EVALUATION OF THE ZHE TCLP PROTOCOL

FINAL REPORT

Contract No. 68-01-7075
Work Assignment No. 42

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Introduction

Ruggedness testing is a variation of a factorial experimental design which assesses the ruggedness of a procedure by systematically introducing variations in the procedure. Parameters are selected for study and two levels of each parameter are designated.

A full factorial design would require runs for all possible combinations of parameters and levels of parameters. Ruggedness testing which is a fractional factorial design uses only a fraction of the possible combinations thereby increasing the efficiency of the experiment. For example, a full design with two levels for each of seven variables has 2^7 or 128 possible combinations. Ruggedness testing might involve selection of 8 combinations which would represent 1/16 of the total possible combinations.

Because of its fractional design, ruggedness testing only evaluates the main effects, eg. the effect of percent headspace on the TCLP recovery of toluene from ammonia-lime still bottoms. The design assumes that no interactions exist between parameters; thus labor is saved at the expense of precision.

Ruggedness testing is invaluable for picking up variations in results due to small changes in the procedure. Results of ruggedness testing are used to identify critical parameters in a procedure and to assess the ability of the method to withstand minor variations in the procedure.

Design of the ZHE TCLP Ruggedness Testing

For ruggedness testing of the zero headspace Toxicity Characteristic Leaching Procedure (ZHE TCLP), program managers from ERCO and the EPA chose seven variables and designated two levels of each. Wherever possible, the two levels represented values on both sides of the protocol value (Table 1).

A set of eight combinations (extractions) was selected so that when comparing two levels of a parameter, results from all extractions would be used and the effects of the remaining six parameters would cancel out (Table 2). The TCLP Draft Protocol was followed with the exception of alterations in the parameters under investigation.

Two wastes were chosen for study. Duplicate extractions were done to enable calculation of standard error and significance. In addition, six blanks were run to compare the effect of ZHE device on the concentration of volatile compounds in the blank leachate. Three blanks were run in ADM devices and three blanks were run in Millipore devices. A total of thirty-eight extractions were run, ie. 8 extractions x 2 duplicates x 2 wastes + 6 blanks.

Table 1. Parameters and Conditions for the ZHE TCLP Ruggedness Testing.

Parameter	Protocol	Condition 1		Condition 2	
Liquid/solid ratio	20:1	19:1	(A)	21:1	(a)
% Headspace	0	0	(B)	5	(b)
Acidity of fluid #1	70 meq	60 meq	(C)	80 meq	(c)
Device	variable	ADM	(D)	Millipore	(d)
Collection Method	variable	Syringe	(E)	Tedlar bag	(e)
Aliquotting	no	yes	(F)	no	(f)
Pressure behind piston	5-10 psi	0 psi	(G)	20 psi	(g)

Table 2. Experimental Design for the ZHE TCLP Ruggedness Testing.

	Extraction Number							
Parameter	1	2	3	4	5	6	7	8
Liquid/solid ratio	A	A	A	A	a	a	a	a
% Headspace	B	B	b	b	B	B	b	b
Acidity of fluid #1	C	c	C	c	C	c	C	c
Device	D	D	d	d	d	d	D	D
Collection Method	E	e	E	e	e	E	e	E
Aliquotting	F	f	f	F	F	f	f	F
Pressure behind piston	G	g	g	G	g	G	G	g

Implementation

The two wastes tested were ammonia-lime still bottoms and a mixture of API Separator Sludge and Electroplating Waste (API/EW mixture). The ammonia-lime still bottoms averaged 94.0% solid while the API/EW mixture averaged 92.3% solid as evaluated by filtration with the ZHE device.

Both wastes had initial filtrates which were miscible with water. The initial filtrates (usually 1-2ml in volume) were collected in 5cc syringes and then placed in 5ml VOA vials. Deionized distilled water was added to the vials to eliminate headspace. So as not to interfere with the experimental conditions, the initial filtrates were analyzed separately from the final filtrates.

Using a direct-drive lab pump, the extraction fluid was pumped into the ZHE device through Teflon tubing and a septum TEE arrangement at the inlet to the device. For extractions requiring 5% headspace, a 25ml volume of air was pumped into the device prior to introduction of the extraction fluid.

All samples were spiked with a solution of five volatile organic compounds. The solution contained benzene, toluene, 1,1-dichloroethene, chlorobenzene, and trichloroethylene each at concentration of 5ug/l. One hundred microliters of the solution were injected through the septum TEE arrangement as the extraction fluid was pumped in. To limit the loss of spiked compounds and required headspace, none of the devices were vented before extraction. Pressure behind the pistons was applied as designated and the ZHE devices were placed in a rotary extractor for 18 hours.

The wastes were filtered as required by the experimental design. For those samples requiring aliquotting and collection by syringe, a 50cc syringe was rinsed with the first 10ml of filtrate and the next 50ml were collected for analysis. For samples requiring complete filtration and collection by syringe, consecutive 50ml aliquots of filtrate were placed in a 500ml Erlenmeyer flask. The filtrate was swirled to mix and 50ml were poured into a VOA vial for analysis.

The six blanks were run according to TCLP protocol with complete collection of the final filtrate in a Tedlar bag. Blanks A, B and C were run in ADM devices while Blanks D, E and F were run in Millipore devices.

Results of the Volatile Analysis

The volatile data are compiled in Tables 3 and 4. Also included are the averages of duplicate results and the differences between duplicate results. The actual data reports for extractions and blanks are in Appendix A. The data reports for the initial filtrates are in Appendix B.

To determine if a variation in parameter affects the leaching of a volatile compound by the TCLP, several algebraic manipulations are necessary. The following example uses benzene results from the extractions of ammonia-lime still bottoms to examine the significance of liquid/solid ratio on benzene recovery.

Table 3. Ammonia-Lime Still Bottoms
Volatile Organics Data (µg/l)

	Extraction Number							
	1	2	3	4	5	6	7	8
ERCO ID	25687 25688	25647 25648	27962 27963	27261 27262	27964 28002	27821 27822	25754 25755	25789 25790
Benzene								
result	1,100	920	660	1,000	720	710	970	600
duplicate result	950	1,000	690	760	760	610	790	970
average of duplicates	1,025	960	675	880	740	660	880	785
difference between duplicates	150	80	30	240	40	100	180	370
Chlorobenzene								
result	940	750	740	1,000	750	770	900	590
duplicate result	640	860	920	730	810	590	770	850
average of duplicates	790	805	830	865	780	680	835	720
difference between duplicates	300	110	180	270	60	180	130	280
1,1-Dichloroethene								
result	1,100	860	340	640	600	560	1,600	660
duplicate result	780	1,000	540	420	370	300	1,200	1,100
average of duplicates	940	930	440	530	485	430	1,400	880
difference between duplicates	320	140	200	220	230	260	400	440
Toluene								
result	1,000	900	700	1,000	860	730	940	570
duplicate result	690	1,100	380	750	810	590	800	920
average of duplicates	845	1,000	540	875	835	660	870	745
difference between duplicates	310	200	320	250	50	140	140	350
Trichloroethene								
result	930	730	700	970	690	660	910	530
duplicate result	680	860	700	680	750	550	730	830
average of duplicates	805	795	700	825	720	605	820	680
difference between duplicates	250	130	0	290	60	110	180	300

Table 4. API Separator Sludge/Electroplating Waste
Volatile Organics Data (µg/l)

	Extraction Number							
	1	2	3	4	5	6	7	8
ERCO ID	25753 26010	25788 25894	28660 28661	28348 28349	28000 28001	28456 28457	26011 26012	25895 25896
Benzene								
result	980	720	680	600	630	690	820	890
duplicate	1,000	940	850	720	980	670	810	840
average	990	830	765	660	805	680	815	865
difference	20	220	170	120	350	20	10	50
Chlorobenzene								
result	180	120	160	140	160	170	140	190
duplicate	180	160	210	150	930	170	140	150
average	180	140	185	145	545	170	140	170
difference	0	40	50	10	770	0	0	40
1,1-Dichloroethene								
result	820	440	100	260	150	130	420	460
duplicate	540	510	210	125	250	140	420	430
average	680	475	155	192.5	200	135	420	445
difference	280	70	110	135	100	10	0	30
Toluene								
result	880	620	580	560	550	620	670	960
duplicate	880	750	740	590	830	620	670	730
average	880	685	660	575	690	620	670	845
difference	0	130	160	30	280	0	0	230
Trichloroethene								
result	240	170	200	210	180	210	190	240
duplicate	240	240	340	220	890	200	190	210
average	240	205	270	215	535	205	190	225
difference	0	70	140	10	710	10	0	30

1. Subtract the average of results at condition a from the average of results at condition A.

$1/4(1,025+960+675+880)-1/4(740+660+880+785)= 118.75$

2. Calculate the standard deviation of a single result (s).

$$s=\sqrt{\frac{\Sigma d^2}{2k}}$$ where d=difference between duplicate results
k=number of duplicate results=8

$$\Sigma d^2=150^2+ 80^2+ 30^2+ 240^2+ 40^2+ 100^2+ 180^2+ 370^2 = 268,300$$

$$s=\sqrt{\frac{268,300}{2x8}} = 129.49$$

3. Calculate the standard error of the difference between two averages ($S_{\bar{d}}$).

$$S_{\bar{d}}= s\sqrt{\frac{2}{n}}$$ where n=number of individual results in each average=8

$$S_{\bar{d}}= 129.49\sqrt{\frac{2}{8}} = 64.75$$

4. Determine the t value at a probability level p=0.01 and eight degrees of freedom.

$t_{0.01,8}= 3.355$, according to Student's t table.

$t(S_{\bar{d}})= 3.355(64.75)= 217.23$

Therefore, there is a 99% probability that the difference between averages will fall between -217.23 and 217.23.

5. Compare the difference between averages calculated in Step 1 with the value determined in Step 4. If the absolute value of the difference between averages is greater than the calculated $t(S_{\bar{d}})$ of Step 4, then the effect is significant.

In this example, the absolute value of 118.75 is less than 217.23 and therefore the effect of a variation in liquid/solid ratio is not significant for benzene recovery in a TCLP extraction of ammonia-lime still bottoms.

Similar calculations for each volatile compound and each waste appear in Appendix C.

The calculations are based on the concentrations of the spiked compounds in the final filtrates. Though the initial filtrates were analyzed for volatile compounds, the results were not used. The main reason for their omission is that only the solid portion of the waste was spiked and therefore only the final filtrates contained spiked compounds. In some cases, spiked compounds were detected at low levels in the initial filtrates. Their presence may have resulted from contamination or the presence of these compounds in the waste. At any rate, calculations showed that the initial concentrations of the compounds and the volume of initial filtrate were too small to affect the final concentrations. For example, the mathematical combination of benzene in the initial and final filtrates for Extract 4B of the ammonia-lime still bottoms is as follows:

Concentration of benzene in initial filtrate= 31ug/l
Volume of initial filtrate= 1.6ml diluted to 5.0ml

Concentration of benzene in final filtrate= 760ug/l
Volume of final filtrate= 467ml

$$\frac{(31\text{ug/L} \times 0.005\text{L}) + (760\text{ug/L} \times 467\text{L})}{0.0016\text{L} + 0.467\text{L}} = \frac{355\text{ug}}{0.4686\text{L}} = 760\text{ug/L}$$

The concentration of benzene in the final filtrate and the combined concentration of benzene in the initial and final filtrates are the same.

Discussion of Volatile Results

Table 5 summarizes the significant findings for the ZHE TCLP Ruggedness Testing. The only significant parameter was the choice of device. For both wastes studied, recovery of 1,1-dichloroethene was higher in the ADM device than in the Millipore device.

The reason for this difference is believed to be due to observed leaks in the Millipore device. The Millipore devices repeatedly lost all pressure from behind the piston during the 18 hour extraction. The loss of pressure implies that the O-ring seals or the valve fittings may be faulty. Because similar seals and valve fittings are found on the top and the bottom of the device, the presence of a tight seal is a necessity. In several instances, the Millipore devices leaked extraction fluid from between the top where the extraction fluid enters the device and the cylinder. In these cases, the samples were redone. Leakage of volatile compounds would be less easily detected.

In comparison, the ADM devices retained all pressure applied prior to extraction. Due to the loss of pressure in the Millipore devices, the parameter of pressure behind the piston was not sufficiently tested and may actually be important in TCLP recovery of volatile compounds.

Whatever factors are involved with reduced recovery in the Millipore device, the volatility of the compounds appears to be important. 1,1-

Table 5. Summary of Volatile Organics Results for the Ruggedness Testing of the ZHE TCLP*

Waste	Parameter						
	Liquid/ solid ratio	% Head- space	Acidity of Fluid #1	Device	Collection Method	Aliquotting	Pressure behind Piston
Ammonia-Lime Still Bottoms				1,1-Dichloroethene (D>d)			
API Separator Sludge/Electro-plating Waste				1,1-Dichloroethene (D>d)			

*The TCLP recovery of volatile organics appearing in this table is significantly affected by variations in the designated parameter. The (D>d) notations explains that condition D resulted in a higher recovery than condition d. Conditions are defined as follows:

Parameter	Condition 1		Condition 2	
Liquid/solid ratio	19:1	(A)	21:1	(a)
% Headspace	0	(B)	5	(b)
Acidity of Fluid #1	60 meq	(C)	80 meq	(c)
Device	ADM	(D)	Millipore	(d)
Collection Method	syringe	(E)	Tedlar bag	(e)
Aliquotting	yes	(F)	no	(f)
Pressure behind Piston	0 psi	(G)	20 psi	(g)

1,1-Dichloroethene is the most volatile of the five spiked compounds. The least volatile compound, chlorobenzene, experienced the least variation in recovery between the two devices.

The parameter of headspace did not significantly affect recovery of volatile compounds. Therefore, the ability of the devices to eliminate headspace does not appear to be crucial.

The blanks showed little evidence of contamination. Tetrachloroethene was present at 44 and 11ppb in two of the blanks. The remaining blanks contained none of the volatile compounds on the Hazardous Substance List.

Other than the choice of device, variations in the parameters did not seem to significantly affect TCLP recovery of volatile compounds. The TCLP protocol may be considered to be adequately rugged with respect to the parameters investigated with the exception of device.

Conclusion

The results of the ZHE TCLP Ruggedness Testing suggest that one parameter, the ZHE device, is critical particularly for highly volatile compounds. As indicated above, the reason for this observation is believed to be the presence of leaks in the Millipore device.

As a fractional factorial design, ruggedness testing assumes that the parameters are independent. In practice, the parameters are likely to interact. Additional work such as doubling the number of extractions in the experimental design would help to differentiate main effects from interactions.

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/21/86
ANALYSIS COMPLETED: 01/30/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

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VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 1A-(AL) 25687	Extract 1B-(AL) 25688
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		ND	ND
Acetone	50		290	*
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		1,100	780
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		ND	ND
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		930	680
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		1,100	950
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		11	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		1,000	690
Chlorobenzene	2		940	640
Ethylbenzene	2		ND	ND
Styrene	2		ND	ND
Total xylenes	2		ND	ND

ND = Not detected.

*Trace concentrations detected below minimum reporting limit.

VOLATILE ORGANICS ANALYSIS

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CLIENT: HWMSS-42

Additional compounds	Client ID: / ERCO ID:	Extract 1A-(AL) 25687	Extract 1B-(AL) 25688
Unknowns (See attached sheet)		X	X
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	91	97
% Recovery d_8-Toluene	111	100

CLIENT: HWMSS-42
CLIENT ID: 25687
ERCO ID: Extract 1A (AL)
REPORTED BY: JFM
CHECKED BY: NS

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ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS
BY EPA METHOD 624
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Compound name	Fraction	Scan no.	Estimated concentration (µg/l)
Naphthalene	VOA	1,079	370
Butanoic acid,1-methylethylester	VOA	999	440

CLIENT: HWMSS-42

CLIENT ID: 25688

ERCO ID: Extract 1B (AL)

REPORTED BY: JFM

CHECKED BY: NS

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ORGANICS ANALYSIS

TENTATIVELY IDENTIFIED COMPOUNDS

BY EPA METHOD 624

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Compound name	Fraction	Scan no.	Estimated concentration (µg/l)
Butanoic acid, 1-methylethylester	VOA	999	470
Naphthalene	VOA	1,079	440

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/20/86
ANALYSIS COMPLETED: 01/30/86
RESULTS IN: µg/l (ppb)
REPORTED BY: PTA/JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 2A-(AL) 25647	Extract 2B-(AL) 25648
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		ND	ND
Acetone	50		ND	ND
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		860	1,000
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		ND	ND
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		730	860
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		920	1,000
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		ND	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		900	1,100
Chlorobenzene	2		750	860
Ethylbenzene	2		ND	ND
Styrene	2		ND	ND
Total xylenes	2		ND	ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

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CLIENT: HWMSS-42

Additional compounds	Client ID: ERCO ID:	Extract 2A-(AL) 25647	Extract 2B-(AL) 25648
Butanoic acid 1-methylethylester[a]		490	440
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

[a]Calculated with an RF. of 1.0. Identification based on reference spectra.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	97	96
% Recovery d_8-Toluene	110	105

CLIENT: HWMSS-42
SAMPLE RECEIVED: 03/10/86
ANALYSIS COMPLETED: 04/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

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VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
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Compound	Minimum reporting limit	Client ID:	Extract 3A (AL)	Extract 3B (AL)
		ERCO ID:	27962	27963
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		ND	ND
Acetone	50		ND	360
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		340	540
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		ND	ND
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		700	700
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		660	690
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		16	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		700	380
Chlorobenzene	2		740	920
Ethylbenzene	2		ND	ND
Styrene	2		ND	ND
Total xylenes	2		ND	ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

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CLIENT: HWMSS-42

Additional compounds	Client ID: / ERCO ID:	Extract 3A (AL) 27962	Extract 3B (AL) 27963
Unknown		X	X
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	95	99
% Recovery d_8-Toluene	98	53

CLIENT: HWMSS-42
SAMPLE RECEIVED: 03/03/86
ANALYSIS COMPLETED: 04/02/86
RESULTS IN: µg/l (ppb)
REPORTED BY: DJW / JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
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Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 4A (AL) 27261	Extract 4B (AL) 27262
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		ND	ND
Acetone	50		ND	ND
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		640	420
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		ND	ND
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		970	680
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		1,000	760
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		ND	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		1,000	750
Chlorobenzene	2		1,000	730
Ethylbenzene	2		ND	ND
Styrene	2		ND	ND
Total xylenes	2		ND	ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: ERCO ID:	Extract 4A (AL) 27261	Extract 4B (AL) 27262
Unknown hydrocarbon		X	X
Dilution factor:		25	10

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	96	93
% Recovery d_8-Toluene	100	103

CLIENT: HWMSS-42
SAMPLE RECEIVED: 03/10/86
ANALYSIS COMPLETED: 04/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 5A (AL) 27964
Chloromethane	5		ND
Bromomethane	5		ND
Vinyl chloride	5		ND
Chloroethane	5		ND
Methylene chloride	5		ND
Acetone	50		ND
Carbon disulfide	2		ND
1,1-Dichloroethene	2		600
1,1-Dichloroethane	2		ND
trans-1,2-Dichloroethene	2		ND
Chloroform	2		12
1,2-Dichloroethane	2		ND
2-Butanone	10		ND
1,1,1-Trichloroethane	2		ND
Carbon tetrachloride	2		ND
Vinyl acetate	2		ND
Bromodichloromethane	2		ND
1,2-Dichloropropane	2		ND
trans-1,3-Dichloropropene	2		ND
Trichloroethene	2		690
Dibromochloromethane	2		ND
1,1,2-Trichloroethane	2		ND
Benzene	2		720
cis-1,3-Dichloropropene	2		ND
2-Chloroethyl vinyl ether	2		ND
Bromoform	2		ND
2-Hexanone	10		ND
4-Methyl-2-pentanone	10		ND
Tetrachloroethene	2		10
1,1,2,2-Tetrachloroethane	2		ND
Toluene	2		860
Chlorobenzene	2		750
Ethylbenzene	2		ND
Styrene	2		ND
Total xylenes	2		ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: / ERCO ID:	Extract 5A (AL) 27964
Unknown		X
Dilution factor:		5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	86
% Recovery d_8-Toluene	115

CLIENT: HWMSS-42
CLIENT ID: 5B (AL)
ERCO ID: 28002
SAMPLE RECEIVED: 03/11/86
ANALYSIS COMPLETED: 05/06/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	750
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	760
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	370	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<50	Toluene	810
Carbon tetrachloride	<10	Chlorobenzene	810
Vinyl acetate	<10	Ethylbenzene	<10
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	<10

Reported by: WHC
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 91
d_8-toluene 102

CLIENT: HWMSS-42
SAMPLE RECEIVED: 03/06/86
ANALYSIS COMPLETED: 04/14/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 6A(AL) 27821	Extract 6B(AL) 27822
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		ND	ND
Acetone	50		ND	ND
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		560	300
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		10	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		ND	ND
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		660	550
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		710	610
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		ND	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		730	590
Chlorobenzene	2		770	590
Ethylbenzene	2		ND	ND
Styrene	2		*	ND
Total xylenes	2		ND	ND

ND = Not detected.
*Trace concentrations detected below minimum reporting limit.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: Extract 6A(AL) ERCO ID: 27821	Extract 6B(AL) 27822
Unknown hydrocarbons	X	X
Dilution factor:	5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	104	93
% Recovery d_8-Toluene	96	101

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/22/86
ANALYSIS COMPLETED: 02/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 7A-(AL) 25754	Extract 7B-(AL) 25755
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		ND	ND
Acetone	50		ND	ND
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		1,600	1,200
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		ND	210
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		910	730
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		970	790
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		ND	110
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		940	800
Chlorobenzene	2		900	770
Ethylbenzene	2		ND	ND
Styrene	2		ND	ND
Total xylenes	2		ND	ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: ERCO ID:	Extract 7A-(AL) 25754	Extract 7B-(AL) 25755
Butanoic acid 1-methylethylester		470	400
Propyl benzene isomer		73	ND
Propyl benzene isomer		37	ND
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	112	110
% Recovery d_8-Toluene	98	100

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/23/86
ANALYSIS COMPLETED: 02/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID:	Extract 8A-(AL)	Extract 8B-(AL)
		ERCO ID:	25789	25790
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		ND	ND
Acetone	50		ND	ND
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		660	1,100
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		ND	160
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		530	830
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		600	970
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		ND	130
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		570	920
Chlorobenzene	2		580	860
Ethylbenzene	2		ND	ND
Styrene	2		ND	ND
Total xylenes	2		ND	ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: ERCO ID:	Extract 8A-(AL) 25789	Extract 8B-(AL) 25790
Unknown hydrocarbons		X	X
Alkyl benzene		X	ND
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	108	95
% Recovery d_8-Toluene	96	100

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/22/86
ANALYSIS COMPLETED: 02/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 1A-(SS) 25753
Chloromethane	5		ND
Bromomethane	5		ND
Vinyl chloride	5		ND
Chloroethane	5		ND
Methylene chloride	5		ND
Acetone	50		ND
Carbon disulfide	2		ND
1,1-Dichloroethene	2		820
1,1-Dichloroethane	2		ND
trans-1,2-Dichloroethene	2		ND
Chloroform	2		ND
1,2-Dichloroethane	2		ND
2-Butanone	10		ND
1,1,1-Trichloroethane	2		ND
Carbon tetrachloride	2		ND
Vinyl acetate	2		ND
Bromodichloromethane	2		ND
1,2-Dichloropropane	2		ND
trans-1,3-Dichloropropene	2		ND
Trichloroethene	2		240
Dibromochloromethane	2		ND
1,1,2-Trichloroethane	2		ND
Benzene	2		980
cis-1,3-Dichloropropene	2		ND
2-Chloroethyl vinyl ether	2		ND
Bromoform	2		ND
2-Hexanone	10		ND
4-Methyl-2-pentanone	10		ND
Tetrachloroethene	2		20
1,1,2,2-Tetrachloroethane	2		ND
Toluene	2		880
Chlorobenzene	2		180
Ethylbenzene	2		180
Styrene	2		ND
Total xylenes	2		1,900

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: ERCO ID:	Extract 1A-(SS) 25753
Butanoic acid 1-methylethyl ester		250
Propyl benzene isomer		110
Propyl benzene isomer		65
Dilution factor:		5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	106
% Recovery d_8-Toluene	100

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/29/86
ANALYSIS COMPLETED: 02/05/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 1B-(SS) 26010
Chloromethane	5		ND
Bromomethane	5		ND
Vinyl chloride	5		ND
Chloroethane	5		ND
Methylene chloride	5		33
Acetone	50		ND
Carbon disulfide	2		ND
1,1-Dichloroethene	2		540
1,1-Dichloroethane	2		ND
trans-1,2-Dichloroethene	2		ND
Chloroform	2		ND
1,2-Dichloroethane	2		ND
2-Butanone	10		ND
1,1,1-Trichloroethane	2		ND
Carbon tetrachloride	2		ND
Vinyl acetate	2		ND
Bromodichloromethane	2		ND
1,2-Dichloropropane	2		ND
trans-1,3-Dichloropropene	2		ND
Trichloroethene	2		240
Dibromochloromethane	2		ND
1,1,2-Trichloroethane	2		ND
Benzene	2		1,000
cis-1,3-Dichloropropene	2		ND
2-Chloroethyl vinyl ether	2		ND
Bromoform	2		ND
2-Hexanone	10		ND
4-Methyl-2-pentanone	10		ND
Tetrachloroethene	2		ND
1,1,2,2-Tetrachloroethane	2		ND
Toluene	2		880
Chlorobenzene	2		180
Ethylbenzene	2		180
Styrene	2		ND
Total xylenes	2		1,200

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: / ERCO ID:	Extract 1B-(SS) 26010
Unknown hydrocarbons		X
Alkyl benzenes		X
Dilution factor:		5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	107
% Recovery d_8-Toluene	103

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/23/86
ANALYSIS COMPLETED: 02/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 2A-(SS) 25788
Chloromethane	5		ND
Bromomethane	5		ND
Vinyl chloride	5		ND
Chloroethane	5		ND
Methylene chloride	5		ND
Acetone	50		ND
Carbon disulfide	2		ND
1,1-Dichloroethene	2		440
1,1-Dichloroethane	2		ND
trans-1,2-Dichloroethene	2		ND
Chloroform	2		ND
1,2-Dichloroethane	2		ND
2-Butanone	10		ND
1,1,1-Trichloroethane	2		ND
Carbon tetrachloride	2		ND
Vinyl acetate	2		ND
Bromodichloromethane	2		ND
1,2-Dichloropropane	2		ND
trans-1,3-Dichloropropene	2		ND
Trichloroethene	2		170
Dibromochloromethane	2		ND
1,1,2-Trichloroethane	2		ND
Benzene	2		720
cis-1,3-Dichloropropene	2		ND
2-Chloroethyl vinyl ether	2		ND
Bromoform	2		ND
2-Hexanone	10		ND
4-Methyl-2-pentanone	10		ND
Tetrachloroethene	2		ND
1,1,2,2-Tetrachloroethane	2		ND
Toluene	2		620
Chlorobenzene	2		120
Ethylbenzene	2		130
Styrene	2		ND
Total xylenes	2		840

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: ERCO ID:	Extract 2A-(SS) 25788
Unknown hydrocarbons		X
Alkyl benzene		X
Dilution factor:		5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	108
% Recovery d_8-Toluene	98

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/27/86
ANALYSIS COMPLETED: 02/05/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 2B-(SS) 25894
Chloromethane	5		ND
Bromomethane	5		ND
Vinyl chloride	5		ND
Chloroethane	5		ND
Methylene chloride	5		ND
Acetone	50		ND
Carbon disulfide	2		ND
1,1-Dichloroethene	2		510
1,1-Dichloroethane	2		ND
trans-1,2-Dichloroethene	2		ND
Chloroform	2		ND
1,2-Dichloroethane	2		ND
2-Butanone	10		170
1,1,1-Trichloroethane	2		ND
Carbon tetrachloride	2		ND
Vinyl acetate	2		ND
Bromodichloromethane	2		ND
1,2-Dichloropropane	2		ND
trans-1,3-Dichloropropene	2		ND
Trichloroethene	2		240
Dibromochloromethane	2		ND
1,1,2-Trichloroethane	2		ND
Benzene	2		940
cis-1,3-Dichloropropene	2		ND
2-Chloroethyl vinyl ether	2		ND
Bromoform	2		ND
2-Hexanone	10		ND
4-Methyl-2-pentanone	10		ND
Tetrachloroethene	2		ND
1,1,2,2-Tetrachloroethane	2		ND
Toluene	2		750
Chlorobenzene	2		160
Ethylbenzene	2		150
Styrene	2		ND
Total xylenes	2		1,000

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: / ERCO ID:	Extract 2B-(SS) 25894
Unknown hydrocarbons		X
Alkyl benzene		X
Dilution factor:		5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	97
% Recovery d_8-Toluene	98

CLIENT: HWMSS-42
CLIENT ID: Extract 3A (SS)
ERCO ID: 28660
SAMPLE RECEIVED: 03/21/86
ANALYSIS COMPLETED: 04/15/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC
PRIORITY POLLUTANT ANALYSIS
VOLATILE ORGANIC
COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	200
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	680
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	100	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	580
Carbon tetrachloride	<10	Chlorobenzene	160
Vinyl acetate	<10	Ethylbenzene	110
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	1,100

Reported by: WHC
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 97
d_8-toluene 102

CLIENT: HWMSS-42
CLIENT ID: Extract 3B (SS)
ERCO ID: 28661
SAMPLE RECEIVED: 03/21/86
ANALYSIS COMPLETED: 04/14/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS
VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	340
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	850
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	210	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	740
Carbon tetrachloride	<10	Chlorobenzene	210
Vinyl acetate	<10	Ethylbenzene	140
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	1,300

Reported by: WHC
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 96
d_8-toluene 97

CLIENT: HWMSS-42
CLIENT ID: Extract 4A (SS)
ERCO ID: 28348
SAMPLE RECEIVED: 03/17/86
ANALYSIS COMPLETED: 04/12/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	210
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	600
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	260	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	25	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	560
Carbon tetrachloride	<10	Chlorobenzene	140
Vinyl acetate	<10	Ethylbenzene	120
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	1,200

Reported by: WHC
Checked by: JFM

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 175
d_8-toluene 94

CLIENT: HWMSS-42
CLIENT ID: Extract 4B (SS)
ERCO ID: 28349
SAMPLE RECEIVED: 03/17/86
ANALYSIS COMPLETED: 04/12/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC
PRIORITY POLLUTANT ANALYSIS
VOLATILE ORGANIC
COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	220
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	720
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	125	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	590
Carbon tetrachloride	<10	Chlorobenzene	150
Vinyl acetate	<10	Ethylbenzene	120
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	1,000

Reported by: WHC
Checked by: JFM

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 115
d_8-toluene 6

CLIENT: HWMSS-42
CLIENT ID: Extract 5A (SS)
ERCO ID: 28000
SAMPLE RECEIVED: 03/11/86
ANALYSIS COMPLETED: 04/18/86
RESULTS IN: µg/l (ppb)

ERCO/A Division of ENSECO

SUMMARY OF ORGANIC
PRIORITY POLLUTANT ANALYSIS
VOLATILE ORGANIC
COMPOUNDS
- Data Report -

Compound	Result	Minimum reporting limit	Compound	Result	Minimum reporting limit
Chloromethane	ND	5	1,2-Dichloropropane	ND	2
Bromomethane	ND	5	trans-1,3-Dichloropropene	ND	2
Vinyl chloride	ND	5	Trichloroethene	180	2
Chloroethane	ND	5	Dibromochloromethane	ND	2
Methylene chloride	ND	5	1,1,2-Trichloroethane	ND	2
Acetone	ND	50	Benzene	630	2
Carbon disulfide	ND	2	cis-1,3-Dichloropropene	ND	2
1,1-Dichloroethene	150	2	2-Chloroethylvinylether	ND	2
1,1-Dichloroethane	ND	2	Bromoform	ND	2
trans-1,2-Dichloroethene	ND	2	4-Methyl-2-pentanone	ND	10
Chloroform	ND	2	2-Hexanone	ND	10
1,2-Dichloroethane	ND	2	Tetrachloroethene	ND	2
2-Butanone	ND	10	1,1,2,2-Tetrachloroethane	ND	2
1,1,1-Trichloroethane	ND	2	Toluene	550	2
Carbon tetrachloride	ND	2	Chlorobenzene	160	2
Vinyl acetate	ND	2	Ethylbenzene	97	2
Bromodichloromethane	ND	2	Styrene	ND	2
			Total xylenes	930	2

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

Reported by: JFM
Checked by: NS

Dilution factor: 10.

ND = Not detected above the true minimum limit.

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 97
d_8-toluene 98

COMMENTS: Unknown hydrocarbons present.

CLIENT: HWMSS-42
CLIENT ID: Extract 5B (SS)
ERCO ID: 28001
SAMPLE RECEIVED: 03/11/86
ANALYSIS COMPLETED: 04/05/86
RESULTS IN: µg/l (ppb)

ERCO/A Division of ENSECO

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS
VOLATILE ORGANIC COMPOUNDS
- Data Report -

Compound	Result	Minimum reporting limit	Compound	Result	Minimum reporting limit
Chloromethane	ND	5	1,2-Dichloropropane	ND	2
Bromomethane	ND	5	trans-1,3-Dichloropropene	ND	2
Vinyl chloride	ND	5	Trichloroethene	890	2
Chloroethane	ND	5	Dibromochloromethane	ND	2
Methylene chloride	ND	5	1,1,2-Trichloroethane	ND	2
Acetone	540	50	Benzene	980	2
Carbon disulfide	ND	2	cis-1,3-Dichloropropene	ND	2
1,1-Dichloroethene	250	2	2-Chloroethylvinylether	ND	2
1,1-Dichloroethane	ND	2	Bromoform	ND	2
trans-1,2-Dichloroethene	ND	2	4-Methyl-2-pentanone	170	10
Chloroform	12	2	2-Hexanone	ND	10
1,2-Dichloroethane	ND	2	Tetrachloroethene	ND	2
2-Butanone	ND	10	1,1,2,2-Tetrachloroethane	ND	2
1,1,1-Trichloroethane	ND	2	Toluene	830	2
Carbon tetrachloride	ND	2	Chlorobenzene	930	2
Vinyl acetate	ND	2	Ethylbenzene	ND	2
Bromodichloromethane	ND	2	Styrene	ND	2
			Total xylenes	ND	2

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

Reported by: JFM
Checked by: NS

Dilution factor: 5.

ND = Not detected above the true minimum limit.

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 109
d_8-toluene 85

COMMENTS: Unknown hydrocarbons present.

CLIENT: HWMSS-42
CLIENT ID: Extract 6A (SS)
ERCO ID: 28456
SAMPLE RECEIVED: 03/18/86
ANALYSIS COMPLETED: 04/18/86
RESULTS IN: µg/l

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	210
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	690
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	130	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	620
Carbon tetrachloride	<10	Chlorobenzene	170
Vinyl acetate	<10	Ethylbenzene	120
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	1,200

Reported by: TRB
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 98
d_8-toluene 96

CLIENT: HWMSS-42
CLIENT ID: Extract 6B (SS)
ERCO ID: 28457
SAMPLE RECEIVED: 03/18/86
ANALYSIS COMPLETED: 04/18/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS
VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	200
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	670
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	140	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	620
Carbon tetrachloride	<10	Chlorobenzene	170
Vinyl acetate	<10	Ethylbenzene	110
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	1,200

Reported by: TRB
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 98
d_8-toluene 97

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/29/86
ANALYSIS COMPLETED: 02/05/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 7A-(SS) 26011	Extract 7B-(SS) 26012
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		43	39
Acetone	50		ND	ND
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		420	420
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		ND	120
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		190	190
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		820	810
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		ND	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		670	670
Chlorobenzene	2		140	140
Ethylbenzene	2		130	130
Styrene	2		ND	ND
Total xylenes	2		1,200	1,300

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: ERCO ID:	Extract 7A-(SS) 26011	Extract 7B-(SS) 26012
Unknown hydrocarbons		X	X
Alkyl benzenes		X	X
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	107	102
% Recovery d_8-Toluene	104	103

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/27/86
ANALYSIS COMPLETED: 02/05/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 8A-(SS) 25895	Extract 8B-(SS) 25896
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		ND	ND
Acetone	50		ND	ND
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		460	430
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		ND	100
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		240	210
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		890	840
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		ND	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		960	730
Chlorobenzene	2		190	150
Ethylbenzene	2		160	150
Styrene	2		ND	ND
Total xylenes	2		1,400	1,400

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: / ERCO ID:	Extract 8A-(SS) 25895	Extract 8B-(SS) 25896
Unknown hydrocarbons		X	X
Alkyl benzene		X	X
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	100	96
% Recovery d_8-Toluene	140	99

CLIENT: HWMSS-42
SAMPLE RECEIVED: 02/03/86
ANALYSIS COMPLETED: 02/12/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: / ERCO ID:	Blank A 26245	Blank B 26246	Blank C 26247
Chloromethane	5		ND	ND	ND
Bromomethane	5		ND	ND	ND
Vinyl chloride	5		ND	ND	ND
Chloroethane	5		ND	ND	ND
Methylene chloride	5		ND	ND	ND
Acetone	50		ND	ND	ND
Carbon disulfide	2		ND	ND	ND
1,1-Dichloroethene	2		ND	ND	ND
1,1-Dichloroethane	2		ND	ND	ND
trans-1,2-Dichloroethene	2		ND	ND	ND
Chloroform	2		ND	ND	ND
1,2-Dichloroethane	2		ND	ND	ND
2-Butanone	10		ND	ND	ND
1,1,1-Trichloroethane	2		ND	ND	ND
Carbon tetrachloride	2		ND	ND	ND
Vinyl acetate	2		ND	ND	ND
Bromodichloromethane	2		ND	ND	ND
1,2-Dichloropropane	2		ND	ND	ND
trans-1,3-Dichloropropene	2		ND	ND	ND
Trichloroethene	2		ND	ND	ND
Dibromochloromethane	2		ND	ND	ND
1,1,2-Trichloroethane	2		ND	ND	ND
Benzene	2		ND	ND	ND
cis-1,3-Dichloropropene	2		ND	ND	ND
2-Chloroethyl vinyl ether	2		ND	ND	ND
Bromoform	2		ND	ND	ND
2-Hexanone	10		ND	ND	ND
4-Methyl-2-pentanone	10		ND	ND	ND
Tetrachloroethene	2		44	ND	11
1,1,2,2-Tetrachloroethane	2		ND	ND	ND
Toluene	2		ND	ND	ND
Chlorobenzene	2		ND	ND	ND
Ethylbenzene	2		ND	ND	ND
Styrene	2		ND	ND	ND
Total xylenes	2		ND	ND	ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: / ERCO ID:	Blank A 26245	Blank B 26246	Blank C 26247
Unknown hydrocarbons		X	X	X
Dilution factor:		5	5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	109	97	108
% Recovery d_8-Toluene	99	97	94

CLIENT: HWMSS-42
CLIENT ID: Blank D
ERCO ID: 28958
SAMPLE RECEIVED: 04/01/86
ANALYSIS COMPLETED: 04/14/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	<10
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	<10
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	<10	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	<10
Carbon tetrachloride	<10	Chlorobenzene	<10
Vinyl acetate	<10	Ethylbenzene	<10
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	<10

Reported by: WHC
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 97
d_8-toluene 96

CLIENT: HWMSS-42
CLIENT ID: Blank E
ERCO ID: 29009
SAMPLE RECEIVED: 04/02/86
ANALYSIS COMPLETED: 05/07/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	<10
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	<10
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	<10	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	<10
Carbon tetrachloride	<10	Chlorobenzene	<10
Vinyl acetate	<10	Ethylbenzene	<10
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	<10

Reported by: WHC
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 97
d_8-toluene 99

COMMENTS: Unknown present.

CLIENT: HWMSS-42
CLIENT ID: Blank F
ERCO ID: 28959
SAMPLE RECEIVED: 04/01/86
ANALYSIS COMPLETED: 04/18/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	<10
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	<10
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	<10	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	<10
Carbon tetrachloride	<10	Chlorobenzene	<10
Vinyl acetate	<10	Ethylbenzene	<10
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	<10

Reported by: WHC
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 73
d_8-toluene 86

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/21/86
ANALYSIS COMPLETED: 01/30/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: / ERCO ID:	Initial Filtrates: Extract 1A-(AL) 25685	Initial Filtrates: Extract 1B-(AL) 25686
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		ND	ND
Acetone	50		690	1,300
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		13	ND
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		ND	150
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		ND	ND
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		35	44
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		11	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		30	24
Chlorobenzene	2		ND	ND
Ethylbenzene	2		ND	ND
Styrene	2		ND	ND
Total xylenes	2		ND	ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: / ERCO ID:	Initial Filtrates: Extract 1A-(AL) 25685	Initial Filtrates: Extract 1B-(AL) 25686
Unknown (see attached sheets)		X	X
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	92	90
% Recovery d_8-Toluene	93	111

CLIENT: HWMSS-42

CLIENT ID: Extract 1A (AL) Initial Filtrate

ERCO ID: 25685

REPORTED BY: JFM

CHECKED BY: NS

ERCO/A Division of ENSECO

ORGANICS ANALYSIS

TENTATIVELY IDENTIFIED COMPOUNDS

BY EPA METHOD 624

- Data Report -

Compound name	Fraction	Scan no.	Estimated concentration (µg/l)
Unknown Hydrocarbon	VOA	130	30
Pyridine	VOA	688	65
Unknown aromatic	VOA	1,011	30

CLIENT: HWMSS-42

CLIENT ID: Extract 1B (AL) Initial Filtrate

ERCO ID: 25686

REPORTED BY: JFM

CHECKED BY: NS

ERCO/A Division of ENSECO

ORGANICS ANALYSIS

TENTATIVELY IDENTIFIED COMPOUNDS

BY EPA METHOD 624

- Data Report -

Compound name	Fraction	Scan no.	Estimated concentration (µg/l)
Unknown hydrocarbon	VOA	129	56
Pyridine	VOA	684	160
Unknown aromatic	VOA	1,011	140
Unknown aromatic	VOA	897	83
Unknown hydrocarbon	VOA	1,356	26

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/20/86
ANALYSIS COMPLETED: 01/28/86
RESULTS IN: µg/l (ppb)
REPORTED BY: PTA/JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: / ERCO ID:	Initial Filtrates: Extract 2A-(AL) 25645	Initial Filtrates: Extract 2B-(AL) 25646
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		130	110
Acetone	50		910	1,100
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		ND	ND
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		140	150
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		ND	ND
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		24	23
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		ND	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		20	13
Chlorobenzene	2		ND	ND
Ethylbenzene	2		ND	ND
Styrene	2		ND	ND
Total xylenes	2		ND	ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: / ERCO ID:	Initial Filtrates: Extract 2A-(AL) 25645	Initial Filtrates: Extract 2B-(AL) 25646
Unknowns[a] (See attached sheet)		X	X
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

[a]Calculated with an R.F. of 1.0. Identification based on reference spectra.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	111	105
% Recovery d_8-Toluene	102	99

CLIENT: HWMSS-42

CLIENT ID: 25645

ERGO ID: Extract 2A (AL)

REPORTED BY: PTA/JFM

CHECKED BY: NS

ERCO/A Division of ENSECO

ORGANICS ANALYSIS

TENTATIVELY IDENTIFIED COMPOUNDS

BY EPA METHOD 624

- Data Report -

Compound name	Fraction	Scan no.	Estimated concentration (µg/l)
Pyridine	VOA	690	72
Phenol	VOA	1,015	43
Unknown hydrocarbon	VOA	1,332	25

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CLIENT: HWMSS-42
CLIENT ID: 25646
ERCO ID: Extract 2B (AL)
REPORTED BY: PTA/JFM
CHECKED BY: NS

ERCO/A Division of ENSECO
ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS
BY EPA METHOD 624
- Data Report -

Compound name	Fraction	Scan no.	Estimated concentration (µg/l)
Pyridine	VOA	690	120
Phenol	VOA	1,014	92
Phenol,2-methyl-	VOA	1,282	25
Unknown hydrocarbon	VOA	1,328	25
Benzofuran	VOA	1,396	25

CLIENT: HWMSS-42
SAMPLE RECEIVED: 03/10/86
ANALYSIS COMPLETED: 04/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY:

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID:	Initial Filtrates Extract 3A (AL)	Extract 3B (AL)
		ERCO ID:	27959	27960
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		ND	ND
Acetone	50		1,400	1,100
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		ND	ND
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		140	79
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		ND	ND
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		45	29
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		14	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		24	16
Chlorobenzene	2		ND	ND
Ethylbenzene	2		ND	ND
Styrene	2		ND	ND
Total xylenes	2		ND	ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: / ERCO ID:	Initial Filtrates Extract 3A (AL) 27959	Extract 3B (AL) 27960
Pyridine		X	X
Alkyl-substituted pyridine		X	X
Unknown aliphatic hydrocarbons		X	X
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	97	140
% Recovery d_8-Toluene	98	95

CLIENT: HWMSS-42
CLIENT ID: Extract 4A (AL) Initial Filtrate
ERCO ID: 27258
SAMPLE RECEIVED: 03/03/86
ANALYSIS COMPLETED: 04/02/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS
VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	<10
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	35	1,1,2-Trichloroethane	<10
Acetone	860	Benzene	19
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	<10	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	130	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	<2*
Carbon tetrachloride	<10	Chlorobenzene	<10
Vinyl acetate	<10	Ethylbenzene	<10
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	<10

*Trace concentrations detected below the reporting limit.

Reported by: JFM
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 95
d_8-toluene 100

CLIENT: HWMSS-42
CLIENT ID: Extract 4B (AL) Initial Filtrate
ERCO ID: 27259
SAMPLE RECEIVED: 03/03/86
ANALYSIS COMPLETED: 04/03/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS
VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	<10
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	32	1,1,2-Trichloroethane	<10
Acetone	480	Benzene	31
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	<10	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	17
Carbon tetrachloride	<10	Chlorobenzene	<10
Vinyl acetate	<10	Ethylbenzene	<10
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	<10

Reported by: WHC
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 88
d_8-toluene 114

CLIENT: HWMSS-42
SAMPLE RECEIVED: 03/10/86
ANALYSIS COMPLETED: 04/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY:

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Initial Filtrates

Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 5A (AL) 27961
Chloromethane	5		ND
Bromomethane	5		ND
Vinyl chloride	5		ND
Chloroethane	5		ND
Methylene chloride	5		ND
Acetone	50		1,500
Carbon disulfide	2		ND
1,1-Dichloroethene	2		ND
1,1-Dichloroethane	2		ND
trans-1,2-Dichloroethene	2		ND
Chloroform	2		ND
1,2-Dichloroethane	2		ND
2-Butanone	10		180
1,1,1-Trichloroethane	2		ND
Carbon tetrachloride	2		ND
Vinyl acetate	2		ND
Bromodichloromethane	2		ND
1,2-Dichloropropane	2		ND
trans-1,3-Dichloropropene	2		ND
Trichloroethene	2		ND
Dibromochloromethane	2		ND
1,1,2-Trichloroethane	2		ND
Benzene	2		41
cis-1,3-Dichloropropene	2		ND
2-Chloroethyl vinyl ether	2		ND
Bromoform	2		ND
2-Hexanone	10		ND
4-Methyl-2-pentanone	10		ND
Tetrachloroethene	2		12
1,1,2,2-Tetrachloroethane	2		ND
Toluene	2		20
Chlorobenzene	2		ND
Ethylbenzene	2		ND
Styrene	2		ND
Total xylenes	2		ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Initial Filtrates

Additional compounds	Client ID: ERCO ID:	Extract 5A (AL) 27961
Pyridine		X
Alkyl-substituted pyridine		X
Unknown aliphatic hydrocarbons		X
Dilution factor:		5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	95
% Recovery d_8-Toluene	97

CLIENT: HWMSS-42
SAMPLE RECEIVED: 03/11/86
ANALYSIS COMPLETED: 04/05/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

—Initial Filtrates—

Compound	Minimum reporting limit	Client ID: ERCO ID:	Extract 5B (AL) 27999
Chloromethane	5		ND
Bromomethane	5		ND
Vinyl chloride	5		ND
Chloroethane	5		ND
Methylene chloride	5		ND
Acetone	50		1,400
Carbon disulfide	2		ND
1,1-Dichloroethene	2		ND
1,1-Dichloroethane	2		ND
trans-1,2-Dichloroethene	2		ND
Chloroform	2		10
1,2-Dichloroethane	2		ND
2-Butanone	10		ND
1,1,1-Trichloroethane	2		ND
Carbon tetrachloride	2		ND
Vinyl acetate	2		ND
Bromodichloromethane	2		ND
1,2-Dichloropropane	2		ND
trans-1,3-Dichloropropene	2		ND
Trichloroethene	2		ND
Dibromochloromethane	2		ND
1,1,2-Trichloroethane	2		ND
Benzene	2		20
cis-1,3-Dichloropropene	2		ND
2-Chloroethyl vinyl ether	2		ND
Bromoform	2		ND
2-Hexanone	10		ND
4-Methyl-2-pentanone	10		ND
Tetrachloroethene	2		ND
1,1,2,2-Tetrachloroethane	2		ND
Toluene	2		ND
Chlorobenzene	2		ND
Ethylbenzene	2		ND
Styrene	2		ND
Total xylenes	2		ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

		Initial Filtrates
Additional compounds	Client ID: ERCO ID:	Extract 5B (AL) 27999
Unknowns		X
Dilution factor:		5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	112
% Recovery d_8-Toluene	80

CLIENT: HWMSS-42
CLIENT ID: Extract[6] 6A (AL) - Initial Filtrate
ERCO ID: 27348
SAMPLE RECEIVED: 03/05/86
ANALYSIS COMPLETED: 04/14/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	<10
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	2,200	Benzene	64
Carbon disulfide	<25	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	<25	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<25	Bromoform	<10
trans-1,2-Dichloroethene	<25	4-Methyl-2-pentanone	<50
Chloroform	13	2-Hexanone	<50
1,2-Dichloroethane	<25	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	33
Carbon tetrachloride	<10	Chlorobenzene	<10
Vinyl acetate	<10	Ethylbenzene	<10
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	<10

Reported by: WHC
Checked by: JFM

COMMENTS: Unknowns present.

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 150
d_8-toluene 96

CLIENT: HWMSS-42
CLIENT ID: Extract 6B (AL) - Initial Filtrate
ERCO ID: 27349
SAMPLE RECEIVED: 03/05/86
ANALYSIS COMPLETED: 04/02/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	<10
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	820	Benzene	55
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	<10	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	30
Carbon tetrachloride	<10	Chlorobenzene	<10
Vinyl acetate	<10	Ethylbenzene	<10
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	<10

Reported by: WHC
Checked by: JFM

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 85
d_8-toluene 114

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/22/86
ANALYSIS COMPLETED: 02/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: / ERCO ID:	Initial Filtrates: Extract 7A-(AL) 25751	Initial Filtrates: Extract 7A-(AL) 25752
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		ND	ND
Acetone	50		840	920
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		ND	ND
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		130	150
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		ND	ND
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		31	40
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		ND	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		16	22
Chlorobenzene	2		ND	ND
Ethylbenzene	2		ND	ND
Styrene	2		ND	ND
Total xylenes	2		ND	ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: / ERCO ID:	Initial Filtrates: Extract 7A-(AL) 25751	Initial Filtrates: Extract 7B-(AL) 25752
Alkyl benzene[a]		27	40
Pyridine[a]		54	75
Unknown hydrocarbon[a]		ND	28
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

[a]Calculated with R.F. of 1.0. Indentification based on reference spectrum.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	98	98
% Recovery d_8-Toluene	100	102

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/23/86
ANALYSIS COMPLETED: 02/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: PT
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: / ERCO ID:	Initial Filtrates: Extract 8A-(AL) 25786	Initial Filtrates: Extract 8B-(AL) 25787
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		ND	ND
Acetone	50		580	860
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		ND	ND
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		ND	85
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		ND	ND
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		23	35
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		ND	18
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		14	19
Chlorobenzene	2		ND	ND
Ethylbenzene	2		ND	ND
Styrene	2		ND	ND
Total xylenes	2		ND	ND

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: ERCO ID:	Extract 8A-(AL) 25786	Extract 8B-(AL) 25787
None detected			
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	102	108
% Recovery d_8-Toluene	100	97

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/22/86
ANALYSIS COMPLETED: 02/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: / ERCO ID:	Initial Filtrate Extract 1A-(SS) 25750
Chloromethane	5		ND
Bromomethane	5		ND
Vinyl chloride	5		ND
Chloroethane	5		ND
Methylene chloride	5		ND
Acetone	50		ND
Carbon disulfide	2		ND
1,1-Dichloroethene	2		ND
1,1-Dichloroethane	2		ND
trans-1,2-Dichloroethene	2		ND
Chloroform	2		ND
1,2-Dichloroethane	2		ND
2-Butanone	10		ND
1,1,1-Trichloroethane	2		ND
Carbon tetrachloride	2		ND
Vinyl acetate	2		ND
Bromodichloromethane	2		ND
1,2-Dichloropropane	2		ND
trans-1,3-Dichloropropene	2		ND
Trichloroethene	2		ND
Dibromochloromethane	2		ND
1,1,2-Trichloroethane	2		ND
Benzene	2		140
cis-1,3-Dichloropropene	2		ND
2-Chloroethyl vinyl ether	2		ND
Bromoform	2		ND
2-Hexanone	10		ND
4-Methyl-2-pentanone	10		ND
Tetrachloroethene	2		ND
1,1,2,2-Tetrachloroethane	2		ND
Toluene	2		72
Chlorobenzene	2		ND
Ethylbenzene	2		28
Styrene	2		ND
Total xylenes	2		170

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

	Initial Filtrates
Additional compounds	Client ID: Extract 1A-(SS) ERCO ID: 25750
Alkyl benzene[a]	18
Pyridine[a]	ND
Unknown hydrocarbon[a]	ND
Dilution factor:	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

[a]Calculated with R.F. of 1.0. Identification based on reference spectrum.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	80
% Recovery d_8-Toluene	100

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/29/86
ANALYSIS COMPLETED: 02/05/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: Initial Filtrate ERCO ID: Extract 1B-(SS) 26007
Chloromethane	5	ND
Bromomethane	5	ND
Vinyl chloride	5	ND
Chloroethane	5	ND
Methylene chloride	5	36
Acetone	50	ND
Carbon disulfide	2	ND
1,1-Dichloroethene	2	ND
1,1-Dichloroethane	2	ND
trans-1,2-Dichloroethene	2	ND
Chloroform	2	ND
1,2-Dichloroethane	2	ND
2-Butanone	10	50
1,1,1-Trichloroethane	2	ND
Carbon tetrachloride	2	ND
Vinyl acetate	2	ND
Bromodichloromethane	2	ND
1,2-Dichloropropane	2	ND
trans-1,3-Dichloropropene	2	ND
Trichloroethene	2	ND
Dibromochloromethane	2	ND
1,1,2-Trichloroethane	2	ND
Benzene	2	100
cis-1,3-Dichloropropene	2	ND
2-Chloroethyl vinyl ether	2	ND
Bromoform	2	ND
2-Hexanone	10	ND
4-Methyl-2-pentanone	10	ND
Tetrachloroethene	2	ND
1,1,2,2-Tetrachloroethane	2	ND
Toluene	2	44
Chlorobenzene	2	ND
Ethylbenzene	2	ND
Styrene	2	ND
Total xylenes	2	93

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

		Initial Filtrate
Additional compounds	Client ID:	Extract 1B-(SS)
	ERCO ID:	26007
None detected		
Dilution factor:		5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	91
% Recovery d_8-Toluene	104

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/23/86
ANALYSIS COMPLETED: 02/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: PT
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: / ERCO ID:	Initial Filtrate Extract 2A-(SS) 25785
Chloromethane	5		ND
Bromomethane	5		ND
Vinyl chloride	5		ND
Chloroethane	5		ND
Methylene chloride	5		ND
Acetone	50		ND
Carbon disulfide	2		ND
1,1-Dichloroethene	2		ND
1,1-Dichloroethane	2		ND
trans-1,2-Dichloroethene	2		ND
Chloroform	2		ND
1,2-Dichloroethane	2		ND
2-Butanone	10		ND
1,1,1-Trichloroethane	2		ND
Carbon tetrachloride	2		ND
Vinyl acetate	2		ND
Bromodichloromethane	2		ND
1,2-Dichloropropane	2		ND
trans-1,3-Dichloropropene	2		ND
Trichloroethene	2		ND
Dibromochloromethane	2		ND
1,1,2-Trichloroethane	2		ND
Benzene	2		120
cis-1,3-Dichloropropene	2		ND
2-Chloroethyl vinyl ether	2		ND
Bromoform	2		ND
2-Hexanone	10		ND
4-Methyl-2-pentanone	10		ND
Tetrachloroethene	2		ND
1,1,2,2-Tetrachloroethane	2		ND
Toluene	2		87
Chlorobenzene	2		ND
Ethylbenzene	2		14
Styrene	2		ND
Total xylenes	2		120

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: / ERCO ID:	Extract 2A-(SS) 25785
None detected		
Dilution factor:		5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	106
% Recovery d_8-Toluene	104

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/27/86
ANALYSIS COMPLETED: 02/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: ERCO ID:	Initial Filtrate Extract 2B-(SS) 25891
Chloromethane	5		ND
Bromomethane	5		ND
Vinyl chloride	5		ND
Chloroethane	5		ND
Methylene chloride	5		170
Acetone	50		ND
Carbon disulfide	2		ND
1,1-Dichloroethene	2		ND
1,1-Dichloroethane	2		ND
trans-1,2-Dichloroethene	2		ND
Chloroform	2		ND
1,2-Dichloroethane	2		ND
2-Butanone	10		ND
1,1,1-Trichloroethane	2		ND
Carbon tetrachloride	2		ND
Vinyl acetate	2		ND
Bromodichloromethane	2		ND
1,2-Dichloropropane	2		ND
trans-1,3-Dichloropropene	2		ND
Trichloroethene	2		ND
Dibromochloromethane	2		ND
1,1,2-Trichloroethane	2		ND
Benzene	2		140
cis-1,3-Dichloropropene	2		ND
2-Chloroethyl vinyl ether	2		ND
Bromoform	2		ND
2-Hexanone	10		ND
4-Methyl-2-pentanone	10		ND
Tetrachloroethene	2		ND
1,1,2,2-Tetrachloroethane	2		ND
Toluene	2		100
Chlorobenzene	2		ND
Ethylbenzene	2		18
Styrene	2		ND
Total xylenes	2		150

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

Additional compounds	Client ID: / ERCO ID:	Extract 2B-(SS) 25891
None detected		
Dilution factor:		5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	93
% Recovery d_8-Toluene	101

CLIENT: HWMSS-42
CLIENT ID: Extract 3A (SS) - Initial Filtrate
ERCO ID: 28615
SAMPLE RECEIVED: 03/20/86
ANALYSIS COMPLETED: 04/13/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS
VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	<10
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	200
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	<10	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	11	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	130
Carbon tetrachloride	<10	Chlorobenzene	<10
Vinyl acetate	<10	Ethylbenzene	<10
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	270

Reported by: WHC
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 94
d_8-toluene 97

CLIENT: HWMSS-42
CLIENT ID: Extract 3B (SS) - Initial Filtrate
ERCO ID: 28616
SAMPLE RECEIVED: 03/20/86
ANALYSIS COMPLETED: 04/14/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS
VOLATILE ORGANIC COMPOUNDS
- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	<10
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	43
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	<10	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	<10
Carbon tetrachloride	<10	Chlorobenzene	<10
Vinyl acetate	<10	Ethylbenzene	<10
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	160

Reported by: WHC
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 95
d_8-toluene 97

CLIENT: HWMSS-42
CLIENT ID: Extract 4A (SS) - Initial Filtrate
ERCO ID: 28346
SAMPLE RECEIVED: 03/17/86
ANALYSIS COMPLETED: 04/12/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS
VOLATILE ORGANIC COMPOUNDS
- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	<10
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	80
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	<10	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	19	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	<10
Carbon tetrachloride	<10	Chlorobenzene	<10
Vinyl acetate	<10	Ethylbenzene	<10
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	140

Reported by: TRB
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 96
d_8-toluene 100

CLIENT: HWMSS-45
CLIENT ID: Extract 4B (SS) - Initial Filtrate
ERCO ID: 28347
SAMPLE RECEIVED: 03/17/86
ANALYSIS COMPLETED: 04/12/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS
VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	<10
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	110
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	<10	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	10
Carbon tetrachloride	<10	Chlorobenzene	<10
Vinyl acetate	<10	Ethylbenzene	<10
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	260

Reported by: TRB
Checked by: NS

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 89
d_8-toluene 97

CLIENT: HWMSS-42
SAMPLE RECEIVED: 03/11/86
ANALYSIS COMPLETED: 04/05/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Initial Filtrates

Compound	Minimum reporting limit	Client ID: / ERCO ID:	Extract 5A (SS) 27997	Extract 5B (SS) 27998
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		ND	ND
Acetone	50		290	410
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		ND	ND
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		ND	ND
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		ND	ND
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		140	190
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		ND	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		120	170
Chlorobenzene	2		ND	ND
Ethylbenzene	2		40	43
Styrene	2		ND	ND
Total xylenes	2		330	380

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

		Initial Filtrates	
Additional compounds	Client ID: / ERCO ID:	Extract 5A (SS) 27997	Extract 5B (SS) 27998
Unknowns		X	X
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	113	111
% Recovery d_8-Toluene	75	81

CLIENT: HWMSS-42
CLIENT ID: Extract 6A (SS) - Initial Filtrate
ERCO ID: 28454
SAMPLE RECEIVED: 03/18/86
ANALYSIS COMPLETED: 04/12/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<25
Bromomethane	<25	trans-1,3-Dichloropropene	<25
Vinyl chloride	<25	Trichloroethene	<25
Chloroethane	<25	Dibromochloromethane	<25
Methylene chloride	<25	1,1,2-Trichloroethane	<25
Acetone	<250	Benzene	110
Carbon disulfide	<25	cis-1,3-Dichloropropene	<25
1,1-Dichloroethene	<25	2-Chloroethylvinylether	<25
1,1-Dichloroethane	<25	Bromoform	<25
trans-1,2-Dichloroethene	<25	4-Methyl-2-pentanone	<50
Chloroform	<25	2-Hexanone	<50
1,2-Dichloroethane	<25	Tetrachloroethene	<25
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<25
1,1,1-Trichloroethane	<25	Toluene	15
Carbon tetrachloride	<25	Chlorobenzene	<25
Vinyl acetate	<25	Ethylbenzene	<25
Bromodichloromethane	<25	Styrene	<25
		Total xylenes	150

Reported by: WHC
Checked by: JFM

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 108
d_8-toluene 95

CLIENT: HWMSS-42
CLIENT ID: Extract 6A (SS) - Initial Filtrate
ERCO ID: 28455
SAMPLE RECEIVED: 03/18/86
ANALYSIS COMPLETED: 04/13/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS
VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<25	1,2-Dichloropropane	<10
Bromomethane	<25	trans-1,3-Dichloropropene	<10
Vinyl chloride	<25	Trichloroethene	<10
Chloroethane	<25	Dibromochloromethane	<10
Methylene chloride	<25	1,1,2-Trichloroethane	<10
Acetone	<250	Benzene	110
Carbon disulfide	<10	cis-1,3-Dichloropropene	<10
1,1-Dichloroethene	<10	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<10	Bromoform	<10
trans-1,2-Dichloroethene	<10	4-Methyl-2-pentanone	<50
Chloroform	<10	2-Hexanone	<50
1,2-Dichloroethane	<10	Tetrachloroethene	<10
2-Butanone	<50	1,1,2,2-Tetrachloroethane	<10
1,1,1-Trichloroethane	<10	Toluene	<10
Carbon tetrachloride	<10	Chlorobenzene	<10
Vinyl acetate	<10	Ethylbenzene	<10
Bromodichloromethane	<10	Styrene	<10
		Total xylenes	180

Reported by: WHC
Checked by: JFM

SURROGATE RECOVERIES (%): d_4-1,2-dichloroethane 97
d_8-toluene 99

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/29/86
ANALYSIS COMPLETED: 02/05/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: ERCO ID:	Initial Filtrates: Extract 7A-(SS) 26008	Initial Filtrates: Extract 7B-(SS) 26009
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		33	34
Acetone	50		ND	250
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		ND	ND
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		ND	87
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		ND	ND
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		130	170
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		ND	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		59	110
Chlorobenzene	2		ND	ND
Ethylbenzene	2		ND	ND
Styrene	2		ND	ND
Total xylenes	2		190	82

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

		Initial Filtrates	
Additional compounds	Client ID: / ERCO ID:	Extract 7A-(SS) 26008	Extract 7B-(SS) 26009
None detected			
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	103	108
% Recovery d_8-Toluene	99	106

CLIENT: HWMSS-42
SAMPLE RECEIVED: 01/27/86
ANALYSIS COMPLETED: 02/04/86
RESULTS IN: µg/l (ppb)
REPORTED BY: JFM
CHECKED BY: NS

ERCO/A Division of ENSECO

VOLATILE ORGANICS ANALYSIS
BY EPA METHOD 624
- Data Report -

Compound	Minimum reporting limit	Client ID: / ERCO ID:	Initial Filtrates: Extract 8A-(SS) 25892	Initial Filtrates: Extract 8B-(SS) 25893
Chloromethane	5		ND	ND
Bromomethane	5		ND	ND
Vinyl chloride	5		ND	ND
Chloroethane	5		ND	ND
Methylene chloride	5		250	150
Acetone	50		ND	ND
Carbon disulfide	2		ND	ND
1,1-Dichloroethene	2		ND	ND
1,1-Dichloroethane	2		ND	ND
trans-1,2-Dichloroethene	2		ND	ND
Chloroform	2		ND	ND
1,2-Dichloroethane	2		ND	ND
2-Butanone	10		60	ND
1,1,1-Trichloroethane	2		ND	ND
Carbon tetrachloride	2		ND	ND
Vinyl acetate	2		ND	ND
Bromodichloromethane	2		ND	ND
1,2-Dichloropropane	2		ND	ND
trans-1,3-Dichloropropene	2		ND	ND
Trichloroethene	2		ND	ND
Dibromochloromethane	2		ND	ND
1,1,2-Trichloroethane	2		ND	ND
Benzene	2		120	150
cis-1,3-Dichloropropene	2		ND	ND
2-Chloroethyl vinyl ether	2		ND	ND
Bromoform	2		ND	ND
2-Hexanone	10		ND	ND
4-Methyl-2-pentanone	10		ND	ND
Tetrachloroethene	2		ND	ND
1,1,2,2-Tetrachloroethane	2		ND	ND
Toluene	2		68	99
Chlorobenzene	2		ND	ND
Ethylbenzene	2		*	32
Styrene	2		ND	ND
Total xylenes	2		74	130

ND = Not detected.

VOLATILE ORGANICS ANALYSIS

BY EPA METHOD 624

- Data Report -

CLIENT: HWMSS-42

		Initial Filtrate	
Additional compounds	Client ID: / ERCO ID:	Extract 8A-(SS) 25892	Extract 8B-(SS) 25893
None Detected			
Dilution factor:		5	5

Multiply minimum reporting limit by dilution factor to obtain true minimum limit.

X = Present.

Surrogate Recoveries

% Recovery d_4-1,2-Dichloroethane	89	100
% Recovery d_8-Toluene	98	100

Ammonia-Lime Still Bottoms
Benzene

Liquid/Solid Ratio A-a

$1/4(1{,}025 + 960 + 675 + 880) - 1/4(740 + 660 + 880 + 785) = 118.75$

% Headspace B-b

$1/4(1{,}025 + 960 + 740 + 660) - 1/4(675 + 880 + 880 + 785) = 41.25$

Acidity of Fluid #1 C-c

$1/4(1{,}025 + 675 + 740 + 880) - 1/4(960 + 880 + 660 + 785) = 8.75$

Device D-d

$1/4(1{,}025 + 960 + 880 + 785) - 1/4(675 + 880 + 740 + 660) = 173.75$

Collection Method E-e

$1/4(1{,}025 + 675 + 660 + 785) - 1/4(960 + 880 + 740 + 880) = -78.75$

Aliquotting F-f

$1/4(1{,}025 + 880 + 740 + 785) - 1/4(960 + 675 + 660 + 880) = 63.75$

Pressure Behind Piston G-g

$1/4(1{,}025 + 880 + 660 + 880) - 1/4(960 + 675 + 740 + 785) = 71.25$

$\Sigma d^2 = 150^2 + 80^2 + 30^2 + 240^2 + 40^2 + 100^2 + 180^2 + 370^2 = 268{,}300$

$s = \sqrt{\frac{\Sigma d^2}{2k}} = 129.49$

$S_{\bar{d}} = s\sqrt{\frac{2}{n}} = 64.75$

$t(p = 0.01,\ df = 8) = 3.355(64.75) = 217.23$

Nothing significant.

Ammonia-Lime Still Bottoms
Chlorobenzene

Liquid/Solid Ratio A-a

$1/4(790 + 805 + 830 + 865) - 1/4(780 + 680 + 835 + 720) = 68.75$

% Headspace B-b

$1/4(790 + 805 + 780 + 680) - 1/4(830 + 865 + 835 + 720) = -48.75$

Acidity of Fluid #1 C-c

$1/4(790 + 830 + 780 + 835) - 1/4(805 + 865 + 680 + 720) = 41.25$

Device D-d

$1/4(790 + 805 + 835 + 720) - 1/4(830 + 865 + 780 + 680) = -1.25$

Collection Method E-e

$1/4(790 + 830 + 680 + 720) - 1/4(805 + 865 + 780 + 835) = -66.25$

Aliquotting F-f

$1/4(790 + 865 + 780 + 720) - 1/4(805 + 830 + 680 + 835) = 1.25$

Pressure Behind Piston G-g

$1/4(790 + 865 + 680 + 835) - 1/4(805 + 830 + 780 + 720) = 8.75$

$\Sigma d^2 = 300^2 + 110^2 + 180^2 + 270^2 + 60^2 + 180^2 + 130^2 + 280^2 = 338,700$

$s = \sqrt{\frac{\Sigma d^2}{2k}} = 145.49$

$S_{\bar{d}} = s\sqrt{\frac{2}{n}} = 72.74$

$t(p = 0.01, df = 8) = 3.355(72.74) = 244.07$

Nothing significant.

Ammonia-Lime Still Bottoms
1,1-Dichloroethene

Liquid/Solid Ratio A-a

$1/4(940 + 930 + 440 + 530) - 1/4(485 + 430 + 1,400 + 880) = -88.75$

% Headspace B-b

$1/4(940 + 930 + 485 + 430) - 1/4(440 + 530 + 1,400 + 880) = -116.25$

Acidity of Fluid #1 C-c

$1/4(940 + 440 + 485 + 1,400) - 1/4(930 + 530 + 430 + 880) = 123.75$

Device D-d

$1/4(940 + 930 + 1,400 + 880) - 1/4(440 + 530 + 485 + 430) = 566.25$*

Collection Method E-e

$1/4(940 + 440 + 430 + 880) - 1/4(930 + 530 + 485 + 1,400) = -163.75$

Aliquotting F-f

$1/4(940 + 530 + 485 + 880) - 1/4(930 + 440 + 430 + 1,400) = -91.25$

Pressure Behind Piston G-g

$1/4(940 + 530 + 430 + 1,400) - 1/4(930 + 440 + 485 + 880) = 141.25$

$\Sigma d^2 = 320^2 + 140^2 + 200^2 + 220^2 + 230^2 + 260^2 + 400^2 + 440^2 = 684,500$

$s = \sqrt{\frac{\Sigma d^2}{2k}} = 206.84$

$S_{\bar{d}} = s\sqrt{\frac{2}{n}} = 103.42$

$t(p = 0.01,\ df = 8) = 3.355(103.42) = 346.97$

*Significant effect.

Ammonia-Lime Still Bottoms
Toluene

Liquid/Solid Ratio A-a

$1/4(845 + 1{,}000 + 540 + 875) - 1/4(835 + 660 + 870 + 745) = 37.50$

% Headspace B-b

$1/4(845 + 1{,}000 + 835 + 660) - 1/4(540 + 875 + 870 + 745) = 77.50$

Acidity of Fluid #1 C-c

$1/4(845 + 540 + 835 + 870) - 1/4(1{,}000 + 875 + 660 + 745) = -47.50$

Device D-d

$1/4(845 + 1{,}000 + 870 + 745) - 1/4(540 + 875 + 835 + 660) = 137.50$

Collection Method E-e

$1/4(845 + 540 + 660 + 745) - 1/4(1{,}000 + 875 + 835 + 870) = -197.50$

Aliquotting F-f

$1/4(845 + 875 + 835 + 745) - 1/4(1{,}000 + 540 + 660 + 870) = 57.50$

Pressure Behind Piston G-g

$1/4(845 + 875 + 660 + 870) - 1/4(1{,}000 + 540 + 835 + 745) = 32.50$

$\Sigma d^2 = 310^2 + 200^2 + 320^2 + 250^2 + 50^2 + 140^2 + 140^2 + 350^2 = 465{,}200$

$s = \sqrt{\frac{\Sigma d^2}{2k}} = 170.51$

$S_{\bar{d}} = s\sqrt{\frac{2}{n}} = 85.26$

$t(p = 0.01,\ df = 8) = 3.355(85.26) = 286.04$

Nothing significant.

Ammonia-Lime Still Bottoms
Trichloroethene

Liquid/Solid Ratio A-a

$1/4(805 + 795 + 700 + 825) - 1/4(720 + 605 + 820 + 680) = 75.00$

% Headspace B-b

$1/4(805 + 795 + 720 + 605) - 1/4(700 + 825 + 820 + 680) = -25.00$

Acidity of Fluid #1 C-c

$1/4(805 + 700 + 720 + 820) - 1/4(795 + 825 + 605 + 680) = 35.00$

Device D-d

$1/4(805 + 795 + 820 + 680) - 1/4(700 + 825 + 720 + 605) = 62.50$

Collection Method E-e

$1/4(805 + 700 + 605 + 680) - 1/4(795 + 825 + 720 + 820) = -92.50$

Aliquotting F-f

$1/4(805 + 825 + 720 + 680) - 1/4(795 + 700 + 605 + 820) = 27.50$

Pressure Behind Piston G-g

$1/4(805 + 825 + 605 + 820) - 1/4(795 + 700 + 720 + 680) = 40.00$

$\Sigma d^2 = 250^2 + 130^2 + 0^2 + 290^2 + 60^2 + 110^2 + 180^2 + 300^2 = 301,600$

$s = \sqrt{\frac{\Sigma d^2}{2k}} = 137.30$

$S_{\bar{d}} = s\sqrt{\frac{2}{n}} = 68.65$

$t(p = 0.01, df = 8) = 3.355(68.65) = 230.31$

Nothing significant.

API Separator Sludge/Electroplating Waste
Benzene

Liquid/Solid Ratio A-a

$1/4(990 + 830 + 765 + 660) - 1/4(805 + 680 + 815 + 865) = 20$

% Headspace B-b

$1/4(990 + 830 + 805 + 680) - 1/4(765 + 660 + 815 + 865) = 50$

Acidity of Fluid #1 C-c

$1/4(990 + 765 + 805 + 815) - 1/4(830 + 660 + 680 + 865) = 85$

Device D-d

$1/4(990 + 830 + 815 + 865) - 1/4(765 + 660 + 805 + 680) = 147.5$

Collection Method E-e

$1/4(990 + 765 + 680 + 865) - 1/4(830 + 660 + 805 + 815) = 47.5$

Aliquotting F-f

$1/4(990 + 660 + 805 + 865) - 1/4(830 + 765 + 680 + 815) = 57.5$

Pressure Behind Piston G-g

$1/4(990 + 660 + 680 + 815) - 1/4(830 + 765 + 805 + 865) = -30$

$\Sigma d^2 = 20^2 + 220^2 + 170^2 + 120^2 + 350^2 + 20^2 + 10^2 + 50^2 = 217,600$

$s = \sqrt{\frac{\Sigma d^2}{2k}} = 116.6$

$S_{\bar{d}} = s\sqrt{\frac{2}{n}} = 58.3$

$t(p = 0.01, df = 8) = 3.355(58.3) = 195.6$

Nothing significant.

API Separator Sludge/Electroplating Waste
Chlorobenzene

Liquid/Solid Ratio A-a

$1/4(180 + 140 + 185 + 145) - 1/4(545 + 170 + 140 + 170) = -93.75$

% Headspace B-b

$1/4(180 + 140 + 545 + 170) - 1/4(185 + 145 + 140 + 170) = 98.75$

Acidity of Fluid #1 C-c

$1/4(180 + 185 + 545 + 140) - 1/4(140 + 145 + 170 + 170) = 106.25$

Device D-d

$1/4(180 + 140 + 140 + 170) - 1/4(185 + 145 + 545 + 170) = -103.75$

Collection Method E-e

$1/4(180 + 185 + 170 + 170) - 1/4(140 + 145 + 545 + 140) = -66.25$

Aliquotting F-f

$1/4(180 + 145 + 545 + 170) - 1/4(140 + 185 + 170 + 140) = 101.25$

Pressure Behind Piston G-g

$1/4(180 + 145 + 170 + 140) - 1/4(140 + 185 + 545 + 170) = -101.25$

$\Sigma d^2 = 0^2 + 40^2 + 50^2 + 10^2 + 770^2 + 0^2 + 0^2 + 40^2 = 598,700$

$s = \sqrt{\frac{\Sigma d^2}{2k}} = 193.44$

$S_{\bar{d}} = s\sqrt{\frac{2}{n}} = 96.72$

$t(p = 0.01, df = 8) = 3.355(96.72) = 324.49$

Nothing significant.

API Separator Sludge/Electroplating Waste
1,1-Dichloroethene

Liquid/Solid Ratio A-a

$1/4(680 + 475 + 155 + 192.5) - 1/4(200 + 135 + 420 + 445) = 75.625$

% Headspace B-b

$1/4(680 + 475 + 200 + 135) - 1/4(155 + 192.5 + 420 + 445) = 69.375$

Acidity of Fluid #1 C-c

$1/4(680 + 155 + 200 + 420) - 1/4(475 + 192.5 + 135 + 445) = 51.875$

Device D-d

$1/4(680 + 475 + 420 + 445) - 1/4(155 + 192.5 + 200 + 135) = 334.375$*

Collection Method E-e

$1/4(680 + 155 + 135 + 445) - 1/4(475 + 192.5 + 200 + 420) = 31.875$

Aliquotting F-f

$1/4(680 + 192.5 + 200 + 445) - 1/4(475 + 155 + 135 + 420) = 83.125$

Pressure Behind Piston G-g

$1/4(680 + 192.5 + 135 + 420) - 1/4(475 + 155 + 200 + 445) = 38.125$

$\Sigma d^2 = 280^2 + 70^2 + 110^2 + 135^2 + 100^2 + 10^2 + 0^2 + 30^2 = 124625$

$s = \sqrt{\frac{\Sigma d^2}{2k}} = 88.256$

$S_{\bar{d}} = s\sqrt{\frac{2}{n}} = 44.128$

$t(p = 0.01, df = 8) = 3.355(44.128) = 148.049$

*Significant effect.

API Separator Sludge/Electroplating Waste
Toluene

Liquid/Solid Ratio A-a

$1/4(880 + 685 + 660 + 575) - 1/4(690 + 620 + 670 + 845) = -6.25$

% Headspace B-b

$1/4(880 + 685 + 690 + 620) - 1/4(660 + 575 + 670 + 845) = 31.25$

Acidity of Fluid #1 C-c

$1/4(880 + 660 + 690 + 670) - 1/4(685 + 575 + 620 + 845) = 43.75$

Device D-d

$1/4(880 + 685 + 670 + 845) - 1/4(660 + 575 + 690 + 620) = 133.75$

Collection Method E-e

$1/4(880 + 660 + 620 + 845) - 1/4(685 + 575 + 690 + 670) = 96.25$

Aliquotting F-f

$1/4(880 + 575 + 690 + 845) - 1/4(685 + 660 + 620 + 670) = 88.75$

Pressure Behind Piston G-g

$1/4(880 + 575 + 620 + 670) - 1/4(685 + 660 + 690 + 845) = -33.75$

$\Sigma d^2 = 0^2 + 130^2 + 160^2 + 30^2 + 280^2 + 0^2 + 0^2 + 230^2 = 174,700$

$s = \sqrt{\frac{\Sigma d^2}{2k}} = 104.49$

$S_{\bar{d}} = s\sqrt{\frac{2}{n}} = 52.25$

$t(p = 0.01, df = 8) = 3.355(52.25) = 175.29$

Nothing significant.

API Separator Sludge/Electroplating Waste
Trichloroethene

Liquid/Solid Ratio A-a

$1/4(240 + 205 + 270 + 215) - 1/4(535 + 205 + 190 + 225) = -56.25$

% Headspace B-b

$1/4(240 + 205 + 535 + 205) - 1/4(270 + 215 + 190 + 225) = 71.25$

Acidity of Fluid #1 C-c

$1/4(240 + 270 + 535 + 190) - 1/4(205 + 215 + 205 + 225) = 96.25$

Device D-d

$1/4(240 + 205 + 190 + 225) - 1/4(270 + 215 + 535 + 205) = -91.25$

Collection Method E-e

$1/4(240 + 270 + 205 + 225) - 1/4(205 + 215 + 535 + 190) = -51.25$

Aliquotting F-f

$1/4(240 + 215 + 535 + 225) - 1/4(205 + 270 + 205 + 190) = 86.25$

Pressure Behind Piston G-g

$1/4(240 + 215 + 205 + 190) - 1/4(205 + 270 + 535 + 225) = -96.25$

$\Sigma d^2 = 0^2 + 70^2 + 140^2 + 10^2 + 710^2 + 10^2 + 0^2 + 30^2 = 529,700$

$s = \sqrt{\frac{\Sigma d^2}{2k}} = 181.95$

$S_{\bar{d}} = s\sqrt{\frac{2}{n}} = 90.98$

$t(p = 0.01, df = 8) = 3.355(90.98) = 305.22$

Nothing significant.

ERCO
205 Alewife Brook Parkway, Cambridge, Massachusetts 02138 (617) 661-3111 Telex 650-256-7697 (MCI)

A DIVISION OF
ENSECO
INCORPORATED

June 11, 1986

Mr. Todd Kimmell
US EPA (WH-562B)
401 M Street S.W.
Washington, D.C. 20460

Dear Todd,

I have enclosed three bound copies and one unbound copy of the ZHE Ruggedness Testing Final Report.

Let me explain why Nancy and I chose to spike only the solid portion of the waste. We considered spiking the waste directly but foresaw several problems.

1. An efficient mixing of the spike with the waste would have increased the potential loss of spiked compounds.

2. Spiking of the waste would have to be done before every extraction thereby increasing variability.

3. Without mixing, the initial filtrate of a spiked waste would not have been representative of the waste or consistent from sample to sample.

4. We do not know how the spikes react with the samples. Do they stick to the solid, remain in the liquid portion or both? Variability in the percent solids could have drastically affected the results.

Therefore, we decided to remove the initial filtrate and use our normal method of spiking which is through a septum TEE arrangement as the extraction fluid is pumped into the device. This method has proved to be efficient and consistent in recovering spiked compounds. We chose this method to reduce the variability introduced into the experiment.

Mathematically combining the analytical results of the initial and final filtrates indicate that the initial filtrates of these wastes contribute nothing to the final concentration of compounds.

We welcome any comments. Please don't hesitate to call.

Sincerely,
Betsy Henry
Betsy Henry

Regional and international offices:
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