOUNDS IN THE ACID EXTRACT OF THE INFLUENT SAMPLE, DILUTED 1:10, NOT CORRECTED FOR BACKGROUND[a,b]

Peak No.	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Internal standard[c]				
10	21.28	Anthracene-d_{10}	431025	1000	-	-
		Recovery standard[d,e]				
		Phenol-d_5		28	100	28 0
		Organics detected[f,g,h]				
1	8.00	Benzenemethanol	154148	$3\ 6 \times 10^2$		
2-3	10.25	Nitrophenol isomer	1129666	$2\ 6 \times 10^3$		
4	10.92	Dichlorophenol isomer	100080	2.3×10^2		
5	11.65	Mixture of 25% dichlorophenol isomer and 75% chlorophenol isomer	133692	$3\ 1 \times 10^2$		
6	14.02	Cl-containing unknown (121,93.66,173)	128939	3.0×10^2		
7	14.50	Trichlorophenol isomer	357472	8.3×10^2		

(continued)

TABLE 21 (continued)

Peak No.	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Organics detected (continued)				
8	16.02	Cl_2-containing unknown (207 209 97 133)	46427	1.1×10^2		
9	17.63	Nitrophenol isomer	317844	7.4×10^2		
		TOTAL CONCENTRATION[i]		5.5×10^3		

[a] For background, see method blank analysis, Table 19.

[b] Includes all substances that were found at or above a 5% threshold on the BATCH peak identification program in the Hewlett-Packard system, corresponding to a detection of limit of 80 µg/L.

[c] Anthracene-d_{10} internal standard added immediately prior to analysis; 50 mg/L injected equivalent to 1000 µg/L in original sample.

[d] Deuterated recovery standard (spike), added to original sample before extraction.

[e] Quantitated relative to area of major ion for authentic standard.

[f] Estimated concentration based on area of total ion relative to that of anthracene-d_{10}, internal standard.

[g] Tentative identification, not confirmed with authentic standards.

[h] Major masses of unknown compounds are listed in parentheses according to decreasing intensities. Possible molecular ions are underlined.

[i] Summation of concentrations of detected compounds, excluding standards.

TABLE 22. IDENTIFICATION OF MAJOR EXTRACTABLE ORGANIC COMPOUNDS IN THE BASE/NEUTRAL EXTRACT OF THE EFFLUENT SAMPLE, DILUTED 1:10, NOT CORRECTED FOR BACKGROUND[a,b]

Peak No.	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Internal standard[c]				
29	21.28	Anthracene-d_{10}	375998	1000	-	-
		Recovery standard[d,e]				
		1,2-Dichlorobenzene-d_4		88	100	88.0
		Pyrene-d_{10}		20	100	20.0
		Chrysene-d_{12}		73	100	73.0
		Organics detected[f,g,h]				
1	3.25	Chlorobenzene	423801	1.1×10^3		
2	3.77	Xylene (isomer)	230111	6.1×10^2		
3	4.37	Xylene (isomer)	125069	3.3×10^2		
4	6.12	Mixture of 95% benzaldehyde and 5% C_3-benzene (isomer)	296079	7.9×10^2		
5	6.63	Aniline	577450	1.5×10^3		
6	6.92	C_3-benzene (isomer)	170110	4.5×10^2		

(continued)

TABLE 22 (continued)

Peak No.	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Organics detected (continued)				
7	7.33	Dichlorobenzene (isomer)	387403	1.0×10^3		
8	7.50	Unknown (111,125,154,71)	144063	3.8×10^2		
9	7.70	C_4-benzene (isomer)	493985	1.3×10^3		
10	7.88	Dichlorobenzene (isomer)	847373	2.3×10^3		
11	8.08	Benzyl alcohol	719824	1.9×10^3		
12	10.12	50% Propyl benzene and 50% chloroaniline (isomer)	357095	9.5×10^2		
13	11.23	Naphthalene and/or azulene and/or isomer	121498	3.2×10^2		
14	11.60	Unknown (91,148,163,92)	825794	2.2×10^3		
15	11.68	Mixture of 67% chloroaniline (isomer) and 33% chlorophenol (isomer)	142507	3.8×10^2		
16	12.20	Chloronitrobenzene	124660	3.3×10^2		
17 & 18	12.48	Chloronitrobenzene (isomer)	2210187	5.9×10^3		
19	12.65	Chloronitrobenzene (isomer)	1107879	2.9×10^3		
20	14.12	Mixture of 80% N-phenyl formamide and 20% unknown (151,153)	577294	1.5×10^3		
21	15.18	Dichloronitrobenzene (isomer)	562688	1.5×10^3		
22	15.37	Dichloronitrobenzene (isomer)	68923	1.8×10^2		
23-25	15.55	Nitroaniline (isomer)	1340059	3.6×10^3		

(continued)

TABLE 22 (continued)

Peak No	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Organics detected (continued)				
26	16.45	Chloronitroaniline (isomer)	66353	1.8×10^{2}		
27	16.57	Ethoxynitrobenzene (isomer)	91565	2.4×10^{2}		
28	18.73	Nitroaniline (isomer)	487626	1.3×10^{1}		
30	28.13	Butyl benzyl phthalate	32357	8.6×10^{2}		
		TOTAL CONCENTRATION[i]		$3.4.0 \times 10^{3}$		

[a] For background, see method blank analysis, Table 18.

[b] Includes all substances that were found at or above a 5% threshold on the BATCH peak identification program in the Hewlett-Packard system, corresponding to a detection of limit of 200 µg/L.

[c] Anthracene-d_{10} internal standard added immediately prior to analysis, 50 mg/L injected equivalent to 1000 µg/L in original sample.

[d] Deuterated recovery standard (spike), added to original sample before extraction.

[e] Quantitated relative to area of major ion for authentic standard.

[f] Estimated concentration based on area of total ion relative to that of anthracene-d_{10}, internal standard.

[g] Tentative identification, not confirmed with authentic standards.

[h] Major masses of unknown compounds are listed in parentheses according to decreasing intensities. Possible molecular ions are underlined.

[i] Summation of concentrations of detected compounds, excluding standards.

TABLE 23. IDENTIFICATION OF MAJOR EXTRACTABLE ORGANIC COMPOUNDS IN THE ACID EXTRACT OF THE EFFLUENT SAMPLE, DILUTED 1 10, NOT CORRECTED FOR BACKGROUND[a,b]

Peak No	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Internal standard[c]				
10	21 28	Anthracene-d_{10}	415039	1000	-	-
		Recovery standard[d,e]				
		Phenol-d_5		30	100	30.0
		Organics detected[f,g,h]				
1	6.77	Chlorophenol isomer	81181	2.0×10^2		
2	8.00	Benzenemethanol	174088	4.2×10^2		
3	10.25	Nitrophenol isomer	920624	2.2×10^3		
4	10.92	Dichlorophenol isomer	370139	8.9×10^2		
5	11.65	Mixture of 25% dichlorophenolisomer and 75% chlorophenol isomer	353570	8.5×10^2		
6	14.03	Cl-containing unknown (121,93,66,173)	192132	4.6×10^2		
7	14.52	Trichlorophenol isomer	470451	1.1×10^3		

(continued)

TABLE 23 (continued)

Peak No	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Organics detected (continued)				
8	16.02	Cl_2-containing unknown (207, 97, 209, 133)	42090	1.9×10^2		
9	17.62	Nitrophenol isomer	235963	5.7×10^2		
		TOTAL CONCENTRATION[i]		6.8×10^3		

[a] For background, see method blank analysis, Table 19

[b] Includes all substances that were found at or above a 5% threshold on the BATCH peak identification program in the Hewlett-Packard system, corresponding to a detection of limit of 70 µg/L.

[c] Anthracene-d_{10} internal standard added immediately prior to analysis, 50 mg/L injected equivalent to 1000 µg/L in original sample.

[d] Deuterated recovery standard (spike), added to original sample before extraction

[e] Quantitated relative to area of major ion for authentic standard.

[f] Estimated concentration based on area of total ion relative to that of anthracene-d_{10}, internal standard.

[g] Tentative identification, not confirmed with authentic standards.

[h] Major masses of unknown compounds are listed in parentheses according to decreasing intensities. Possible molecular ions are underlined.

[i] Summation of concentrations of detected compounds, excluding standards.

TABLE 24. IDENTIFICATION OF MAJOR EXTRACTABLE ORGANIC COMPOUNDS IN THE BASE/NEUTRAL EXTRACT OF THE EFFLUENT DUPLICATE SAMPLE, DILUTED 1:10, NOT CORRECTED FOR BACKGROUND[a,b]

Peak No	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Internal standard[c]				
28	21 28	Anthracene-d_{10}	361258	1000	-	-
		Recovery standard[d,e]				
		1,2-Dichlorobenzene-d_4		80	100	80.0
		Pyrene-d_{10}		21	100	21.0
		Chrysene-d_{12}		82	100	82.0
		Organics detected[f,g,h]				
1	3.23	Chlorobenzene	344954	9.5×10^2		
2	3.78	Xylene (isomer)	226741	6.3×10^2		
3	4.33	Xylene (isomer)	153266	4.2×10^2		
4	6.10	Mixture of 95% benzaldehyde and 5% C_3-benzene (isomer)	235243	6.5×10^2		
5	6.63	Aniline	603662	1.7×10^3		

(continued)

TABLE 24 (continued)

Peak No	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Organics detected (continued)				
6	6.92	C_3-benzene (isomer)	211513	5.9×10^{2}		
7	7.35	Dichlorobenzene (isomer)	341836	9.5×10^{2}		
8	7.72	C_4-benzene (isomer)	501962	1.4×10^{3}		
9	7.88	Dichlorobenzene (isomer)	824287	2.3×10^{3}		
10	8.10	Benzyl alcohol	748664	2.1×10^{3}		
11	10.12	Mixture of 70% chloroaniline (isomer) and 30% unknown (91,120,133,134)	355915	9.9×10^{2}		
12	11.23	Naphthalene and/or azulene and/or isomer	126080	3.5×10^{2}		
13	11.58	Unknown (91,148,163,92)	815700	2.3×10^{3}		
14	11.70	Mixture of 70% chloroaniline (isomer) and 30% chlorophenol (isomer)	134788	3.7×10^{2}		
15	12.22	Chloronitrobenzene (isomer)	131556	3.6×10^{2}		
16	12.53	Chloronitrobenzene (isomer)	2317029	6.4×10^{3}		
17 & 18a	12.65	Chloronitrobenzene (isomer)	1169099	3.2×10^{3}		
18b	14.1	N-phenyl formamide	591344	1.6×10^{3}		
19	15.20	Dichloronitrobenzene (isomer)	598057	1.7×10^{3}		
20	15.37	Dichloronitrobenzene (isomer)	72987	2.0×10^{2}		
21-24	15.55	Nitroaniline	1392402	3.9×10^{3}		

(continued)

TABLE 24 (continued)

Peak No	Retention time, min	Compound (major masses)	Peak area total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Organics detected (continued)				
25	16.45	Chloronitroaniline	67294	1.9×10^2		
26	16.57	Ethoxynitrobenzene	90437	2.5×10^2		
27	18.80	Nitroaniline and 5% chloronitroaniline	480195	1.3×10^3		
29	28.13	Butyl benzyl phthalate	324456	9.0×10^2		
		TOTAL CONCENTRATION[1]		35.7×10^3		

[a] For background, see method blank analysis, Table 18.

[b] Includes all substances that were found at or above a 5% threshold on the BATCH peak identification program in the Hewlett-Packard system, corresponding to a detection of limit of 200 µg/L.

[c] Anthracene-d_{10} internal standard added immediately prior to analysis; 50 mg/L injected equivalent to 1000 µg/L in original sample.

[d] Deuterated recovery standard (spike), added to original sample before extraction.

[e] Quantitated relative to area of major ion for authentic standard.

[f] Estimated concentration based on area of total ion relative to that of anthracene-d_{10}, internal standard.

[g] Tentative identification, not confirmed with authentic standards.

[h] Major masses of unknown compounds are listed in parentheses according to decreasing intensities. Possible molecular ions are underlined.

[i] Summation of concentrations of detected compounds, excluding standards.

TABLE 25. IDENTIFICATION OF MAJOR EXTRACTABLE ORGANIC COMPOUNDS IN THE ACID EXTRACT OF THE EFFLUENT DUPLICATE SAMPLE, DILUTED 1:10, NOT CORRECTED FOR BACKGROUND[a,b]

Peak No	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Internal standard[c]				
10	21.28	Anthracene-d_{10}	425158	1000	-	-
		Recovery standard[d,e]				
		Phenol-d_6		26	100	26.0
		1,2-Dichlorobenzene-d_4				
		Pyrene-d_{10}				
		Chrysene-d_{12}				
		Organics detected[f,g,h]				
1	6.77	Chlorophenol isomer	60426	1.4×10^2		
2	7.98	Benzenemethanol	130238	3.1×10^2		
3	10.23	Nitrophenol isomer	861552	2.0×10^3		
4	10.92	Dichlorophenol isomer	331313	7.8×10^2		
5	11.65	Mixture of 25% dichlorophenol isomer and 75% chlorophenol isomer	324950	7.6×10^2		

(continued)

TABLE 25 (continued)

Peak No	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/L	Amount spiked, µg/L	Percent recovery
		Organics detected (continued)				
6	14 05	Cl-containing unknown (121,73,66,171)	193047	4.5×10^2		
7	14 52	Trichlorophenol isomer	416595	8.8×10^2		
8	16 02	Cl_2-containing unknown (207,97 133,209)	34361	81		
9	17 62	Nitrophenol isomer	241521	5.7×10^2		
		TOTAL CONCENTRATION[i]		6.0×10^3		

[a] For background, see method blank analysis, Table 19

[b] Includes all substances that were found at or above a 5% threshold on the BATCH peak identification program in the Hewlett-Packard system, corresponding to a detection of limit of 70 µg/L.

[c] Anthracene-d_{10} internal standard added immediately prior to analysis; 50 mg/L injected equivalent to 1000 µg/L in original sample.

[d] Deuterated recovery standard (spike), added to original sample before extraction.

[e] Quantitated relative to area of major ion for authentic standard.

[f] Estimated concentration based on area of total ion relative to that of anthracene-d_{10}, internal standard.

[g] Tentative identification, not confirmed with authentic standards.

[h] Major masses of unknown compounds are listed in parentheses according to decreasing intensities. Possible molecular ions are underlined.

[i] Summation of concentrations of detected compounds, excluding standards.

TABLE 26. IDENTIFICATION OF MAJOR EXTRACTABLE COMPOUNDS IN THE METHYLENE CHLORIDE EXTRACT OF THE SEDIMENT SAMPLE, DILUTED 1:10, NOT CORRECTED FOR BACKGROUND[a]

Peak No	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/g	Amount spiked, µg/g	Percent recovery
		Internal standard[b]				
24	21.15	Anthracene-d_{10}	158680	935	-	-
		Recovery standard[c,d]				
4	6.58	Phenol-d_5	9676	99	187	53.0
8b	7.7	1,2-Dichlorobenzene-d_4	35670	99	187	53.0
30	25.25	Pyrene-d_{10}	18800	99	187	53.0
40	29.10	Chrysene-d_{12}	11207	92	187	49.0
		Organics detected[e,f,g]				
1	3.62	1,4-Dimethylbenzene (isomer)	13562	80		
2	5.53	Bicyclo[2.2.1]heptane,2,2-dimethyl-3-methylene - or Bicyclo[3.1.1]hept-2-ene,2,6,6-trimethyl-cyclohexene,5-methyl-3-(1-methylethenyl)-, trans-(-)	11247	66		

(continued)

TABLE 26 (continued)

Peak No.	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/g	Amount spiked, µg/g	Percent recovery
		Organics detected (continued)				
3	5.95	C_3-benzene (isomer) or 1,3-cyclopentadiene,5-(1-methylpropylidene)	13927	82		
5	6.73	C_3-benzene (isomer)	24832	1.5×10^2		
6	7.20	Dichlorobenzene (isomer)	31070	1.8×10^2		
7	7.57	C_4-benzene (isomer)	249691	1.5×10^3		
8a	7.63	80% C_4-benzene (isomer) and 20% unknown (93,107,121,136)	71340	4.2×10^2		
8b	7.7	30% Cl_2-benzene (isomer) and 70% Cl_2-benzene-d_4 spiking standard	35670	2.1×10^2		
9	9.00	50% C_4-benzene (isomer) and 50% unknown (109,93,107,136)	12172	71		
10	10.62	Unknown (152,87,88,154)	9322	55		
11	11.10	Bicyclo[4.4.1]undeca-1,3,5,7,9-pentaen-11-one and/or naphthalene	9181	54		
12	12.27	Chloronitro-benzene (isomer)	25310	1.5×10^2		
13	12.42	Chloronitro-benzene (isomer)	8718	51		
14	15.03	Dichloronitrobenzene (isomer)	21225	1.3×10^2		
15	16.47	Unknown (97,69,83,70,139)	3677	22		
16	18.07	Unknown (83,97,69,111,70)	6360	37		
17	18.30	Unknown (97,83,111,69)	7763	46		
18	19.57	Unknown (97,83,111,69)	4591	27		

(continued)

TABLE 76 (continued)

Peak No	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/g	Amount spiked, µg/g	Percent recovery
		Organics detected (continued)				
19	20.02	Phenol,4-(1,1,3,3-tetramethylbutyl)	6362	37		
20	20.13	Nonyl phenol (isomer)	8284	49		
21	20.27	Nonyl phenol (isomer)	9901	58		
22a	20.4	Unknown (135,107,121,134)	2740	16		
22b	20.50	Unknown (91,210,121,85,107)	8279	49		
22c	20.5	Unknown (149,107,91,121)	2760	16		
23	20.67	Unknown (135,107,136,91)	5189	31		
25	23.57	Unknown (91,119,134,167)	3857	23		
26	23.80	Unknown (134,97,83,91)	4411	26		
27	24.08	Unknown alkyl benzene(105,106,134)	10945	65		
28	24.35	Sulfur, molecular (S_8)	8845	52		
29	24.90	Unknown (150,97,83,164)	4877	29		
31	25.37	Unknown (91,105,150)	4764	28		
32	26.50	Unknown alkyl benaene (105,106,91)	6037	36		
33	26.88	Benzenamine,4-nitro-N-phenyl-	6617	39		
34	27.63	Unknown (91,115,149,119,133)	3613	21		
35	27.88	Unknown (91,149,147)	3534	21		
36-37	28.03	Unknown phthalate (149,91,206,150)	968426	5.7×10^3		

(continued)

TABLE 26 (continued)

Peak No	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/g	Amount spiked, µg/g	Percent recovery
		Organics detected (continued)				
38	28.32	Unknown (91,119,105,133)	2849	17		
39	28.73	Unknown alkyl benzene (105,106,91)	9943	59		
41	32.08	Unknown phthalate (149,107,91,207)	5796	34		
		TOTAL CONCENTRATION[h]		9.7×10^3		

[a] Includes all substances that were found at or above a 0.5% threshold on the BATCH peak identification program in the Hewlett-Packard system, corresponding to a detection of limit of 10 µg/g.

[b] Anthracene-d_{10} internal standard added immediately prior to analysis: 50 mg/L injected equivalent to 935 µg/g in original sample.

[c] Deuterated recovery standard (spike), added to original sample before extraction.

[d] Quantitated relative to area of major ion for authentic standard.

[e] Estimated concentration based on area of total ion relative to that of anthracene-d_{10}, internal standard.

[f] Tentative identification, not confirmed with authentic standards.

[g] Major masses of unknown compounds are listed in parentheses according to decreasing intensities. Possible molecular ions are underlined.

[h] Summation of concentrations of detected compounds, excluding standards

TABLE 27. IDENTIFICATION OF MAJOR EXTRACTABLE COMPOUNDS IN THE METHYLENE CHLORIDE EXTRACT OF THE SEDIMENT DUPLICATE SAMPLE, DILUTED 1:10, NOT CORRECTED FOR BACKGROUND

Peak No.	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/g	Amount spiked, µg/g	Percent recovery
		Internal standard[b]				
28	21.13	Anthracene-d_{10}	171907	725	-	-
		Recovery standard[c,d]				
4	6.58	Phenol-d_5	8575	73	145	50.0
8	7.57	1,2-Dichlorobenzene-d_4	88738	57	145	39.0
35	25.25	Pyrene-d_{10}	29681	93	145	64.0
48a	29.10	Chrysene-d_{12}	16423	91	145	63.0
		Organics detected[e,f,g]				
1	3.62	(See previous table for compound identifications)	10472	44		
2	5.55		8609	36		
3	5.95		10659	45		
5	6.75		28990	1.2×10^2		
6	7.18		42636	1.8×10^2		
7	7.53		266215	1.1×10^3		
9	8.38		7364	31		
10a	9.00		19898	84		
10b	9.1		19898	84		
11	11.63		13516	57		
12	11.08		8593	36		

(continued)

TABLE 27 (continued)

Peak No.	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected, µg/g	Amount spiked, µg/g	Percent recovery
		Organics detected (continued)				
13	12.25	(See previous table for compound identifications)	28546	1.2×10^2		
14	12.40		9775	41		
15	15.02		32086	1.4×10^2		
16	16.45		6439	27		
17	18.07		8968	38		
18	18.30		9267	39		
19	18.42		4118	17		
20	19.57		7727	33		
21	19.88		2701	16		
22	20.02		8040	34		
23	20.12		18718	79		
24	20.27		11319	47		
25	20.50		5277	22		
26	20.67		6192	26		
27	21.02		1593	7		
29	22.97		6090	26		
30	23.57		6759	29		
31	23.80		2297	10		
32	24.05		14737	62		
33	24.33		5187	22		
34	24.88		15369	65		
36	25.38		9231	39		
37	25.55		5036	21		
38	25.73		3311	14		
39	26.50		9585	40		
40	26.88		1200	5		
41	27.65		10268	43		

(continued)

TABLE 27 (continued)

Peak No	Retention time, min	Compound (major masses)	Peak area, total counts	Amount detected µg/g	Amount spiked, µg/g	Percent recovery
		Organics detected (continued)				
42	27.90	(See previous table for compound identifications)	2018	9		
43 & 44	28.05-28.08		1406794	5.9×10^3		
45	28.32		4897	25		
46	28.53		4338	18		
47	28.73		14553	61		
48b	29.2		2053	9		
48c	29.2		2053	9		
49	32.07		9124	38		
		TOTAL CONCENTRATION[h]		8.9×10^3		

[a] Includes all substances that were found at or above a 0.5% threshold on the BATCH peak identification program in the Hewlett-Packard system, corresponding to a detection of limit of 10 µg/g.

[b] Anthracene-d_{10} internal standard added immediately prior to analysis; 50 mg/L injected equivalent to 725 µg/g in original sample.

[c] Deuterated recovery standard (spike), added to original sample before extraction.

[d] Quantitated relative to area of major ion for authentic standard.

[e] Estimated concentration based on area of total ion relative to that of anthracene-d_{10}, internal standard.

[f] Tentative identification, not confirmed with authentic standards.

[g] Major masses of unknown compounds are listed in parentheses according to decreasing intensities. Possible molecular ions are underlined.

[h] Summation of concentrations of detected compounds, excluding standards.

TABLE 28. ANALYSIS OF CHLORINATED DIBENZO-P-DIOXINS IN WATER SAMPLES

Sample	ng Dibenzofuran/liter (ppt) Isomers							
	Cl_1	Cl_2	Cl_3	Cl_4	Cl_5	Cl_6	Cl_7	Cl_8
Effluent	ND[a]	ND	ND	ND	ND	ND	ND	ND
Influent	<14	ND (<17)[b]	ND (<7)	ND (<6)	6	61	17	100
Influent (rep)	<14	ND (<16)	ND (<8)	ND (<5)	12	140	20	110
Blank	ND	ND	ND	ND	ND	ND	ND	ND
Method detection limit	6	8	3	2	5	4	5	6
Spike level	13	12	14	10	12	12	13	10
Effluent (spiked)	9	11	14	12	12	9	12	14
Recovery percent	69	92	100	120	100	75	92	140
Spike level	130	120	140	99	120	120	130	100
Influent (spiked)	97	110	120	99	130	220	120	170
Recovery percent	75	92	86	100	101	100	78	65

[a] ND - none detected.

[b] ND (<xx) - none detected (detection limit).

TABLE 29. ANALYSIS OF CHLORINATED DIBENZO-P-DIOXINS IN WATER SAMPLES

Sample	Dibenzofuran Isomers (ppt)							
	Cl_1	Cl_2	Cl_3	Cl_4	Cl_5	Cl_6	Cl_7	Cl_8
Effluent	ND[a]	ND	ND	ND	ND	ND	ND	ND
Influent	ND (<11)[b]	ND (<90)	ND	ND (<4)	ND	ND	4	11
Influent (rep)	ND (<14)	ND (<110)	ND	ND (<4)	ND	ND	6	11
Blank	ND	ND	ND	ND	ND	ND	ND	ND
Method detection limit	2	3	4	3	7	4	3	6
Spike level	4	6	7	4	10	18	4	11
Effluent (spiked)	4	4	8	4	11	14	5	11
Recovery percent	100	67	114	100	110	78	125	100
Spike level	36	64	69	45	104	176	38	110
Influent (spiked)	39	70	70	31	81	131	33	110
Recovery percent	108	109	101	69	78	74	74	90

[a] ND - none detected.

[b] ND (<xx) - none detected (detection limit).

TABLE 30. ANALYSIS OF CHLORINATED DIBENZO-P-DIOXINS IN SLUDGE SAMPLES

Sample	ng Dibenzo-p-dioxin/gm sludge (ppb) Isomers							
	Cl_1	Cl_2	Cl_3	Cl_4	Cl_5	Cl_6	Cl_7	Cl_8
Sludge	ND[a]	ND	ND	ND	ND	11	65	620
Sludge (rep)	ND	ND	ND	ND	ND	17	81	830
Blank	ND	ND	ND	ND	ND	ND	ND	ND
Method detection limit	20	20	15	15	10	10	10	10
Spike level	13	12	14	10	12	12	13	10
Sludge (spiked)	ND	ND	ND	ND	18	34	93	700
Recovery percent	-	-	-	-	150	167	154	-
Spike level	130	120	140	100	120	120	130	100
Sludge (spiked)	69	120	87	120	150	153	220	860
Recovery percent	53	100	62	120	125	116	113	55

[a]ND - none detected.

TABLE 31. ANALYSIS OF CHLORINATED DIBENZOFURANS IN SLUDGE SAMPLES

Sample	ng Dibenzofuran/gm sludge (ppb) Isomers							
	Cl_1	Cl_2	Cl_3	Cl_4	Cl_5	Cl_6	Cl_7	Cl_8
Sludge	ND[a]	ND	ND	ND	ND	ND	33	39
Sludge (rep)	ND	ND	ND	ND	ND	ND	25	73
Blank	ND	ND	ND	ND	ND	ND	ND	ND
Method detection limit	10	20	25	10	30	45	20	20
Spike level	110	200	220	140	310	520	110	370
Sludge (spiked)	27	110	130	110	290	580	130	410
Recovery percent	25	55	59	85	94	112	92	89
Spike level	1,100	2,000	2,200	1,400	3,100	5,200	1,110	3,700
Sludge (spiked)	380	2,000	2,700	1,300	3,100	5,300	940	3,400
Recovery percent	35	100	123	93	100	102	83	90

[a]ND - none detected.

TABLE 32. RCRA METALS IN SLUDGE LEACHATE[a]

Analyte	µg/L (ppb)
Arsenic	<3
Barium	1.75×10^3
Cadmium	1.88×10^3
Chromium	348
Lead	514
Mercury	2
Selenium	8.2
Silver	96

Quality Control Data

Reference standard	Observed value, µg/L	True value, µg/L	Percent recovery
Arsene TM-7	35.7	35	102
Barium ERA 2767	429	460	93
Cadmium TM-NR	313.5	300	105
Chromium ERA-1120	165.3	160	103
Lead ERA-1120	278	265	105
Mercury TM-C1	18.5	20	93
Selenium SRMA	10.2	10	102
Silver SPEX-A	111	100	111

Spike[b]

Analyte	Concentration added, µg/L	Percent recovery
Arsenic	50	102

[a]All analyses by AA.

[b]50 µg/L of standard solution is added to leachate and amount recovered is determined.

TABLE 33. HERBICIDE AND PESTICIDE CONCENTRATION IN LEACHATE

Analyte	Concentration, µg/L (ppb)	Lower detection limit, µg/L
Lindane	ND[a]	1,000
Endrin	ND	400
Methoxychlor	ND	50
Toxaphene	ND	1×10^4
2.4-D[b]	ND	10
2.4.5-TP Silvex[b]	ND	10

Quality Control Data

A known amount of 2.4-D and 2.4.5-TP Silvex were spiked into the sludge sample. The percent recovery was:

Analyte	Percent recovery
2.4-D	120
2.4.5-TP Silvex	105

[a]ND - not detected above lower detection limit.

[b]Duplicate analyses performed.

TABLE 34 CYANIDE AND PHENOL ANALYSIS OF LEACHATE

Analyte	Concentration, µg/L
Cyanide	10
Phenol	1,297

Quality Control Data

Analyte	Observed value, µg/L	True value, µg/L	Percent recovery
Cyanide	60	80	75
Phenol	118	125	94

TABLE 35. TOTAL METALS ANALYSIS OF SLUDGE SAMPLE

Analyte	µg/g (ppm)
Arsenic[a]	16.9
Mercury[a]	<0.2
Selenium[a]	5.7
Aluminum	2.8×10^3
Antimony	<73.0
Barium	96.8
Beryllium	<23.0
Boron	78.8
Cadmium	45.0
Calcium	4.5×10^4
Chromium	156.0
Cobalt	15.0
Copper	995.0
Iron	1.1×10^4
Lead	361.0
Magnesium	2.5×10^3
Manganese	230.0
Molybdenum	84.0
Nickel	820.0
Potassium	$<2.4 \times 10^3$
Silver	23.7
Sodium	1.2×10^4
Tin	<519.0
Titanium	105.0
Vanadium	<14.8
Zinc	3.0×10^3

[a]Analyses by AA, all others by ICP.

TABLE 36. ANALYTICAL RESULTS FOR PRIORITY AND NON-PRIORITY METAL POLLUTANTS IN WATER SAMPLES

	Sample ID, µg/L (ppb)	
	Influent	Effluent[a]
Priority metals		
Arsenic[b]	31.7	4.3
Mercury[b]	<0.8	<0.8
Selenium[b]	14.3	9.95
Thallium[b]	<63	<63
Antimony	<830	<830
Beryllium	7	12
Cadmium	71	<18
Chromium	227	91
Copper	1.7×10^3	<35
Lead	777	<460
Nickel	851	303
Silver	<250	<250
Zinc	3.9×10^3	133
Non-priority metals		
Aluminum	890	<450
Barium	187	77
Boron	388	674
Calcium	2.6×10^5	<210
Cobalt	<70	<70
Iron	6.8×10^3	253
Magesium	3.6×10^4	<70
Manganese	457	186
Molybdenum	562	849
Potassium	1.6×10^5	1.1×10^5
Sodium	6.4×10^5	$<1.5 \times 10^4$
Tin	$<2.2 \times 10^3$	$<2.2 \times 10^3$
Titanium	54	<43
Vanadium	<150	<150

[a]Average of duplicate analyses.

[b]Analyses by AA; all others by ICP.

TABLE 37. QUALITY CONTROL DATA FOR METALS ANALYSES OF WATER SAMPLES

Analyte	Reference standard	Observed value, µg/L	True value, µg/L	Percent recovery
Arsenic[a]	TM-7	31.7	35.0	106
Mercury[a]	TM-C1	18.5	20.0	93
Selenium[a]	SRMA	12.2	11.0	111
Thallium[a]	SPEX-A	91.3	100	91
Aluminum	ICP	410	515	80
Antimony	ICP	1,010	1,000	101
Barium	ICP	831	920	90
Beryllium	ICP	173	165	105
Cadmium	ICP	51	50	103
Calcium	ICP	1,180	1,000	118
Chromium	ICP	153	160	96
Cobalt	ICP	123	115	107
Copper	ICP	602	615	98
Iron	ICP	1,100	1,000	110
Lead	ICP	254	265	96
Manganese	ICP	1,090	1,000	109
Nickel	ICP	1,160	1,000	116
Titanium	ICP	1,100	1,000	110
Vanadium	ICP	114	110	104
Zinc	ICP	157	165	95

[a]Analyses by AA; all others by ICP.

TABLE 38. LOQ[a] VALUES FOR METALS BY ICP ANALYSES

Analyte	µg/L
Aluminum	450
Antimony	825
Barium	23
Beryllium	6
Boron	230
Cadmium	18
Calcium	210
Chromium	33
Cobalt	70
Copper	35
Iron	56
Lead	460
Magnesium	70
Manganese	3
Molybdenum	65
Nickel	60
Potassium	4.3×10^4
Silver	250
Sodium	1.4×10^4
Tin	2.2×10^3
Titanium	43
Vanadium	150
Zinc	26

[a]Least observable quality.

TABLE 39. ANALYTICAL RESULTS FOR TOTAL CYANIDE AND TOTAL PHENOL IN WATER SAMPLES

Analyte	Sample ID, µg/L (ppb) Influent	Effluent
Cyanide	NR[a]	10
Phenol	1384	1898

Quality Control Data

Reference standard	Observed value, µg/L	True value, µg/L	Percent recovery
Cyanide	110	160	69
Phenol	222	250	89

[a]NR - analysis not requested.

TABLE 40. ANALYTICAL RESULTS FOR NON-PRIORITY POLLUTANTS IN WATER SAMPLES

Analyte	Sample ID Influent	Effluent
Biological Oxygen Demand (BOD)	NR[a]	117 mg/L
Total Suspended Solids (TSS)	NR	19 mg/L
pH	NR	8.54
Total Organic Carbon (TOC)	NR	184 mg/L
Fluoride	NR	1.56 mg/L
Oil and grease	NR	16 mg/L

Quality Control Data

Analyte	Reference standard	Observed value, mg/L	True value, mg/L	Percent recovery
TSS	Hardness 3253	34	34	100
Oil and grease	PCS	24.9	26	96
TOC	PCS	48.6	48	101
Fluoride	ERA 3253	3.3	3.4	97

[a]NR - analysis not requested.

APPENDIX A

GC/MS ANALYSES OF EXTRACTABLE ORGANICS

GC/MS ANALYSES OF EXTRACTABLE ORGANICS

Introduction

All GC/MS analyses were performed using the protocol developed for the EPA-sponsored Chesapeake Bay analysis program. These analyses were performed by automated capillary column chromatography using a Hewlett-Packard 5985-A GC/MS with a 5934 data system, which used Revision C Software and inluded a 7920 multi-drive disc unit.

Method

The relevant GC/MS parameters used for the present analyses are summarized below:

- 30 m fused silica SE-54 WCOT column
- Column head pressure, 7-9 psi
- MS operating pressure, 1 x 10^{5} to 4 x 10^{-6} torr
- Septem purge on at 0.5 min
- Initial temperature, 50°C
- Initial temperature held for 4 minutes
- Heating rate, 8°C/min
- Final temperature, 300°C
- Total analysis time, 40 min
- Injector, splitless mode, temperature, 250°C
- Transfer line temperature, 250°C (fused silica column through this zone, directly to the MS source)
- Electron energy, 70eV
- Source temperature, 200°C
- A/D rate, 1 measurement/0.125 amu; scan rate, approximately 0.6 s/scan
- Mass spectrometer scan delay, 3.0 min

The routine procedure used for GC/MS analysis was to transfer 150 µL of the sample extract into 1.5 mL sample vials along with 150 µL of a 100 µg/mL anthracene-d_{10} in methylene chloride internal standard. The vial was capped and placed in the autosampler, which injected approximately 1 µL into the GC, operating in the splitless mode.

Interpretation of Mass Spectra

The following protocol was followed in interpreting the mass spectral data obtained from analysis of water and sediment extracts:

1) Spectra of compounds detected as peaks in the Hewlett-Packard BATCH program with a 0.5% or 5% threshold (depending upon the complexity of the sample) were automatically compared with standard spectra in the computerized EPA/NIH mass spectral data base using the Probability Based Search (PBS) software supplied by Hewlett-Packard. A goodness of fit parameter was generated (1.0 being a perfect match) for the ten matches closest to 1.0.

2) The results from these searches were reviewed by an experienced mass spectroscopist using the Hewlett-Packard supplied spectral comparison software, SPDIF, to compare the sample spectra with the standard spectra identified by the SEARCH program.

3) In cases where the spectral agreement was judged to be adequate, compound identities were assigned. When compound isomers produced similar spectra, no specific isomer could be identified based solely upon mass spectral data.

4) In cases where the agreement was not adequate, identifications were made on the basis of manual interpretation (when obvious), or compounds were listed as unknown with their major masses given in parentheses. If a high even mass was present after which followed isotope peaks in the proper ratio, the underlined to indicate a possible molecular ion.

The approach outlined above was adopted to minimize the cost and time required for the analyses of large amounts of capillary chromatographic mass spectra by maximizing the use of computerized data interpretation techniques.

Figures A-1 and A-2 show spectral comparison plots which were generated from those "best fit" candiate compounds identified in the a computerized search of some typical GC/MS data. These figures show comparisons of two different trichlorobenzene isomers with the unknown spectrum. From the difference of each of the two spectra plotted in these figures, it can be seen that less than 30% deviations with the two standard spectra were measured. Since the two standard spectra of trichlorobenzene isomers are very similar, the identification of the peak at 11.0 minutes would be listed in the effluent table for as "Benzene,trichloro-(isomer)."

These comparative mass spectral plots were reviewed by an expert mass spectroscopist who based on experience in mass spectrometry and mass spectral interpretation, accepted or rejected the computer-generated identification. In the example, trichlorobenzene (isomer) was determined to be the proper identification for the compound in question. It should be emphasized that this identification is considered to be tentative until confirmed by the measurement of its relative retention time of an authentic standard of isomers of the identified compound using similar analytical conditions as those used for the original sample extract analysis.

Some considerations that go into making decisions on the identity of components in effluent and sediment extracts include:

1) The unknown spectrum must contain all peaks with intensities greater than 10% of the base peak in the standard spectrum.

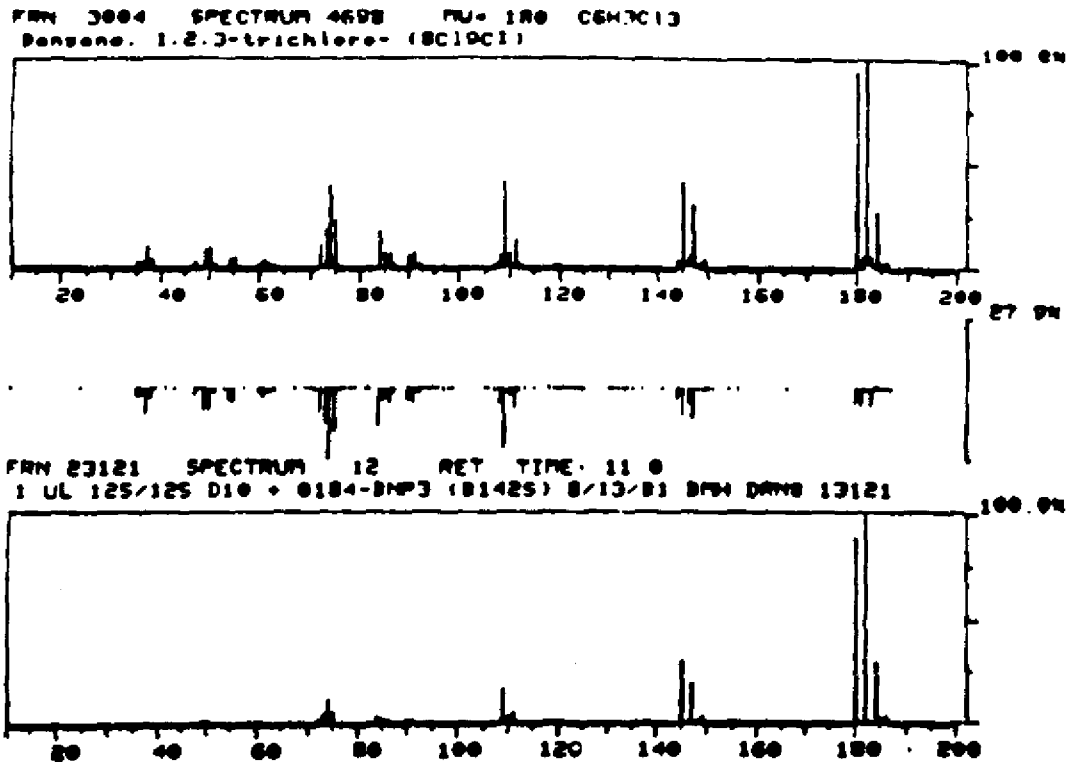


Figure A-1. Comparison of the mass spectrum of the highest matching compound with that of an unknown compound eluting at 11.0 minutes.

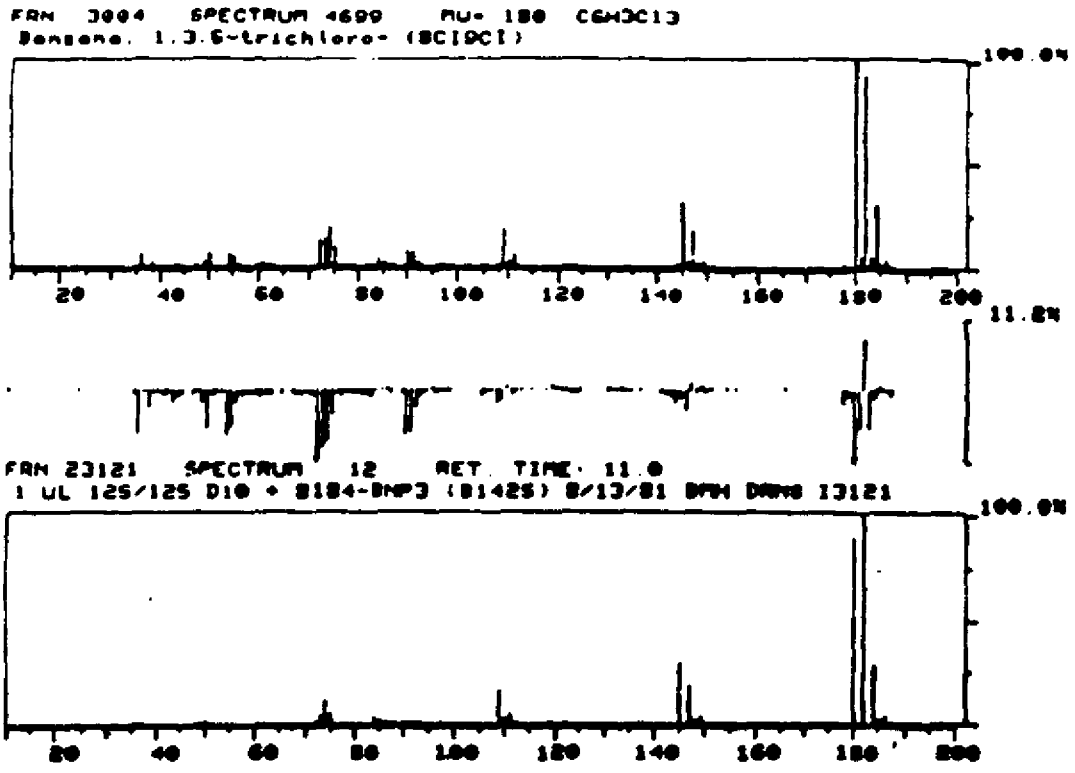


Figure A-2. Comparison of the mass spectrum of the third highest matching compound with that of an unknown compound eluting at 11.0 minutes.

2) All mass intensities of multiplets present in the standard spectrum must also be present in the unknown spectrum with similar relative intensities.

3) Since the DFTPP spectrum in the low mass region is lower than that given in the EPA criterion for this compound quantitative agreement of ion intensities was not required for masses below m/e 60.

4) If peaks are present additional to those in the standard spectrum of a compound, then it is assumed that the additional peaks are due to the presence of an unknown co-eluting compound. In obvious cases of mixed spectra, the PBS SEARCH program identified the presence of a mixture of spectra with a "+" in the column following the match factor. Where mixed spectra are confirmed using the spectral comparison program, the major identified compound was listed along with an estimate of the percent of the unknown compound present in the mixed spectrum.

Attempts were made to give additional information such as the major masses found in the unknown, the molecular weight if the spectrum appears to contain a molecular ion, and the presence of nonhydrocarbon atoms. However, the identification of the presence of chlorine, sulfur, or silicon in unknown compounds is based solely upon the occurrance of multiplet ion patterns which are consistent with the naturally-occurring abundances of isotopes for these species, and is used only to give more information about the unknown compound's spectrum.

Quantitation of GC/MS Data

The calculations used for determining the concentration of organics in sample extracts were performed in two ways. All levels of deuterated spiking compounds were determined using the response

of the molecular ion of each of the compounds, relative to the anthracene-d_{10} molecular ion. Therefore, all recovery data were calculated using authentic standards.

The amounts of all other compounds were determined assuming the total ion response of each compound to be equal to the response of the anthracene-d_{10} internal standard. This latter calculation was made using the following relationship:

$$\text{Concentration of X} = \text{concentration Anthracene-d}_{10} \frac{\text{Total ion area X in unknown}}{\text{Total ion area anthracene-d}_{10}} \times \text{(sample concentration factor)}$$

The sample concentration factor takes into account the extraction and concentration of the 1-liter sample to a 1-mL extract or the extraction of approximately 30 g sediment and final volume of 1 mL in the sediment extract.

QA/QC for Extractable Organics

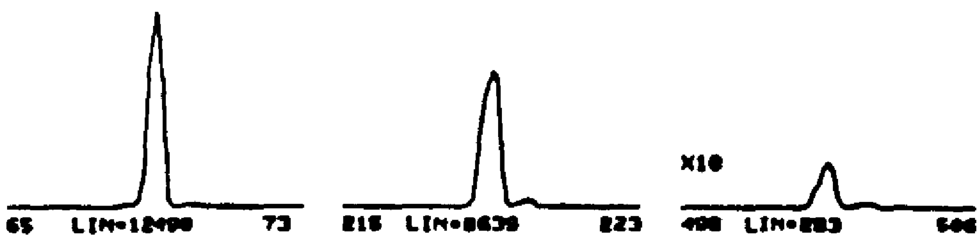
MRI uses a routine procedure for assessing the condition of the mass spectrometer and the capillary column in the gas chromatograph. The mass spectrometer is tuned approximately daily using perfluorotributylamine (PFTBA) which is the basis for the Hewlett-Packard AUTOTUNE program. The output from an average tune is shown in Figure A-3.

Samples were run in the automated BATCH AQUIRE mode overnight, and with each batch of samples a system performance standard was analyzed. This included the compound decafluorotriphenylphosphine (DFTPP) which was analyzed by the Hewlett-Packard program: DFTPP EPA Criterion Verifier. The output from a typical analysis by this program is shown in Figure A-4.

* CURRENT PARAMETERS *
(MS985-1V041M)

DATE (FRM 1000) 1/20/81 1115

REPELLER(V)=10.84	EM VOLTAGE(V)=2200
DRAWOUT(V)=26.5	AMU GAIN=115
ION FOCUS(V)=35	AMU OFFSET=113
ENT LENS(MV/AMU)=133	MASS AXIS GAIN=1.00157
X-RAY(V)=154	MASS AXIS OFFSET=-.100491
EMISSION(UA)=300	IONS: POSITIVE
ELECT. ENERGY(EV)=70	ACTUAL SOURCE TEMP =200
LOG AMP OFFSET=1	



ACTUAL MASS	ABS ABUND	REL ABUND	FWHM	ACTUAL ISO MS	ISO ABUND	ACTUAL ISO RATIO	EFF WIDTH
68.99	12480	100	.54	70	143	1.14	.529
218.97	8630	69.10	.58	219.98	433	5.01	.58
501.98	282	2.25	.52	503	26	9.21	.507

OPTION?

Figure A-3. A typical result from tuning the Hewlett-Packard 5985 mass spectrometer with PFTBA.

DFTPP EPA CRITERION VERIFIER

DRN: 22512
SPECTRUM: 2011

	Mass	Rel. Abund.	Criterion
xx	51	9.95206	30-60% MASS 198
	68	0	< 2% MASS 69
	69	29.7239	
	70	0	< 2% MASS 69
xx	127	33.4849	40-60% MASS 198
	197	0	< 1% MASS 198
	198	100	BASE PEAK
	199	6.69613	5-9% MASS 198
	275	22.8732	10-30% MASS 198
	365	1.70276	> 1% MASS 198
	441	14.7049	< MASS 443
	442	73.8387	> 40% MASS 198
	443	16.0367	17-23% MASS 442

NOTE: 'xx' indicates out of range!

PRESS <RETURN> TO RERUN...

Figure A-4. Computer analysis of mass spectrum of DFTPP.

MONS 220713

Typically, the m/e 51 and 127 on our instrument fell somewhat below the normal range specified by the program. This fact was taken into account in interpreting mass spectra. If other peaks fell outside the ranges, the tuning of the mass spectrometer was re-examined.

The substances present in the system performace standard were: (1) 2,6-dimethylphenol, (2) 2,6-dimethylaniline, (3) decanol, (4) pentachlorophenol, (5) anthracene-d_{10} added prior to analysis, (6) octadecene, (7) octadecane, (8) DFTPP, (9) eicosane, (10) henelcosane, (11) pyrene, (12) methyl stearate, and (13) chrysene. Figure A-5 shows a typical chromatogram obtained from the standard. By examining the resolution of the peaks ~20.7 min and ~24.7 min, and by looking at the tailing of certain peaks such as decanol and pentachlorophenol, we visually determined the condition of the column. When the resolution and tailing were substantially worse than in a new column, the injection port insert was replaced and the front end of the column was broken off or the column replaced.

In order to assess the accuracy of GC/MS quantitation, two standards were compared with each other. A Supelco phenols standard was analyzed on 8 February 1981, and a freshly prepared MRC standard containing many of the same phenols was analyzed on 4 April 1981. In both standards the concentrations of the components were close to 100 mg/L. Taking the concentrations in the MRC standard to be correct, the concentrations of the components in the Supelco standard were calculated and compared with their stated values. The substances analyzed included 2-nitrophenol, 2,4-dinitrophenol, 2,4-dichlorophenol, 4-chloro-m-cresol, 2,4,6-trichlorophenol, 2,4-dinitrophenol, 4-nitrophenol, 4,6-dinitro-o-cresol, and pentachlorophenol.

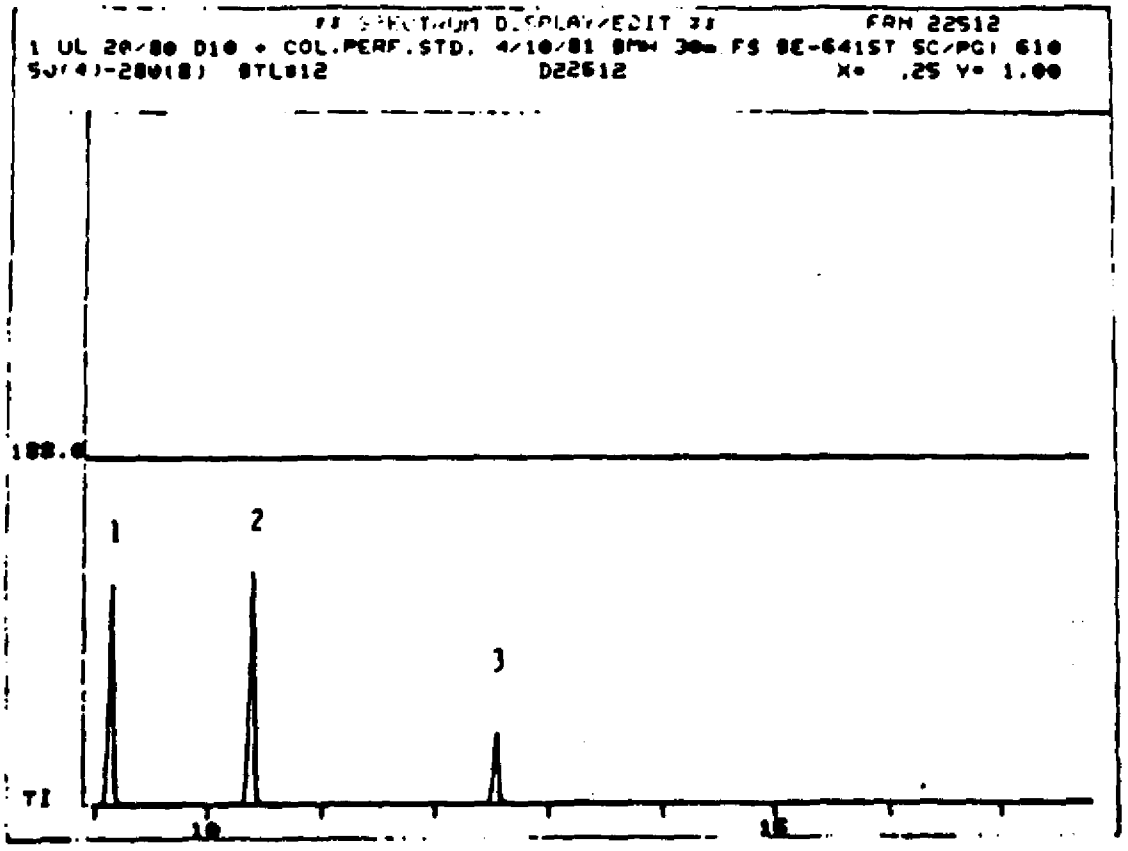


Figure A-5. Chromatogram of the column performance standard with the GC column in average condition. The numbered peaks are identified in the text.

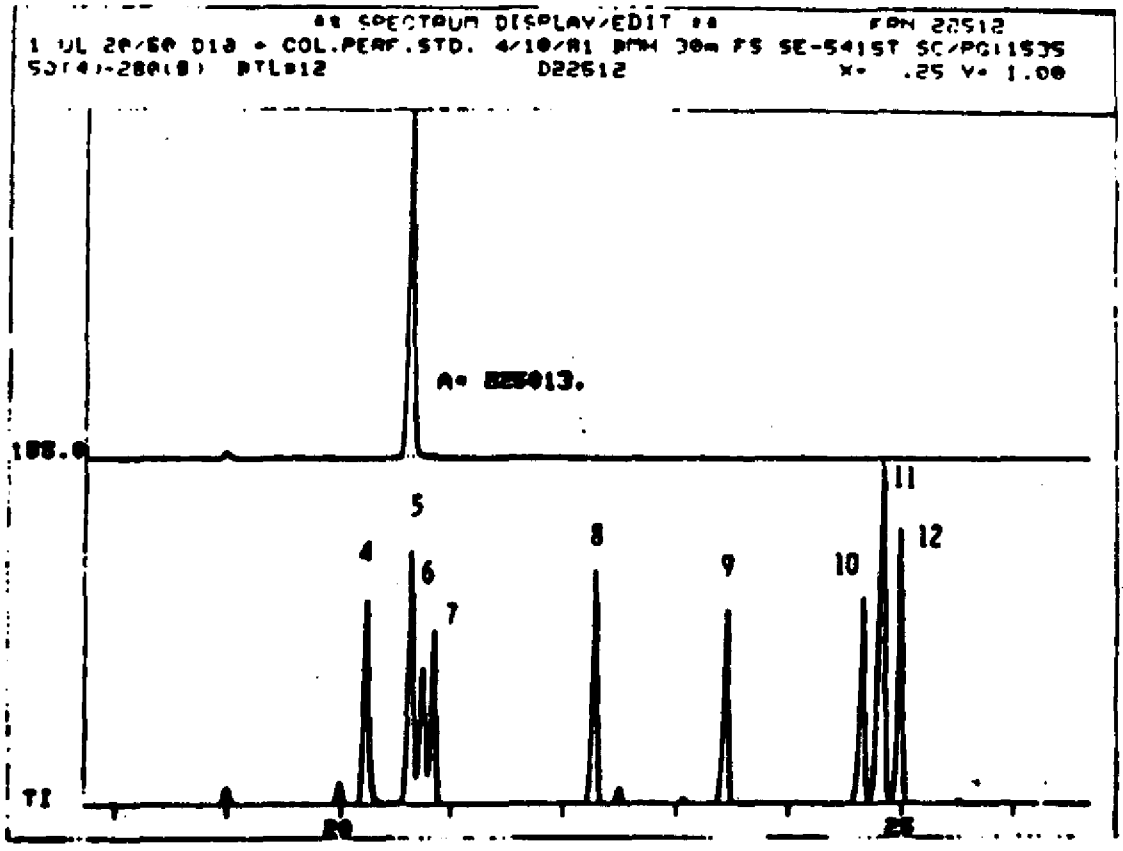


Figure A-5 (continued)

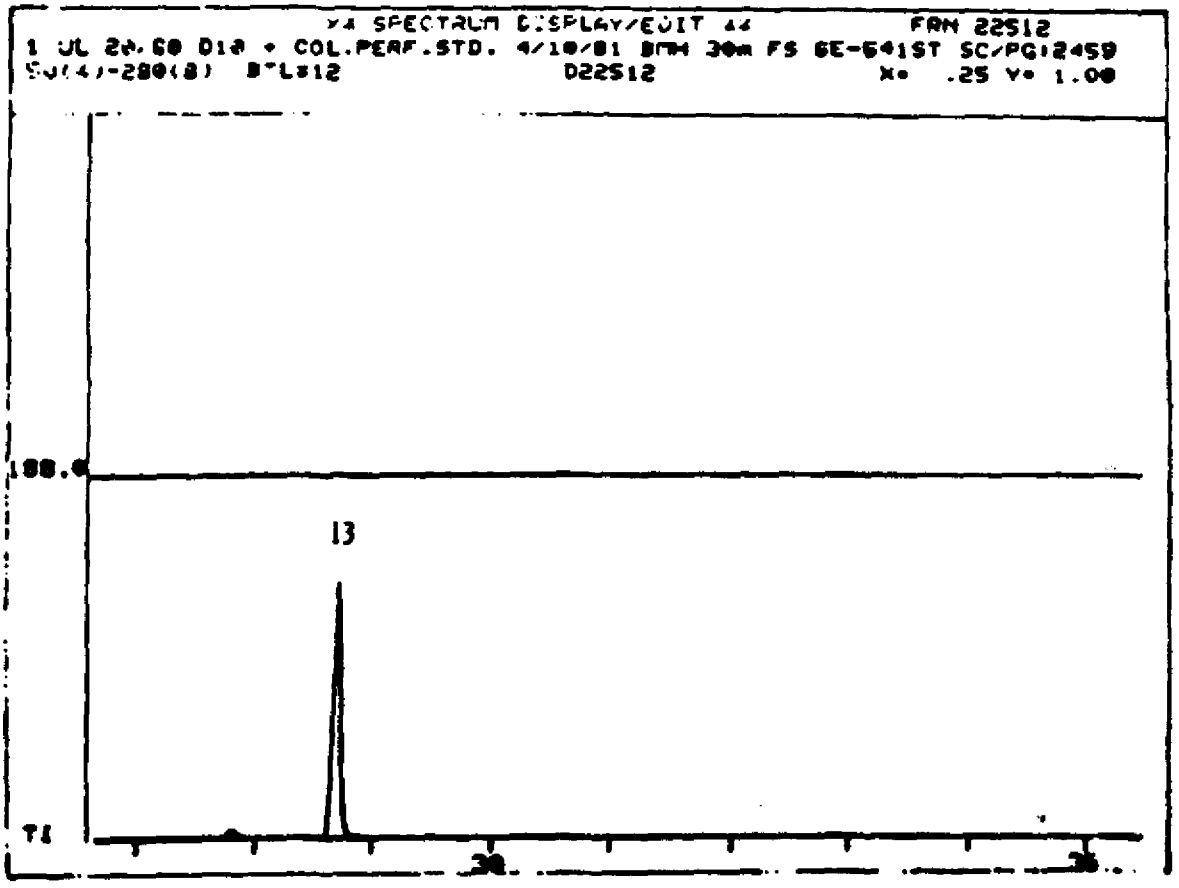


Figure A-5 (continued)

Based on MRC standards the average percent deviation of the values found from the stated values was 28%, excluding 4-nitrophenol, where 7 mg/L was found vs. the stated 100 mg/L.

The quantitation of 4-nitrophenol has been a source of difficulty previously, as it appears to diminish in concentration with storage time of the standard. The indication from the comparison of standards is that except for a particularly troublesome compound such as the 4-nitrophenol, the average uncertainty in the quantitation of clean samples in which the unknown component is of comparable concentration to the standard, is approximately ±30%.