3R -

REPORTS

DATE: <u>SEPT. 1988</u>

REPORT ON THE INSTALLATION OF A GROUND WATER MONITORING SYSTEM AT THE TENNECO RIDDLE FLS-3A WELL SITE

September 2, 1988

Prepared for:

MR. MARTIN BUYS ENVIRONMENTAL COORDINATOR TENNECO OIL COMPANY 6162 South Willow Drive Englewood, CO 80111

Prepared by:

GEOSCIENCE CONSULTANTS, LTD.

HEADQUARTERS 500 Copper Avenue, NW Suite 200 Albuquerque, New Mexico 87102 (505) 842-0001 FAX (505) 842-0595

WEST COAST REGIONAL OFFICE 1400 Quail Street Suite 140 Newport Beach, CA 92660 (714) 724-0536 FAX (714) 724-0538 EASTERN REGIONAL OFFICE 1109 Spring Street Suite 706 Silver Spring, Maryland 20910 (301) 587-2088 FAX (301) 587-3625

TABLE OF CONTENTS

1.0	EXECUTIVE SUMMARY	1
2.0	METHODS OF INVESTIGATION	2
3.0	REGIONAL GEOLOGY AND HYDROLOGY	4 4 7
4.0	SITE CONDITIONS AT RIDDLE FLS-3A WELL SITE	8 8 8
5.0	ANALYTICAL RESULTS	12
6.0	REFERENCES	14

LIST OF FIGURES

FIGURE	3-1	LOCATION MAP OF THE TENNECO RIDDLE FLS-3A WELL SITE	5
FIGURE	3-2	STRUCTURAL ELEMENTS OF THE SAN JUAN BASIN	6
FIGURE	4-1	SITE MAP OF MONITOR WELL LOCATIONS AT RIDDLE FLS-3A	
		WELL SITE	9
FIGURE	4-2	CONTOUR MAP OF WATER TABLE BENEATH RIDDLE FLS-3A	
		WELL SITE	0
FIGURE	4-3	RANGE OF VALUES OF HYDRAULIC CONDUCTIVITY AND	
		PERMEABILITY	1

LIST OF TABLES

TABLE 5-1 AN	ALYTICAL RESULTS															•		13
--------------	------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	----

LIST OF APPENDICES

APPENDIX	Α	LITHOLOGIC LOGS OF BOREHOLES
APPENDIX	B	WELL COMPLETION DIAGRAMS
APPENDIX	С	RADIAN CORPORATION REPORT OF ANALYTICAL RESULTS

1.0 EXECUTIVE SUMMARY

During late June, 1988, Geoscience Consultants, Ltd. (GCL) conducted a limited hydrogeologic study and monitor well installation program at Tenneco's Riddle FLS-3A well site in San Juan County, New Mexico. The Riddle FLS-3A well site is located approximately 20 miles southeast of Bloomfield, New Mexico. The site is an active natural gas producing well with an associated condensate storage tank, separator and waste water disposal facilities.

Four 2-inch PVC monitor wells were installed to quantify and determine the areal extent of any hydrocarbons in ground water at the Riddle FLS-3A facility. Minor concentrations of benzene, toluene and xylenes were present in ground-water samples from three wells at the site. However, no concentrations of hydrocarbons in excess of New Mexico drinking water standards were observed.

2.0 METHODS OF INVESTIGATION

Drilling and monitor well installation at the Riddle FLS-3A well site were performed on June 27 through June 29, 1988. Monitor wells were located in those areas where hydrocarbons were suspected based on a preliminary survey by the New Mexico Oil Conservation Division (NMOCD). Up- and down-gradient well locations were selected by a Tenneco representative.

Drilling was performed with a CME-55 hollow-stem auger owned and operated by Western Technologies, Inc. of Farmington, New Mexico. All drilling equipment and associated materials were thoroughly steam-cleaned with a hot water washer generating temperatures greater than 180° Fahrenheit prior to setting up on each borehole location.

During drilling operations, soil samples were recovered and logged by a GCL on-site geologist. Two boreholes, R-1 and R-4 (see Appendix A), were cored with a continuous sampler to obtain detailed subsurface information; the cores were cased in Lexan tubing and stored at the Tenneco warehouse in Farmington, New Mexico. The boreholes and working area were monitored constantly during drilling operations with a combustible gas and oxygen indicator (CGI) and an H-Nu photoionization detector. Hydrocarbon levels requiring protective measures were not encountered during drilling operations.

Flowing sands were encountered in all wells on the Riddle site. In order to complete the wells, it was necessary to introduce clean water into the borehole to build head on the water-bearing unit, thus minimizing the flow of formational sand into the borehole. Less than 10 gallons of water were introduced at each borehole. During development, immediately after completion of the well, a much greater volume of water was removed from the borehole. This procedure ensured that subsequent samples were representative of water in the formation and did not include any admixture of the water introduced during well completion.

The monitor wells were developed and purged by bailing. The limited amounts of water introduced into the wells during installation were bailed out to ensure that ground-water quality was not compromised. An additional three casing volumes of water were removed from each well prior to sampling.

Before sampling the monitor wells at the Riddle FLS-3A well site, static water levels were determined, then three casing volumes of water were purged from each monitor well to minimize the effect of the well on ground-water chemistry. A 5-foot stainless steel bailer was used to purge and sample the monitor wells. The samples were collected in 40-milliliter glass septum vials and sent to Radian Analytical Services, Austin, Texas. Radian Corporation analyzed the samples taken from Riddle FLS-3A monitor wells for purgeable halocarbons (EPA method 601), purgeable aromatics (EPA method 602), pH and total dissolved solids (TDS).

3.0 REGIONAL GEOLOGY AND HYDROLOGY

3.1 REGIONAL GEOLOGY

The Riddle FLS-3A well site is located in eastern San Juan County, New Mexico (Figure 3-1) in the east-central San Juan Basin. The San Juan Basin is located in the southeastern part of the Colorado Plateau and is approximately the eastern half of the Navajo physiographic section of the Colorado Plateau Province (Figure 3-2). The San Juan Basin is a Laramide (Late Cretaceous - early Tertiary) depression with maximum structural relief of 10,000 feet (Kelley, 1950). Local topographic relief is in the range of tens of feet. The Central Basin is bounded on all sides except the south by the "Hogback" monocline. To the south the principal structural boundary is the domal northwestward-trending Zuni uplift. At the east end of this uplift the boundary is a low, wide divide along the axis of the southward-trending Mount Taylor syncline and the Acoma embayment (Kelley, 1950). The lithologic units exposed in the Central Basin area are largely the San Jose, Nacimiento, and Animas formations of early Tertiary age (Kelley, 1950). Quaternary deposits are restricted mainly to major valleys.

Quaternary deposition in the San Juan Basin included the formation of outwash terraces along the San Juan River and its tributaries (Pleistocene), the growth and migration of sand dunes on higher plateaus (Pleistocene and Recent), and the cutting and filling of alluvial channels throughout the area (Stone and others, 1983). The Quaternary deposits consist of heterogeneous mixtures of gravel, sand, silt and clay. Texture and composition vary widely depending on age and source. In the valleys of the San Juan River and its tributaries, the alluvium does not exceed 100 feet in thickness (Stone and others, 1983). Terrace deposits consisting of boulder gravel rest on benches cut into the tertiary bedrock of the area. The boulders are very well rounded and consist of various igneous and metamorphic rock types. These deposits can be traced upstream to late Pleistocene glacial moraines in the mountains of Colorado and are termed outwash terraces by Stone and others (1983, p. 24). The valley fill and terrace deposits from a disconformable contact with all underlying units.



FIGURE 3-1 LOCATION MAP OF THE TENNECO RIDDLE FLS-3A SITE (BASE FROM USGS 15 MINUTE BLOOMFIELD QUADRANGLE)



FIGURE 3-2 STRUCTURAL ELEMENTS OF THE SAN JUAN BASIN (MODIFIED FROM KELLEY, 1951)

The Nacimiento Formation is largely characterized by interbedded black, carbonaceous mudstones and white, coarse-grained sandstones, but the upper part of the formation is dominated by more somber beds of mudstone and sandstone. Thickness of the Nacimiento ranges from about 400 to 2200 feet (Stone and others, 1983). The Nacimiento Formation outcrops throughout the central Basin and is in disconformable contact with Quaternary valley fill and San Juan River alluvium.

3.2 REGIONAL HYDROLOGY

Much of the recharge to ground water in the San Juan Basin occurs on the flanks of the Zuni, Chuska, and Cebolleta Mountains (Stone and others, 1983, p.22). Numerous ephemeral-stream channels filled with alluvium are the principal sources of ground-water recharge in some areas and the principal locations of discharge in others.

Numerous shallow wells produce water from valley fill for stock and domestic users along some streams in the San Juan Basin. In many areas valley fill provides the only source of potable water for rural inhabitants.

The transmissivity of valley fill varies widely, depending on the lithology and thickness of the fill materials. Highest transmissivities can be expected in the San Juan, Animas, and La Plata River Valleys where coarse sand and gravel predominate (Stone and others, 1983).

In the ephemeral-stream channels draining to the San Juan River, most recharge to the valley fill results from infiltration of stormflow, but small quantities are also contributed from bedrock sources, especially in lower reaches. In their upper reaches, these channels may be major sources of water for recharge to underlying bedrock aquifers.

In the Nacimiento Formation sandstone bodies near Cañon Largo there are several flowing wells, with reported outflow of 16 to 100 gallons per minute and transmissivities of as much as 100 feet squared per day (Stone and others, 1983). The Nacimiento provides water for domestic and stock use on ranches in its outcrop area.

4.0 SITE CONDITIONS AT RIDDLE FLS-3A WELL SITE

4.1 MONITOR WELL INSTALLATION

Drilling and monitor well installation were performed at the Riddle FLS-3A well site during June 27 through June 29, 1988. Four 2-inch diameter PVC monitor wells were installed at the site (Figure 4-1). Borehole depths ranged from 27 feet below ground level (BGL) at monitor wells R-2 and R-3 to 28 feet BGL at monitor well R-4. The total depth of the completed monitor wells ranges from 24.5 feet BGL at monitor well R-2 to 26.33 feet BGL at monitor well R-4 (Appendix B). Flowing sands were encountered below the static water level in all of the boreholes. Therefore water was introduced into the boreholes to build head on the sand to prevent it from flowing into the auger annulus and also aid in the installation of the well casing.

4.2 SITE GEOLOGY AND HYDROLOGY

The subsurface geology at the Riddle FLS-3A well site is composed of poorly sorted, unconsolidated sand of Quaternary age. The sand locally contains substantial amounts of clay, and isolated clay horizons were noted during drilling. Ground water was encountered at approximately 11 to 12 feet below the ground surface.

Shallow ground water at the Riddle FLS-3A well site is under water table conditions. Based on July 1988 data, ground water flows to the northwest with a hydrologic gradient of 0.0026 (Figure 4-2). The uppermost saturated zone beneath the site is a water-bearing fine-grained unit of Quaternary age which overlies the Nacimiento Formation. The water table occurs at depths below the land surface ranging from 11.66 feet in monitor well R-1 to 12 feet in monitor well R-4 (Appendix A).

During development of the monitor wells, low yields were observed. Each well may yield a sustainable rate of up to 2 gallons per minute. The fine-grained sediments that occur beneath the site, which typically can be expected to exhibit hydraulic conductivities of 10^{-2} to 10^{2} gallons per day per square foot (Figure 4-3).



SITE MAP OF MONITOR WELL LOCATIONS AT TENNECO RIDDLE FLS-3A SITE.



FIGURE 4-2 LOCAL HYDROLOGIC GRADIENT MAP OF TENNECO RIDDLE FLS-3A WELL SITE



FIGURE 4-3

RANGE OF VALUES OF HYDRAULIC CONDUCTIVITY AND PERMEABILITY (FROM FREEZE AND CHERRY, 1979)

5.0 ANALYTICAL RESULTS

Based on July 1988 data, the shallow ground water sampled at the Riddle FLS-3A well site indicated virtually no hydrocarbons (Table 5-1). Only trace amounts of chloroform were indicated from the analyses in monitor wells R-1 and R-2. Toluene in minor amounts was found in monitor wells R-1, R-3 and R-4. Benzene was present in monitor well R-3, at a level within New Mexico water quality standards. Minor amounts of xylenes were also present in monitor wells R-1, R-3 and R-4. All ground-water results were compared with the New Mexico Water Quality Control Commission regulations for drinking water as amended through February 27, 1987. The Radian reports of analytical results are included in Appendix C. All wells will be resampled during early September 1988.

TENN\BTEX4.FIG

:

TABLE 5-1

ł

I

ANALYTICAL RESULTS, RIDDLE FLS-3A SITE JULY 1988

WELL NUMBER

.

ANAL YTF	R-1	R - 3	د <u>-</u> 0	V Q	REGULATORY STANDARDS FOR DRINKING	DETECTION
	P _V	7-1	C-7	K-4	WALEK	LIMI1
Н	7.2	7.1	7.3	7.5	6 10 9	
BENZENE (ppb)	QN	QN	2.5	NA	<10	0.20
TOLUENE (ppb)	1.2	QN	0.5*	1.1	<750	0.20
ETHYLBENZENE (ppb)	QN	QN	QN	NA	<750	0.30
TOTAL XYLENES (ppb)	3.1	ND	QN	1.9	<620	0.20
CHLOROFORM (ppb)	0.2*	0.6	QN	NA	<100	0.05
FILTERABLE RESIDUE (TDS) (ppm)	8300	6200	6100	10300	<1000	3.00

NUIES:

ND = NOT DETECTED NA = NOT ANALYZED * = LESS THAN 5 TIMES THE DETECTION LIMIT * = LESS THAN 5 TIMES THE DETECTION LIMIT V-4 NOT SAMPLED DUE TO DAMAGED CASING REGULATORY STANDARDS TAKEN FROM THE NEW MEXICO WATER QUALITY CONTROL COMMISSION (1987) ppb = PARTS PER BILLION ppm = PARTS PER MILLION

· i

6.0 REFERENCES

- Freeze, R. A., and Cherry, J. A., 1979, Groundwater. Englewood Cliffs, N.J., Prentice-Hall, 604 pp.
- Kelley, V. C., 1950, Regional structure of the San Juan Basin; <u>in</u> New Mexico Geological Society, Guidebook of the San Juan Basin, New Mexico and Colorado, pp. 101-108.
- Kelley, V. C., 1951, Tectonics of the San Juan Basin; <u>in</u> New Mexico Geological Society, Guidebook of the South and West Sides of the San Juan Basin, New Mexico and Arizona, pp. 124-130.
- New Mexico Water Quality Control Commission, 1987, New Mexico Water Quality Control Commission Regulations as amended through February 27, 1987.
- Stone, W. J., Lyford, F. P., Frenzel, P. F., Mizell, N. H., and Padgett, E. T., 1983, Hydrogeology and Water Resources of San Juan Basin, New Mexico: Hydrologic Report 6, New Mexico Bureau of Mines and Mineral Resources.

APPENDIX A

LITHOLOGIC LOGS OF BOREHOLES



| LUCATION DESCRIPTION: _

		R	s		RUN		SAMI	PLE		
			^ M	#	FROM	то	REC.	TYPE		
				1	0,	3'	25X		SM	0'-3' <u>Sand</u> - pale brn 5 YR 5/2 minor org material, poorly srt, v fn to crs, qtz rich, uncons. Damp 5 YR 5/2
5				2	31	7.5'	20%			 3'-7.5' - <u>Sand</u> . As above, damp.
10				3	7.5'	12.5'	20%		SM	7.5'-12.5' <u>Sand</u> - v fn to v crs, qtz rich w/lithic & feldspar grains, pale brn 5 YR 5/2 to dk ylsh org 10 YR 6/6. Minor clay layers, damp.
l 15				4	12.5'	17.5'	50%		SC	12.5'-17.5' <u>Sand</u> - v fn to v crs qtz rich, as above, no clay layers but some admixed clay. Wet.
20				5	17.5'	22.5'	75X		SL	17.5'-22.5' <u>Sand, Silt and Clay</u> : mixed sample - flowing - sand. Grain size from mud to small gravel.
25				6	22.5'	27.5'	0% 		SC	22.5'-27.5' <u>Sand</u> - No sample - sampler stuck in auger. Abundant water in sand, flowing. Small amount of sample is light brown gray, 5 YR 6/1, medium to coarse grained quartz- rich sand.
30										



. _ ____

		Page <u>1</u> of <u>1</u>
SITE ID:	LOCATION ID:	<u>R-2</u>
SITE COORDINATES (ft.): _	1825 FNL, 1625 FWL	
N	Ε	
GROUND ELEVATION (ft. MSL	.):	
STATE: New Mexico	COUNTY: Sen Juar	n
DRILLING METHOD:		
DRILLING CONTR.: <u>Wester</u>	n Technologies	
DATE STARTED:6/27/88	DATE COMPLETE	D: <u>6/27/88</u>
FIELD REP.: <u>W.S. Dubyk</u>		
COMMENTS:		

LOCATION DESCRIPTION:

	1 1 1 1 1	R	S		RUN		I SAMI	PLE		
UEPTH	; LIIH !	Е С	A M	#	FROM	TO	REC.	TYPE		VISUAL LLASSIFICATION
0									sc	0'-11' <u>Sand</u> - w/minor clay (8') - pale to medium brown 5 YR 5/2 to 5 YR 3/4 fine to coarse grained, uncemented, no odor.
5										
10									 CH	 12'-13' - <u>Clay</u> very fine grained pale brown 5 YR 5/2 laminated, plastic: no odor.
15									SC	13'-18' <u>Sand & Clay</u> - poorly sorted pale brown 5 YR 5/2. H ₂ O at -18', odor noted, at ~18'.
20					 				SC	18'-28' <u>Sand</u> - as above, flowing, T. D. at 28'.
25										
30	TD 27.0'									
		 	 		 	 	# 			



SITE ID: LOCATION ID:	
SITE COORDINATES (ft.): 1825 FNL, 1625 FWL	
ΝΕ	
GROUND ELEVATION (ft. MSL):	
STATE: New Mexico COUNTY: San Juan	
DRILLING METHOD: HSA	
DRILLING CONTR.: <u>Western Technologies</u>	
DATE STARTED: DATE COMPLETED:	8 <u>8</u>
FIELD REP.: <u>W.S. Dubyk, P. Linley</u>	
COMMENTS:	

LOCATION DESCRIPTION:

		R	S		RUN		SAM	PLE						
		C	A H	*	FROM	то	REC.	TYPE	1 0505					
0						 			l sw	0'-12' <u>Recent Dune Sand</u> and alluvium; no odor.				
							; ; ;		 					
5							 		 					
10									 СН	 12'-13' - <u>Clay</u> light brown 5 YR 6/4 plastic, no odor. 				
		 							SC	13'-22' - <u>Clay & Sand</u> - light brown, 5 YR 6/4 saturated at -14', H ₂ O -17'. No odor. 				
20														
									SC	22'-28' <u>Sand</u> - minor clay, poorly sorted, uncemented, fine to medium grained, clayey, flowing. T.D. at 28'. No odor.				
25		 												
30	TD 28.0'	+ 		+ 		1	 							
		 		 	1	 	 							

Page 1 of 1

i



		Page <u>1</u> of <u>1</u>
SITE ID: <u>Riddle</u>	LOCATION ID:	R-4
SITE COORDINATES (ft.): _	1825 FNL, 1625 FWL	
4	E	
GROUND ELEVATION (ft. MSL)):	
STATE: <u>New Mexico</u>	COUNTY: San Juan	
DRILLING METHOD: HSA		
DRILLING CONTR.: <u>Western</u>	n Technologies	
DATE STARTED:6/29/88	DATE COMPLETED	:
FIELD REP.: <u>W.S. Dubyk</u>		
COMMENTS: <u>Cored w/continu</u>	uous sampler.	

LOCATION DESCRIPTION:

	DCDTU		R	s	ļ	RUN		SAH	PLE		VISUAL CLASSIFICATION			
		LIIM. 	E C	^ M	#	FROM	то	REC.	TYPE	USCS 				
	0				1	0'	2.5'	90%		 sw 	0'-2.5' <u>Sand</u> - light brown 5 YR 6/4 fine to medium grained, well sorted, quartz rich, moderate to well rounded, concentrated, damp.			
	5									 sw 	2.5'-7.5' <u>Sand</u> - light brown 5 YR 6/4 to dark yellowish orange 10 YR 6/6; fine-medium grained quartz rich, some organic material, 1 piece of gravel, damp.			
	"0				3	2.5/	7.5' 	50% 90%		SW 	7.5'-12.5' <u>Sand</u> - as above, some layers of coarse, angular sand. Predominantly quartz, some organic material. Damp.			
	15				4	7.5'	12.5'	35%		SC	12.5'-17.5' <u>Sand and Silt</u> - very fine to medium grained, well sorted light brown gray 5 YR 6/1 to light brown 5 YR 6/2. Some admixed clay. Wet.			
	20									SC	17.5'-22.5' <u>Sand and Silt</u> - clayey, very fine to coarse grained, light brown gray 5 YR 6/1, very wet, probably flowed into barrel.			
					5	12.5'	17.5' 	50 %		SC	22.5′-27.5′ - as above, flowing sand.			
	25				6	17.5'	22.5'	ox						
	30	T.D. 27.	5		7	22.5'	27.5'	50%						
-	<u> </u>	I												

APPENDIX B

WELL COMPLETION DIAGRAMS



TENNECO WELL COMPLETION DIAGRAM RIDDLE SITE WELL R-1



TENNECO WELL COMPLETION DIAGRAM RIDDLE SITE: WELL R-2



}___

TENNECD WELL COMPLETION DIAGRAM RIDDLE SITE: WELL R-3



i.

TENNECO WELL COMPLETION DIAGRAM RIDDLE SITE: WELL R-4

APPENDIX C

ANALYTICAL RESULTS

Page 1 Received:	07/08/88	Austin REPORT RECEIVED Jot 2 9 1988 07/25/88 09: 32: 24
REPORT TO ATTEN	<u>Geoscience Consultants, Ltd. 500 Copper NW Suite 200 Albuquerque, NM 87102</u> Anita Larson	PREPARED Radian Analytical Services BY 8501 Mo-pac B1. PO Box 201088 CERTIFIED Austin, TX 78720-1088 CERTIFIED ATTEN
CLIENT COMPANY FACILITY	<u>GEOSCIENCE</u> SAMPLES <u>6</u> <u>Geoscience Consultants, Ltd.</u>	PHONE <u>512-454-4797</u> CONTACT <u>GIBSON</u> <u>Unknown compounds present in 602 analyses of -02, -04, -05.</u>
WORK ID TAKEN	Tenneco Pl	Footnotes and Comments
TRANS TYPE P. Q. #	Fed Ex 88-0490-100	* Indicates a value less than 5 times the detection limit. Potential error for such low values ranges between 50 and 100%.
INVOICE	under separate cover	@ Indicates that spike recovery for this analysis on the specific matrix was not within acceptable limits indicating an interferent present.
SAMPLE	E IDENTIFICATION	TEST CODES and NAMES used on this report
01 Domest	tic EPA60	D1 EPA method 601

EPA602 EPA method 602

TDS Total dissolved solids XYLENE Xulenes, EPA 602

РН рН

1

<u>01</u>	<u>Vomestic</u>
02	R-1
<u>C3</u>	R-2
<u>C4</u>	R-3
05	R-4
27	wassach blank

<u>06 reagent blank</u>

1

1

Щ

•(-

				RECEIVED JUL 2 9 1900	
rage 2 Received: 07/08/88	RAS -	Austin Results Ru	REPORT	Work Order # 88-07-020	

SAMPLE	Test: PH	
Sample Id	pH units	
Domestic 01	7. 1	
l 02	7. 2	
03	7. 1	
04 R-3	7. 3	
05 R-4	7. 5	

.

•

.

. .

,

rage IU Received: 07/09/88 SAMPLE ID <u>R-1</u>	RAS - Austin Result FRACTION Date & T	lts by Sa <u>O2B</u> T ime Colle	REPORT Work Order # 88-07-020 mple EST CODE EPA601 NAME EPA method 601 cted 07/06/88 Category
ANALYST <u>BM</u> INSTRMT <u>G</u>	INJECTD 07/08/88	FILE #	VERIFIED <u>CL</u> UNITS <u>ug/L</u>
CAS#	COMPOUND	RESULT	DET LIMIT
74-87-3	Chloromethane		0. 30
74-83-9	Bromomethane	<u>ND</u>	1.2
75-01-4	Vinyl chloride	<u>ND</u>	0.20
75-00-3	Chloroethane	ND	0. 50
75-09-2	Methylene chloride	<u>ND</u>	0, 30
75-69-4	Trichlorofluoromethane	ND	0.10
75-35-4	1,1-Dichloroethene	<u>ND</u>	0.10
75-34-3	1,1-Dichloroethane	<u> </u>	0.090
156-60-5	trans-1,2-Dichloroethene	<u>ND</u>	0.20
67-66-3	Chlaroform	0.2*	0.050
107-06-2	1,2-Dichloroethane	ND	0.030
71-55-6	1,1,1-Trichlorgethane	ND	0.090
56-23-5	Carbon tetrachloride	<u> </u>	0.10
75-27-4	Bromodichloromethane		0.10

Ŕ

ł,

÷(

Page 14 Received: 07/08/88	RAS - Austin REPORT Results by Sample	Work Order # 88-07-020 Continued From Above
SAMPLE ID <u>R-1</u>	FRACTION <u>O2D</u> TEST CODE <u>EPA602</u> Date & Time Collected <u>07/06/88</u>	NAME <u>EPA method 602</u> Category
A-Chlorobenzene and m- Quantitated as chlor	xylene co-elute. obenzene unless	

(

otherwise noted.

.

,

Page 15 Received: 07/08/88	RAS - Austin REPORT Results by Sample	Work Order # 88-07-020
SAMPLE ID <u>R-1</u>	FRACTION <u>02A</u> TEST CODE <u>TDS</u> Date & Time Collected <u>07/06/88</u>	NAME <u>Total dissolved solids</u> Category
	VERIFIE	EDLM
ANALYSTTBL INSTRMT AN	IALYZED 07/11/88	JNITSMg/L
ANALYTE	RESULT DET LIMIT	
Filterable Residue (TDS)	8300 3.0	
NOTES AND DEFINITIONS FOR THE DET LIMIT = DETECTION LE ND = not detected at def NA = not analyzed * = less than 5 times th N\A = not available	IS REPORT. IMIT Rection limit Ne detection limit	
SAMPLE ID <u>R-1</u>	FRACTION <u>02D</u> TEST CODE <u>XYLENE</u> Date & Time Collected 07/06/88	E NAME <u>Xylenes, EPA 602</u> Category
ANALYST <u>CL</u> INSTRMT <u>D</u>	VERIFIE FILE #	EDCL
CAS # 106-42-3 109-38-3 95-47-6	COMPOUND RESULT DET LIMIT p-Xylene <u>0.5*0</u> <u>0.2</u> m-Xylene <u>0.9*</u> <u>0.2</u> a-Xylene <u>1.7</u> <u>0.1</u>	



SURROGATES 98-08-8 a.a.a-Trifluorotoluene 98% recovery

NOTES AND DEFINITIONS FOR THIS REPORT.

DET LIMIT = DETECTION LIMIT

ND = not detected at detection limit

NA = not analyzed

5

* = less than 5 times the detection limit

N\A = not available

Second column confirmation NOT performed unless otherwise noted.

Chlorobenzene and m-xylene co-elute. Quantitated as chlorobenzene unless otherwise noted.

ų,

-(

Page 17 Received: 07/08/88 SAMPLE ID R-2	RAS - Austin Resul	ts by Sa 03R T	REPORT mple FST_CODE_EPA601	Work Order # 88-07-020
	Date & Ti	me Colle	cted 07/06/88	Category
ANALYST <u>Rw</u> Instrmt <u>G</u>	INJECTD 07/08/88	FILE #	VERIFIE	D <u>CL</u> Uq/L
CAS#	COMPOUND	RESULT	DET LIMIT	
74-87-3	Chloromethane	ND	0_30	
74-83-9	Bromomethane		<u> 1. 2</u>	
75-01-4	Vinyl chloride	ND	0.20	
75-00-3	Chloroethane	<u>ND</u>	0, 50	
75-09-2	Methylene chloride	<u>ND</u>	0.30	
75-69-4	Trichlorofluoromethane	ND	0.10	
75-35-4	1,1-Dichloroethene	<u>ND</u>	0,10	
75-34-3	1,1-Dichloroethane	<u>ND</u>	0.090	
156-60-5	trans-1,2-Dichloroethene	<u>ND</u>	0.20	
67-66-3	Chloroform	0.5	0.050	
107-06-2	1,2-Dichloroethane	ND	0, 030	
71-55-6	1,1,1-Trichloroethane		0.090	
56-23-5	Carbon tetrachloride	<u>ND</u>	0.10	
75-27-4	Bromodichloromethane		0.10	

Page 18 Received: 07/08/8	RAS - Austin Resu	lts by Sam	KEPORT ple	Work Order # 88-07-020 Continued From Above
SAMPLE ID <u>R-2</u>	FRACTION Date & T	<u>O3B</u> TE ime Collec	ST CODE <u>EPA601</u> ted 07/06/88	NAME <u>EPA method 601</u> Category
CAS#	COMPOUND	RESULT	DET LIMIT	
78-87-5	1,2-Dichloropropane	ND	<u> 0. 10</u>	
10061-02-6	trans-1,3-Dichloropropene	ND	0.30	
79-01-6	Trichloroethene	ND	0.20	
124-48-1	Dibromochloromethane-A	ND	0.20	
79-00-5	1,1,2-Trichloroethane-A	ND	0.070	
10061-01-5	cis-1,3-Dichloropropene-A	ND	<u>N\A</u>	
110-75-8	2-Chloroethylvinyl ether	ND	0.20	
75-25-2	Bromoform	ND	0.30	
79-34-5	1, 1, 2, 2-Tetrachloroethane-B	ND	0.12	
127-18-4	Tetrachloroethene-B	ND	0.030	
108-90-7	Chlorobenzene	ND	0.30	
541-73-1	1,3-Dichlorobenzene	ND	0.30	
75-50-1	1,2-Dichlorobenzene	ND	0.50	
106-46-7	1,4-Dichlorobenzene	ND	0.40	
	SURROGATES			
74-97-5	Bromochloromethane	<u>98</u> % R	ecoveri	
3017-95-6	2-Bromo-1-chloropropane	<u>NA</u> % R	ecovery	
110-56-5	1-4-Dichlorobutane	<u>NA</u> % R	ecoverų	
;1		h		؛(ر_

×.

Page 19 RAS -	Austin REPORT	Wark Order # 88-07-020
Received: 07/08/88	Results by Sample	Continued From Above
SAMPLE ID <u>R-2</u>	FRACTION <u>O3B</u> TEST CODE <u>EPA601</u> Date & Time Collected <u>07/06/88</u>	NAME <u>EPA method 601</u> Category

٠Ĺ

460-00-4 1-Bromo-4-fluorobenzene <u>103</u> % Recovery

NOTES AND DEFINITIONS FOR THIS REPORT. DET LIMIT = DETECTION LIMIT ND = not detected at detection limit NA = not analyzed * = less than 5 times the detection limit N\A= not available Second column confirmation NOT performed unless otherwise noted. A-Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. Quantitated as dibromochloromethane unless otherwise noted. B-1,1,2,2-tetrachloroethane and tetrachloroethene co-elute. Quantitated as tetrachloroethene unless otherwise noted.

) CORPORATION	· · · · · · · · · · · · · · · · · · ·		
Page 20	AS - Austin	REPORT WOT	k Order # 88-07-020
Received: 07/08/88	Results by San	ıple	
SAMPLE ID <u>R-2</u>	FRACTION 03D TE	ST CODE <u>EPA602</u> NAME <u>EP</u>	A method 602
	Date & Time Collec	ted 07/06/88	Category

VERIFIED CL

ANALYST BM		FILE #			
INSTRMT D	INJECTED	07/08/88	<u></u>	UNITS	uq/L
	CAS#	COMPOUND	RESULT D	ET LIMIT	
71-	-43-2	Benzene	ND	0.2	
10B-	-88-3	Tolvene	ND	0.2	
100	-41-4	Ethylbenzene	ND	0.3	
108	-90-7	Chlorobenzene-A	ND	0.3	
106	-46-7	l,4-Dichlorobenzene	ND	0.3	
541	-73-1	1,3-Dichlorabenzene	ND	0.4	
95	-50-1 3	1,2-Dichlorobenzene	ND	0.4	

SURROGATES

98-08-8 a.a.a-Trifluorotoluene <u>105</u>% recovery

NOTES AND DEFINITIONS FOR THIS REPORT. DET LIMIT = DETECTION LIMIT ND = not detected at detection limit NA = not analyzed * = less than 5 times the detection limit N\A = not available Second column confirmation NOT performed unless otherwise noted.

CORPORATION		
Page 21 Received: 07/08/88	RAS - Austin REPORT Results by Sample	Work Order # 88-07-020 Continued From Above
SAMPLE ID <u>R-2</u>	FRACTION <u>O3D</u> TEST CODE <u>EPA602</u> Date & Time Collected <u>07/06/88</u>	NAME <u>EPA method 602</u> Category
A-Chlorobenzene and m-x	vlene co-elute	· ·

-Chiorobenzene and m-xylene co-elute. Quantitated as chlorobenzene unless otherwise noted.

Page 22 Received: 07/08/88	RAS - Austin Results	REPORT by Sample	Work Order # 88-07-020
SAMPLE ID <u>R-2</u>	FRACTION <u>03/</u> Date & Time	A TEST CODE <u>TDS</u> Collected <u>07/06/88</u>	NAME <u>Total dissolved solids</u> Category
		VERIF	IED LM
ANALYSTTBL INSTRMT	ANALYZED 07/11/88		UNITSmg/L
A	NALYTE RESULT DET LIMIT		
Filterable Residu	e (TDS) <u>6200</u> <u>3.0</u>		
NA = not analyzed * = less than 5 t N\A = not availab	imes the detection limit le		
SAMPLE ID <u>R-2</u>	FRACTION <u>03</u> Date & Time	D TEST CODE <u>XYLE</u> Collected <u>07/06/88</u>	ENE NAME Xylenes, EPA 602 B Category
		VERIF	FIEDCL
ANALYST <u>BM</u> INSTRMT <u>D</u>	F. INJECTD <u>07/08/88</u>	ILE #	UNITS Ug/L
CAS # 106-42 108-36 95-47	CDMPDUND RESULT -3 p-Xylene <u>ND,Q</u> -3 m-Xylene-A <u>ND</u> -6 o-Xylene <u>ND</u>	DET LIMIT 0_2 0_1	

CORPORE			
Page 23 Received: 07/08/88	RAS - Austi Re	n REPORT sults by Sample	Work Order # 88-07-020 Continued From Above
SAMPLE ID <u>R-2</u>	FRACTI Date &	ON <u>O3D</u> TEST CODE <u>XYLENE</u> Time Collected <u>07/06/88</u>	NAME <u>Xylenes, EPA 602</u> Category
	-08-8 a.a.a-Trif]	SURROGATES Luorotoluene <u>105</u> % recove	ų عو
NOTES AND DEFINITION DET LIMIT = DET ND = not detect NA = not analyz * = less than 5 N\A = not avail Second column of Unless otheru Q = daily EPA s 95% confidenc Chlorobenzene a Guantitated a	IS FOR THIS REPORT. ECTION LIMIT ed at detection limit ed times the detection limit able confirmation NOT perform vise noted. tandard recovery outsid te interval. and m-xylene co-elute. s chlorobenzene unless	imit ned je	

i.

· T ·

CORPORATION			
Page 24 Received: 07/08/88	RAS -	- Austin REPORT Results by Sample	Work Order # 88-07-020
SAMPLE ID <u>R-3</u>		FRACTION <u>04B</u> TEST CODE <u>EPA601</u> Date & Time Collected <u>07/06/88</u>	NAME <u>EPA method 601</u> Category

ANALYST BM			VERIFIEDCL
INSTRMTG	INJECTD 07/08/88	1 2 12 12 17	UNITS UQ/L
CAS#	COMPOUND	RESULT	DET LIMIT
74-87-3	Chloromethane	ND	0.30
74-83-9	Bromomethane	ND	1.2
75-01-4	Vinyl chloride	<u>ND</u>	0.20
75-00-3	Chloroethane	ND	0. 50
75-09-2	Methylene chloride		0.30
75-69-4	Trichlorofluoromethane	<u>ND</u>	0.10
75-35-4	1,1-Dichloroethene	ND	0.10
75-34-3	1,1-Dichloroethane	ND	0.090
156-60-5	trans-1,2-Dichloroethene	ND	_0.20
67-66-3	Chloroform	NDC	0.050
107-06-2	1,2-Dichloroethane	ND	0.030
71-55-6	1,1,1-Trichloroethane	ND	<u> 0. 090</u>
56-23-5	Carbon tetrachloride		0.10
75-27-4	Bromodichloromethane	ND	0.10

.

,

Page 25 Received: 07/08/8	RAS - Austin NB Resu	lts by Sa	REPORT imple	Work Order # 88-07-020 Continued From Above
SAMPLE ID <u>R-3</u>	FRACTION Date & T	<u>04B</u> T ime Colle	EST CODE <u>EPA601</u> cted <u>07/06/88</u>	NAME <u>EPA method 601</u> Category
CAS#	COMPOUND	RESULT	DET LIMIT	
78-87-5	1;2-Dichloropropane	ND	0.10	
10061-02-6	trans-1,3-Dichloropropene		0.30	
79-01-6	Trichloroethene	ND	0.20	
124-48-1	Dibromochloromethane-A	NDC	0.20	
79-00-5	1,1,2-Trichloroethane-A		0.070	
10061-01-5	cis-1,3-Dichloropropene-A		<u>N\A</u>	
110-75-8	2-Chloroethylvinyl ether	<u>ND</u>	0.20	
75-25-2	Bromoform	ND	0.30	2
79-34-5	1, 1, 2, 2-Tetrachloroethane-B		0.12	
127-18-4	Tetrachloroethene-B		0.030	
108-90-7	Chlorobenzene		0.30	
541-73-1	1,3-Dichlorobenzene		0.30	
95-50-1	1,2-Dichlorobenzene	ND	0.50	
106-46-7	1,4-Dichlorobenzene	ND	0.40	
	SURRDGATES			
74-97-5	Bromochloromethane	<u> </u>	Recovery	
3017-95-6	2-Bromo-1-chloropropane	<u>NA</u> %	Recovery	
110-56-5	1-4-Dichlorobutane	<u>NA</u> %	Recovery	

CORPORATION		
Page 26 Received: 07/08/88	RAS - Austin REPORT Results by Sample	Work Order # 8 8-07-020 Continued From Above
SAMPLE ID <u>R-3</u>	FRACTION <u>04B</u> TEST CODE <u>EPA601</u> Date & Time Collected <u>07/06/8B</u>	NAME <u>EPA method 601</u> Category

460-00-4 1-Bromo-4-fluorobenzene <u>102</u> % Recovery

NOTES AND DEFINITIONS FOR THIS REPORT. DET LIMIT = DETECTION LIMIT ND = not detected at detection limit NA = not analyzed * = less than 5 times the detection limit N\A= not available Second column confirmation NOT performed unless otherwise noted. A-Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. Guantitated as dibromochloromethane unless otherwise noted. B-1,1,2,2-tetrachloroethane and tetrachloroethene co-elute. Guantitated as tetrachloroethene unless otherwise noted.

'n.

CORPORATION		
Page 27 Received: 07/08/88	RAS - Austin REPORT Results by Sample	Work Order # 88-07-020
SAMPLE ID <u>R-3</u>	FRACTION <u>04D</u> TEST CODE <u>EPA602</u> Date & Time Collected <u>07/06/88</u>	NAME <u>EPA method 602</u> Category

ANALYST <u>RP</u> INSTRMT <u>D</u>	INJECT	FILE # _		UNITS	<u>uq/L</u>
	CAS#	COMPOUND	RESULT	DET LIMIT	
	71-43-2	Benzene	2.5	0.2	
	108-88-3	Toluene	0.5*	0.2	
	100-41-4	Ethylbenzene	<u>ND</u>	0.3	
	108-90-7	Chlorobenzene-A	ND	0.3	
	106-46-7	1,4-Dichlorobenzene	<u>IND</u>	0.3	
	541-73-1	1,3-Dichlorobenzene	<u>ND</u>	0.4	
	95-50-1	1,2-Dichlorobenzene	<u> </u>	0.4	
		SURROGATES			

VERIFIED CL

98-08-8 a.a.a-Trifluorotoluene 100% recovery

```
NOTES AND DEFINITIONS FOR THIS REPORT.

DET LIMIT = DETECTION LIMIT

ND = not detected at detection limit

NA = not analyzed

* = less than 5 times the detection limit

N\A = not available

Second column confirmation NOT performed

unless otherwise noted.
```

Page 28 Received: 07/08/88	RAS -	- Austin Results	REPO by Sample	RT	Work Order # Continued Fr	88-07-020 om Above	
SAMPLE ID <u>R-3</u>		FRACTION <u>04</u> Date & Time	D TEST C Collected	0DE <u>EPA602</u> 07/06/88	NAME <u>EPA method</u> Catego	602 iry	
A-Chlorobenzene and m-x	ylene co	-elute.					

.

.

Guantitated as chlorobenzene unless otherwise noted.

.)

.

,

CORPORA	tiū ii ())	
age 29 eceived: 07/08/88	RAS - Austin Results by S	REPORT ample	Work Order # 88-07-020
SAMPLE ID <u>R-3</u>	FRACTION <u>04A</u> Date & Time Coll	TEST CODE <u>TDS</u> ected <u>07/06/88</u>	NAME <u>Total dissolved solids</u> Category
		VERIFIED	<u>LM</u>
ANALYSTTBL INSTRMT	ANALYZED 07/11/88	UN	ITSMg/L
1A	ALYTE RESULT DET LIMIT		
Filterable Residue	e (TDS) <u>6100</u> <u>3.0</u>		
NOTES AND DEFINITIONS (DET LIMIT = DETECT ND = not detected	FOR THIS REPORT. FION LIMIT at detection limit		
NOTES AND DEFINITIONS (DET LIMIT = DETEC ND = not detected NA = not analyzed * = less than 5 t N\A = not availab	FOR THIS REPORT. FION LIMIT at detection limit imes the detection limit le		
NOTES AND DEFINITIONS (DET LIMIT = DETECT ND = not detected NA = not analyzed * = less than 5 t N\A = not availab	FOR THIS REPORT. FION LIMIT at detection limit imes the detection limit le FRACTION <u>O4D</u> Date & Time Coll	TEST CODE <u>Xylene</u> ected <u>07/06/88</u>	NAME <u>Xulenes, EPA 602</u> Category
NOTES AND DEFINITIONS (DET LIMIT = DETEC ND = not detected NA = not analyzed * = less than 5 t N\A = not availab	FOR THIS REPORT. FION LIMIT at detection limit lmes the detection limit le FRACTION <u>O4D</u> Date & Time Coll	TEST CODE <u>XYLENE</u> ected <u>07/06/88</u> verifiei	NAME <u>Xylenes, EPA 602</u> Category
NOTES AND DEFINITIONS (DET LIMIT = DETECT ND = not detected NA = not analyzed * = less than 5 t N\A = not availab SAMPLE ID <u>R-3</u>	FOR THIS REPORT. FION LIMIT at detection limit le FRACTION <u>04D</u> Date & Time Coll FILE # INJECTD <u>07/13/88</u>	TEST CODE <u>XYLENE</u> ected <u>07/06/88</u> verifier	NAME <u>Xulenes, EPA 602</u> Category O NITSUg/L

CORPORATIO			
Page 30 Received: 07/08/88	RAS - Austin Result:	REPORT s by Sample	Work Order # 88-07-020 Continued From Above
SAMPLE ID <u>R-3</u>	FRACTION <u>04</u> Date & Time	<u>AD</u> TEST CODE <u>XYLENE</u> e Collected <u>07/06/88</u>	NAME <u>Xylenes, EPA 602</u> Category
98-08-8 NOTES AND DEFINITIONS FOR	SURF a, a, a-Trifluorof THIS REPORT.	ROGATES toluene <u>100</u> % recover	
DET LIMIT = DETECTION ND = not detected at NA = not analyzed * = less than 5 times N\A = not available	LIMIT detection limit the detection limit		
Second column confirm unless otherwise no Q = daily EPA standar 95% confidence inte	ation NOT performed ted. d recovery outside rval.		
Chlorobenzene and m-x Guantitated as chlo otherwise noted.	ylene co-elute. robenzene unless		

:)

,

Page 31 Received: 07/08/88	RAS - Austin Resul	ts by Sa	REPORT Work Order # 88-07-020 ample
SAMPLE ID <u>R-4</u>	FRACTION Date & Ti	<u>05B</u> T me Colle	TEST CODE <u>EPA601</u> NAME <u>EPA method 601</u> ected <u>07/06/88</u> Category
ANALYST <u>BM</u> INSTRMT <u>G</u>	INJECTD 07/08/88	FILE #	VERIFIED <u>CL</u> UNITS <u>ug/L</u>
CAS#	COMPOUND	RESULT	DET LIMIT
74-87-3	Chloromethane	<u>ND</u>	0.30
74-83-9	Bromomethane	ND	1.2
75-01-4	Vinyl chloride	ND	0.20
75-00-3	Chloroethane	<u> </u>	0.50
75-09-2	Methylene chloride	<u> </u>	0.30
75-69-4	Trichlorofluoromethane	<u> </u>	0.10
75-35-4	1,1-Dichloroethene		0.10
75-34-3	1,1-Dichloroethane	<u>ND</u>	0.090
156-60-5	trans-1,2-Dichloroethene		0.20
67-66-3	Chloroform		0.050
107-06-2	1,2-Dichloroethane		0.030
71-55-6	1,1,1-Trichloroethane		0.090
56-23-5	Carbon tetrachloride		0.10
75-27-4	Bromodichloromethane		0.10

ı

.

,

, ÷

:

	PORATION))		. X
Page 32 Received: 07/08/8	RAS - Austin 18 Resul	lts by Sa	REPORT ample	Work Drder # 88-07-020 Continued From Above
SAMPLE ID <u>R-4</u>	FRACTION Date & Ti	<u>05B</u> 1 ime Colle	EST CODE <u>EPA601</u> ected <u>07/06/88</u>	NAME <u>EPA method 601</u> Category
CAS#	COMPOUND	RESULT	DET LIMIT	
78-87-5	1,2-Dichloropropane	ND	0.10	
10061-02-6	trans-1,3-Dichloropropene	ND	0.30	
79-01-6	Trichloroethene	ND	0.20	
124-48-1	Dibromochloromethane-A	<u>ND</u>	0.20	
79-00-5	1,1,2-Trichloroethane-A		0.070	
10061-01-5	cis-1,3-Dichloropropene-A	ND	<u>N\A</u>	
110-75-8	2-Chloroethylvinyl ether	ND	0, 20	
75-25-2	Bromoform		0.30	
79-34-5	1, 1, 2, 2-Tetrachloroethane-B	ND	0.12	
127-18-4	Tetrachloroethene-B	<u>ND</u>	0.030	
108-90-7	Chlorobenzene	<u> </u>	0.30	
541-73-1	1,3-Dichlorobenzene		0.30	
95-50-1	1,2-Dichlorobenzene	<u>ND</u>	0. 50	
106-46-7	1,4-Dichlorobenzene	ND	<u> 0. 40</u>	
	SURROGATES			
74-97-5	Bromochloromethane	<u> </u>	Recovery	
3017-95-6	2-Bromo-1-chloropropane	<u>NA</u> %	Recovery	
110-56-5)	1-4-Dichlorobutane	<u>NA</u> %	Recovery	

CORPORATION		
Page 33 Received: 07/08/88	RAS - Austin REPORT Results by Sample	Work Order # 88-07-020 Continued From Above
SAMPLE ID <u>R-4</u>	FRACTION <u>05B</u> TEST CODE <u>EPA601</u> Date & Time Collected <u>07/06/88</u>	NAME <u>EPA method 601</u> Category

460-00-4 1-Bromo-4-fluorobenzene <u>96</u>% Recovery

NOTES AND DEFINITIONS FOR THIS REPORT. DET LIMIT = DETECTION LIMIT ND = not detected at detection limit NA = not analyzed * = less than 5 times the detection limit N\A= not available Second column confirmation NDT performed unless otherwise noted. A-Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. Guantitated as dibromochloromethane unless otherwise noted. B-1,1,2,2-tetrachloroethane and tetrachloroethene co-elute. Quantitated as tetrachloroethene unless otherwise noted.

Page 34 Received: 07/08/88	RAS - Austin REPORT Work Urder # 88-0/-020 Results by Sample
SAMPLE ID <u>R-4</u>	FRACTION <u>05D</u> TEST CODE <u>EPA602</u> NAME <u>EPA method 602</u> Date & Time Collected <u>07/06/88</u> Category
	VERIFIEDCL
ANALYST <u>RP</u> INSTRMT <u>D</u>	FILE # UNITSUq/L
	CAS# COMPOUND RESULT DET LIMIT
	71-43-2 Benzene <u>ND 0.2</u>
	108-88-3 Toluene <u>1.1</u> <u>0.2</u>
	100-41-4 Ethylbenzene <u>ND 0.3</u>
	108-90-7 Chlorobenzene-A ND 0.3
	106-46-7 1,4-Dichlorobenzene <u>ND 0.3</u>
	541-73-1 1,3-Dichlorobenzene <u>ND</u> <u>0.4</u>
	95-50-1 1,2-Dichlorobenzene <u>ND 0.4</u>
	SURROGATES
	98-08-8 a.a.a-Trifluorotoluene <u>106</u> % recovery

Second column confirmation NDT performed unless otherwise noted.

,

ì

TRADIAN"	na and and the same and the same and the same and the same a	
Page 35 Received: 07/08/88	RAS - Austin REPORT Work Order # 88-07-020 Results by Sample Continued From Above	
SAMPLE ID <u>R-4</u>	FRACTION <u>05D</u> TEST CODE <u>EPA602</u> NAME <u>EPA method 602</u> Date & Time Collected <u>07/06/88</u> Category	-
A-Chlorobenzene and m-xy	lene co-elute.	

Quantitated as chlorobenzene unless otherwise noted.

EDRPORATION			
Page 36 Received: 07/08/88	RAS - Austin Results b	REPORT y Sample	Work Order # 88-07-020
SAMPLE ID <u>R-4</u>	FRACTION <u>05A</u> Date & Time C	TEST CODE <u>TDS</u> ollected <u>07/06/88</u>	NAME <u>Total dissolved solids</u> Category
		VERIFIEI	D <u>LM</u>
ANALYST <u>TBL</u> INSTRMT	ANALYZED <u>07/11/88</u>	IJ	NITSMQ/L
ANALYTI	E RESULT DET LIMIT		
Filterable Residue (TD	5) <u>10300 3.0</u>		
NUTES AND DEFINITIONS FOR T DET LIMIT = DETECTION (ND = not detected at d NA = not analyzed * = less than 5 times (N\A = not available	HIS REPORT. _IMIT etection limit the detection limit		
SAMPLE ID <u>R-4</u>	FRACTION <u>05D</u> Date & Time C	TEST CODE <u>XYLENE</u> ollected <u>07/06/88</u>	NAME <u>Xulenes, EPA 602</u> Category
		VERIFIEI	DCL
ANALYST <u>RP</u> INSTRMT <u>D</u>	FIL INJECTD <u>07/13/88</u>	E #U	NITSUQ/L
CAS #	COMPOUND RESULT D	ET LIMIT	

RADIAN		
Page 37 Received: 07/08/88	RAS - Austin REPORT Results by Sample	Work Order # 88-07-020 Continued From Above
SAMPLE ID <u>R-4</u>	FRACTION <u>05D</u> TEST CODE <u>XYLENE</u> Date & Time Collected <u>07/06/88</u>	NAME <u>Xylenes, EPA 602</u> Category
	SURROGATES a.a.a-Trifluorotoluene <u>106</u> % recover	ų
NOTES AND DEFINITIONS FOR T DET LIMIT = DETECTION ND = not detected at d NA = not analyzed * = less than 5 times	HIS REPORT. LIMIT etection limit the detection limit	

N\A = not available

otherwise noted.

unless otherwise noted.

95% confidence interval.

Second column confirmation NOT performed

Q = daily EPA standard recovery outside

Chlorobenzene and m-xylene co-elute. Guantitated as chlorobenzene unless

	R	AD	Â		
ł	, COR	POR	ATIO	N	

. /

CORPORATION		1	})	
Page 38 Received: 07/08/88	Ras	- Austin Results by	REPORT Sample	Work	Order # 88-07-020	
SAMPLE ID <u>reagent blank</u>		FRACTION <u>O6A</u> Date & Time Co	TEST CODE <u>EPA6C</u> llected not speci) <u>1</u> NAME <u>EPA</u> fied	<u>method 601</u> Category	

ANALYST CL			VERIFIED <u>CL</u>
INSTRMTG	INJECTD <u>07/08/88</u>	1166 #	UNITSUq/L
CAS#	COMPOUND	RESULT	DET LIMIT
74-87-3	Chloromethane		0.30
74-83-9	Bromomethane	ND	1_2
75-01-4	Vinyl chloride		0.20
75-00-3	Chloroethane	ND	0.50
75-09-2	Methylene chloride		0.30
75-69-4	Trichlorofluoromethane	ND	0,10
75-35-4	1,1-Dichloroethene		0.10
75-34-3	1,1-Dichloroethane	ND	0.090
156-60-5	trans-1,2-Dichloroethene	ND	0.20
67-66-3	Chloroform	<u> </u>	0.050
107-06-2	1,2-Dichloroethane		0.030
71-55-6	1,1,1-Trichloroethane	ND	<u> </u>
56-23-5	Carbon tetrachloride	<u> </u>	0.10
75-27-4	Bromodichloromethane		0.10

	PORATION	1)		· `}
Page 39 Received: 07/08/8	RAS - Austin B Resul	lts by Sa	REPORT mple	Work Order # 88-07-020 Continued From Above
SAMPLE ID <u>reagent</u>	<u>blank</u> FRACTION Date & T:	<u>06A</u> TI ime Colle	EST CODE <u>EPA601</u> cted <u>not specif</u>	NAME <u>EPA method 601</u> ied Category
CA5#	COMPOUND	RESULT	DET LIMIT	
78-87-5	1,2-Dichloropropane	ND	0.10	
10061-02-6	trans-1,3-Dichloropropene	ND	0.30	
79-01-6	Trichloroethene	ND	0.20	
124-48-1	Dibromochloromethane-A	<u> </u>	0.20	
79-00-5	1,1,2-Trichloroethane-A	<u> </u>	0.070	
10061-01-5	cis-1,3-Dichloropropene-A	<u>ND</u>	<u>N\A</u>	
110-75-8	2-Chloroethylvinyl ether	<u> </u>	0.20	
75-25-2	Bromoform	ND	0.30	
79-34-5	1, 1, 2, 2-Tetrachloroethane-B	ND	0.12	
127-18-4	Tetrachloroethene-B	<u> </u>	0.030	
108-90-7	Chlorobenzene	ND	0.30	
541-73-1	1,3-Dichlorobenzene		0.30	
95-50-1	1,2-Dichlorobenzene	ND	0.50	
106-46-7	1,4-Dichlorobenzene		0.40	
	SURROGATES			
74-97-5	Bromochloromethane	<u>NA</u> %	Recovery	
3017-95-6	2-Bromo-1-chloropropane	<u>NA</u> %	Recovery	
110-56-5	1-4-Dichlorobutane	<u>NA</u> %	Recovery	

_

· -

۴	,	RADIAN'	۴	Ĩ	Far i	#	-						(Cigan t
Page Recei	40 ved:	07/08/88	RAS	-	Austin Res	ults	by	REPO Sample	RT		1	Work Di Contini	rder # Jed Fr	88-07 om Abo	-020 Ve	
SAMPL	EID	<u>reagent blank</u>			FRACTIO Date &	N <u>O6A</u> Time	Co]	TEST C llected	ODE not	<u>EPA601</u> specifi	NAME ed	<u>EPA m</u>	<u>ethod</u> Catego	<u>601</u> гу		

460-00-4 1-Bromo-4-fluorobenzene <u>NA</u> % Recovery

NOTES AND DEFINITIONS FOR THIS REPORT. DET LIMIT = DETECTION LIMIT ND = not detected at detection limit NA = not analyzed * = less than 5 times the detection limit N\A= not available Second column confirmation NOT performed unless otherwise noted. A-Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. Guantitated as dibromochloromethane unless otherwise noted. B-1,1,2,2-tetrachloroethane and tetrachloroethene co-elute. Quantitated as tetrachloroethene unless otherwise noted.

	CORPOR					
Page 41 Received:	07/08/88	RAS -	- Austin Results by Sam	REPORT ple	Wor	(Order # 88-07-020
SAMPLE ID	<u>reagent blan</u>	<u>k</u>	FRACTION <u>O6A</u> TE Date & Time Collec	ST CODE [°] ted <u>not</u>	<u>EPA602</u> NAME <u>EP</u> specified	<u>A method 602</u> Category
				v	ERIFIEDCL	
ANALYST INSTRMT	<u>CL</u>	INJECTED	FILE # _		UNITS	ug/L
		CAS#	COMPOUND	RESULT	DET LIMIT	
		71-43-2	Benzene	ND	0.2	
		108-88-3	Toluene	ND	0.2	
		100-41-4	Ethylbenzene		<u> 0. 3</u>	
		108-90-7	Chlorobenzene-A		0.3	
		106-46-7	1,4-Dichlorobenzene	<u>ND</u>	0.3	
		541-73-1	1,3-Dichlorobenzene	ND	0.4	
	_	95-50-1	1,2-Dichlorobenzene		0.4	
			SURRDGATES			
		98-08-8 a,a	,a-Trifluorotoluene	<u>NA</u> ?	recovery	
NOTES AN DET ND NA * =	AD DEFINITIONS LIMIT = DETE = not detecto = not analyzo = less than 5	5 FOR THIS REPO ECTION LIMIT ed at detection ed times the dete	RT. limit ction limit			

N\A = not available

Second column confirmation NOT performed

unless otherwise noted.

	ange some some konst some some s	
Page 42 Received: 07/08/88	RAS - Austin REPORT Results by Sample	Work Order # 88-07-020 Continued From Above
SAMPLE ID <u>reagent blank</u>	FRACTION <u>O6A</u> TEST CODE <u>EPA6</u> Date & Time Collected <u>not spec</u>	02 NAME EPA method 602 ified Category
A-Chlorobenzene and m-	xulene co-elute.	· ·

Guantitated as chlorobenzene unless otherwise noted.

: : ,

Page 43 Received: 07/08/88	RAS - Austin REPORT Work Order # 88-07-020 Results by Sample
SAMPLE ID <u>reagent blank</u>	FRACTION <u>O6A</u> TEST CODE <u>XYLENE</u> NAME <u>Xylenes, EPA 602</u> Date & Time Collected <u>not specified</u> Category
	VERIFIEDCL
ANALYST <u>CL</u> Instrmt <u>D</u>	FILE # UNITSUq/L
CAS # 106-42-3 108-38-3 95-47-6	COMPOUND RESULT DET LIMIT p-Xylene <u>ND,Q 0.2</u> m-Xylene-A <u>ND 0.2</u> a-Xylene <u>ND 0.1</u>
98-08-8	SURROGATES

NOTES AND DEFINITIONS FOR THIS REPORT.

DET LIMIT = DETECTION LIMIT

ND = not detected at detection limit

NA = not analyzed

```
* = less than 5 times the detection limit
```

```
N A = not available
```

. .

- Second column confirmation NOT performed unless otherwise noted.
- Q = daily EPA standard recovery outside 95% confidence interval.
- Chlorobenzene and m-xylene co-elute. Guantitated as chlorobenzene unless otherwise noted.

			R		1								
:	· .	C	0	R	p	0	R	A	Ŧ	2	0	N	

Page 44 Received: 07/08/88

1

RAS - Austin REPORT NonReported Work Work Order # 88-07-020

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

010	ł	SPR601	01E	ł	SPR602						
02C	ł	SPR601	02E	ł	SPR602						
030	1	SPR601	3£0	1	SPR602	03F	1	SPR602	036	1	SPR602
04C	ł	SPR601	04E	ł	SPR602	04F	ł	SPR602	04G	1	SPR602
05C	ł	SPR601	05E	1	SPR602						

Page 38 Received: 07/08/88	RAS - Austin REPORT Results by Sample	Work Order # 88-07-021
SAMPLE ID <u>equipment rinse</u>	FRACTION <u>06A</u> TEST CODE <u>EPA601</u> Date & Time Collected <u>07/06/88</u>	NAME <u>EPA method 601</u> Category

.

.

			VERIFIED <u>CL</u>	
STRMT <u>B</u>	INJECTD 07/08/88	LICE #	UNITS UQ/L	
CAS#	COMPOUND	RESULT	DET LIMIT	
74-87-3	Chloromethane	<u>IND</u>	0.30	
74-83-9	Bromomethane	<u> </u>	<u>1.2</u>	
75-01-4	Vinyl chloride	ND	0,20	
75-00-3	Chloroethane	ND	0.50	
75-09-2	Methylene chloride	ND	0.30	
75-69-4	Trichlorofluoromethane	ND	0.10	
75-35-4	1,1-Dichloroethene	ND	0.10	
75-34-3	1,1-Dichloroethane	ND	0.090	
156-60-5	trans-1,2-Dichloroethene	<u>IND</u>	0.20	
67-66-3	Chloroform	ND	0.050	
107-06-2	1,2-Dichloroethane	ND	0.030	
71-55-6	1,1,1-Trichloroethane	ND	0.090	
56-23-5	Carbon tetrachloride	ND	0.10	
75-27-4	Bromodichloromethane	<u>ND</u>	0.10	

) ,

•

	PORATION	
Page 39 Received: 07/08/8	RAS - Austin B Resu	REPORT Work Order # 88-07-021 ults by Sample Continued From Above
SAMPLE ID <u>equipme</u>	<u>nt rinse</u> FRACTION Date & T	V <u>O6A</u> TEST CODE <u>EPA601</u> NAME <u>EPA method 601</u> Fime Collected <u>07/06/88</u> Category
CAS#	COMPOUND	RESULT DET LIMIT
78-87-5	1,2-Dichloropropane	<u>ND 0.10</u>
10061-02-6	trans-1,3-Dichloropropene	<u>ND</u> <u>0.30</u>
79-01-6	Trichloroethene	<u>ND</u> 0.20
124-48-1	Dibromochloromethane-A	<u>ND 0.20</u>
79-00-5	1,1,2-Trichloroethane-A	<u>ND</u> 0.070
10061-01-5	cis-1,3-Dichloropropene-A	<u>ND</u> <u>N\A</u>
110-75-8	2-Chloroethylvinyl ether	<u>ND 0.20</u>
75-25-2	Bromoform	<u>ND 0.30</u>
79-34-5	1, 1, 2, 2-Tetrachloroethane-B	<u>ND</u> 0.12
127-18-4	Tetrachloroethene-B	<u>ND 0.030</u>
108-90-7	Chlorobenzene	<u>ND</u> 0.30
541-73-1	1,3-Dichlorobenzene	<u>ND</u> 0.30
95-50-1	1,2-Dichlorobenzene	<u>ND</u> 0.50
106-46-7	1,4-Dichlorobenzene	<u>ND 0.40</u>
	SURROGATES	
74-97-5	Bromochloromethane .	<u> </u>
3017-95-6	2-Bromo-1-chloropropane	<u>NA</u> % Recovery
110-56-5	1-4-Dichlorobutane	NA % Recovery

...

i) CORPORATION	RAG - Austin BEDART	Honk Andon # 89-07-071
Received: 07/08/88	Results by Sample	Continued From Above
SAMPLE ID <u>equipment rinse</u>	FRACTION 06A TEST CODE EPA601	NAME EPA method 601
	Date & Time Collected <u>07/06/88</u>	Category

460-00-4

1-Bromo-4-fluorobenzene 105 % Recovery

NOTES AND DEFINITIONS FOR THIS REPORT. DET LIMIT = DETECTION LIMIT ND = not detected at detection limit NA = not analyzed * = less than 5 times the detection limit N\A= not available Second column confirmation NOT performed unless otherwise noted. A-Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. Guantitated as dibromochloromethane unless otherwise noted. B-1,1,2,2-tetrachloroethane and tetrachloroethene co-elute. Guantitated as tetrachloroethene unless otherwise noted.

Page 41 Received: 07/08/88	RAS - Austin Results by Sam	REPORT Iple	Work Order # 88-07-021
SAMPLE ID <u>equipment rinse</u>	FRACTION <u>O6B</u> TE Date & Time Collec	ST CODE <u>El</u> ted <u>07/06</u>	A602 NAME EPA method 602 /88 Category
		VE	RIFIEDCL
ANALYST <u>BM</u> INSTRMT <u>D</u> INJ	FILE # _		UNITSUq/L
CAS#	COMPOUND	RESULT D	ET LIMIT
71-43-2	Benzene	ND	0.2
108-88-3	Tolvene	37	1
100-41-4	Ethylbenzene	8.8	0.3
108-90-7	Chlorobenzene-A		0.3
106-46-7	1,4-Dichlorobenzene	ND	0.3
541-73-1	1,3-Dichlorobenzene		0.4
95-50-1	1,2-Dichlorobenzene	<u>ND</u>	<u> 0. 4</u>
	SURROGATES		
98-08-8	a,a,a-Trifluorotoluene	115%	recovery
NOTES AND DEFINITIONS FOR THIS DET LIMIT = DETECTION LIN ND = not detected at dete NA = not analyzed * = less than 5 times the N\A = not available Second column confirmatio unless otherwise noted.	B REPORT. AIT ection limit e detection limit on NOT performed		

· .

,

i

CORPORATION		
Page 42 Received: 07/08/88	RAS - Austin REPORT Results by Sample	Work Order # 88-07-021 Continued From Above
SAMPLE ID <u>equipment rinse</u>	FRACTION <u>06B</u> TEST CODE <u>EPA602</u> Date & Time Collected <u>07/06/88</u>	NAME <u>EPA method 602</u> Category

1

A-Chlorobenzene and m-xylene co-elute. Guantitated as chlorobenzene unless otherwise noted.

'n

•...

		ng animi kangi kangi anini kangi ani
CORPORATION)
Page 43 Received: 07/08/88	RAS - Austin REPORT Results by Sample	Work Order # 88-07-02 1
SAMPLE ID <u>equipment rinse</u>	FRACTION <u>06B</u> TEST CODE <u>XYLEN</u> Date & Time Collected <u>07/06/88</u>	<u>VE</u> NAME <u>Xylenes, EPA 602</u> Category
	VERIF	IED <u>CL</u>
ANALYST <u>BM</u> INSTRMT <u>D</u>	FILE #	UNITSUq/L
CAS # 106-42-3 108-38-3 95-47-6	COMPOUND RESULT DET LIMIT p-Xylene <u>3.40</u> <u>0.2</u> m-Xylene-A <u>ND 0.2</u> o-Xylene <u>58</u> 0.5	
98-08-8	SURROGATES a.a.a-Trifluorotoluene <u>115</u> % reco [.]	very
NOTES AND DEFINITIONS FOR TH DET LIMIT = DETECTION (ND = not detected at do NA = not analyzed * = less than 5 times (N\A = not available Second column confirmation unless otherwise note G = daily EPA standard 95% confidence interv Chlorobenzene and m-xy Quantitated as chloro otherwise noted.	HIS REPORT. .IMIT tection limit the detection limit tion NOT performed ed. recovery outside val. lene co-elute. obenzene unless	