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Appendix E: Bioplulme II Model Input/Output Files (Site 57) McDill AFB.

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FINAL

TREATABILITY STUDY IN SUPPORT OF INTRINSIC REMEDIATION FOR PUMPHOUSE 75 (SITE 57)

at

MACDILL AIR FORCE BASE
TAMPA, FLORIDA

January 1997

Prepared for:

AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE
TECHNOLOGY TRANSFER DIVISION
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AND

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EXECUTIVE SUMMARY

This report presents the results of an intrinsic remediation treatability study (TS) performed by Parsons Engineering Science, Inc. (Parsons ES) at Pumphouse 75, MacDill Air Force Base (AFB, the Base), Tampa, Florida to evaluate the use of intrinsic remediation (natural attenuation) with long-term monitoring (LTM) as a remedial option for dissolved benzene, toluene, ethylbenzene, and xylenes (BTEX) contamination in the shallow saturated zone. Soil and groundwater contamination is documented for the site, with contamination being present in the aqueous (i.e., dissolved) and gaseous phases and as residual light nonaqueous-phase liquid (LNAPL) within the aquifer matrix. There is no evidence of mobile LNAPL (free product) at this site. This study focused on the impact of dissolved BTEX on the shallow groundwater system at and downgradient from the site. Site history and the results of soil, groundwater, and surface water investigations conducted previously also are summarized in this report.

Comparison of BTEX, electron acceptor, and biodegradation byproduct isopleth maps for groundwater at Pumphouse 75 provides strong qualitative evidence of biodegradation of BTEX compounds. Geochemical data strongly suggest that biodegradation of fuel hydrocarbons is occurring at the site, primarily via the anaerobic processes of sulfate reduction and methanogenesis.

An important component of this study was an assessment of the potential for contamination in groundwater to migrate from the source area to potential receptors at concentrations above regulatory levels intended to be protective of human health and the environment. The Bioplume II model was used to estimate the rate and direction of dissolved BTEX movement through the shallow saturated zone under the influence of advection, dispersion, sorption, and biodegradation. Input parameters for the Bioplume II model were obtained from existing site characterization data, supplemented with data collected by Parsons ES. Model parameters that were not measured at the site were estimated using reasonable literature values.

The results of this study suggest that dissolved BTEX contamination present in groundwater poses no significant threat to human health or the environment in its present, or predicted future, concentrations and distribution. However, dissolved BTEX concentrations in excess of state groundwater quality guidelines for no further action may persist in the vicinity of the site for approximately 14 years (calendar year 2009) without the implementation of an engineered remedial action. If a source removal technology such as *in situ* bioventing is implemented, then dissolved BTEX concentrations may decrease below no-further-action guidelines after 8 years. It is the Air Force's opinion that intrinsic remediation with LTM and institutional controls achieves the best combination of risk reduction and cost effectiveness, and recommends that this option be implemented for this site. However, engineered source reduction via a combination of bioventing and biosparging should be considered as a contingency in the event that land use in this area changes to commercial or residential, or if measured BTEX reductions in the groundwater are substantially slower than predicted by the Bioplume model. In addition, if a substantial length of the fuel pipelines is exposed in

the near future to detect leakage and repair damage, then consideration should be given to installing a bioventing/biosparging system in the resulting excavation.

To verify the Bioplume II model predictions, the Air Force recommends using 11 LTM wells and up to four point-of-compliance (POC) monitoring wells to monitor the long-term migration and degradation of the dissolved BTEX plume. Regular sampling and analysis of groundwater from these wells will allow the effectiveness of intrinsic remediation to be monitored, and should allow sufficient time to implement additional engineering controls to contain the plume if BTEX compounds are detected in the POC wells at levels of concern. Contaminant fate and transport model results indicate that sampling should continue on an annual basis for approximately 18 years. Along with other analyses used to verify the effectiveness of intrinsic remediation, the groundwater samples should be analyzed for BTEX compounds by US Environmental Protection Agency Method SW8020. If BTEX concentrations in groundwater from the POC wells exceed the Florida Department of Environmental Protection guidelines of 50 micrograms per liter for benzene and total BTEX, additional corrective actions may be required to remediate groundwater at the site.

SECTION 1

INTRODUCTION

This report was prepared by Parsons Engineering Science, Inc. (Parsons ES) and presents the results of a treatability study (TS) conducted to evaluate the use of intrinsic remediation for remediation of fuel-hydrocarbon-contaminated groundwater at Pumphouse 75 at MacDill Air Force Base (AFB, the Base), Tampa, Florida. Pumphouse 75 is a portion of Site 57, which includes the north and south apron taxiways and associated pumphouses, fueling pits, and defueling pits. Previous investigations determined that fuel hydrocarbons had been released into the soil and shallow groundwater at the site.

The main emphasis of the work described herein was to evaluate if naturally occurring attenuation mechanisms would be sufficient to reduce dissolved fuel-related compounds in groundwater to levels that meet state-specified groundwater protection standards. This study is not intended to be a contamination assessment report or a remedial action plan; rather, it is provided for the use of the Base and its prime environmental contractor(s) as information to be used for future decision making regarding this site.

1.1 SCOPE AND OBJECTIVES

Parsons ES was retained by the United States Air Force Center for Environmental Excellence (AFCEE) to conduct site characterization and groundwater modeling to evaluate if intrinsic remediation with long-term monitoring would be a scientifically defensible remedial option for contaminated groundwater at Pumphouse 75.

As used throughout this report, the term "intrinsic remediation" refers to a management strategy that relies on natural attenuation mechanisms to control exposure of potential receptors to concentrations of contaminants in the subsurface that exceed regulatory levels intended to be protective of human health and the environment. "Natural attenuation" refers to the actual processes (e.g., sorption, dispersion, and biodegradation) that facilitate intrinsic remediation.

The intent of the intrinsic remediation demonstration program sponsored by AFCEE is to develop a systematic process for scientifically investigating and documenting naturally occurring subsurface attenuation processes that can be factored into overall site remediation plans. The objective of the program and this specific MacDill AFB study is to provide substantive evidence of intrinsic remediation of dissolved fuel hydrocarbons in groundwater so that this information can be used by the Base and its prime environmental contractor(s) to develop an effective groundwater remediation strategy. As a result, these studies are not necessarily intended to fulfill specific

federal or state requirements regarding site assessments, remedial action plans, or other such mandated investigations and reports. A secondary goal of this multi-site initiative is to provide a database from multiple sites that demonstrates that natural processes of contaminant degradation often can reduce contaminant concentrations in groundwater to below acceptable cleanup standards before potential receptor exposure pathways are completed.

The scope of work for this project involved the following tasks:

- Reviewing existing hydrogeologic and soil and groundwater quality data for the site;
- Conducting supplemental site characterization activities to determine the nature and extent of soil and groundwater contamination and to collect geochemical data in support of intrinsic remediation;
- Developing a conceptual hydrogeologic model of the shallow saturated zone, including the current distribution of contaminants;
- Determining if naturally occurring processes of contaminant attenuation and destruction are occurring in groundwater at the site;
- Simulating the fate and transport of fuel hydrocarbons [benzene, toluene, ethylbenzene, and xylenes (BTEX)] in groundwater under the influence of advection, dispersion, adsorption, and biodegradation using the Bioplume II model;
- Evaluating a range of model input parameters to determine the sensitivity of the model to those parameters and to consider several contaminant fate and transport scenarios;
- Determining if naturally occurring processes are sufficient to minimize BTEX plume expansion so that groundwater quality standards can be met at a downgradient point of compliance (POC);
- Developing remedial action objectives (RAOs) and reviewing available remedial technologies;
- Using the results of modeling to recommend the most appropriate remedial option based on specific effectiveness, implementability, and cost criteria; and
- Providing a long-term monitoring (LTM) plan that includes LTM and POC well locations and a sampling and analysis plan.

Much of the hydrogeologic and groundwater chemical data necessary to evaluate the various remedial options were available from previous investigations conducted at this site or at other sites with similar characteristics, or in the technical literature. The field work conducted under this program was oriented toward the collection of supplementary hydrogeologic and chemical data necessary to document and model the

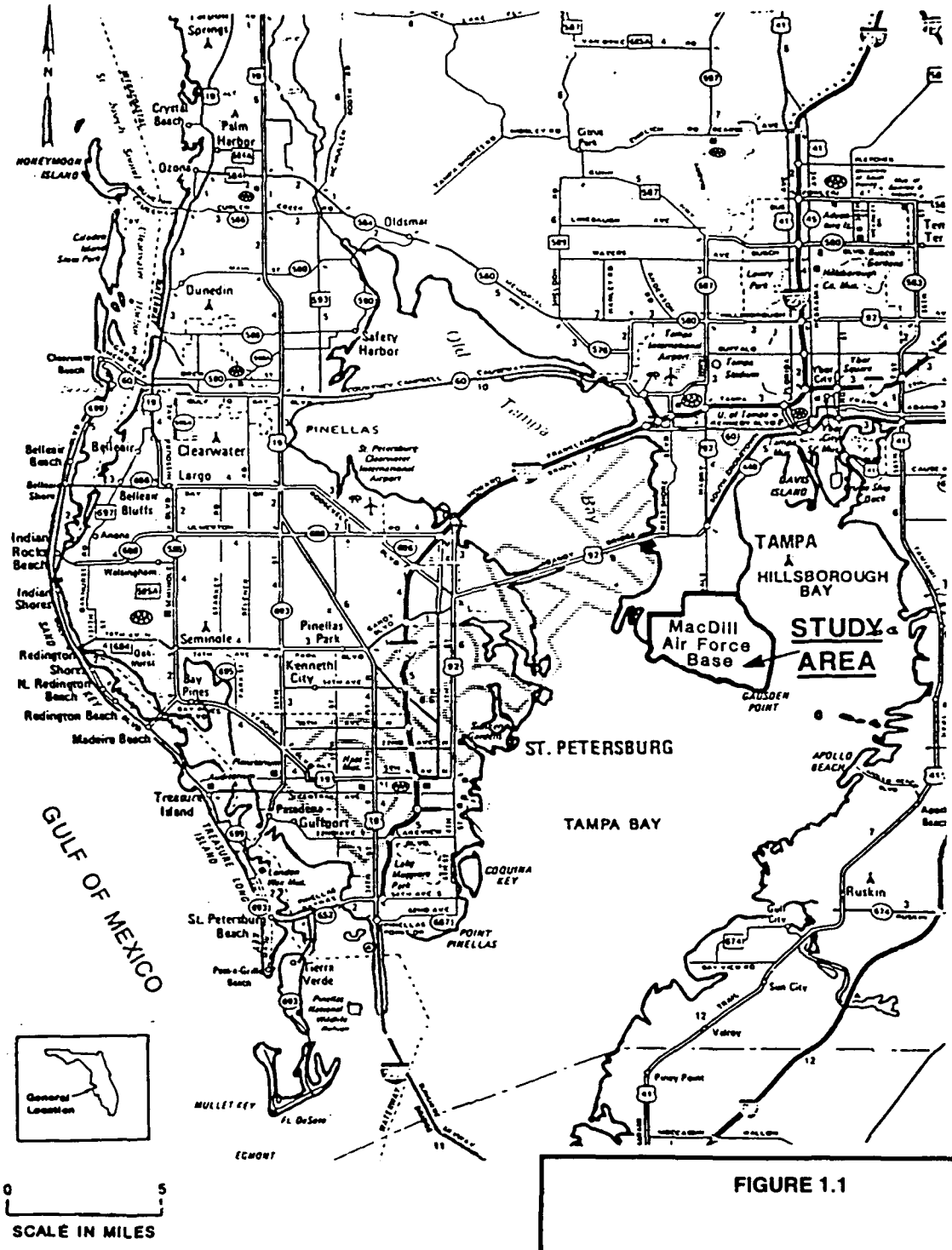
effectiveness of intrinsic remediation with long-term monitoring for fuel-hydrocarbon-contaminated groundwater. Site characterization activities in support of intrinsic remediation, performed in March and April 1995, included use of the Geoprobe® system for soil sample collection and monitoring point installation; aquifer testing; and sampling and analysis of groundwater from newly installed monitoring points and existing monitoring wells.

Site-specific data were used to develop a contaminant fate and transport model for the site using the groundwater flow and solute transport model Bioplume II, and to conduct a preliminary exposure pathways analysis. The Bioplume II model was used to simulate the movement of dissolved BTEX in the shallow saturated zone under the influence of advection, dispersion, sorption, and biodegradation. Model results were used to help assess the potential for completion of exposure pathways involving groundwater and to identify whether intrinsic remediation with LTM is an appropriate and defensible remedial option for contaminated groundwater.

This report contains nine sections, including this introduction, and six appendices. Section 2 summarizes site characterization activities. Section 3 summarizes the physical characteristics of the study area. Section 4 describes the nature and extent of soil and groundwater contamination and the geochemistry of soil and groundwater at the site. Section 5 describes the Bioplume II model and design of the conceptual model for the site, lists model assumptions and input parameters, and describes sensitivity analyses, model output, and the results of the Bioplume II modeling. Section 6 presents a limited comparative analysis of remedial alternatives. Section 7 presents the LTM plan for the site. Section 8 presents the conclusions of this work and provides recommendations for further work at the site. Section 9 lists the references used to develop this document. Appendix A contains pertinent figures and tables containing data collected during the previous site investigation [Black & Veatch Waste Science, Inc. (BVWS), 1995]. Appendix B contains Geoprobe® borehole logs, monitoring point installation, development and sampling records, slug test results, and survey data. Appendix C presents soil and groundwater analytical results. Appendix D contains calculations and model input parameters, and Appendix E contains Bioplume II model input and output in American Standard Code for Information Exchange (ASCII) format on a diskette. Appendix F contains remedial alternative design and cost calculations.

1.2 FACILITY AND SITE BACKGROUND

The Base, located on the southernmost tip of the Interbay Peninsula, covers nearly 7,000 acres in Hillsborough County, Florida, immediately south of the city of Tampa (Figure 1.1). The Base, which was established in the early 1950s, is bordered on the north by Tampa, on the east by Hillsborough Bay, and on the south and west by Tampa Bay. Pumphouse 75 is located in the northeastern section of the Base adjacent to Taxiway N (Figure 1.2). Contamination at Pumphouse 75 originated as fuel released from underground storage tanks (USTs) and/or underground fuel pipelines beneath and adjacent to the pumphouse (Figure 1.3).



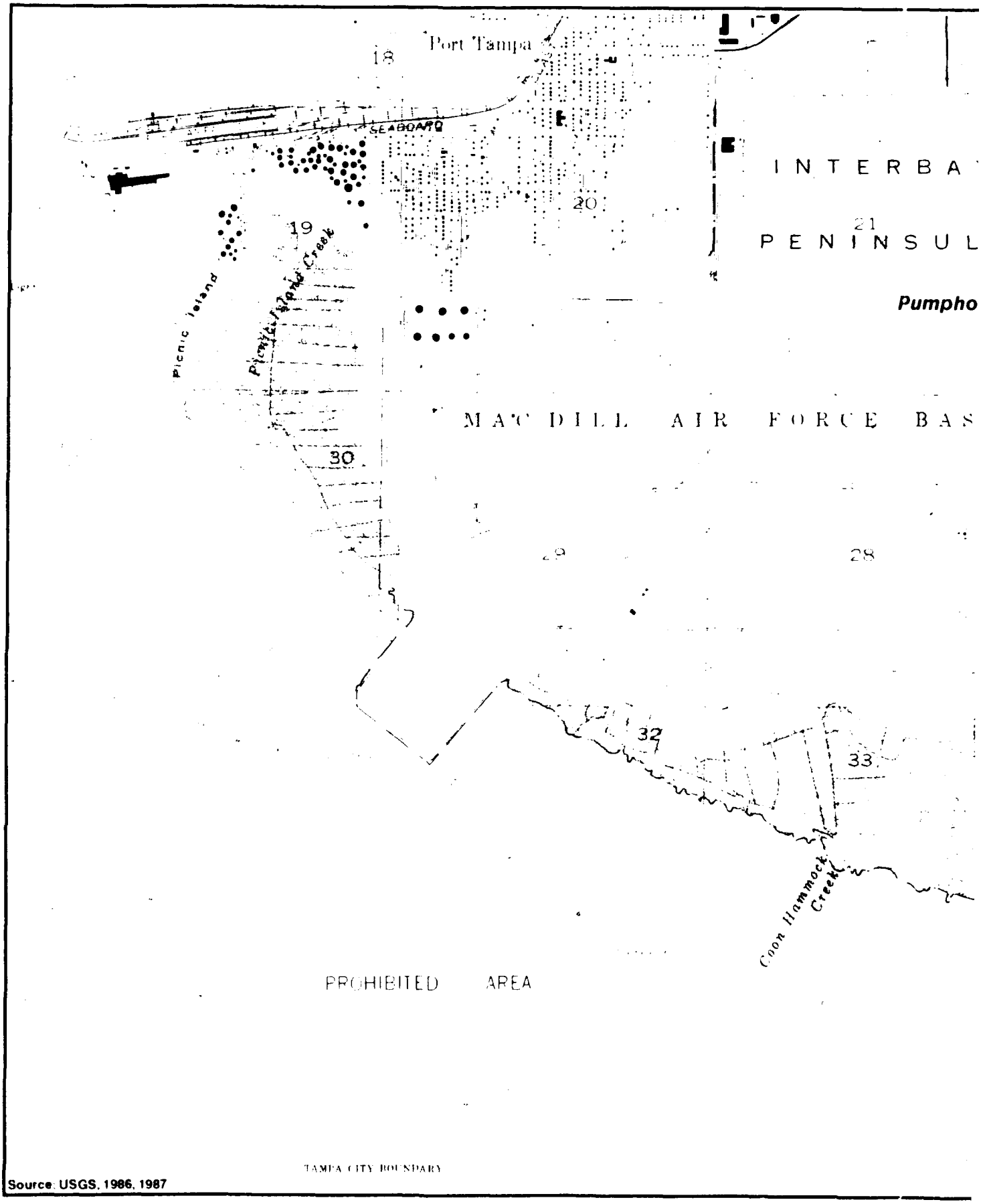
Sources: CH$_2$M HILL, 1991B

FIGURE 1.1

REGIONAL LOCATION OF BASE

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado



Source: USGS, 1986, 1987

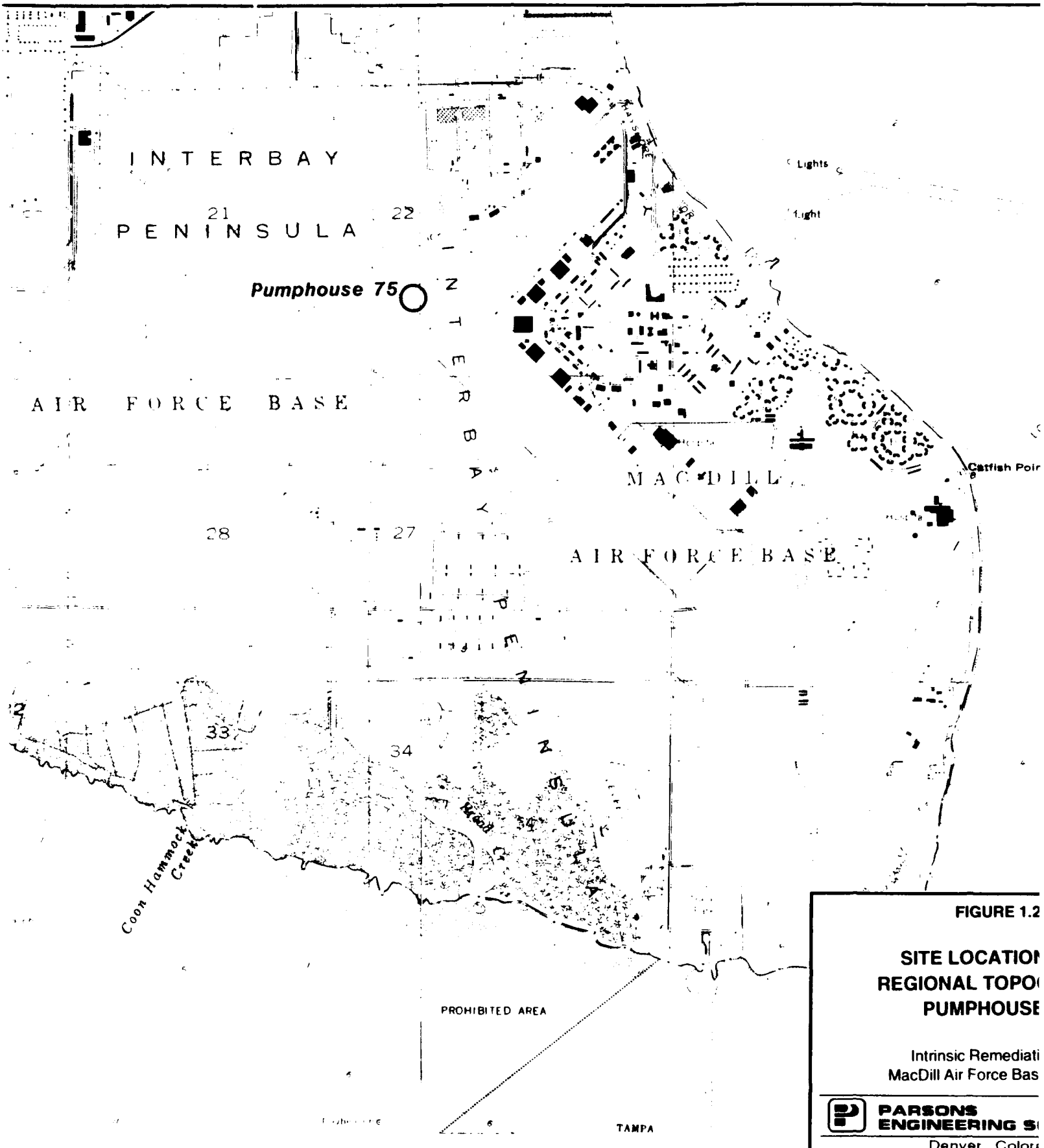


FIGURE 1.2

SITE LOCATION
REGIONAL TOPO
PUMPHOUSE

Intrinsic Remediati
MacDill Air Force Bas

PARSONS ENGINEERING S
Denver, Colora

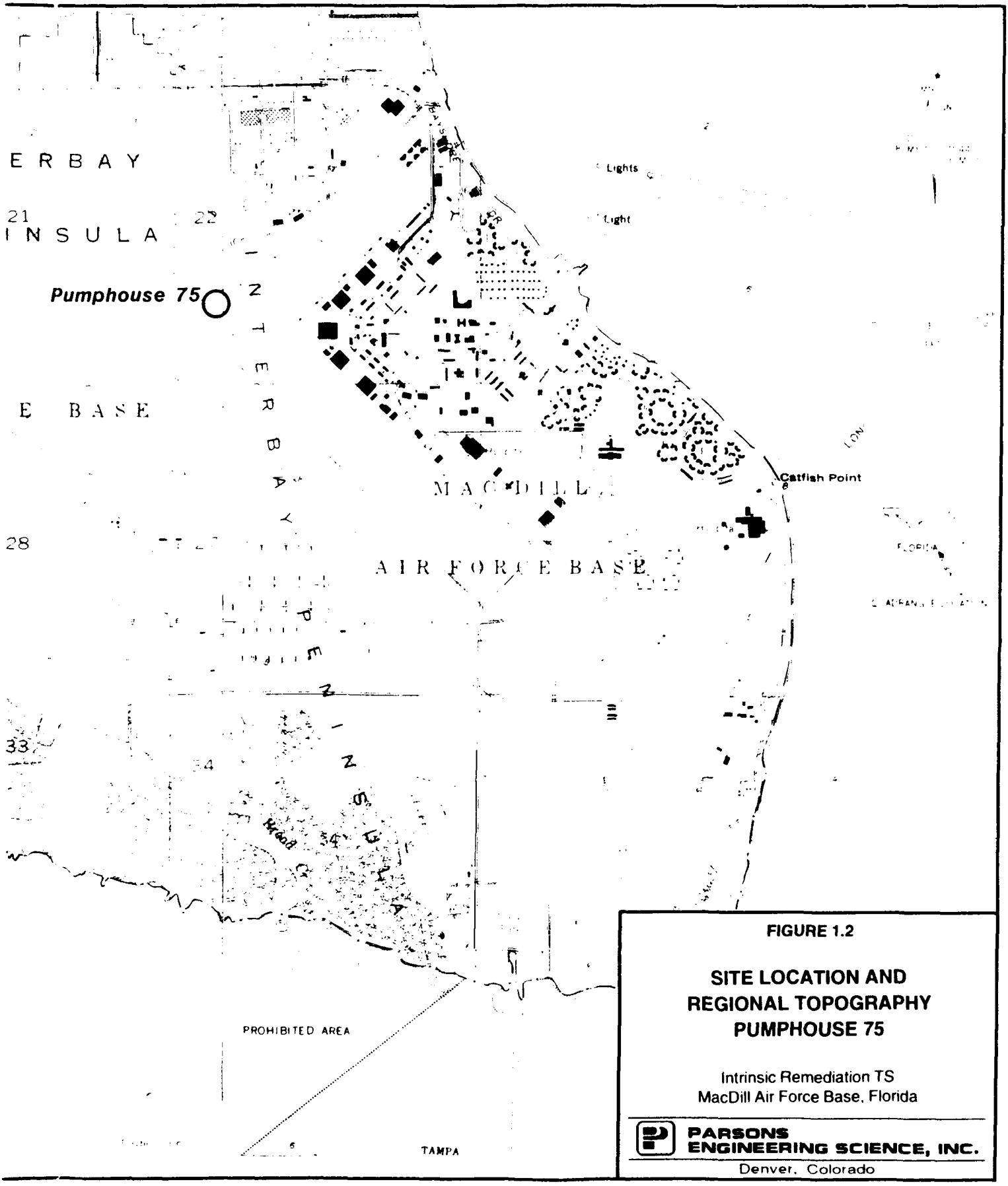
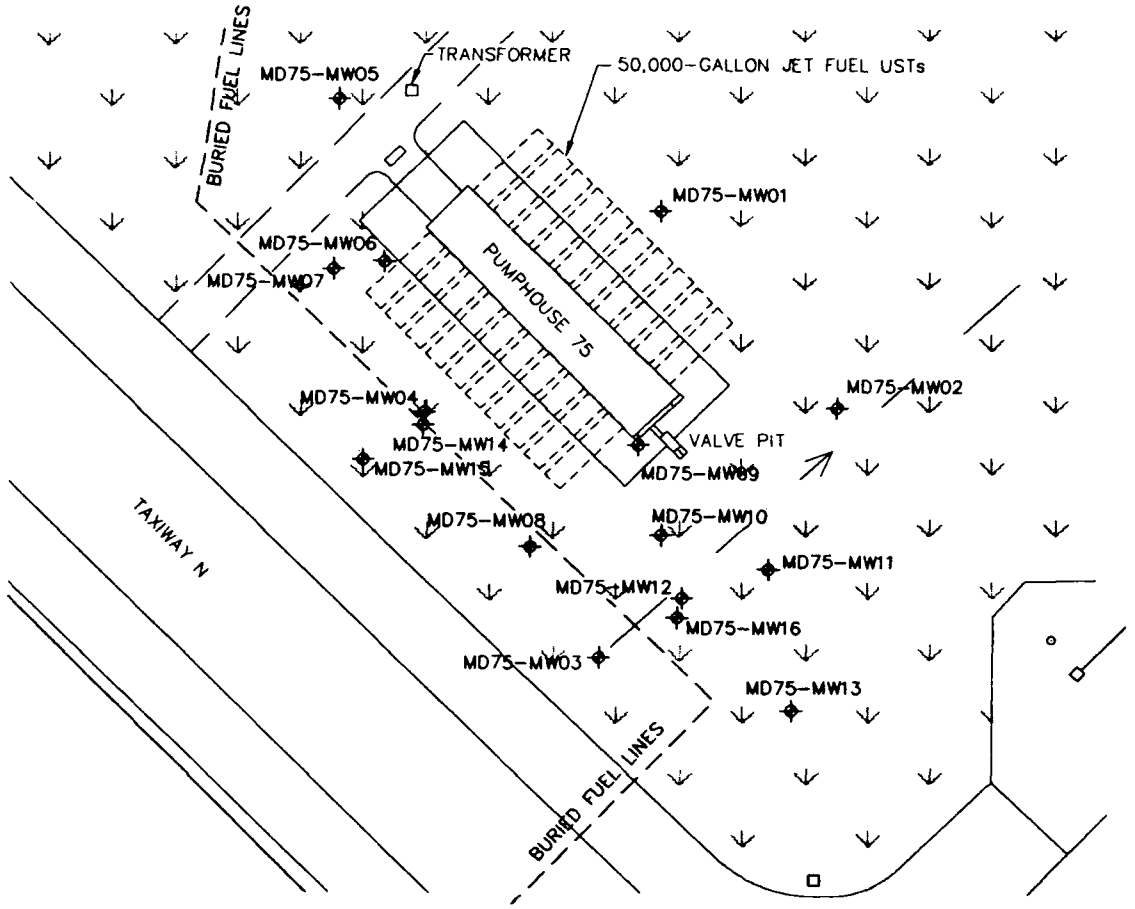


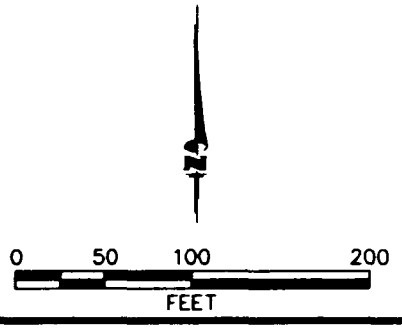
FIGURE 1.2

SITE LOCATION AND REGIONAL TOPOGRAPHY PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

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Denver, Colorado





LEGEND

MD75-MW13 — PRE-EXISTING MONITORING WELL

DRAINAGE SWALE AND FLOW DIRECTION

GRASSY AREA

FIGURE 1.3

SITE LAYOUT
PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

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At Pumphouse 75, twenty 50,000-gallon USTs are used to store jet fuel for refueling aircraft along the north apron of the flightline (Figure 1.3). In the early 1980s, aviation gasoline (AVGAS) and JP-4 fuel were stored in the tanks. No leaks or major spills from these tanks have been reported. However, minor leakage from fuel lines and buried tanks has been suspected [Engineering Science & Technology, Inc. (EA), 1991]. In the past, it was standard practice to collect 1 quart of fuel from each UST on a daily basis and visually inspect it for water content. Afterward, the fuel was poured directly onto the ground (Radian, 1991). Currently, JP-8 is used and stored at Pumphouse 75 and associated fuel pits (BVWS, 1995). The twenty USTs are presumed to lie perpendicular to the pumphouse, as shown in Figure 1.3, and are considered a potential source of petroleum contamination. However, the tanks have reportedly recently passed tightness tests, suggesting that the adjacent fuel supply pipelines are the primary contamination source. Testing of the adjacent fuel supply pipelines is currently scheduled for early 1996.

Two 6-inch-diameter jet fuel pipelines are located west and southwest of the pumphouse building. Previous contaminant assessments have identified the pipelines as sources of environmental contamination. As described in Section 4 of this report, groundwater quality data indicate that the pipelines are the primary source of dissolved BTEX contamination in the groundwater at this site.

BVWS (1995) performed two field investigations at Pumphouse 75 from September 1993 through November 1994. During the initial investigation conducted in 1993 and early 1994, five monitoring wells were installed to characterize the groundwater beneath the site. In addition, 10 Hydrocone®, 2 piezocone, and 237 organic vapor analyzer (OVA) soil headspace samples were obtained. The headspace samples were obtained to delineate the areal and vertical extent of soil contamination at the pumphouse. The 10 Hydrocone® groundwater samples were collected at Pumphouse 75 in September 1993 to delineate the areal and vertical extent of the suspected dissolved contaminant plume. Samples were screened for fuel components (BTEX) and volatile halocarbons using a portable gas chromatograph. The five monitoring wells (MD75-MW01 through -MW05) were installed on November 4 and 5, 1993, and sampled during January 1994. After completion of groundwater sampling activities, slug tests were performed in the wells to allow estimation of the hydraulic conductivity of the screened intervals. During the installation of monitoring wells, soil samples were collected from each borehole for geotechnical classification and chemical analysis. Three sediment samples were also collected in the shallow drainage swale on the southeast side of the pumphouse (Figure 1.3).

Analytical results from the initial investigation indicated data gaps. These gaps were addressed during a second field investigation effort occurring from June to November 1994. Twenty-four additional groundwater samples were collected via Hydrocone® during June, August, and September 1994. In July and October 1994, BVWS installed an additional 11 monitoring wells (MD75-MW06 through -MW16) and collected groundwater samples in an attempt to more accurately delineate groundwater contamination in the surficial aquifer. Following their installation, slug tests were performed in the additional 11 monitoring wells to further delineate lateral and vertical variations in hydraulic conductivity within the surficial aquifer. Soil samples for OVA

headspace screening also were collected from 33 hand-augered soil boreholes and from the 11 monitoring well boreholes.

The results of the BVWS (1995) investigations at Pumphouse 75 are summarized in the *Draft Contamination Assessment Report*. Selected tables and figures from this report are contained in Appendix A of this document. Soil and groundwater beneath Pumphouse 75 were determined to be contaminated with fuel-related constituents in the vicinity of the USTs and the jet fuel pipelines. The maximum total BTEX concentrations detected in soil and groundwater were 90,100JH micrograms per kilogram (µg/kg) and 1,071 micrograms per liter (µg/L), respectively (Appendix A). The qualifier "JH" indicates that the estimated result may be biased high based on high surrogate recovery. Relatively low levels of volatile aromatic hydrocarbons were also detected in sediment samples collected in the shallow drainage swale (Appendix A). The site-specific data presented in Sections 3, 4, and 5 are based on a review of the BVWS (1995) document and on data collected by Parsons ES under this program.

SECTION 2

SITE CHARACTERIZATION ACTIVITIES

This section presents the methods used by Parsons ES personnel to collect site-specific data at Pumphouse 75, MacDill AFB, Florida. To meet the requirements of the intrinsic remediation demonstration, additional data were required to evaluate near-surface geology and geochemistry, aquifer properties, and the extent of soil and groundwater contamination. Site characterization activities involved using the Geoprobe® system for soil sampling and groundwater monitoring point placement. Groundwater sampling was accomplished during this investigation using both newly installed monitoring points and pre-existing monitoring wells. The term "monitoring point" is used in this report to distinguish these groundwater monitoring stations from conventionally-constructed monitoring wells. One aquifer slug test was conducted at a previously installed well (MD75-MW13).

The physical and chemical data listed below were collected during the field work phase of the TS:

- Depth from measurement datum to the water table in monitoring wells and monitoring points;
- Stratigraphy of subsurface media;
- Hydraulic conductivity as determined from slug test data (slug tests measure the rate of change of groundwater elevation in a well in response to the rapid change in water level induced by the introduction or removal of a slug);
- Groundwater geochemical data [pH, temperature, electrical conductivity, total alkalinity, reduction/oxidation (redox) potential, dissolved oxygen (DO), chloride, nitrate, nitrite, ammonia, ferrous and total iron, sulfate, sulfide, manganese, ammonia, carbon dioxide, total organic carbon (TOC), and methane];
- Concentrations of chlorinated and aromatic volatile organic compounds (VOCs), total volatile (gasoline-range) petroleum hydrocarbons (TVH), total extractable (diesel-range) petroleum hydrocarbons (TEH), and ethylene in groundwater; and
- Concentrations of aromatic VOCs, TVH, TEH, and TOC in soil.

The following sections describe the procedures that were followed when collecting site-specific data. Additional details regarding investigative activities are presented in the draft work plan (Parsons ES, 1995a).

2.1 DRILLING, SOIL SAMPLING, AND MONITORING POINT INSTALLATION

Geoprobe®-related field work occurred between March 11 and April 2, 1995, and consisted of drilling, soil sampling, and groundwater monitoring point installation for monitoring points 75MP-1S through 75MP-9D. These activities were performed according to the procedures described in the work plan (Parsons ES, 1995a) and in the following sections.

The Geoprobe® system is a hydraulically powered percussion/probing machine used to advance sampling tools through unconsolidated soils. This system provides for the rapid collection of soil, soil gas, and groundwater samples at shallow depths while minimizing the generation of investigation-derived waste materials. Figure 2.1 is a diagram of the Geoprobe® system.

2.1.1 Groundwater Monitoring Point Locations and Completion Intervals

Thirteen new groundwater monitoring points were installed at nine locations to assist in the characterization of the contaminant distribution and the shallow groundwater flow system at Site 57. These points are identified as 75MP-1D, 75MP-1S, 75MP-2S, 75MP-3D, 75MP-4S, 75MP-5D, 75MP-6D, 75MP-7D, 75MP-7S, 75MP-8D, 75MP-8S, 75MP-9S, and 75MP-9D. The new monitoring points were installed in the locations shown on Figure 2.2, and Table 2.1 presents completion details. Nested points (e.g., 75MP-1S and 75MP-1D) were installed adjacent to each other, with one point (designated by the suffix "S") screened across the water table, and the other point (designated by the suffix "D") screened approximately 10 feet below the bottom of the shallow point. The monitoring point locations were selected to provide the hydrogeologic and chemical data necessary for successful implementation of the Bioplume II model and to support the intrinsic remediation demonstration.

2.1.2 Groundwater Monitoring Point Drilling and Soil Sampling Procedures

2.1.2.1 Pre-Drilling Activities

All subsurface utility lines or other man-made subsurface features were located, and proposed monitoring point and soil borehole locations were cleared and approved by the Base prior to any drilling activities. Water used in drilling, equipment cleaning, or grouting was obtained from an onsite potable water supply.

2.1.2.2 Equipment Decontamination Procedures

Prior to drilling at the site and between each drilling location, all probe rods, tips, sleeves, pushrods, samplers, tools, and other downhole equipment were decontaminated using an Alconox® detergent and potable water solution followed by a high-pressure potable water wash. All equipment also underwent an additional rinse with isopropyl alcohol followed by a final rinse with deionized water.

During drilling operations, the Geoprobe®, probe rods, and any downhole drilling and/or sampling equipment were decontaminated at a site decontamination area. Water

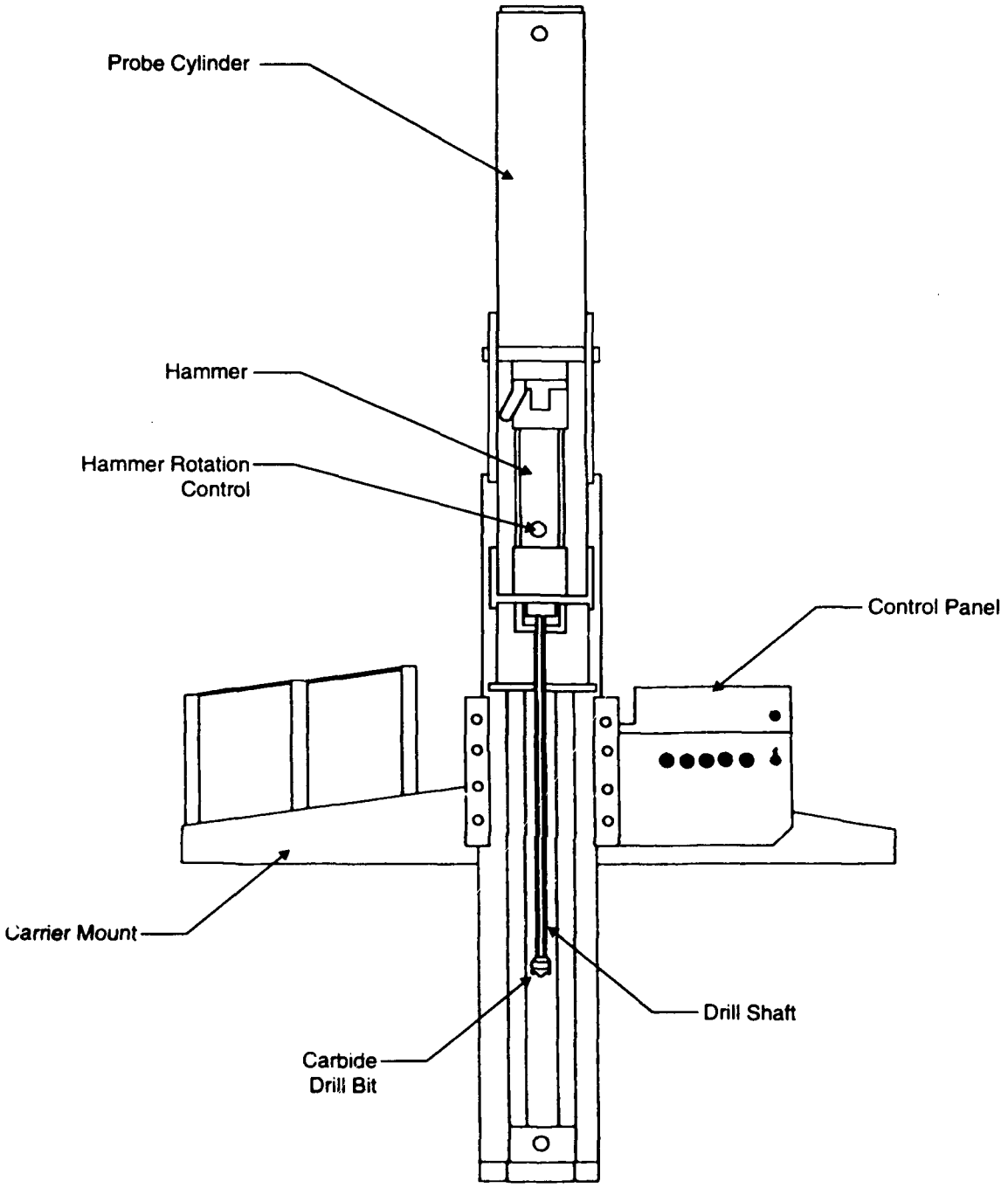
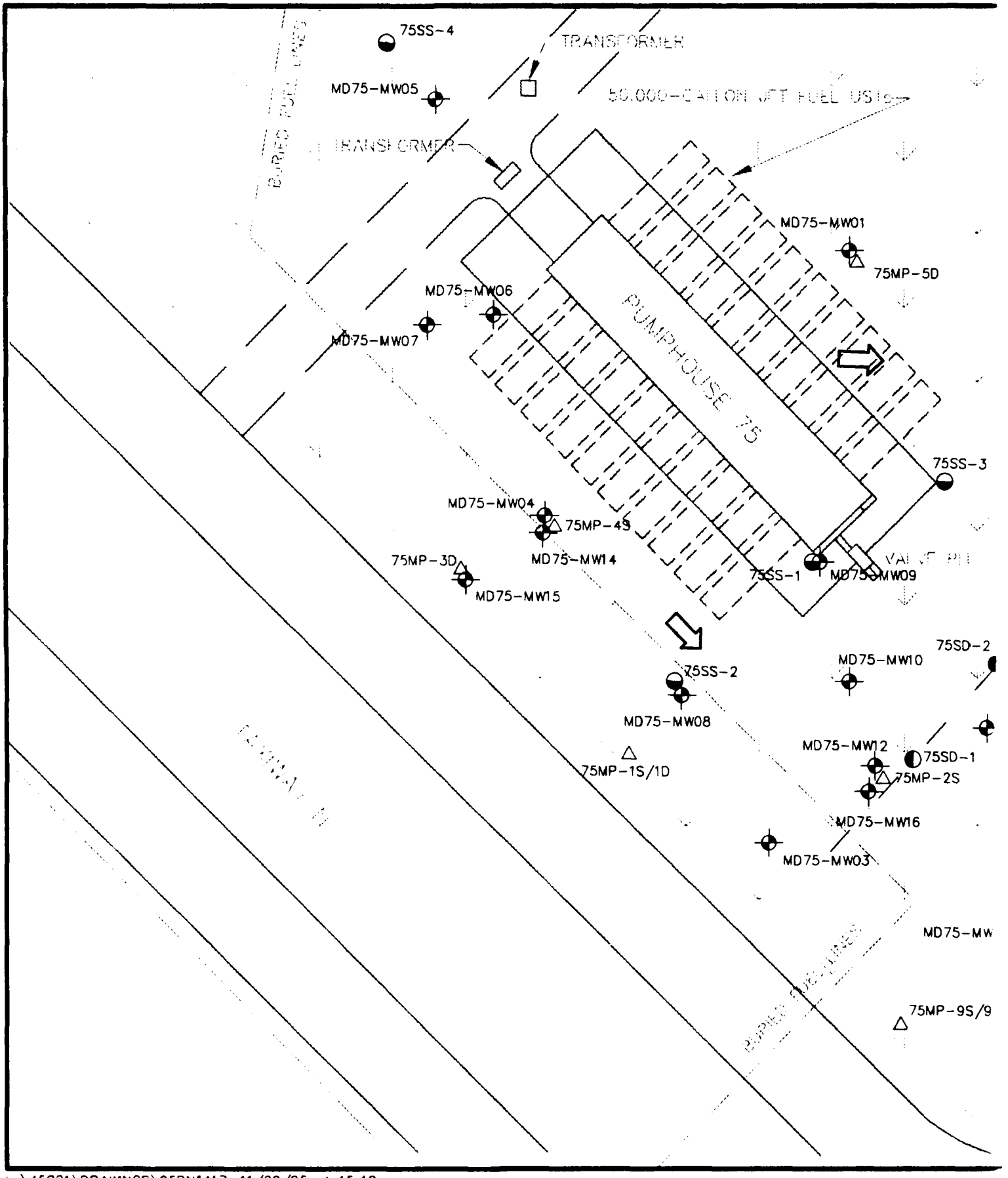


FIGURE 2.1

CROSS-SECTION OF GEOPROBE PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado



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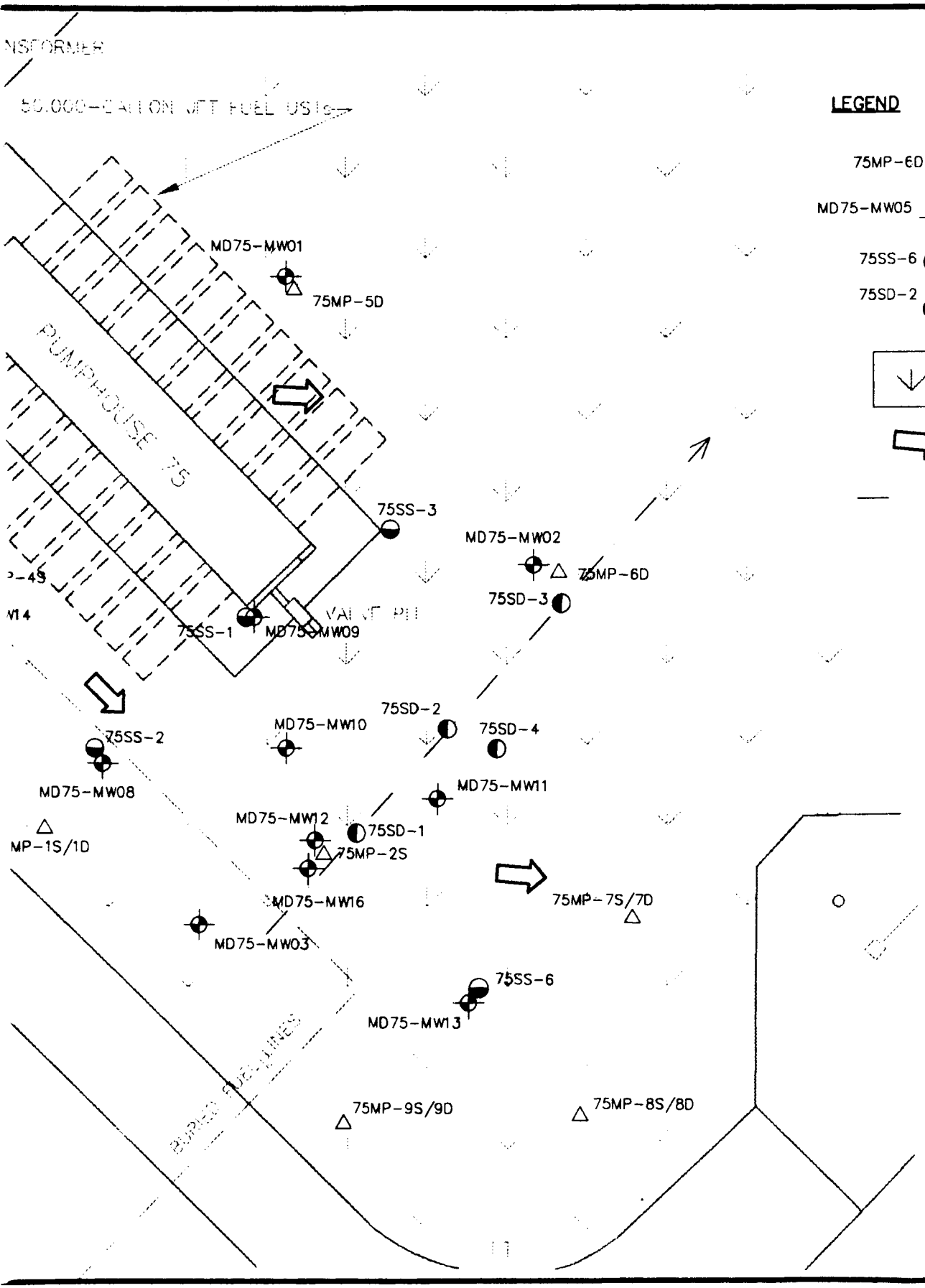


FIGURE 2.

SAMPLING LOC
PUMPHOUSE

Intrinsic Remedia
MacDill Air Force B

PARSONS ENGINEERING S
Denver, Colo

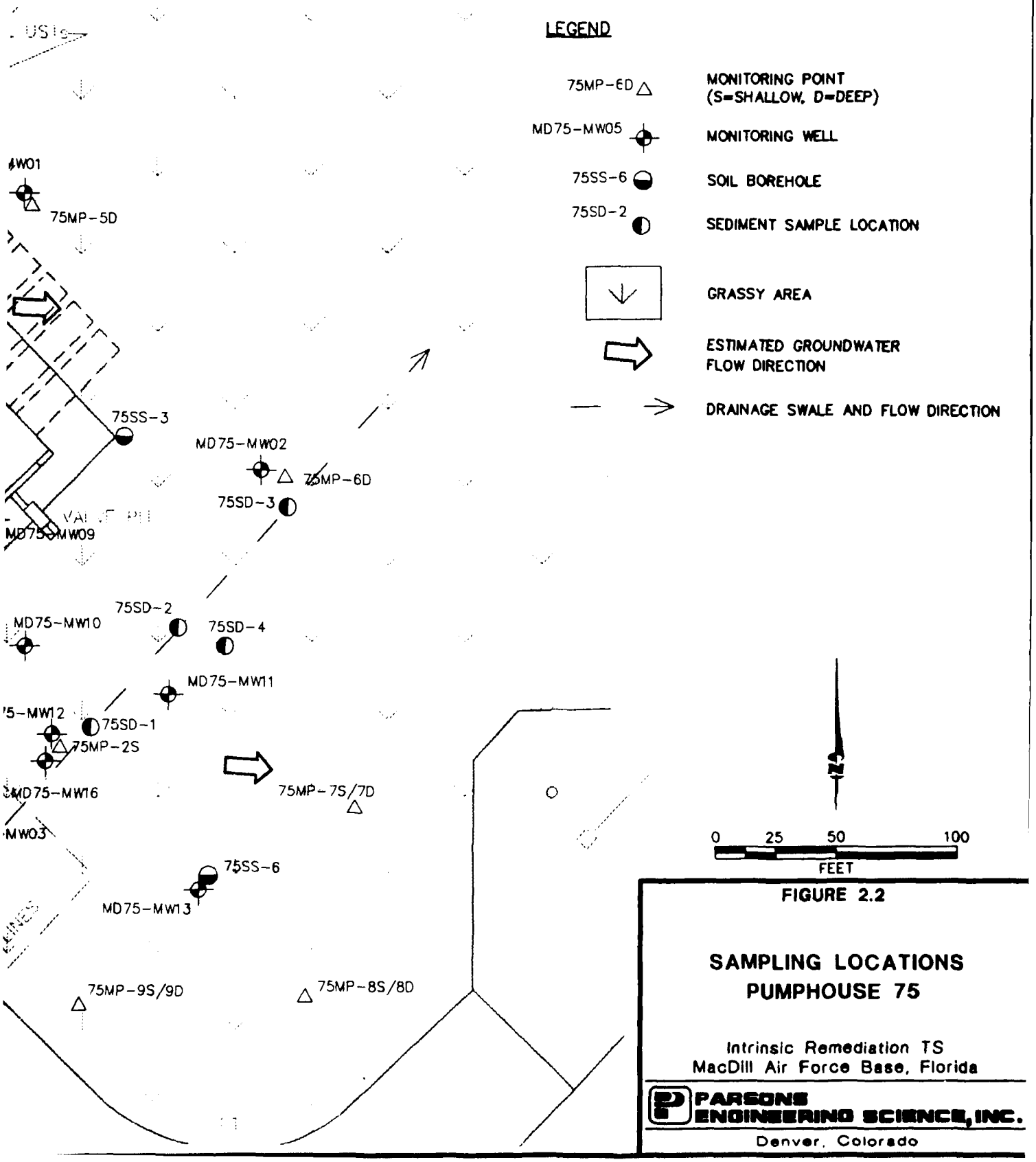


FIGURE 2.2

SAMPLING LOCATIONS PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

TABLE 2.1
MONITORING WELL/POINT COMPLETION DATA
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Well/Borehole Identification	Installation Date	Northing	Easting	Well Diameter (Inches)	Borehole Diameter (Inches)	Total Depth (ft bgs)[a/]	Sandpack Interval (ft bgs)	Screened Interval (ft bgs)	Elevation toc (ft msl)[b/]	Elevation Ground (ft msl)
75MP-1S	3/11/95	1279726 759	494551 022	1 0	2 0	7 0	0 5-2 0	2 0-7 0	9 011	9 165
75MP-1D	3/11/95	1279726 759	494551 022	0 375	1 0	20 5	NP[c/]	20 0-20 5	NM[d/]	9 165
75MP-2S	3/13/95	1279717 008	494661 600	1 0	2 0	7 0	0 5-2 0	2 0-7 0	8 218	8 311
75MP-3D	3/14/95	1279805 335	494476 584	0 375	1 0	17 5	NP	17 0-17 5	8 875	9 278
75MP-4S	3/14/95	1279823 612	494517 761	1 0	2 0	7 0	0 5-2 0	2 0-7 0	8 968	9 095
75MP-5D	3/14/95	1279938 459	494648 986	0 375	1 0	18 0	NP	17 5-18 0	8 821	9 085
75MP-6D	3/14/95	1279830 993	49470 434	0 375	1 0	20 5	NP	20 0-20 5	NM	8 375
75MP-7S	3/15/95	1279692 498	494785 180	0 5	2 0	7 0	NP	2 0-7 0	9 501	9 845
75MP-7D	3/15/95	1279692 498	494785 180	0 375	1 0	20 0	NP	19 5-20 0	NM	9 845
75MP-8S	3/15/95	1279614 809	494764 260	0 5	2 0	7 0	NP	2 0-7 0	9 271	9 418
75MP-8D	3/15/95	1279614 809	494764 260	0 375	1 0	26 0	NP	25 5-26 0	NM	9 418
75MP-9S	3/15/95	1279611 227	494670 600	0 5	2 0	7 0	NP	2 0-7 0	9 355	9 651
75MP-9D	3/15/95	1279611 227	494670 600	0 375	1 0	20 0	NP	19 5-20 0	NM	9 651
MD75-MW01	11/4/93	1279943 109	494645 138	2 0	8 0	13 0	1 75-13 00	2 50-11 47	8 915	9 085
MD75-MW02	11/5/94	1279831 272	494745 261	2 0	8 0	14 0	1 66-14 00	2 41-11 39	8 208	8 375
MD75-MW03	11/5/93	1279689 006	494612 555	2 0	8 0	13 5	1 75-13 50	2 50-11 48	9 298	9 421
MD75-MW04	11/4/93	1279829 304	494513 990	2 0	8 0	13 5	1 75-13 50	2 50-11 48	9 058	9 095
MD75-MW05	11/5/93	1280007 560	494465 031	2 0	8 0	13 5	1 75-13 50	2 50-11 48	9 485	9 621
MD75-MW06	10/6/94	1279914 497	494490 557	2 0	8 0	13 5	1 25-13 5	2 0-10 98	9 125	9 181
MD75-MW07	7/21/94	1279909 652	494461 973	2 0	8 0	13 5	1 68-13 5	2 43-11 40	9 071	9 305
MD75-MW08	7/20/94	1279751 734	494574 206	2 0	8 0	13 5	1 49-13 5	2 43-11 40	9 008	9 308
MD75-MW09	10/7/94	1279809 993	494633 727	2 0	8 0	13 5	1 25-13 5	2 0-10 98	9 498	9 478
MD75-MW10	10/7/94	1279758 453	494646 775	2 0	8 0	13 5	1 25-13 5	2 0-10 98	8 921	9 135
MD75-MW11	10/9/94	1279739 086	494707 251	2 0	8 0	13 5	1 05-13 5	1 80-10 77	9 141	9 211
MD75-MW12	7/21/94	1279722 227	494658 319	2 0	8 0	13 5	1 68-13 5	2 43-11 40	8 208	8 311
MD75-MW13	10/8/94	1279658 577	494720 363	2 0	8 0	13 5	1 25-13 5	2 0-10 98	9 145	9 295
MD75-MW14	7/11/94	1279821 199	494513 126	2 0	8 0	29 0	18 94-29 0	22 86-27 18	9 068	9 095
MD75-MW15	10/6/94	1279801 398	494479 282	2 0	8 0	13 5	1 75-13 5	2 5-11 49	9 081	9 278
MD75-MW16	10/8/94	1279711 077	494655 922	2 0	8 0	28 0	17 75-28 0	20 84-25 15	8 341	8 311
75SS-1	3/13/95	1279808 500	494630 910	NA[e/]	2 0	26 0	NA	NA	NA	9 480
75SS-2	3/13/95	1279756 058	494871 836	NA	2 0	12 0	NA	NA	NA	9 310
75SS-3	3/13/95	1279844 712	494687 836	NA	2 0	8 0	NA	NA	NA	9 150
75SS-4	3/14/95	1280029 260	464442 166	NA	2 0	24 0	NA	NA	NA	9 610
75SS-6	3/15/95	1279661 826	464727 737	NA	2 0	28 0	NA	NA	NA	9 290

a/ ft bgs = feet below ground surface

b. toc = top of casing, ft msl = feet above mean sea level

c/ NP = no sandpack

d/ NM = not measured

e/ NA = not applicable

NOTE All monitoring wells (with "MW" designation) were installed by Black & Veatch Waste Science, Inc (1995)

from the decontamination operation was collected in 55-gallon drums and was transported to an on-Base oil/water separator for disposal. Precautions were taken to minimize any impact to the area surrounding the decontamination pad that might result from the decontamination operations. All decontamination activities were conducted in a manner so that the excess water was controlled and not allowed to flow into any open borehole.

Fuel, lubricants, and other similar substances were handled in a manner consistent with accepted safety procedures and standard operating practices. All well completion materials were factory-sealed and were not stored near or in areas that could be affected by these substances.

2.1.2.3 Borehole Installation and Soil Sampling

Borehole installation was accomplished using the Geoprobe® method. In addition to the 13 boreholes for monitoring point installation, Parsons ES installed and sampled soil boreholes 75SS-1, -2, -3, -4, and -6 (Figure 2.2). In some instances, the presence of loose, saturated sand below the water table prevented collection of soil samples. A final borehole diameter of 2 inches was used for the installation of shallow points. For the deep monitoring points, a final borehole diameter of 1 inch was used.

Soil samples were obtained using a 4-foot by 1.5-inch-inside-diameter (ID) and a 2-foot by 1-1/16-inch-ID sampling device. The large sampler was used for the initial 4 feet of soil. The smaller sampler was then advanced for the remainder of the borehole in an attempt to minimize the smearing of surface contamination into deeper portions of the borehole. Where possible, samples were collected continuously over the full depth of the soil borehole.

A probe-drive sampler serves as both the driving point and the sample collection device and is attached to the leading end of the probe rods. To collect a soil sample, the sampler was pushed or driven to the desired sampling depth, and the stop pin was removed, allowing the piston and drive point to retract as the sample barrel was pushed into undisturbed soil. The soil cores were retained within a clear acetate liner inside the sampling barrel. The probe rods were then retracted, bringing the sampling device to the surface. The soil sample was then extruded from the liners and transferred to analyte-appropriate jars supplied by the analytical laboratory. In addition, a portion of the soil sample was placed in an unused, sealable plastic bag for photoionization detector (PID) headspace measurements of VOCs. Soil remaining in the liner was used for lithologic and stratigraphic logging. Bags containing soil samples collected for the headspace screening procedure were quickly sealed and stored for 15 minutes at the ambient temperature. Semiquantitative measurements were made by puncturing the bag seal with the PID probe and reading the concentration of the headspace gases. The PID relates the concentration of total VOCs in the sample to an isobutylene calibration standard. The PID also was used to monitor for VOCs in the worker breathing zone.

The Parsons ES field hydrogeologist observed drilling and well installation activities and maintained a descriptive log of subsurface materials recovered. Final geologic borehole logs are presented in Appendix B. These logs contain:

- Sampled interval (top and bottom depth);

- Presence or absence of contamination based on odor, staining, and/or PID readings;
- Soil description, including color, major textural constituents, minor constituents, relative moisture content, plasticity of fines, cohesiveness, grain size, structure or stratification, and any other significant observations; and,
- Lithologic contacts, with the depth of lithologic contacts and/or significant textural changes recorded to the nearest 0.1 foot.

In almost all cases, one soil sample from the vicinity of the water table was submitted for laboratory analysis. In addition, a deeper sample was generally submitted from each borehole to assess the vertical extent of contamination.

Analyte-appropriate sample containers for the targeted analytes were provided by the subcontracted laboratory, Evergreen Analytical, Inc. of Wheat Ridge, Colorado. A sample label was firmly attached to the container side, and the following information was legibly and indelibly written on the label:

- Sample identification,
- Sample depth,
- Sampling date, and
- Sample collector's initials.

After the samples were sealed and labeled, they were placed in a cooler with ice and held for overnight transport via Federal Express® to Evergreen Analytical, Inc. A summary of the chemical analyses performed for soil and groundwater samples is presented in Table 2.2. Information regarding sample containers, preservatives, and holding times is presented in Table 4.2 of the project Quality Assurance Project Plan (QAPP) (Parsons ES, 1994). Waste soils generated during drilling and sampling operations were spread on the ground surface in the vicinity of the site.

2.1.3 Monitoring Point Installation

Groundwater monitoring points were installed in 13 boreholes under this program. Detailed monitoring point installation procedures are described in the following paragraphs. Monitoring point completion diagrams are included in Appendix B.

2.1.3.1 Monitoring Point Materials Decontamination

Monitoring point completion materials were inspected by the field hydrogeologist and determined to be clean and acceptable prior to use. All monitoring point completion materials were factory sealed in plastic wrap. Pre-packaged casing, sand, bentonite, and concrete mix were used in point construction, and the bags were inspected for possible external contamination before use. Materials that could not be cleaned to the satisfaction of the field hydrogeologist were not used.

TABLE 2.2
ANALYTICAL PROTOCOL FOR
GROUNDWATER AND SOIL SAMPLES
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

MATRIX/PARAMETER	METHOD	ANALYTICAL LABORATORY
WATER		
Total Iron	Colorimetric, HACH Method 8008	Field
Ferrous Iron (Fe+2)	Colorimetric, HACH Method 8146	Field
Ferric Iron (Fe+3)	Difference between total and ferrous iron	Field
Manganese	Colorimetric, HACH Method 8034	Field
Sulfide	Colorimetric, HACH Method 8131	Field
Sulfate	Colorimetric, HACH Method 8051	Field
Sulfate	E300 or SW9056	Evergreen [a/]
Nitrate	Titrimetric, HACH Method 8039 and 8192	Field
Nitrate	E300 or SW9056	Evergreen
Nitrite	Titrimetric, HACH Method 8040	Field
Nitrite	E300 or SW9056	Evergreen
Redox Potential	A2580B, direct reading meter	Field
Oxygen	Direct reading meter	Field
pH	Direct reading meter	Field
Conductivity	Direct reading meter	Field
Temperature	Direct reading meter	Field
Alkalinity (Carbonate [CO3-2] and Bicarbonate [HCO3-1])	Titrimetric, HACH Method 8221	Field
Carbon Dioxide	CHEMetrics Method 4500	Field
Chloride	HACH Model 8P	Field
Chloride	E300 or SW9056	Evergreen
Ammonia--Diss. Gas in Water	CHEMetrics Method 4500	Field
Alkalinity	310.1	Evergreen
Methane	RSKSOP175	USEPA [b/]
Ethene	RSKSOP175	USEPA
Total Organic Carbon	EPA 415.1	Evergreen
Aromatic Hydrocarbons (Including Trimethylbenzene and Tetramethylbenzene)	SW8020 (RSKSOP-133)	Evergreen
Total Volatile and Extractable Hydrocarbons	SW8015, modified	Evergreen
Volatile Organics	GS/MS method, SW8240	USEPA
Free Product	GS/MSD fuel identification	Evergreen
SOIL/SEDIMENT		
Total Organic Carbon	SW9060, modified	Evergreen [c/]
Moisture	EPA 160.3	Evergreen
Aromatic Hydrocarbons	SW8020	Evergreen
Total Volatile and Extractable Hydrocarbons	SW8015, modified	Evergreen

a/ Evergreen Analytical, Inc. of Wheat Ridge, Colorado.
b/ National Risk Management Research Laboratory of Ada, Oklahoma.
c/ Subcontracted by Evergreen to Huffman Laboratories of Golden, Colorado.

2.1.3.2 Monitoring Point Casing and Screen

Shallow monitoring points were constructed of Schedule 40 polyvinyl chloride (PVC) riser pipe and screen having an ID of 0.5 or 1.0 inch. All casing and screen sections were flush-threaded; glued joints were not used. The riser pipe at each monitoring point was fitted with a PVC top cap, and a threaded PVC bottom cap was placed on the bottom of the screen. Monitoring point screens were 5 feet long and factory-slotted with 0.010-inch openings. Each shallow point was screened so that seasonal fluctuations of the water table could be measured and free-phase product, if present on the groundwater surface, could be detected.

Deep monitoring points were constructed using 0.25-inch-ID, Teflon® or Teflon®-lined polyethylene tubing threaded through the center of the Geoprobe® drive rods and attached to a 0.5-foot-long, 0.375-inch-diameter stainless steel, double-woven wire screen with a 0.037-inch slot size. The well screen was threaded into a dedicated stainless steel drive point/implant anchor that remained in place after the drive rods were removed. The tubing was fitted with a plastic top cap to prevent the entrance of water or sediment.

The field hydrogeologist verified and recorded the borehole depth, the lengths of all casing sections and tubing, and the depth to the top of all monitoring point completion materials placed in the annulus between the casing/tubing and borehole wall.

2.1.3.3 Sand Filter Pack

An attempt was made to place a graded 6-20 or 20-30 sand filter pack around the screened interval of each new monitoring point. The washed and bagged sand was distributed by Standard Sand and Silica Company. However, placement of the filter pack around the monitoring point screens was usually compromised by the collapse of the sand borehole walls below the water table. Therefore, most of the monitoring points are at least partially sand-packed with the native formation materials. However, due to the sandy nature of the native formation materials, monitoring point development and purging activities were accomplished without incident.

2.1.3.4 Annular Sealant

A filter pack seal of sodium bentonite pellets was placed above the sand pack (natural or introduced) in the monitoring points. The filter pack seal was generally placed above the water table due to the collapse of saturated formation sands into the borehole following removal of the Geoprobe® rods, and was hydrated in place with potable water. The thickness of the seal varied depending on the length of borehole remaining open following removal of the Geoprobe® rods, but generally ranged from 0.5 to 2 feet.

2.1.3.5 Flush-Mount Protective Cover

Each monitoring point was completed with an at-grade protective cover with a bolted cap. In all locations, the at-grade covers were cemented in place using concrete. All wells were completed with concrete pads that slope gently away from the protective casing to facilitate runoff during precipitation events. The space inside the protective

covers (below the top of the riser pipe or tubing) was filled with native sandy soils to allow drainage of any precipitation that might collect within the cover.

2.1.4 Monitoring Point Development

Prior to sampling, newly installed monitoring points were developed. Typically, well development removes sediment from inside the well casing and flushes fines, cuttings, and drilling fluids from the sand pack and the portion of the formation adjacent to the well screen. Use of the Geoprobe® system to place monitoring points eliminates cuttings and drilling fluids. As a result, development of monitoring points was primarily intended to minimize the amount of fine sediment that might accumulate in the casing.

Monitoring point development was accomplished using a peristaltic pump with dedicated silicon and high-density polyethylene (HDPE) tubing. The pump tubing was regularly lowered to the bottom of the shallow points so that fines were agitated and removed from the point in the development water. Development was continued until 10 casing volumes of water were removed, and the pH, temperature, and conductivity of the groundwater had stabilized. All well development waters in known or suspected areas of contamination were collected in 55-gallon steel drums and transferred to the oil/water separator located on the Base.

2.2 GROUNDWATER SAMPLING

This section describes the procedures used for collecting groundwater quality samples. In order to maintain a high degree of quality control (QC) during this sampling event, the procedures described in the site work plan (Parsons ES, 1995a) and summarized in the following sections were followed.

Groundwater sampling occurred during March and April 1995, and consisted of collecting groundwater samples from new monitoring points and existing monitoring wells. In addition to the sampling events conducted under this program, BVWS (1995) has conducted groundwater sampling at the site.

2.2.1 Groundwater Sampling Locations

Groundwater samples were collected from pre-existing wells and newly installed monitoring points by Parsons ES personnel. Thirteen new monitoring points, including four nested pairs, were installed at the nine locations shown on Figure 2.2. After completion of installation and development activities, these monitoring points were purged and sampled using a peristaltic pump with dedicated HDPE and silicon tubing. Sixteen existing monitoring wells, installed by BVWS (1995), also were sampled under this program. Existing wells that were sampled included MD75-MW01 through MD75-MW16 (Figure 2.2).

2.2.2 Preparation and Equipment Cleaning

All equipment used for sampling was assembled and properly cleaned and calibrated (if required) prior to use in the field. All portions of sampling and test equipment that contacted the sample were thoroughly cleaned before use. This equipment included the

water level probe and cable, equipment for measuring onsite groundwater chemical parameters, and other equipment that contacted the samples. The following cleaning protocol was used:

- Cleaned with potable water and phosphate-free laboratory-grade detergent;
- Rinsed with potable water;
- Rinsed with isopropyl alcohol;
- Rinsed with distilled or deionized water; and
- Air-dried prior to use.

Any deviations from these procedures were documented in the field scientist's field notebook and on the groundwater sampling form.

As required, field analytical equipment was calibrated according to the manufacturers' specifications prior to field use. This requirement applied to direct-reading meters used for onsite chemical measurements of DO, pH, redox potential, electrical conductivity, and temperature, as well as the Hach® meter used for other on-site geochemical analyses.

2.2.3 Groundwater Sampling Procedures

Special care was taken to prevent contamination of the groundwater and extracted samples through cross-contamination from improperly cleaned equipment. Water level probes and cable used to determine static water levels and total monitoring well/point depths were thoroughly cleaned before and after field use and between uses at different sampling locations according to the procedures presented in Section 2.2.2. In addition, a clean pair of new, disposable latex gloves was worn each time a different well or point was sampled.

2.2.3.1 Preparation of Location

Prior to starting the sampling procedure, the area around the well/point was cleared of foreign materials, such as brush, rocks, and debris. These procedures prevented sampling equipment from inadvertently contacting debris around the monitoring well/point. The integrity of the monitoring well/point was also inspected, and any irregularities in the visible portions of the well or point, protective cover, or concrete pad were noted.

2.2.3.2 Water Level and Total Depth Measurements

Prior to removing any water from the well or shallow monitoring point, the static water level was measured. In the shallow, 0.5-inch-diameter PVC monitoring points, an electrical water level probe was used to measure the depth to groundwater below the well datum to the nearest 0.01 foot. An oil/water interface probe capable of measuring the depth to both petroleum product (if present) and water was used in the previously installed 2-inch-diameter wells. Free-phase hydrocarbons were not detected in any of

the wells. Water levels in the newly-installed points constructed of Teflon® or Teflon®-lined HDPE tubing were not obtained because the diameter of the water level probe was larger than the diameter of the tubing. After measurement of the static water level, the water level probe was lowered to the bottom of the well/point for measurement of total depth (recorded to the nearest 0.1 foot). Based on these measurements, the volume of water to be purged from the wells/points was estimated.

2.2.3.3 Monitoring Well/Point Purging

Where possible, three times the calculated casing volume was removed from each well or point prior to sampling. Purging continued until the pH, DO concentration, redox potential, conductivity, and temperature stabilized for a 1-minute period. A peristaltic pump with dedicated silicon and HDPE tubing was used for well evacuation. Purge water from areas believed to be contaminated based on field observations and historical groundwater quality data was disposed of in the Base oil/water separator. Water presumed to be clean was discharged onto the ground surface in the vicinity of the sampling location.

2.2.3.4 Sample Collection

A peristaltic pump with dedicated silicon and HDPE tubing was used to extract groundwater samples from each well and monitoring point. Purging and sampling constituted one continuous sampling event, and there was no cessation of pumping prior to sample collection. For shallow monitoring points, the dedicated HDPE tubing was lowered down the casing to approximately the middle of the screened interval. Sampling from the deep points, constructed of tubing, was accomplished by attaching the silicon tubing directly to the top of the monitoring point tubing using a hose barb. The samples were transferred directly into the appropriate sample containers. The water was carefully poured down the inner walls of each sample bottle to minimize aeration of the sample. Sample bottles for BTEX, trimethylbenzene (TMB), tetramethylbenzene (tetraMB), TVH, methane, anions, alkalinity, halogenated VOCs, and Hach® field analyses were filled so that there was no headspace or air bubbles within the container. Table 2.2 lists the analyses performed on collected groundwater samples.

2.2.4 Onsite Chemical Parameter Measurement

2.2.4.1 Dissolved Oxygen Measurements

DO measurements were taken using an Orion® model 840 DO meter in a flow-through cell at the outlet of the peristaltic pump. DO concentrations were recorded after the readings stabilized, and in all cases represent the lowest DO concentration observed.

2.2.4.2 Electrical Conductivity, pH, Redox Potential, and Temperature Measurements

The electrical conductivity, pH, redox potential, and temperature of the groundwater were measured in the field, in the same flow-through cell used for DO measurements. The measured values were recorded on the groundwater sampling record (Appendix B).

2.2.4.3 Hach® and CHEMET® Field Chemistry Measurements

An onsite laboratory staffed by Parsons ES personnel was used to analyze for several indicator parameters in groundwater samples taken from pre-existing monitoring wells and newly installed monitoring points. A Hach® DR/700 colorimeter was used to measure ferrous iron (Fe^{2+}), total iron (Fe), nitrate (NO_3^-), nitrite (NO_2^-), sulfate (SO_4^{2-}), manganese (Mn^{2+}), and sulfide (S^{2-}). Titrations using Hach® reagents were conducted to measure alkalinity [as milligrams per liter (mg/L) calcium carbonate ($CaCO_3$)] and chloride (Cl^-), and CHEMet® color tests were used to measure ammonia (NH_3) and carbon dioxide (CO_2). These analyses were completed for each groundwater sample after all sample containers had been filled. The sample to be analyzed was poured into a clean glass container, capped, and transported to the Parsons ES on-Base laboratory for analysis. Care was taken to avoid any headspace in the sample container which could influence the concentration of reduced species. The field holding time for each sample did not exceed 1 hour. Care was taken to minimize sample temperature changes and exposure to sunlight. Concentrations of these indicator parameters were not measured in soil samples.

2.2.5 Sample Handling

2.2.5.1 Sample Containers, Preservation, and Labels

The off-Base analytical laboratories [Evergreen Analytical, Inc. of Wheat Ridge, Colorado and the US Environmental Protection Agency (USEPA) National Risk Management Research Laboratory (NRMRL) in Ada, Oklahoma (formerly the Robert S. Kerr Environmental Research Laboratory)] provided pre-preserved sample containers when appropriate. NRMRL provided a separate preservative for methane analysis, which was added to the samples by the Parsons ES field personnel.

The sample containers were filled as described in Section 2.2.3.4, and the container lids were tightly closed. The sample label was firmly attached to the container side, and the following information was legibly and indelibly written on the label:

- Analysis to be performed;
- Facility name;
- Sample identification;
- Sample type (groundwater);
- Sampling date;
- Sampling time;
- Preservatives added; and
- Sample collector's initials.

2.2.5.2 Sample Shipment

After the samples were sealed and labeled, they were packaged for transport to the analytical laboratory in Wheat Ridge, Colorado or to NRMRL in Ada, Oklahoma. The following packaging and labeling procedures were followed:

- Samples were packaged to prevent leakage or vaporization from the containers;
- Samples were cushioned to avoid breakage; and
- Ice was added to the cooler to keep the samples cool.

The packaged samples were delivered by overnight courier (Federal Express®) to the laboratory. Chain-of-custody procedures outlined in the project work plan (Parsons ES, 1995a) were followed. Laboratory samples for field analysis were hand-delivered to the on-Base Parsons ES laboratory, where they were analyzed by Parsons ES using methods and reagents developed and sold by Hach Chemical Company and CHEMetrics.

2.3 AQUIFER TESTING

A slug test was performed in well MD75-MW13 (Figure 2.2) for comparison to the previous hydraulic conductivity estimates obtained by BVWS (1995). Slug tests are single-well hydraulic tests used to estimate the hydraulic conductivity of an aquifer in the immediate vicinity of the tested well. Slug testing can be performed using either a rising head or a falling head test. Both rising head and falling head tests were used at this site. Detailed slug testing procedures are presented in the *Technical Protocol for Implementing Intrinsic Remediation with Long-Term Monitoring for Natural Attenuation of Fuel Contamination Dissolved in Groundwater* (Wiedemeier *et al.*, 1995), hereafter referred to as the Technical Protocol document.

Data obtained during slug testing were analyzed using the computer program AQTESOLV® (Geraghty & Miller, Inc., 1994) and the methods of Bouwer and Rice (1976) and Bouwer (1989) for unconfined conditions. The results of slug testing are presented in Section 3.3 and Appendix B.

2.4 SURVEYING

After completion of field work, the locations and elevations of all new monitoring points and pre-existing monitoring wells were surveyed by Landmark Surveying and Engineering, Inc. of Tampa, Florida. The horizontal locations and elevations of the measurement datum (top of PVC well casing) and the ground surface adjacent to the well casing were measured relative to existing on-Base survey control points. Horizontal locations were surveyed to the nearest 0.1 foot. Measurement datum and ground surface elevations were surveyed to the nearest 0.01 foot. Survey data are presented in Table 2.1 and Appendix B.

SECTION 3

PHYSICAL CHARACTERISTICS OF THE STUDY AREA

This section incorporates data collected by Parsons ES in March and April 1995 and information contained in BVWS (1995) and CH2M Hill (1990, 1991a, and 1991b).

3.1 GROUND SURFACE TOPOGRAPHY AND SURFACE WATER HYDROLOGY

The Base is located on the western edge of Central Florida in the Southeast Coastal Plain Physiographic Province, a region characterized by slight local relief and low elevations. A topographic map of the Base area is presented in Figure 1.2. Elevations at the Base range from 0 to 12 feet above mean sea level (msl). Major surface water bodies near the Base include Tampa Bay, which borders the Base on the west and south; Hillsborough Bay, which forms the eastern border of the Base; and the Gulf of Mexico, which lies approximately 19 miles to the west (Figure 1.1). Three tidal inlets are present in mangrove swamps on the south side of the Base, including Coon Hammock Creek, Picnic Island Creek, and Broad Creek. Other surface water features include storm drains and drainage canals which traverse the Base, and small ponds and lakes. Runoff of surface water is carried by the drainage canals, which empty into Tampa Bay and Hillsborough Bay.

The ground surface in the vicinity of Pumphouse 75 is relatively flat, with elevations ranging from approximately 8 to 10 feet msl. The lowest ground surface elevations at the site occur in a broad, shallow (maximum 1 foot deep), northeast-southwest trending drainage swale located southeast of the pumphouse building that drains to the northeast. Pumphouse 75 is situated very near a surface drainage divide (see the surface drainage map in Appendix A). The majority of the site appears to drain to the southwest, toward a series of drainage ditches that discharge to Tampa Bay. The southeastern and eastern portions of the site appear to drain to the northeast, toward a drainage ditch that discharges to Hillsborough Bay.

3.2 CLIMATOLOGY

According the BVWS (1995), the average annual precipitation at the Base is 44.3 inches, with the lowest rainfall in April and the highest in August. The reported average annual evapotranspiration (ET) is 39 inches. However, ET rates will vary depending on the vegetative cover.

3.3 MANMADE FEATURES

As shown on Figure 2.2, much of the land surface at the site is paved or covered with buildings. A substantial percentage of the precipitation falling on unpaved areas

probably infiltrates into the subsurface due to the flat surface topography and sandy soils. The extent to which underground utility corridors influence groundwater movement is not known. However, significant preferential movement of contaminants along utility corridors was not indicated by the previous site characterization (BVWS, 1995). The relatively sandy nature of the soils in the saturated zone, and the resulting higher permeabilities, would tend to minimize preferential migration of contaminants along utility corridors.

3.4 REGIONAL GEOLOGY AND HYDROGEOLOGY

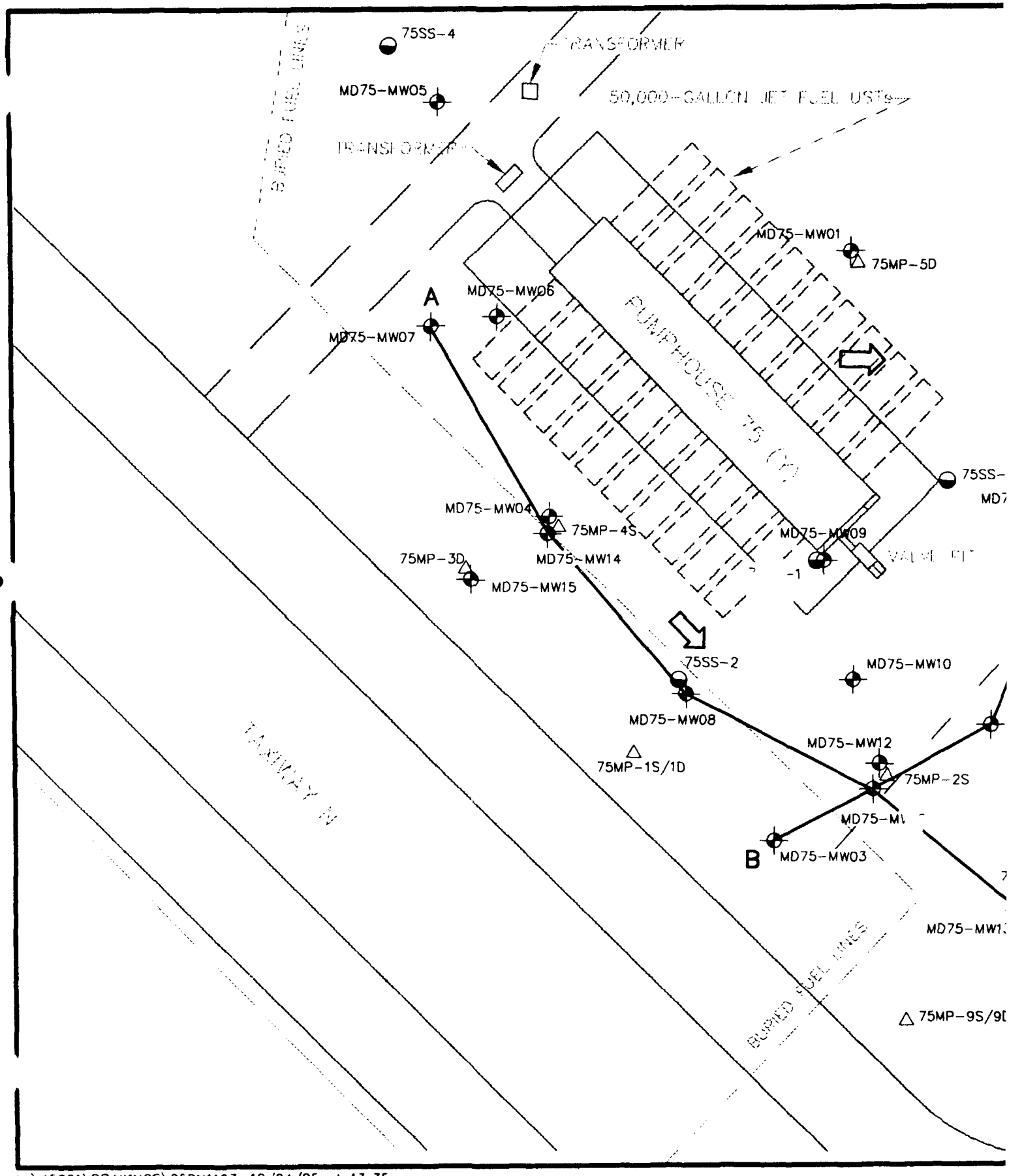
The information provided in this section is condensed from the more detailed discussions contained in BVWS (1995) and CH2M Hill (1990 and 1991a). The unconsolidated, Quaternary-age, coastal plain sediments found at the surface in the Tampa area consist predominantly of fine sand containing interbedded clay, marl, shell, limestone, and phosphorite. These sediments, which form the surficial, unconfined aquifer, range in thickness from almost zero to approximately 100 feet. The water table depth ranges from the ground surface to several feet below the ground surface (bgs).

The surficial aquifer is underlain by Pliocene-age deposits consisting of phosphatic, clayey and pebbly sand, clay, marl, and shell. These deposits, which range from less than 25 feet to about 100 feet in thickness and comprise a confining layer, are underlain by carbonate and clastic sediments of the Hawthorn Formation and Tampa Limestone. The solutioned Tampa Limestone forms the uppermost confined limestone aquifer. The limestones of the Florida Aquifer, which provides water for most of Florida and the southern third of Georgia, lie beneath the Tampa Limestone aquifer.

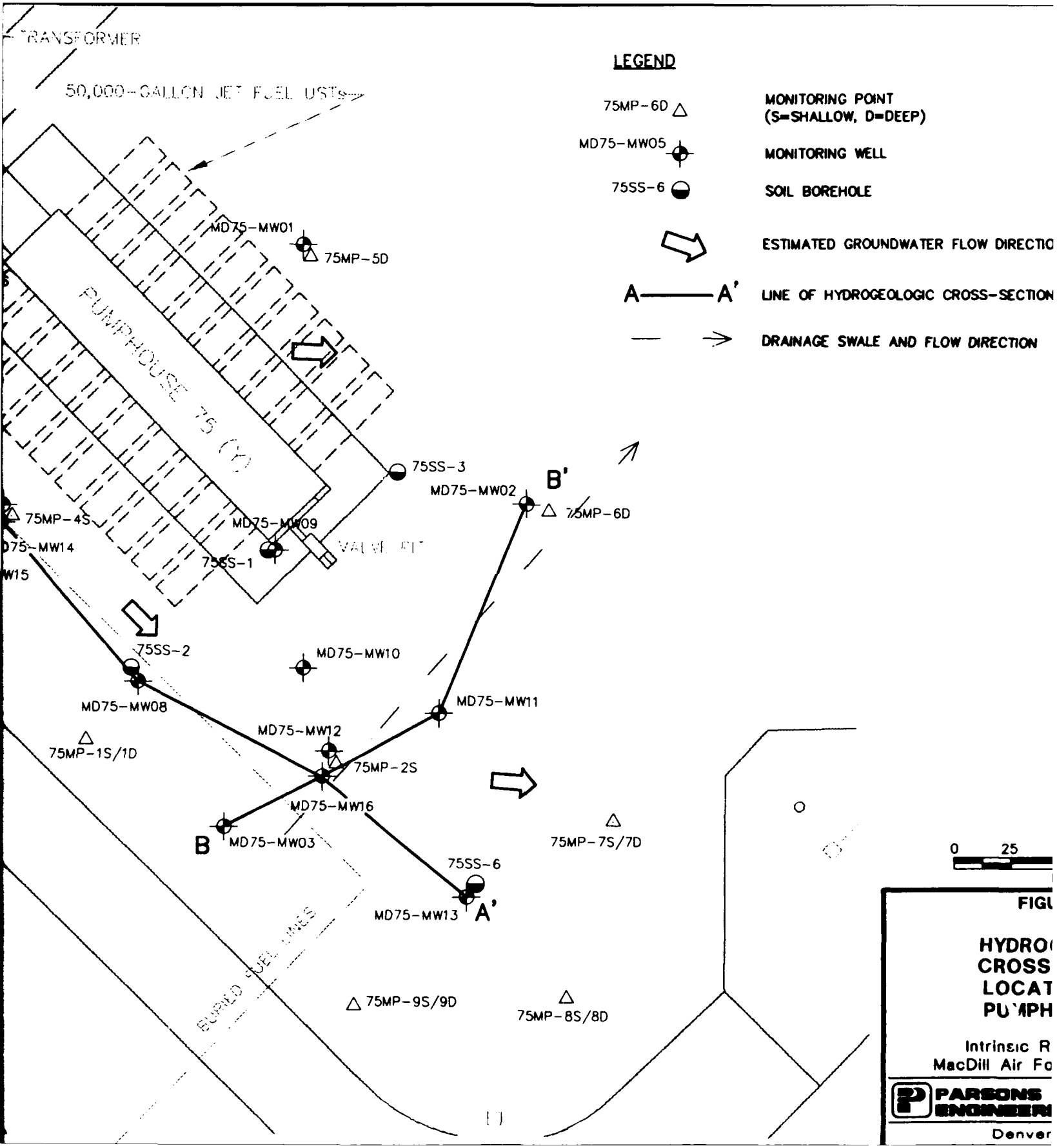
At the Base, the surficial, unconfined aquifer consists of 20- to 60-foot layers of fine quartz sand, silty sand, and clayey sand that overlie a clay unit. The Tampa Limestone occurs beneath the clay and is estimated to be approximately 100 feet thick. In some areas, the surficial and Tampa Limestone aquifers may be hydraulically connected.

3.5 SITE GEOLOGY AND HYDROGEOLOGY

The locations of two site-specific hydrogeologic cross sections are depicted in Figure 3.1, and the sections themselves are shown in Figures 3.2 and 3.3. Sections A-A' and B-B' are oriented approximately parallel and perpendicular, respectively, to the local, southeasterly groundwater flow direction. The shallow sediments in the vicinity of Pumphouse 75 consist primarily of relatively well-sorted, fine-grained sand containing discontinuous layers of silty to clayey sand. Layers of calcareous gravel, clay, clayey sand, sand, silty sand, and clayey limestone were penetrated during the advancement of the borehole for monitoring well MD75-MW14, and clay and limestone were penetrated by the borehole for well MD75-MW16. These boreholes were advanced to depths of 29 feet and 28 feet, respectively. Clay layers were also penetrated by soil boreholes 75SS-1 and 75SS-4 at depths of 24 feet and 20 feet, respectively. Based on the available data, the thickness of the surficial sandy aquifer beneath Pumphouse 75 is estimated to be approximately 15 to 20 feet.



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TRANSFORMER
50,000-GALLON JET FUEL USTs
PUMPHOUSE 75 (Y)
VALVE PIT
LEGEND
75MP-6D
MONITORING POINT (S=SHALLOW, D=DEEP)
MD75-MW05
MONITORING WELL
75SS-6
SOIL BOREHOLE
ESTIMATED GROUNDWATER FLOW DIRECTIO
A
A'
LINE OF HYDROGEOLOGIC CROSS-SECTION
DRAINAGE SWALE AND FLOW DIRECTION
MD75-MW01
75MP-5D
75SS-3
MD75-MW02
B'
75MP-6D
75MP-4S
MD75-MW09
75SS-1
MD75-MW14
MW15
75SS-2
MD75-MW10
MD75-MW08
MD75-MW11
MD75-MW12
75MP-1S/1D
75MP-2S
MD75-MW16
B
MD75-MW03
75MP-7S/7D
75SS-6
MD75-MW13
A'
BURIED FUEL LINES
75MP-9S/9D
75MP-8S/8D
0
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PARSONS ENGINEER
Denver

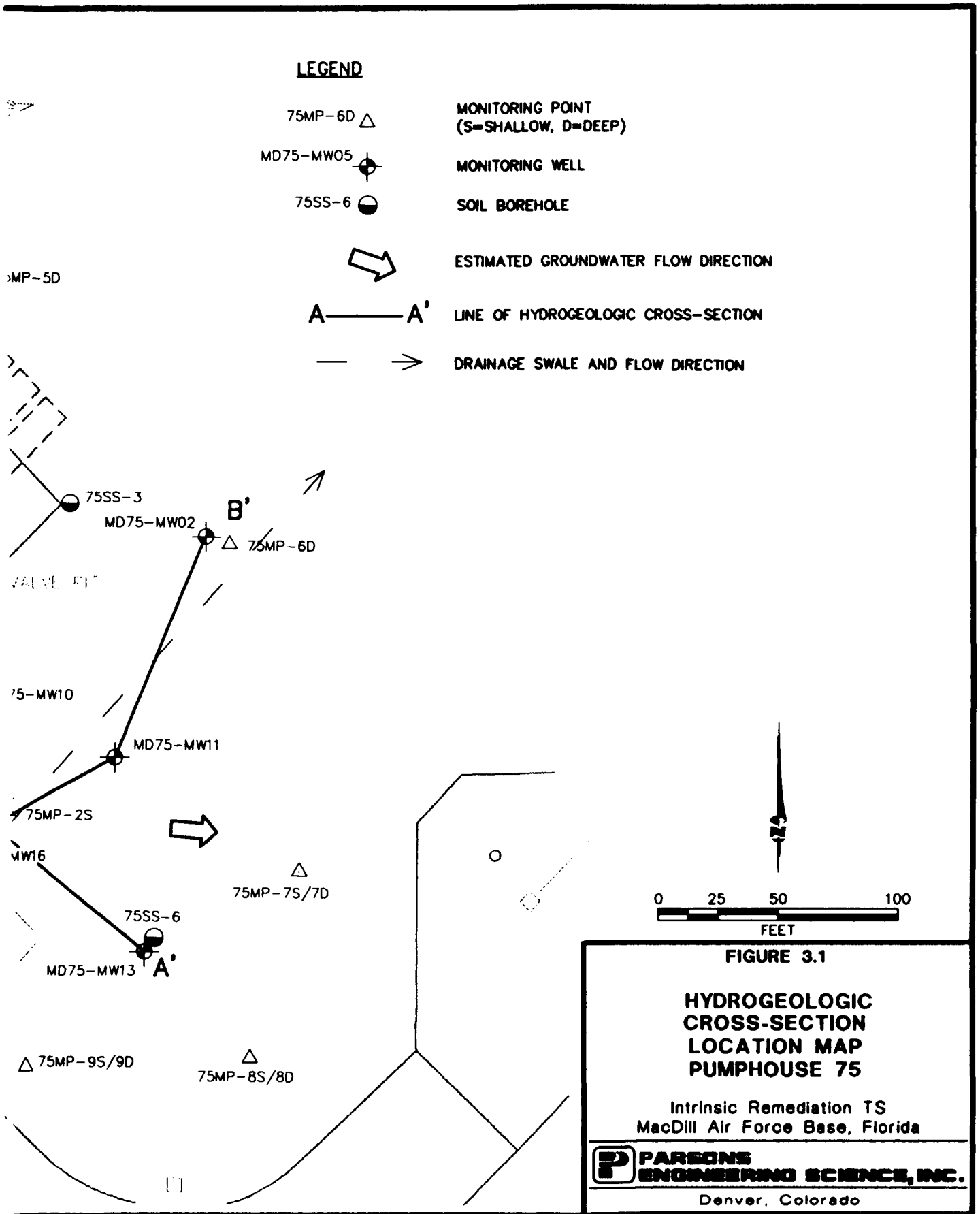
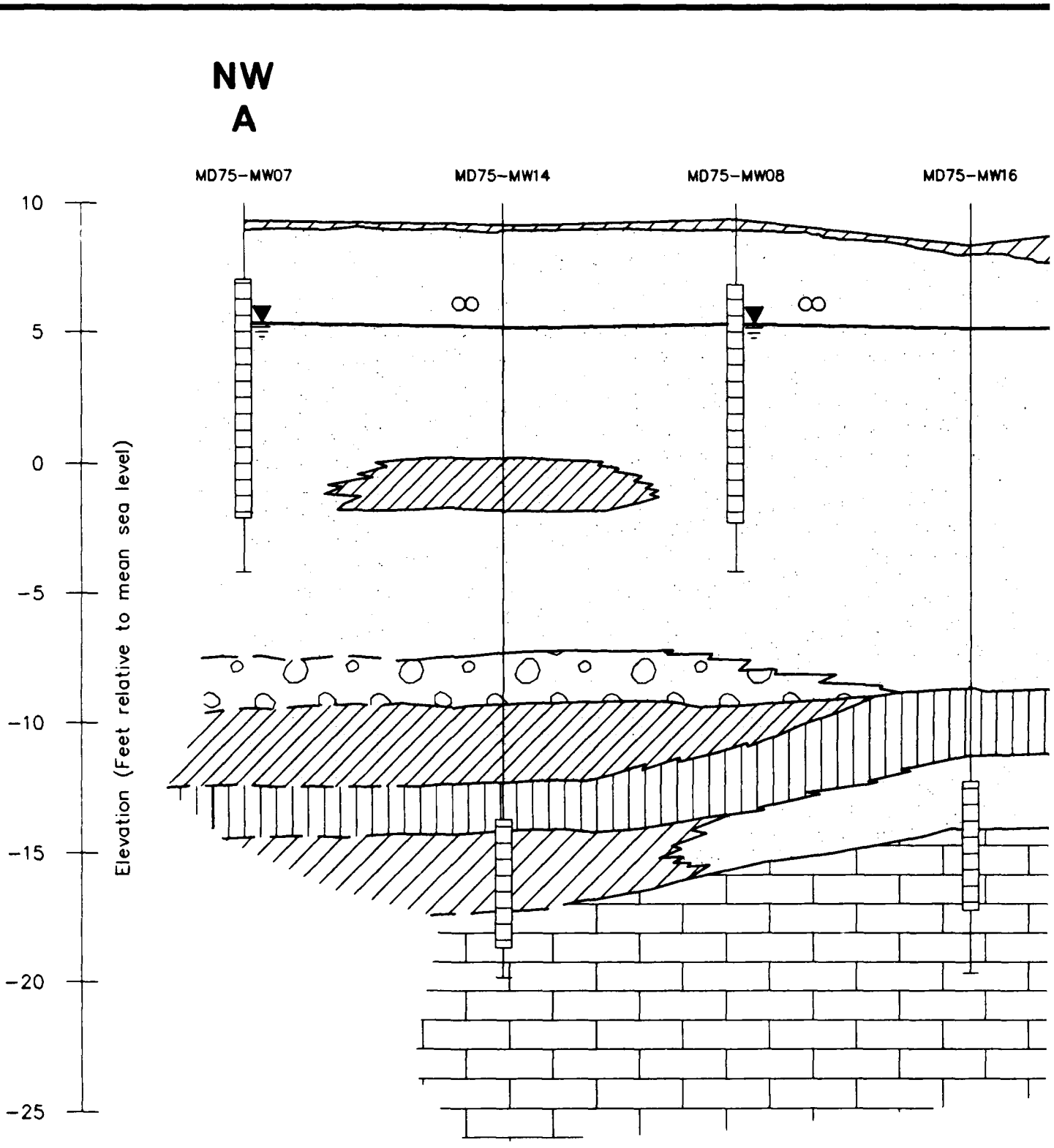


FIGURE 3.1

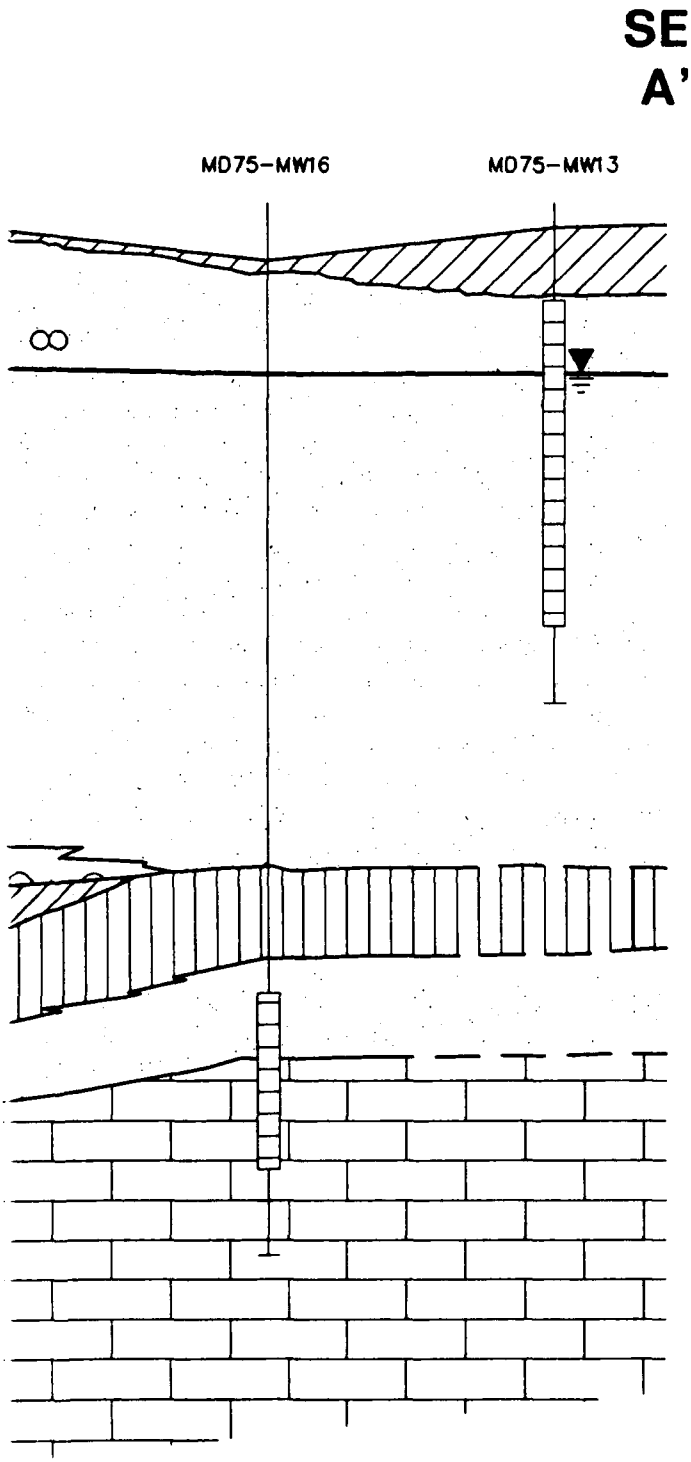
HYDROGEOLOGIC CROSS-SECTION LOCATION MAP PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado



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LEGEND

75MP-8S, 8D — Monitoring well/point identification (S=Shallow, D=Deep)

Borehole

Screened interval

Bottom of borehole

Groundwater surface March 1995

Geologic Contact (Dashed where inferred)

Buried fuel lines

(SM); Silty SAND; dark brown with trace of organics at surface; gray and white at depth; loose; poorly graded; fine to medium grained, subangular, trace pebbles and calcareous at depth.

(SP); SAND; brown to medium gray; medium dense, poorly graded, fine grained; subangular to rounded.

(GC); Calcareous GRAVEL (Packstone); white and gray; very loose; poorly graded; fine grained; subangular; wet.

(SC); Clayey SAND; tan and gray; very loose; poorly graded; fine grained; subangular; wet.

(CL); Clay; light gray; blue-green; soft to stiff; low to high plasticity; wet; trace fine rounded sand.

LIMESTONE; white; wet; some calcareous clay.

0 25 50 100
FEET
VERTICAL EXAGGERATION 10:1

FIGURE 3.2

HYDROGEOLOGIC CROSS-SECTION A-A' PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

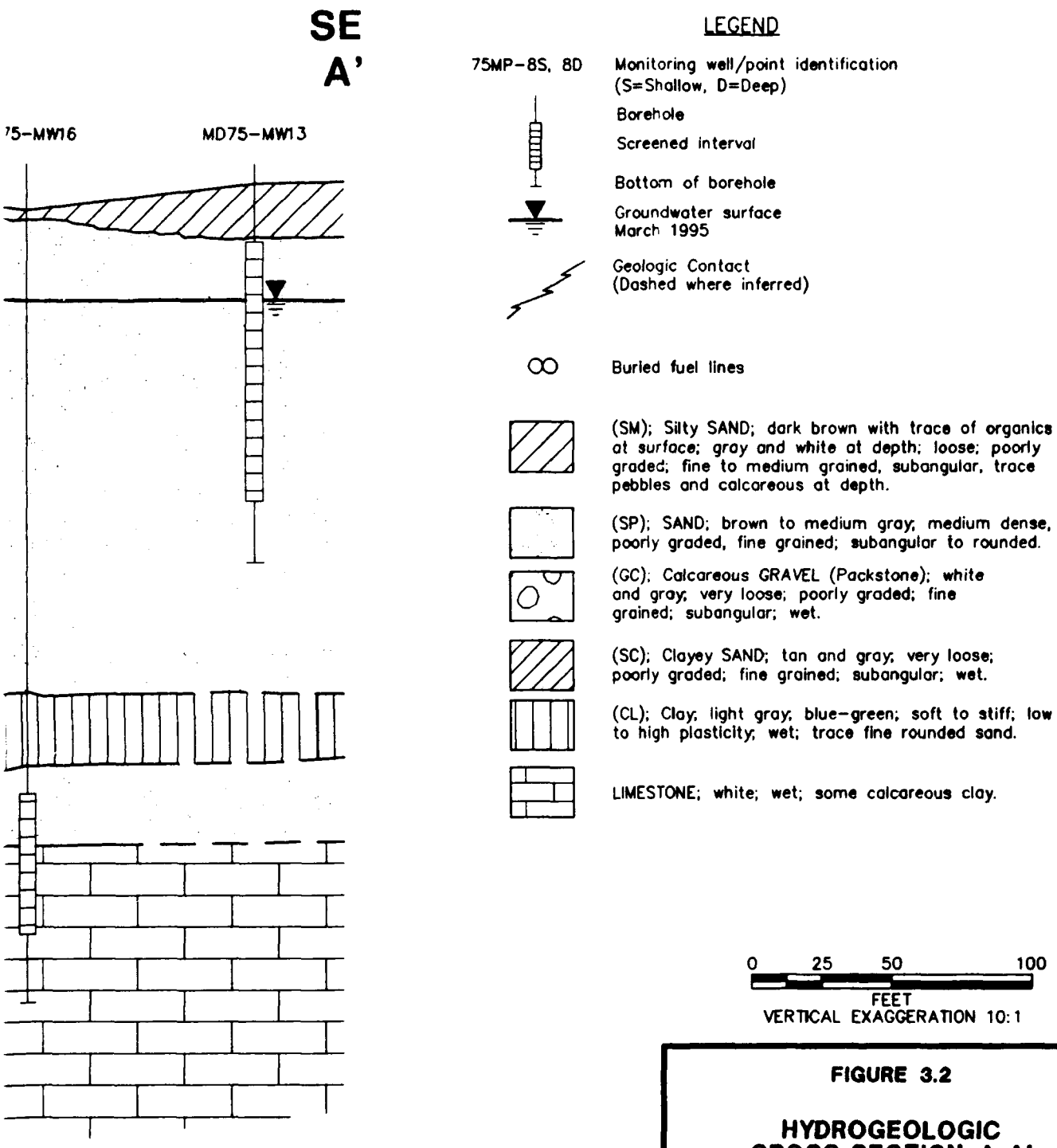


FIGURE 3.2

HYDROGEOLOGIC CROSS-SECTION A-A' PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

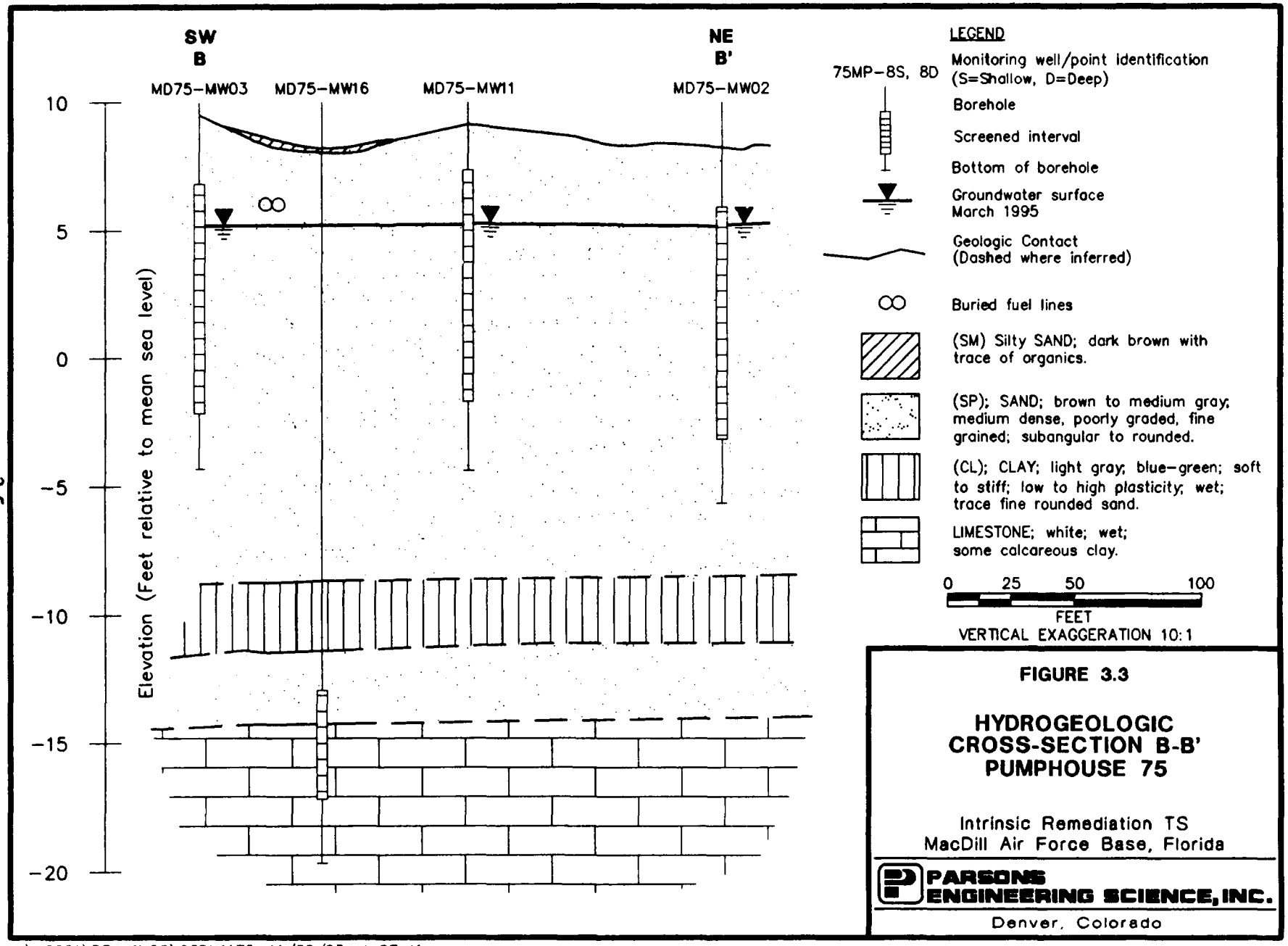


FIGURE 3.3

HYDROGEOLOGIC CROSS-SECTION B-B' PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

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The groundwater surface beneath Pumphouse 75 is present at a depth of approximately 3 to 5 feet (Table 3.1), and groundwater migrates in an easterly to southeasterly direction (Figure 3.4). The lateral hydraulic gradient measured in March 1995 was approximately 0.0009 foot per foot (ft/ft). This measurement is similar to the lateral hydraulic gradient measured by BVWS (1995) in January 1995, which ranged from approximately 0.0007 ft/ft to 0.001 ft/ft.

Comparison of groundwater elevations in two nested well pairs (MD75-MW12/M075-MW16 and MD75-MW4/MD78-MW14) indicates that in March 1995, a vertical (downward) component to the hydraulic gradient was present. Using the head difference between the shallow and deep wells, and the distance between the midpoints of the saturated portions of their screens, the vertical hydraulic gradient was calculated to be approximately 0.007 ft/ft to 0.01 ft/ft. Downward gradients ranging from 0.004 ft/ft to 0.009 ft/ft also were present in October 1994 and January 1995, based on groundwater elevation data reported by BVWS (1995).

A total of 14 slug tests were performed by BVWS (1995) in Pumphouse 75 monitoring wells screened in the sandy surficial aquifer. The resulting hydraulic conductivity values ranged from 5.2 to 90.7 feet per day (ft/day) [1.83 x 10^{-3} to 3.20 x 10^{-2} centimeters per second (cm/sec)]. The mean hydraulic conductivity of the tested wells screened at the water table was 15.6 ft/day. Slug tests also were performed in two wells screened in the silty sands and limestone underlying the surficial sands (MD75-MW14 and MD75-MW16). These tests yielded hydraulic conductivity values of 20.2 ft/day (7.1 x 10^{-3} cm/sec) and 17.7 ft/day (6.20 x 10^{-3} cm/sec), respectively. The slug test performed by Parsons ES in March 1995, resulted in a hydraulic conductivity of 55.4 ft/day (2.0 x 10^{-2} cm/sec) in well MD75-MW13.

The advective velocity of groundwater in the direction parallel to groundwater flow is given by:

$$\bar{v} = \frac{K}{n_e}\frac{dH}{dL}$$

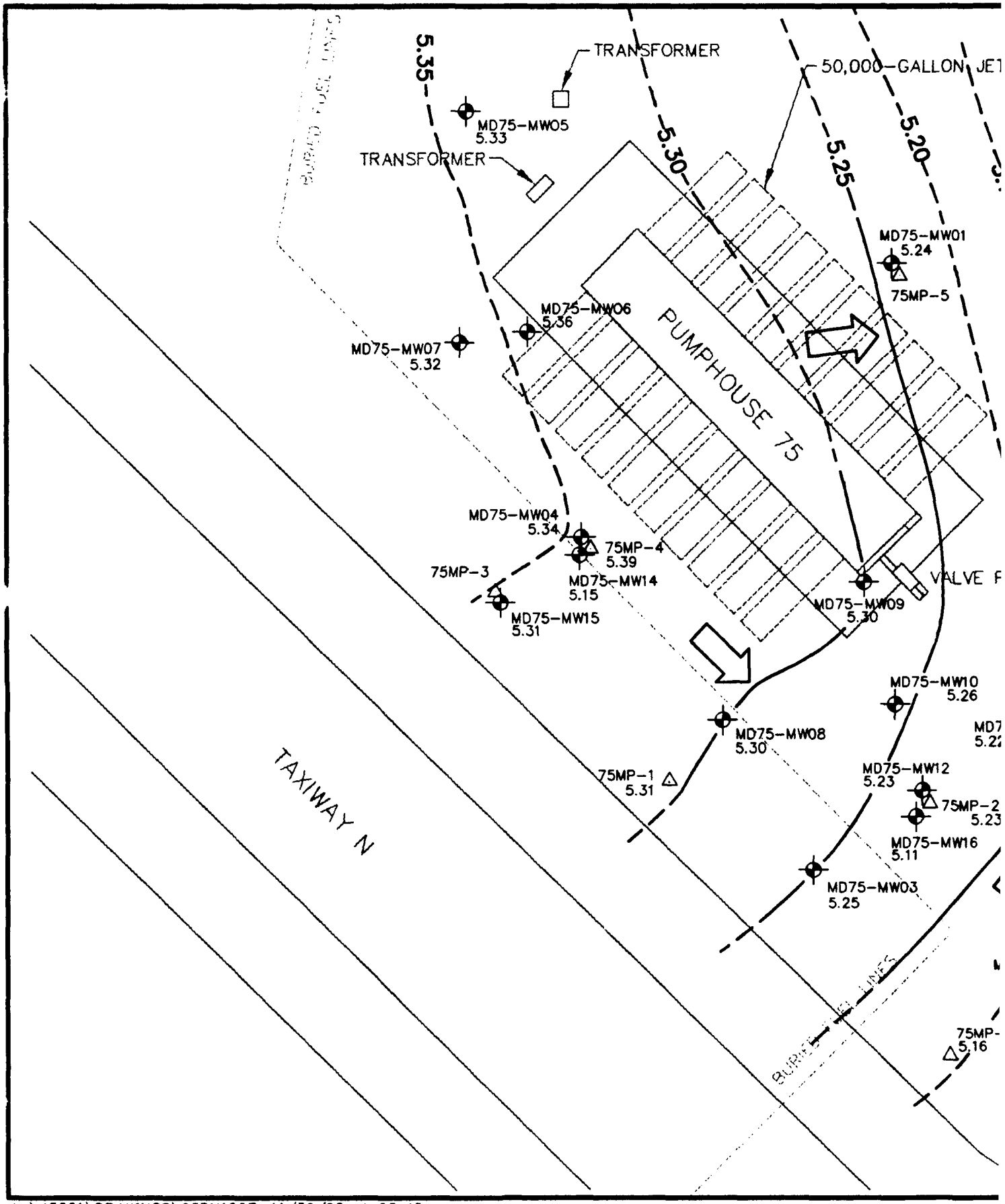
Where: v = Average advective groundwater velocity (seepage velocity) [L/T],
K = Hydraulic conductivity [L/T],
dH/dL = Gradient [L/L], and
η_e = Effective porosity.

The average effective porosity of the shallow, sandy aquifer is estimated to be 0.25 on the basis of literature values contained in Johnson (1967) and Walton (1988). Using an average hydraulic conductivity of 15.6 ft/day (from BVWS slug tests), an average hydraulic gradient of 0.0009 ft/ft, and an effective porosity of 0.25, the average advective groundwater velocity within the shallow, sandy aquifer is approximately 0.06 ft/day (22 ft/year).

TABLE 3.1
WATER LEVEL DATA
PUMPHOUSE 75
Intrinsic Remediation TS
MacDill Air Force Base, Florida

Well Location	Date	Northing	Easting	Well ID (inches)	Datum Elevation (ft msl)[a/]	Ground Elevation (ft msl)	Total Depth to Water (ft bgs)[b/]	Total Depth to Water (ft btoc)[c/]	Elevation of Water Table (ft msl)
75MP-1S	3/27/95	1279726.759	494551.022	1.0	9.011	9.165	3.85	3.70	5.31
75MP-2S	3/27/95	1279717.008	494661.600	1.0	8.218	8.311	3.08	2.99	5.23
75MP-4S	3/27/95	1279823.612	494517.761	1.0	8.968	9.095	3.71	3.58	5.39
75MP-7S	3/27/95	1279692.498	494785.180	0.5	9.501	9.845	4.73	4.39	5.11
75MP-8S	3/27/95	1279614.809	494764.260	0.5	9.271	9.418	4.35	4.20	5.07
75MP-9S	3/27/95	1279611.227	494670.600	0.5	9.355	9.651	4.49	4.19	5.16
MD75-MW01	3/27/95	1279943.109	494645.138	2.0	8.915	9.085	3.84	3.67	5.24
MD75-MW02	3/27/95	1279831.272	494745.261	2.0	8.208	8.375	3.25	3.08	5.13
MD75-MW03	3/27/95	1279689.006	494612.555	2.0	9.298	9.421	4.17	4.05	5.25
MD75-MW04	3/27/95	1279829.304	494513.990	2.0	9.058	9.095	3.76	3.72	5.34
MD75-MW05	3/27/95	1280007.560	494465.031	2.0	9.485	9.621	4.29	4.15	5.33
MD75-MW06	3/27/95	1279914.497	494490.557	2.0	9.125	9.181	3.82	3.76	5.36
MD75-MW07	3/27/95	1279909.652	494461.973	2.0	9.071	9.305	3.98	3.75	5.32
MD75-MW08	3/27/95	1279751.734	494574.206	2.0	9.008	9.308	4.01	3.71	5.30
MD75-MW09	3/27/95	1279809.993	494633.727	2.0	9.498	9.478	4.18	4.20	5.30
MD75-MW10	3/27/95	1279758.453	494646.775	2.0	8.921	9.135	3.87	3.66	5.26
MD75-MW11	3/27/95	1279739.086	494707.251	2.0	9.141	9.211	3.99	3.92	5.22
MD75-MW12	3/27/95	1279722.227	494658.319	2.0	8.208	8.311	3.08	2.98	5.23
MD75-MW13	3/27/95	1279658.577	494720.363	2.0	9.145	9.295	4.15	4.00	5.14
MD75-MW14	3/27/95	1279821.199	494513.126	2.0	9.068	9.095	3.95	3.92	5.15
MD75-MW15	3/27/95	1279801.398	494479.282	2.0	9.081	9.278	3.97	3.77	5.31
MD75-MW16	3/27/95	1279711.077	494655.922	2.0	8.341	8.311	3.20	3.23	5.11

a/ ft msl = feet above mean sea level.
b/ ft bgs = feet below ground surface.
c/ ft btoc = feet below top of casing.



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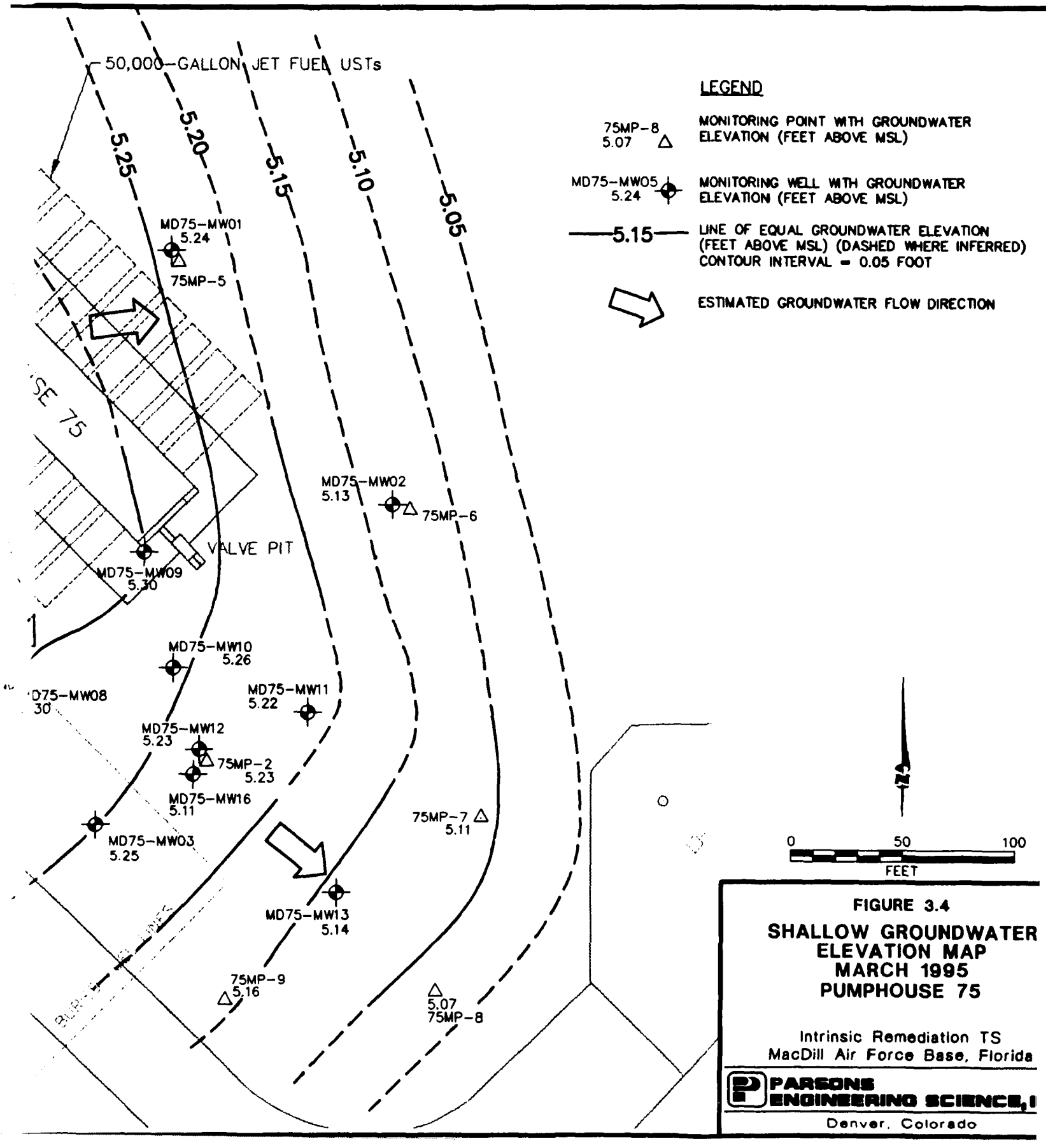


FIGURE 3.4

SHALLOW GROUNDWATER ELEVATION MAP MARCH 1995 PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, I
Denver, Colorado

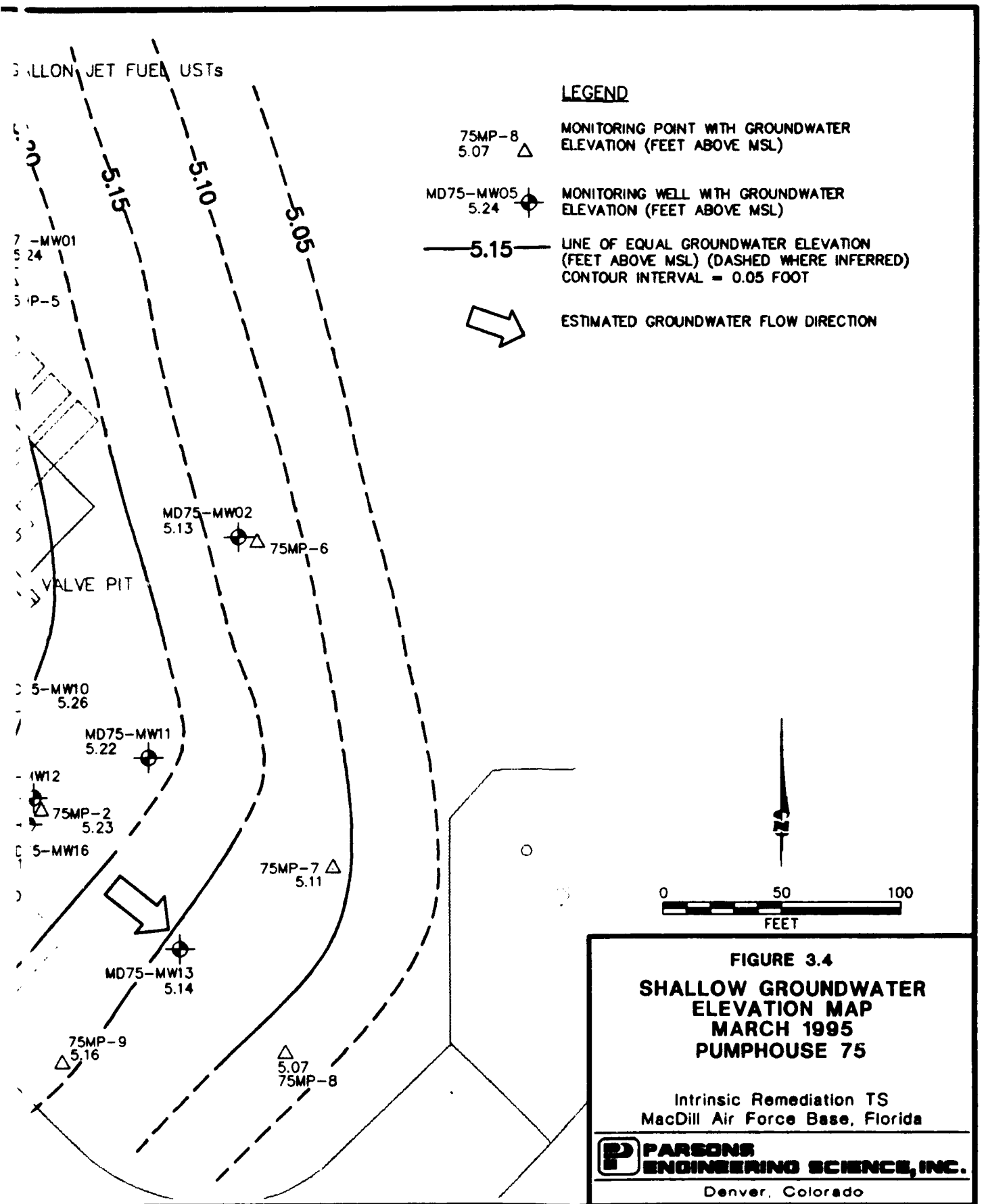


FIGURE 3.4

SHALLOW GROUNDWATER ELEVATION MAP MARCH 1995 PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

Because organic carbon is present in the aquifer matrix, a somewhat retarded velocity (V_R) should be used for solute transport calculations. Section 4.2.4 presents TOC analysis results, and Section 5 contains V_R calculations.

3.6 GROUNDWATER USE

Groundwater from the shallow aquifer at MacDill AFB is not extracted for potable uses. A total of 76 private wells were identified in a residential area located directly north of the Base during a 1988 groundwater use survey (Engineering-Science, Inc., 1988). However, few of these wells were located within a 0.5-mile radius of Site 57. The private well nearest to Site 57 was located on Shelton Street, approximately 0.47 mile north of Pumphouse 77, and was used for irrigation. Pumphouse 75 is located approximately 1,900 feet southwest of Pumphouse 77; therefore, this irrigation well is probably at least 0.6 mile north of Pumphouse 75. There are no private wells located on the Base (BVWS, 1995). The nearest Hillsborough County designated Wellhead Protection Area is located approximately 13 miles north of the Base. Therefore, there are no public water supply wells within 0.5-mile of Site 57 [Southwest Florida Water Management District (SWFMD), 1988].

SECTION 4

NATURE AND EXTENT OF CONTAMINATION AND SOIL AND GROUNDWATER GEOCHEMISTRY

4.1 SOURCES OF CONTAMINATION

Potential contamination sources at Pumphouse 75 include the jet fuel pipelines located southwest of the pumphouse building, the jet fuel USTs and associated piping, and historical surface releases of petroleum fuels in the vicinity of the USTs. The groundwater quality data collected by BVWS (1995) and Parsons ES as part of this TS indicate that the jet fuel pipelines, which are present near the water table at a depth of approximately 3 feet bgs (Jackson, 1995), are the major source of dissolved BTEX contamination in the groundwater. No leaking tanks or major spills have been documented at the site. The USTs have reportedly passed recent tightness tests, but the jet fuel pipelines have not been tested. Pipeline testing is scheduled for early 1996 (Jackson, 1995).

As described in Section 1.2, historically 1 quart of fuel from each underground tank was visually inspected for water content daily, and after inspection the fuel was poured on the ground (EA, 1991). Groundwater quality data suggest that these releases constitute a secondary, relatively minor source of dissolved BTEX contamination at this site.

4.2 SOIL CHEMISTRY

4.2.1 Soil Headspace Screening

Soil headspace screening using an OVA was performed by BVWS (1995) to preliminarily delineate the lateral extent of petroleum-contaminated soil at Pumphouse 75. Soils exhibiting a headspace vapor concentration of 50 parts per million, volume per volume (ppmv) or greater were considered to be excessively contaminated. OVA screening samples were composited from the 0- to 3.5-foot depth interval at a total of 207 locations. In addition, OVA headspace screening was performed on soil samples collected at 2-foot intervals during the drilling of five monitoring wells (MD75-MW01 through MD75-MW05). The area of excessively contaminated soil delineated during this screening survey is shown on Figure 4.1, and the soil screening results are provided in Appendix A.

4.2.2 Magnitude and Extent of BTEX in Soil

During the BVWS (1995) investigation, a total of 10 soil samples from five boreholes were analyzed for petroleum constituents at a laboratory. Eighteen additional



Source: BVWS, 1995

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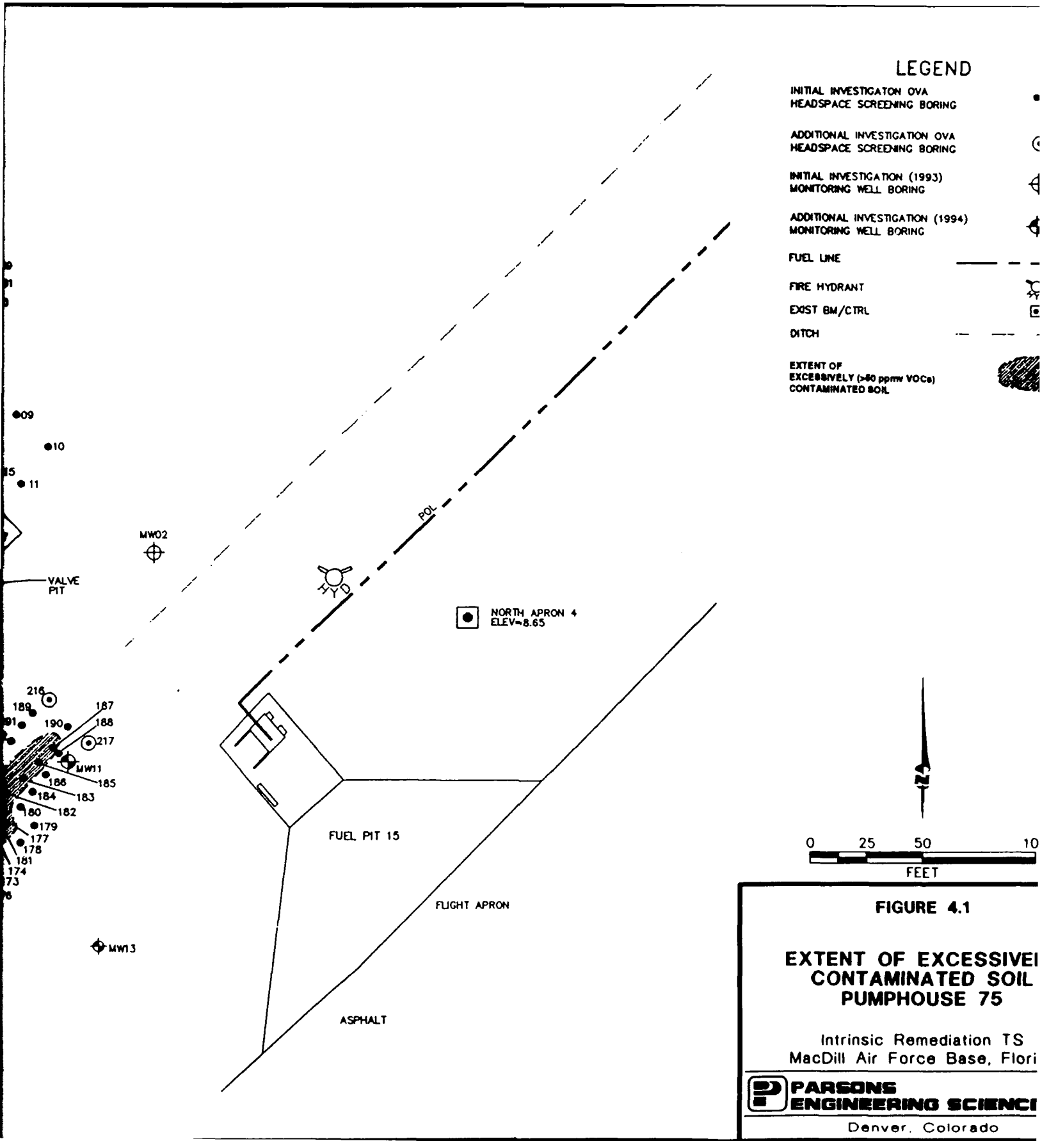


FIGURE 4.1

EXTENT OF EXCESSIVEL CONTAMINATED SOIL PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Flori

PARSONS ENGINEERING SCIENCI

Denver, Colorado

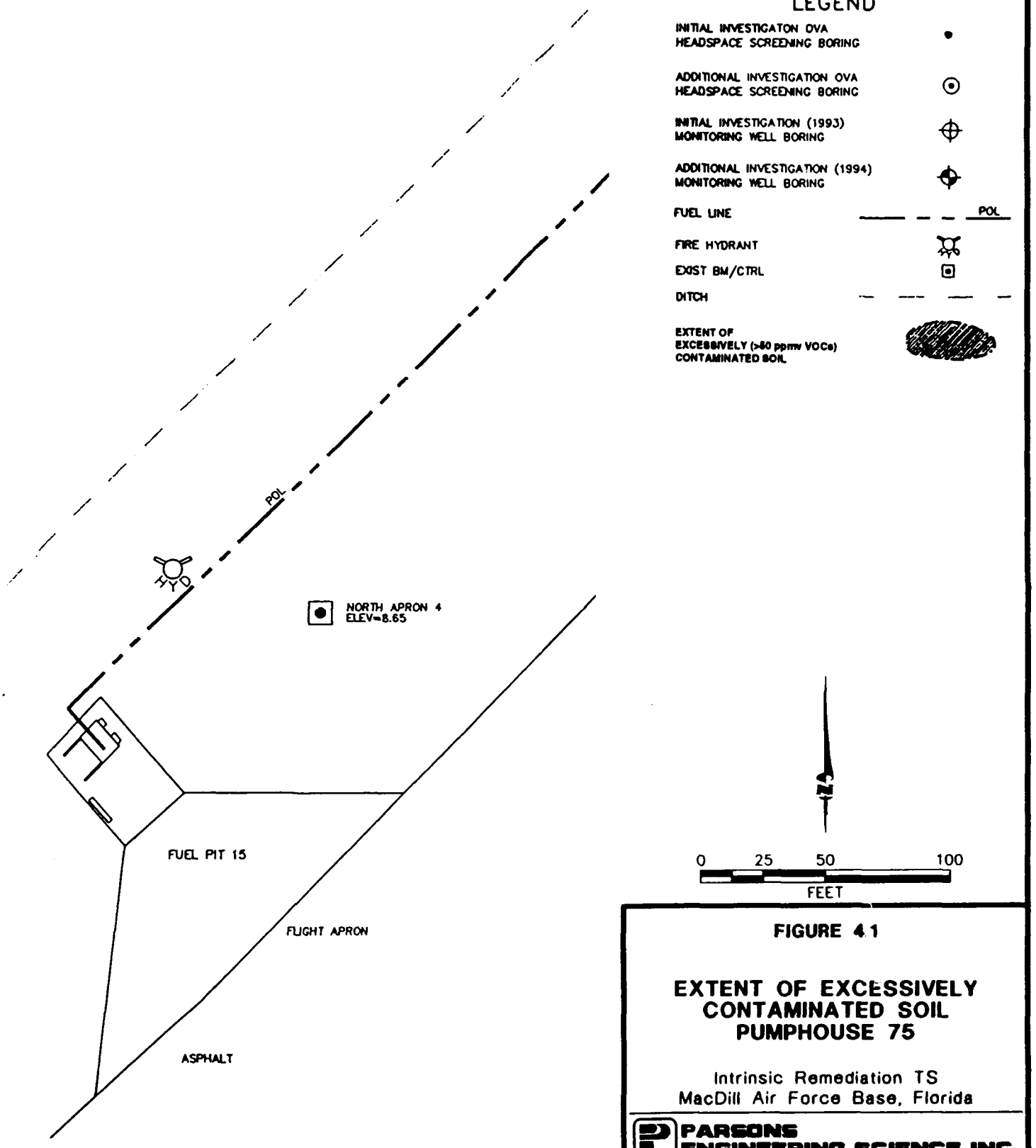


FIGURE 4.1

EXTENT OF EXCESSIVELY CONTAMINATED SOIL PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

soil samples from 10 boreholes (excluding QC samples) were collected by Parsons ES in March 1995 and chemically analyzed for petroleum constituents. Analytical results from the Parsons ES sampling are summarized in Table 4.1, and both BVWS and Parsons ES soil BTEX results are plotted on Figure 4.2.

Significantly elevated BTEX concentrations were detected in samples from 75SS-1 (3-5 feet bgs), 75SS-2 (3-5 feet bgs), 75MP-2 (2-4 feet bgs) and MD75-MW01 (2-3 feet bgs). The lateral distribution of these detections either suggests the existence of multiple sources, or that free product may have migrated downgradient from the source area, leaving residual light, nonaqueous-phase liquid (LNAPL) contamination in a smear zone bordering the water table. Residual LNAPL is defined as product that is trapped in the aquifer matrix by the processes of cohesion and capillarity, and therefore will not migrate within the aquifer or flow from the aquifer matrix into a well under the influence of gravity. The detection of BTEX at a concentration of 90,100 JH µg/kg at MD75-MW01 is anomalous given the lack of significant dissolved BTEX detections in groundwater from that well. In addition, this detection was not confirmed by analytical results for soil samples from adjacent monitoring point 75MP-5. Except for MD75-MW01, the lack of significant BTEX detections in the remainder of the collected samples effectively bounds the contaminated area laterally. The lack of significant BTEX detections below a depth of 5 feet (Table 4.1), combined with the shallow depthof the fuel pipelines (3 feet bgs) believed to be the primary contaminant source, suggests that the contamination is mostly restricted to the top 5 to 6 feet of the soil column.

4.2.3 Magnitude and Extent of Total Petroleum Hydrocarbons in Soil

Soil samples collected by BVWS (1995) were analyzed for total recoverable petroleum hydrocarbons (TRPH) using USEPA Method 418.1. All samples collected by Parsons ES were analyzed for TVH using EPA Method 8015, modified (California Leaking Underground Fuel Tank Task Force, 1989), and most of the samples also were analyzed for TEH using the same method. Analytical results for the Parsons ES samples are summarized in Table 4.1, and the BVWS results are provided in Appendix A.

The magnitude and distribution of significantly elevated TRPH, TVH, and TEH concentrations correlate well with the observed BTEX concentrations. Each of the four locations containing elevated BTEX levels, described in Section 4.2.2, were also characterized by elevated total petroleum hydrocarbon (TPH) levels. Similarly, TPH detections were relatively insignificant in the remainder of the samples analyzed for this parameter. Comparison of detected concentrations of TEH [up to 15,000 milligrams per kilogram (mg/kg)] and TVH (up to 4,800E mg/kg) indicate that diesel-range hydrocarbons are more prevalent than gasoline-range hydrocarbons. The 'E' qualifier in the TVH concentration indicates that it is a laboratory-extrapolated value.

4.2.4 Total Organic Carbon

TOC concentrations are a measure of the amount of organic matter sorbed on soil particles or trapped in the interstitial passages of a soil matrix. The TOC concentration in the saturated zone is an important parameter used to estimate the amount of contaminant that could potentially be sorbed to the aquifer matrix. Sorption results in

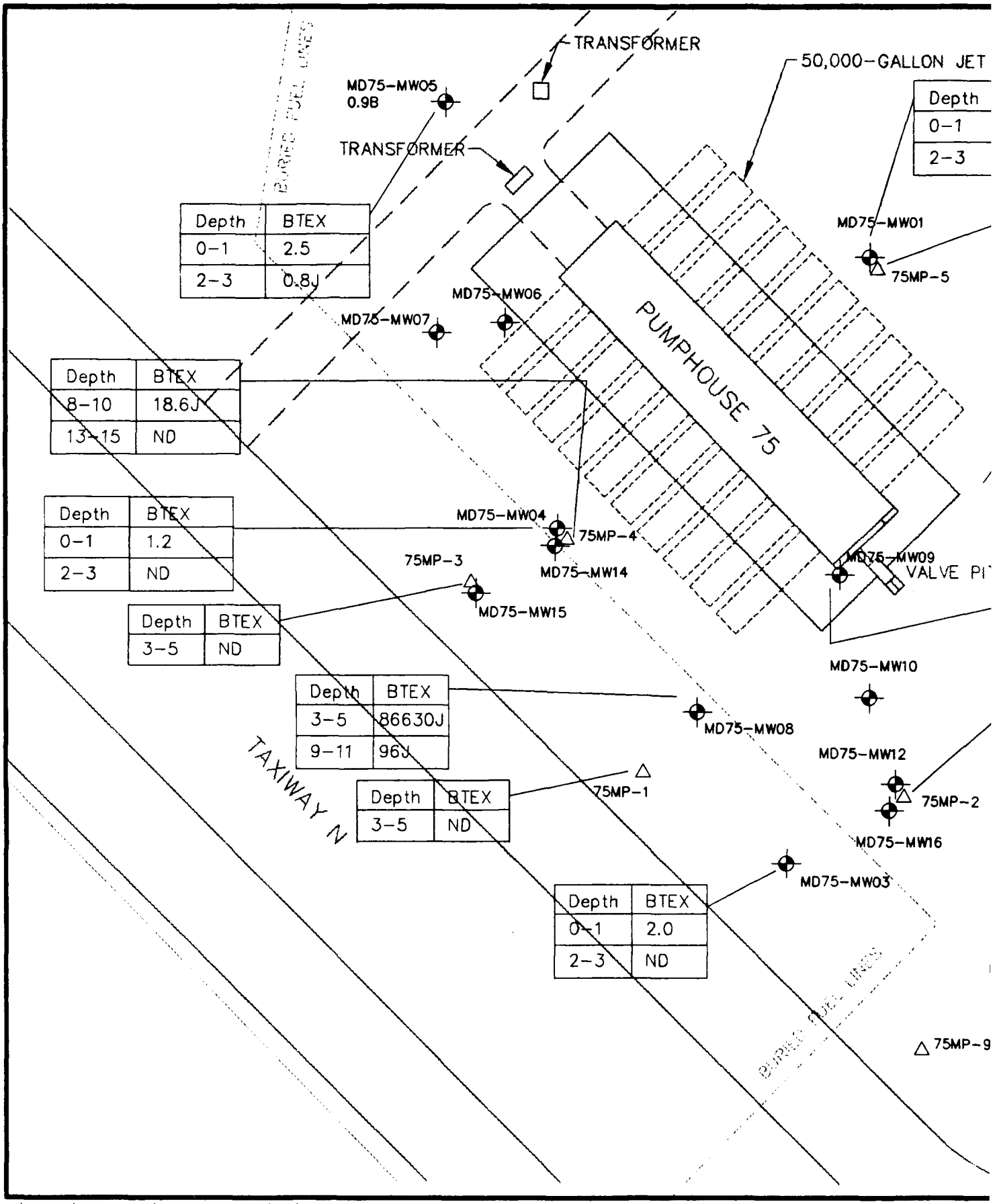
TABLE 4.1
1995 SOIL AND SEDIMENT DATA FOR FUEL-RELATED COMPOUNDS
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Sample Location	Sample Date	Sample Interval (feet)	Benzene (µg/kg)[a]	Toluene (µg/kg)	Ethylbenzene (µg/kg)	Total Xylenes (µg/kg)	Total BTEX (µg/kg)	TEH[a] (mg/kg)[b]	TVH[b] (mg/kg	Chloro-benzene (µg/kg)	1,3,5-TMB[e] (µg/kg)	1,2,4-TMB[d] (µg/kg)	1,2,3-TMB[e] (µg/kg)	,2,3,4-TMB[f] (µg/kg)
Soil Samples														
75MP-1	3/11/95	3-5	ND[i]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
75MP-1 dup	3/11/95	3-5	ND	ND	ND	ND	ND	NA[j]	ND	ND	ND	ND	ND	ND
75MP-2	3/13/95	2-4	ND	630	680	640	1950	4000	3000E[k]	150J[l]	1800	2000	1400	2300
75MP-2	3/13/95	8-10	ND	ND	ND	ND	ND	17	ND	ND	ND	ND	ND	5.0J
75MP-2 dup	3/13/95	8-10	ND	ND	1.2J	3.5J	4.7J	NA	NA	ND	ND	ND	ND	9.3
75MP-3	3/14/95	3-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
75MP-4	3/14/95	8-10	ND	0.9J	16	1.5J	18.6J	NA	ND	ND	ND	ND	ND	14
75MP-4	3/14/95	13-15	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	1.3J
75MP-5	3/14/95	4-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
75SS-15 dup	3/14/95	4-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
75MP-5	3/14/95	6-8	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
75MP-5 dup	3/14/95	6-8	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA
75MP-7	3/15/95	6-8	ND	ND	ND	ND	ND	NA	ND	ND	0.6J	0.5J	ND	ND
75SS-1	3/13/95	3-5	ND	37	550	4900	5487	13	230	340	3200	2200	2300	12000
75SS-1dup	3/13/95	3-5	NA	NA	NA	NA	NA	NA	590	NA	NA	NA	NA	NA
75SS-1	3/13/95	7-9	ND	ND	ND	ND	ND	NA	0.36	ND	ND	ND	ND	34
75SS-1 dup	3/13/95	7-9	ND	ND	ND	ND	ND	NA	NA	ND	ND	ND	ND	54
75SS-2	3/13/95	3-5	330J	5300	14000	67000	86630J	15000	4800E	4500	59000	73000	46000	5000
75SS-2	3/13/95	9-11	32	ND	39	25J	96J	16	ND	ND	22J	21J	9.8J	34
75SS-3	3/13/95	3-4	ND	ND	ND	0.7J	0.7J	ND	ND	ND	ND	ND	ND	ND
75SS-3	3/13/95	8-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.9J
75SS-6	3/15/95	3-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
75SS-6	3/15/95	7-9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
75SS-6 dup	3/15/95	7-9	NA	NA	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA
75SS-6	3/15/95	22-24	3.3J	ND	ND	ND	3.3J	NA	3	ND	ND	ND	ND	ND

TABLE 4.1 (Continued)
1995 SOIL AND SEDIMENT DATA FOR FUEL-RELATED COMPOUNDS
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Sample Location	Sample Date	Sample Interval (feet)	Benzene (µg/kg)[g]	Toluene (µg/kg)	Ethylbenzene (µg/kg)	Total Xylenes (µg/kg)	Total BTEX (µg/kg)	TEH[a/] (mg/kg)[h/]	TVH[b/] (mg/kg	Chloro-benzene (µg/kg)	1,3,5-TMB[c/] (µg/kg)	1,2,4-TMB[d/] (µg/kg)	1,2,3-TMB[e/] (µg/kg)	,2,3,4-TMB[f/] (µg/kg)
Sediment Samples														
75SD-1	3/15/95	0-0.5	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
75SD-2	3/15/95	0-0.5	ND	ND	ND	1.0J	1.0J	NA	ND	ND	ND	ND	ND	ND
75SD-3	3/15/95	0-0.5	ND	ND	ND	0.9J	0.9J	NA	ND	ND	ND	ND	ND	ND
75SD-4	3/15/95	0-0.5	ND	ND	ND	ND	ND	NA	NA	ND	ND	ND	ND	9.6J

a/ TEH = total extractable hydrocarbons.
b/ TVH = total volatile hydrocarbons.
c/ 1,3,5 TMB = 1,3,5 trimethylbenzene.
d/ 1,2,4 TMB = 1,2,4 trimethylbenzene.
e/ 1,2,3 TMB = 1,2,3 trimethylbenzene.
f/ 1,2,3,4 TMB = 1,2,3,4 tetramethylbenzene.
g/ µg/kg = micrograms per kilogram.
h/ mg/kg = milligrams per kilograms.
i/ ND = not detected.
j/ NA = not analyzed for this compound.
k/ E = laboratory-extrapolated value.
l/ J = laboratory estimate.
Note: Analysis methods included SW8015M for TEH and TVH, and SW8020 for aromatic volatile organic compounds, including TMB compounds.



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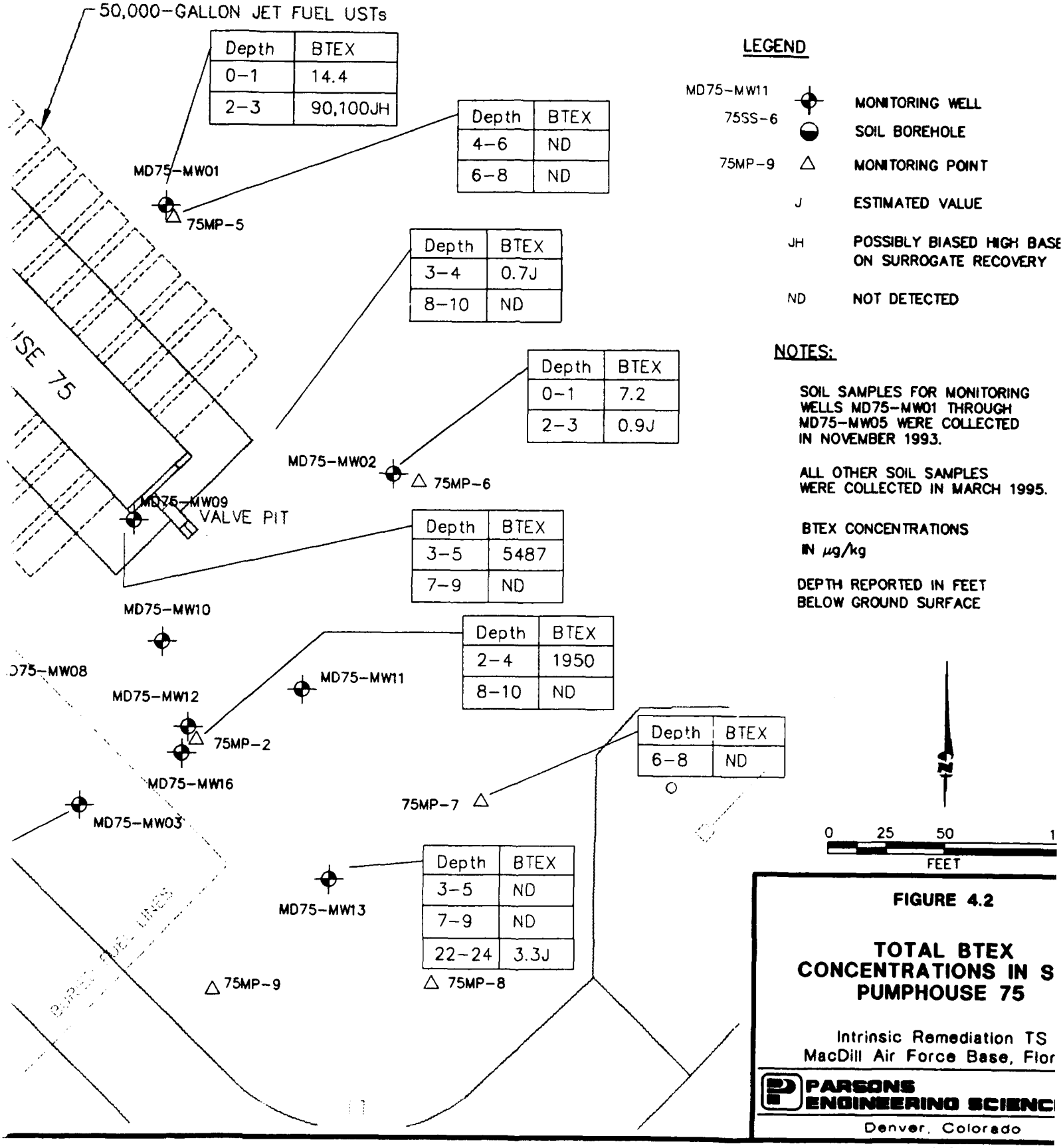


FIGURE 4.2

TOTAL BTEX CONCENTRATIONS IN S
PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Flor

PARSONS ENGINEERING SCIENC
Denver, Colorado

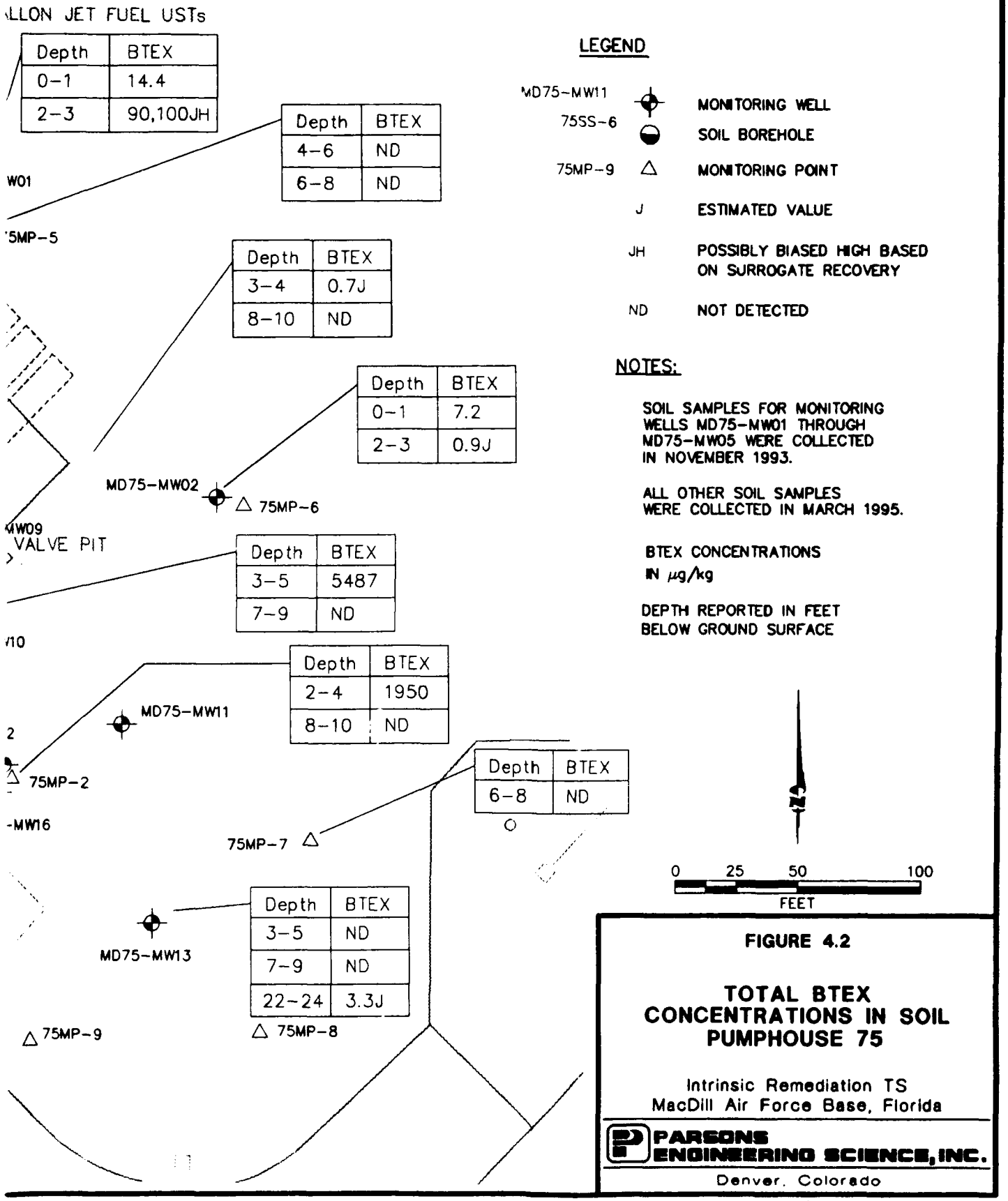


FIGURE 4.2

TOTAL BTEX CONCENTRATIONS IN SOIL PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

retardation of the contaminant plume migration relative to the average advective groundwater velocity.

Samples for TOC analysis were collected in sandy material in the vicinity of the water table at boreholes 75SS-4, 75SS-6, and 75SS-7. To avoid interference from carbon present in fuel hydrocarbons, these samples were collected from locations where data indicated that little or no hydrocarbon contamination was present. The TOC content of the soil at these locations was less than 0.06 percent (Table 4.2).

4.2.5 Magnitude and Extent of Petroleum Hydrocarbons In Sediment

Four sediment samples (75SD-1 through 75SD-4) were collected in and adjacent to the shallow drainage swale located southeast of the pumphouse building (Figure 2.2). Surface water is present in this swale only after storm events, and flow is toward the northeast. These samples were analyzed for aromatic VOCs and TVH. Trace concentrations of xylenes, ranging from 0.9J to 1.0J µg/kg, were detected in two samples, and the remaining analytes were not detected (Table 4.1). BVWS (1995) obtained three sediment samples from this swale in 1994, and analyzed them for aromatic and halogenated VOCs, polynuclear aromatic hydrocarbons (PAHs), TRPH, and Resource Conservation and Recovery Act (RCRA) metals. Analysis results are contained in Appendix A. Similar to the March 1995 samples, only trace concentrations (less than 3 µg/kg) of VOCs were detected. Surface water was not present at the site during field activities, and therefore surface water samples were not collected.

4.3 GROUNDWATER CHEMISTRY

Biodegradation of fuel hydrocarbons can occur when an indigenous population of hydrocarbon-degrading microorganisms is present in the aquifer and sufficient concentrations of electron acceptors and nutrients, including fuel hydrocarbons, are available to these organisms. Three lines of evidence can be used to document the occurrence of natural attenuation:

- Geochemical evidence;
- Documented loss of contaminant mass at the field scale; and
- Laboratory microcosm studies.

The first line of evidence (geochemical evidence) is used herein to support the occurrence of natural attenuation, as described in the following sections. Because this line of evidence strongly suggests that natural attenuation is occurring at this site, laboratory microcosm studies were not deemed necessary. Although available groundwater quality data suggest that loss of contaminant mass may be occurring at the site, there is not sufficient historical data and vertical control to document that line of evidence.

TABLE 4.2
SOIL TOTAL ORGANIC CARBON RESULTS
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Sample Location	Depth (feet bgs)	Total Organic Carbon[a/] (%)
75SS-4	3 - 4	< 0.06
75SS-6	3 - 5	< 0.06
75SS-7	4 - 6	< 0.06
75SS-17 dup	4 - 6	< 0.06

a/ moisture adjusted result.
Note: Analysis method was SW9060, modified.

4.3.1 Dissolved Hydrocarbon Contamination

Laboratory analytical results for groundwater samples collected during previous site investigations (BVWS, 1995) revealed the presence of dissolved fuel hydrocarbon contamination in the shallow saturated zone. BVWS groundwater quality results are contained in Appendix A. Groundwater samples collected in March 1995 by Parsons ES personnel confirmed these results. Table 4.3 summarizes groundwater contaminant data for these samples. Free-phase product (i.e., mobile LNAPL) was not observed during any of the investigations.

4.3.1.1 Dissolved BTEX Contamination

Figure 4.3 is an isopleth map showing the distribution of total BTEX dissolved in groundwater in March 1995. Where nested monitoring points or wells are present, isopleths are drawn using the maximum concentration detected at that location. The maximum observed total BTEX concentration was 676 µg/L at monitoring well MD75-MW04. Elsewhere, the detected total BTEX concentrations ranged from 0.6B µg/L at wells MD75-MW15 and MD75-MW02 to 589 µg/L at monitoring point 75MP-4S. The plume is elongated parallel to the buried fuel lines and the direction of groundwater flow (Figure 4.3). Comparison of March 1995 sampling results with data from January and November 1994 suggests that dissolved BTEX concentrations in the shallow sand zone have generally decreased over time. For example, the total BTEX concentration detected at well MD75-MW04 was 1,071 µg/L in January 1994, 976 µg/L in November 1994, and 676 µg/L in March 1995. Similarly, the detected total BTEX concentration at well MD75-MW08 decreased from 541 µg/L in November 1994 to 377B µg/L in March 1995. The "B" data qualifier indicates that one or more of the BTEX compounds also was detected in an associated laboratory blank sample. BTEX concentrations detected in downgradient wells (e.g., MD75-MW09, MD75-MW10, and MD75-MW12) have not increased significantly over time, indicating that the observed decreases in the source area are not wholly due to migration of the contaminants in the downgradient direction.

The detection of dissolved BTEX in the two deeper wells (MD75-MW14 and MD75-MW16) located in the center of the plume (Figure 4.3) suggests that the BTEX contamination may be migrating vertically as well as horizontally. However, the introduction of dissolved BTEX into the deeper wells from shallower intervals during well purging cannot be ruled out. In both MD75-MW14 and MD75-MW16, the isolation casing and underlying bentonite seal do not extend a significant distance into a confining layer. Therefore, it is conceivable that shallow groundwater containing dissolved BTEX was drawn down into the deeper wells during purging and/or development activities. This observation is supported by the similarity in BTEX concentrations detected in the shallow and deep wells constituting a well cluster. The March 1995 dissolved BTEX concentrations detected in wells MD75-MW04 (shallow) and -MW14 (deep) were 676 and 515 µg/L, respectively. Similarly, the dissolved BTEX concentrations detected in wells MD75-MW12 and -MW16 were 121B and 128 µg/L, respectively. Comparison of November 1994 and March 1995 sampling results indicate that the dissolved BTEX concentrations in the deep wells have increased since 1994. In November 1994, the sample from well MD75-MW14 contained 95 µg/L of dissolved BTEX (as opposed to 515 µg/L in March 1995), and the sample from well MD75-MW16 contained 53 µg/L of BTEX (as opposed to 128 µg/L in March 1995).

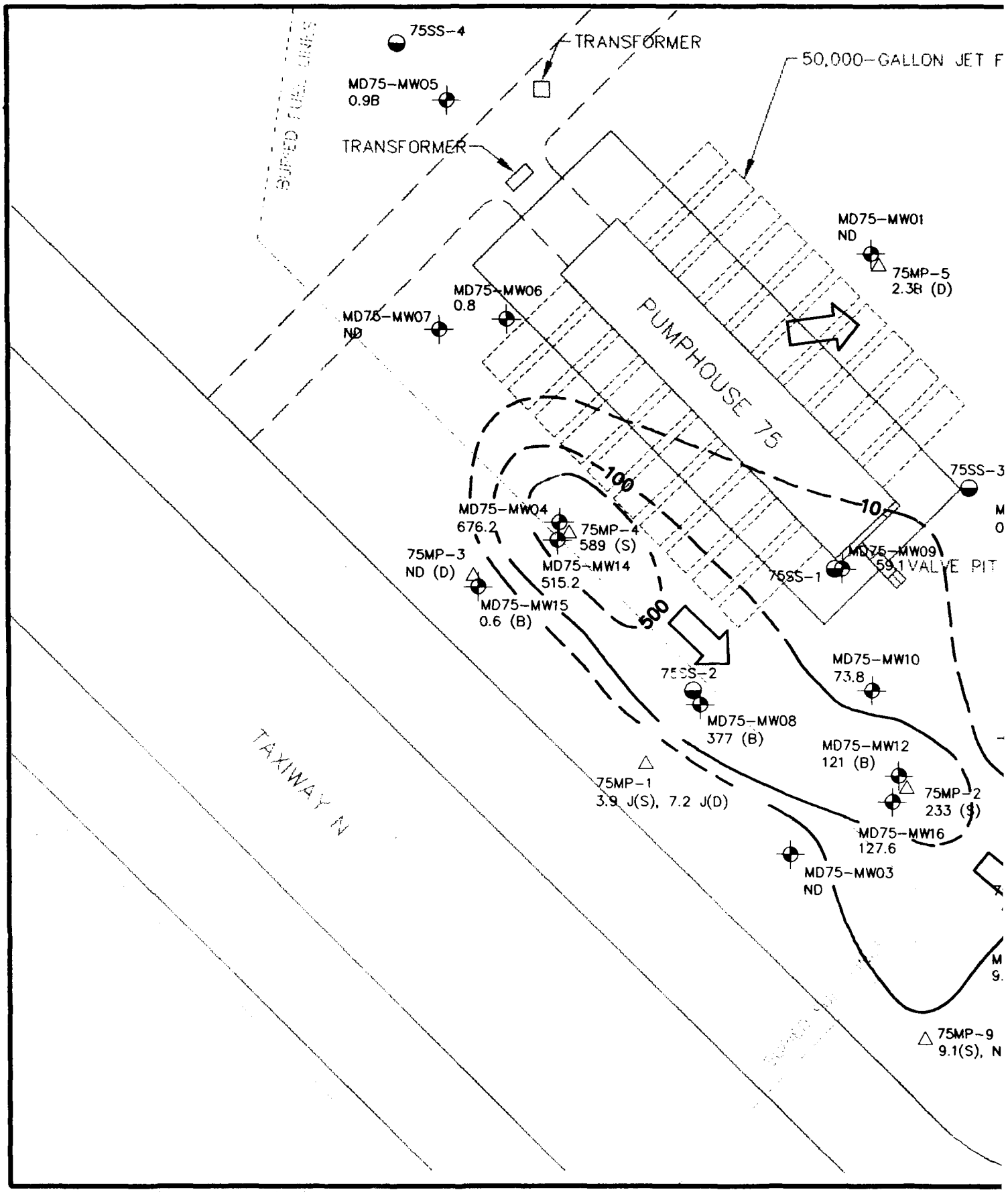
TABLE 4.3
1995 GROUNDWATER QUALITY DATA FOR FUEL-RELATED COMPOUNDS AND TOC
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Sample Location	Sample Date	Benzene (µg/L)[b]	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Total BTEX (µg/L)	TEH[a] (mg/L)[i]	TVH[b] (mg/L)	TOC[c] (mgC/L	Chloro-Benzene (µg/L)	1,3,5-TMB[d] (µg/L)	1,2,4-TMB[e] (µg/L)	1,2,3-TMB[f] (µg/L)	1,2,3,4 TMB[g] (µg/L)
75MP-1S	3/16/95	ND[j]	3.9J[k]	ND	ND	3.9J	NA[l]	ND	NA	ND	ND	ND	ND	ND
75MP-1D	3/16/95	1.7J	0.5J	5	ND	7.2J	NA	ND	NA	ND	ND	ND	ND	11
75MP-2S	3/31/95	13	82	50	88	233	NA	1.8	NA	ND	70	140	110	66
75MP-3D	4/2/95	ND	ND	ND	ND	ND	NA	0.2	NA	ND	ND	ND	ND	ND
75MP-4S	3/31/95	50	36	460	43	589	NA	2.6	NA	3.5	12	41	41	78
75MP-5D	3/29/95	0.8	0.9B[m]	ND	0.6B	2.3B	NA	ND	NA	ND	ND	0.4	ND	8.3
75MP-6D	3/29/95	ND	ND	3.2	0.5B	3.7B	NA	0.1	1	ND	ND	1.5	0.8	17
75MP-6D dup	3/29/95	NA	NA	NA	NA	NA	NA	0.1	NA	NA	NA	NA	NA	NA
75MP-7S	4/2/95	ND	3.3	4	11	18.7	NA	0.1	NA	ND	25	50	22	12
75MP-7D	4/2/95	ND	ND	ND	ND	ND	NA	0.1	NA	ND	ND	ND	ND	ND
75MP-8S	3/30/95	ND	ND	ND	ND	ND	NA	ND	5.18	ND	ND	ND	ND	ND
75MP-8D	3/30/95	ND	ND	ND	ND	ND	NA	ND	NA	ND	ND	ND	0.9	ND
75MP-28S dup	3/30/95	ND	ND	ND	ND	ND	NA	ND	5.28	ND	ND	ND	ND	ND
75MP-9S	3/30/95	ND	9.1	ND	ND	9.1	NA	ND	4.68	ND	ND	ND	ND	ND
75MP-9D	3/30/95	ND	ND	ND	ND	ND	NA	ND	NA	ND	ND	ND	ND	ND
MD75-MW01	3/29/95	ND	ND	ND	ND	ND	NA	ND	NA	ND	ND	ND	ND	ND
MD75-MW02	3/29/95	ND	0.6B	ND	ND	0.6B	NA	ND	NA	ND	ND	ND	ND	ND
MD75-MW03	3/31/95	ND	ND	ND	ND	ND	NA	0.2	NA	ND	ND	ND	ND	ND
MD75-MW04	3/31/95	94.0	2.2	580	ND	676.2	15	2.9	NA	2.2	ND	2.1	0.8	92.0
MD75-MW04 dup	3/31/95	96	3.1	100B	0.7	199.8	NA	3.5	NA	2.9	ND	2.1	1.6	83E[n]
MD75-MW05	3/29/95	ND	0.9B	ND	ND	0.9B	NA	ND	7.42	ND	0.6	ND	0.5	ND
MD75-MW06	3/31/95	ND	ND	0.8	ND	0.8	NA	0.1	NA	ND	0.5	ND	ND	3.2

TABLE 4.3 (Continued)
1995 GROUNDWATER QUALITY DATA FOR FUEL-RELATED COMPOUNDS AND TOC
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Sample Location	Sample Date	Benzene (µg/L)[h]	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Total BTEX (µg/L)	TEH[a] (mg/L)[i]	TVH[b] (mg/L)	TOC[c] (mgC/L	Chloro-Benzene (µg/L)	1,3,5-TMB[d] (µg/L)	1,2,4-TMB[e] (µg/L)	1,2,3-TMB[f] (µg/L)	1,2,3,4 TMB[g] (µg/L)
MD75-MW7	4/2/95	ND	ND	ND	ND	ND	NA	ND	NA	ND	ND	ND	ND	ND
MD75-MW8	3/31/95	140B	17	110B	110	377B	14	2	NA	1.3	33	45	40	61E
MD75-MW09	3/30/95	ND	1	57	1.1	59.1	NA	1.2	NA	0.8	ND	0.7	0.4	298.9
MD75-MW10	3/30/95	7.2	ND	65	1.6	73.8	NA	0.5	NA	ND	1.5	ND	ND	28
MD75-MW11	3/30/95	ND	ND	ND	0.9	0.9	NA	ND	NA	ND	ND	0.5	ND	ND
MD75-MW12	3/31/95	45	1.5	67B	7.5	121B	3.1	0.6	NA	0.5	6.2	20	3.2	41
MD75-MW13	3/30/95	1.3	ND	6.5	1.2	9	NA	ND	NA	ND	ND	2.1	ND	1.1
MD75-MW14	3/31/95	170	1.2	330.0	14	515.2	NA	3.5	NA	1.5	1	1.7	1.7	53
MD75-MW15	4/2/95	ND	ND	ND	0.6B	0.6B	NA	ND	NA	ND	ND	ND	ND	0.4B
MD75-MW16	3/31/95	45	0.9	79	2.7	127.6	NA	0.7	NA	0.7	ND	1.4	0.9	50
RINSATE BLAN	3/30/95	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	ND	ND
FIELD BLANK	3/30/95	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	ND	ND

a/ TEH = total extractable hydrocarbons.
b/ TVH = total volatile hydrocarbons.
c/ TOC = total organic carbon.
d/ 1,3,5-TMB = 1,3,5-trimethylbenzene.
e/ 1,2,4-TMB = 1,2,4-trimethylbenzene.
f/ 1,2,3-TMB = 1,2,3-trimethylbenzene.
g/ 1,2,3,4-TMB = 1,2,3,4-tetramethylbenzene.
h/ µg/L = micrograms per liter.
i/ mg/L = milligrams per liter.
j/ ND = compound not detected.
k/ J = laboratory estimate.
l/ NA = compound not analyzed for.
m/ B = compound detected in blank.
n/ E = laboratory-extrapolated value.
Note: Analysis methods included SW8015M for TEH and TVH, E415.1 for TOC, and SW8020 for aromatic volatile organic compounds, including TMB compounds.



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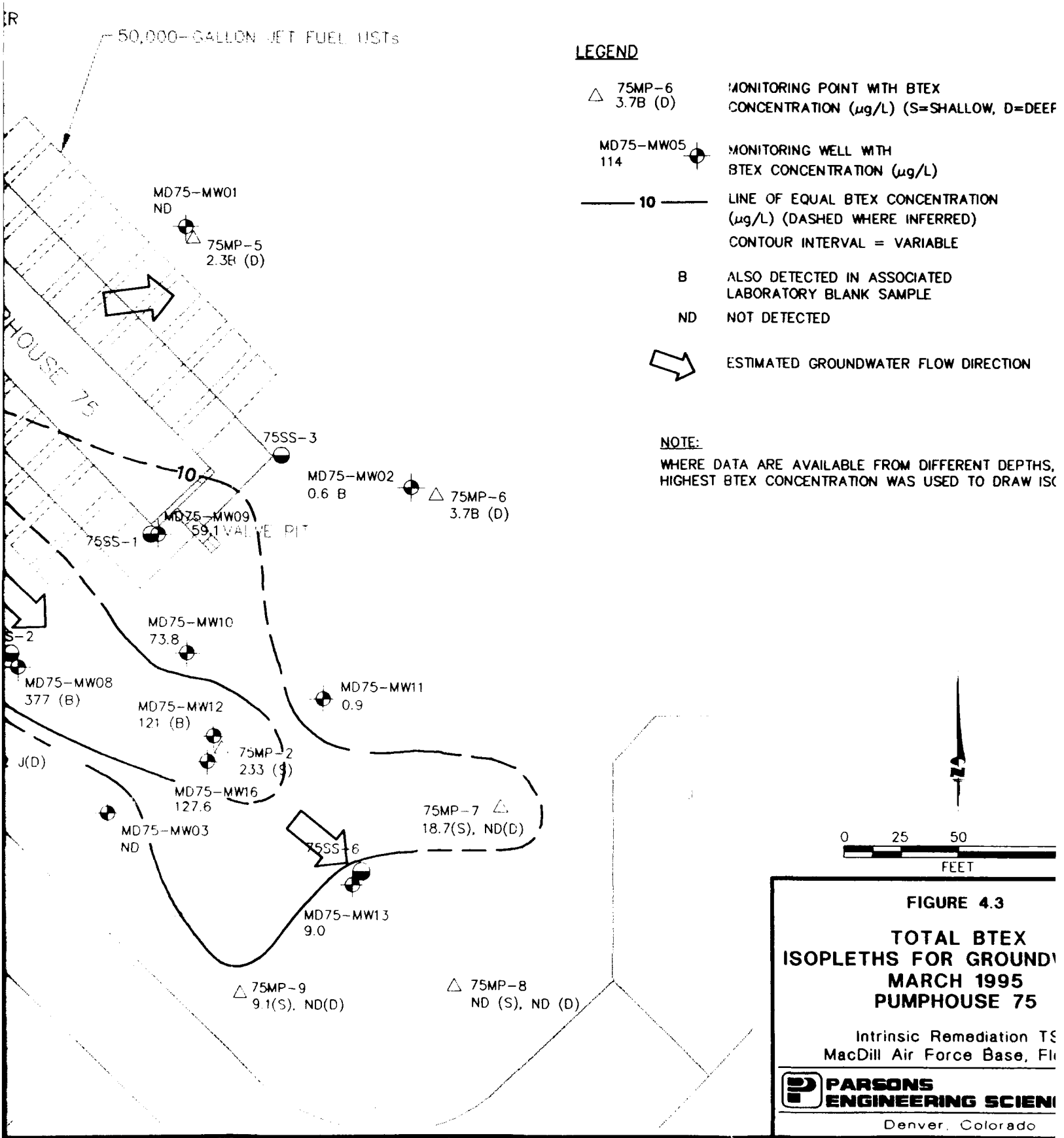


FIGURE 4.3

TOTAL BTEX ISOPLETHS FOR GROUNDW MARCH 1995 PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Fl

PARSONS ENGINEERING SCIEN
Denver, Colorado

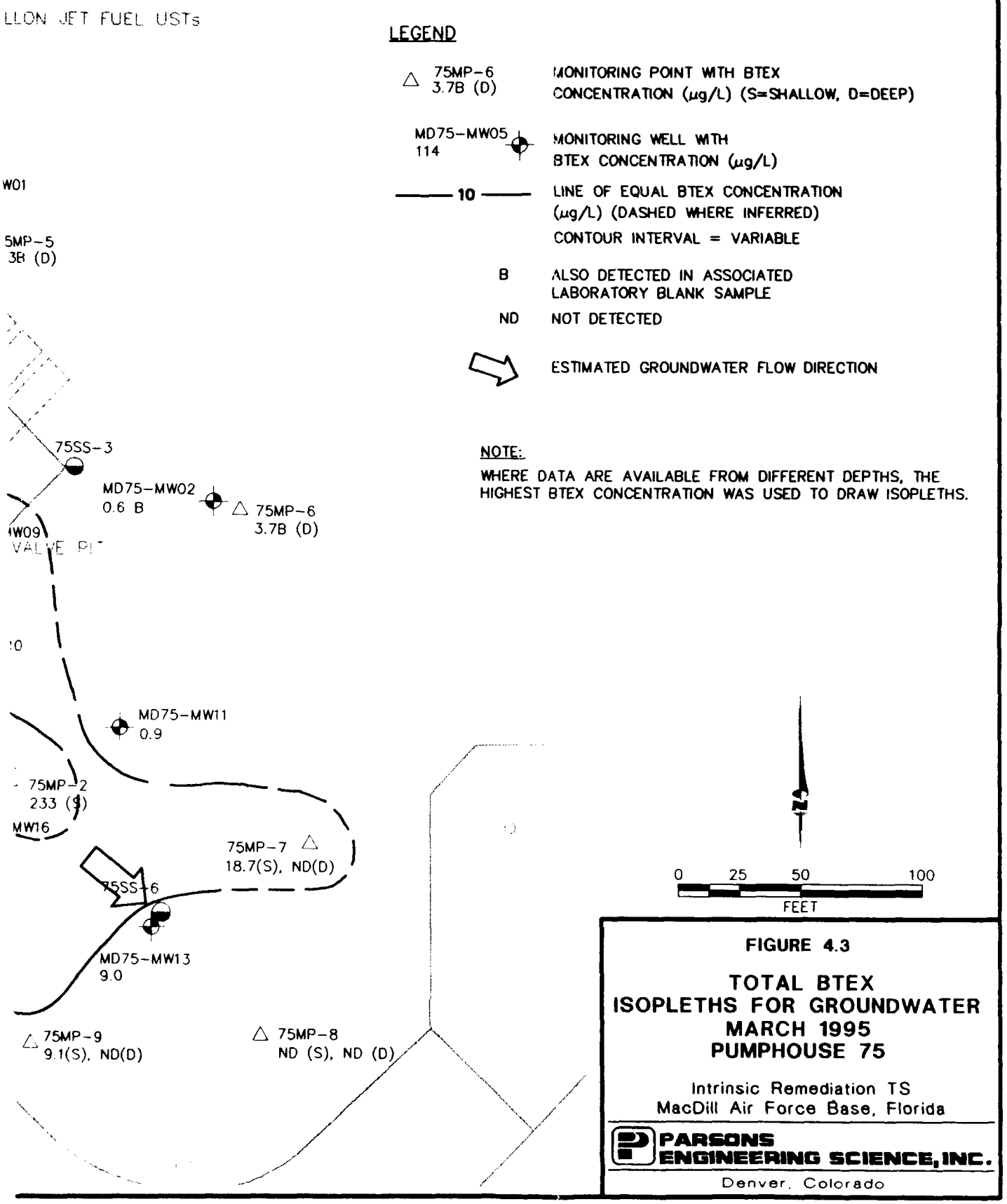


FIGURE 4.3

TOTAL BTEX ISOPLETHS FOR GROUNDWATER MARCH 1995 PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

Except for the detections described above for MD75-MW14 and -MW16, the largest BTEX detection in other samples collected from similar depths was 7.2J µg/L at monitoring point 75MP-1D, indicating that the lateral extent of BTEX contamination in deeper portions of the surficial aquifer is restricted to the immediate vicinity of the pumphouse. The degree to which geochemical data support the presence of BTEX contamination at deeper intervals is discussed in Sections 4.3.2.1 through 4.3.2.7.

4.3.1.2 Dissolved TPH Contamination

Groundwater samples collected by BVWS (1995) were analyzed for TRPH using USEPA Method 418.1 (see Appendix A for results). Samples collected by Parsons ES were analyzed for TVH using USEPA Method SW8015, modified, and three samples were also analyzed for TEH using USEPA Method 8015, modified. The TVH results correlate well with the BTEX results, with the maximum TVH concentration of 3.5 mg/L detected at monitoring wells MD75-MW04 and MD75-MW14 (Table 4.3). As stated in Section 4.3.1.1, the similarity between the shallow and deep petroleum hydrocarbon concentrations at the location of this well cluster suggests that the deep detections may be occurring as a result of cross-contamination from the shallow sand zone. The TEH concentrations are all substantially greater than the corresponding TVH concentrations, indicating that, similar to soil contamination, diesel-range petroleum hydrocarbons are more abundant than gasoline-range hydrocarbons in the groundwater beneath this site.

4.3.1.3 Chlorinated Volatile Organic Compounds

Groundwater samples collected in 1995 by Parsons ES were analyzed for chlorinated VOCs and ethylene (which is a byproduct of chlorinated solvent degradation). Table 4.4 contains analytical data for these compounds. The VOC *cis-1,2-dichloroethene* (cis-1,2-DCE) was detected in the sample from deep monitoring well MD75-MW14 at a concentration of 1 µg/L. Chlorinated solvents were not detected in the remaining samples. Ethylene was detected in three samples at the following concentrations: 0.001J mg/L at 75MP-2S, 0.001J mg/L at 75MP-4S, and <0.003 mg/L at MD75-MW04.

4.3.2 Inorganic Chemistry and Geochemical Indicators of Biodegradation

Microorganisms obtain energy for cell production and maintenance by catalyzing the transfer of electrons from electron donors to electron acceptors. This results in the oxidation of the electron donor and the reduction of the electron acceptor. Electron donors at the site are natural organic carbon and fuel hydrocarbon compounds. Fuel hydrocarbons are completely degraded or detoxified if they are utilized as the primary electron donor for microbial metabolism (Bouwer, 1992). Electron acceptors are elements or compounds that occur in relatively oxidized states, and typically can include oxygen, nitrate, ferric iron, sulfate, and carbon dioxide. Microorganisms preferentially utilize electron acceptors while metabolizing fuel hydrocarbons (Bouwer, 1992). DO is utilized first as the prime electron acceptor. After the DO is consumed, anaerobic microorganisms typically use electron acceptors (as available) in the following order of preference: nitrate, ferric iron hydroxide, sulfate, and finally carbon dioxide. Because the biodegradation of fuel hydrocarbons should deplete the concentrations of these electron acceptors, construction of isopleth maps depicting their

TABLE 4.4
1995 GROUNDWATER QUALITY DATA FOR CHLORINATED VOLATILE ORGANIC COMPOUNDS AND ETHYLENE
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Sample Identification	PCE[a] (ppb)[f]	TCE[b] (ppb)	1,1-DCE[c] (ppb)	Trans-1,2-DCE[d] (ppb)	Cis-1,2-DCE[e] (ppb)	Vinyl Chloride (ppb)	Ethylene (ppm)[g]
75MP-2S	ND[h]	ND	ND	ND	ND	ND	0.001J[i]
75MP-3D	ND	ND	ND	ND	ND	ND	ND
75MP-4S	ND	ND	ND	ND	ND	ND	0.001J
75MP-5D	ND	ND	ND	ND	ND	ND	ND
75MP-6D	ND	ND	ND	ND	ND	ND	ND
75MP-7D	ND	ND	ND	ND	ND	ND	ND
75MP-7S	ND	ND	ND	ND	ND	ND	ND
75MP-8D	ND	ND	ND	ND	ND	ND	ND
75MP-8S	ND	ND	ND	ND	ND	ND	ND
75MP-9D	ND	ND	ND	ND	ND	ND	ND
75MP-9S	ND	ND	ND	ND	ND	ND	ND
MD75-MW02	ND	ND	ND	ND	ND	ND	ND
MD75-MW03	ND	ND	ND	ND	ND	ND	ND
MD75-MW04	ND	ND	ND	ND	ND	ND	<0.003
MD75-MW04 dup	ND	ND	ND	ND	ND	ND	NA[j]
MD75-MW05	ND	ND	ND	ND	ND	ND	ND
MD75-MW06	ND	ND	ND	ND	ND	ND	ND
MD75-MW07	ND	ND	ND	ND	ND	ND	ND
MD75-MW08	ND	ND	ND	ND	ND	ND	ND
MD75-MW09	ND	ND	ND	ND	ND	ND	ND
MD75-MW10	ND	ND	ND	ND	ND	ND	ND
MD75-MW11	ND	ND	ND	ND	ND	ND	ND
MD75-MW12	ND	ND	ND	ND	ND	ND	ND
MD75-MW13	ND	ND	ND	ND	ND	ND	ND
MD75-MW14	ND	ND	ND	ND	1.0	ND	ND
MD75-MW14 dup	ND	ND	ND	ND	1.1	ND	NA
MD75-MW15	ND	ND	ND	ND	ND	ND	ND
MD75-MW16	ND	ND	ND	ND	ND	ND	ND

[a] PCE = Tetrachloroethene.
[b] TCE = Trichloroethene.
[c] 1,1-DCE = 1,1 Dichloroethene.
[d] Trans-1,2-DCE = Trans-1,2,-Dichloroethene.
[e] Cis-1,2-DCE = Cis-1,2-Dichloroethene.
[f] ppb = parts per billion.
[g] ppm = parts per million.
[h] ND = compound not detected.
[i] J = laboratory-estimated value.
[j] NA = compound not analyzed for.
Note: Analysis methods included Robert S. Kerr Standard Operating Procedure (RSKSOP)-148 for volatile organic compounds and RSKSOP-175 for ethylene.

concentrations relative to a dissolved fuel hydrocarbon plume can provide evidence of whether biodegradation is occurring, and the degree to which it is occurring.

During anaerobic biodegradation, there is an increase in the concentrations of metabolic byproducts derived from the microbial degradation of fuel hydrocarbons. Metabolic byproducts include ferrous iron produced during iron reduction, and methane produced during methanogenesis, which uses carbon dioxide as the electron acceptor. Therefore, isopleth maps depicting the concentrations of these byproducts provide additional evidence of biodegradation.

The driving force of BTEX degradation is electron transfer, as quantified by the Gibbs free energy of the reaction (ΔG_r) (Stumm and Morgan, 1981; Bouwer, 1994; Godsey, 1994). The value of ΔG_r represents the quantity of free energy consumed or yielded to the system during the reaction. Table 4.5 lists stoichiometry of the redox equations involving BTEX and the resulting ΔG_r. Although thermodynamically favorable, most of the reactions involved in BTEX oxidation cannot proceed abiotically because of the lack of activation energy. Microorganisms are capable of providing the necessary activation energy; however, they will facilitate only those redox reactions that have a net *yield* of energy (i.e., $\Delta G_r < 0$).

Depending on the types and concentrations of electron acceptors present (e.g., nitrate, ferric iron, sulfate, carbon dioxide), pH conditions, and redox potential, anaerobic biodegradation can occur by denitrification, ferric iron reduction, sulfate reduction, or methanogenesis. Other, less common anaerobic degradation mechanisms such as manganese reduction may dominate if the physical and chemical conditions in the subsurface favor use of these electron acceptors. Anaerobic destruction of BTEX compounds is associated with the accumulation of fatty acids, production of methane, solubilization of iron, and reduction of nitrate and sulfate (Cozzarelli *et al.*, 1990; Wilson *et al.*, 1990). In addition, an increase in alkalinity is often observed when BTEX compounds are being biodegraded. Environmental conditions and microbial competition will ultimately determine which processes will dominate. Vroblesky and Chapelle (1994) show that the dominant terminal electron accepting process can vary both temporally and spatially in an aquifer with fuel hydrocarbon contamination.

On the basis of available data, biodegradation of fuel hydrocarbons at Pumphouse 75 is occurring, and as discussed below, concentrations of methane and sulfate indicate that methanogenesis and sulfate reduction are the primary pathways for biodegradation. Concentrations of DO, nitrate, and ferrous iron also support the occurrence of biodegradation, but the trends are less apparent. Alkalinity data also support the occurrence of biodegradation. Geochemical parameters, and their relation to the distribution of dissolved BTEX in groundwater, are discussed in the following sections.

4.3.2.1 Dissolved Oxygen

DO concentrations were measured at monitoring wells and monitoring points in March 1995 (Table 4.6). Figure 4.4 is an isopleth map showing the distribution of DO concentrations in groundwater. The generally low DO concentrations both inside and outside of the contaminant plume indicate that the groundwater system is naturally low in DO, that DO is not an important electron acceptor at this site, and that the degradation mechanisms operating at the site are primarily anaerobic. Within the area

TABLE 4.5
COUPLED OXIDATION REACTIONS FOR BTEX COMPOUNDS
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Coupled Benzene Oxidation Reactions	$\Delta G°_r$ (kcal/mole Benzene)	$\Delta G°_r$ (kJ/mole Benzene)	Stoichiometric Mass Ratio of Electron Acceptor to Compound
$7.5O_2 + C_6H_6 \Rightarrow 6CO_{2,g} + 3H_2O$ *Benzene oxidation /aerobic respiration*	-765.34	-3202	3.07:1
$6NO_3^- + 6H^+ + C_6H_6 \Rightarrow 6CO_{2,g} + 6H_2O + 3N_{2,g}$ *Benzene oxidation / denitrification*	-775.75	-3245	4.77:1
$60H^+ + 30Fe(OH)_{3,s} + C_6H_6 \Rightarrow 6CO_2 + 30Fe^{2+} + 78H_2O$ *Benzene oxidation / iron reduction*	-560.10	-2343	21.5:1[a]
$7.5H^+ + 3.75SO_4^{2-} + C_6H_6 \Rightarrow 6CO_{2,g} + 3.75H_2S° + 3H_2O$ *Benzene oxidation / sulfate reduction*	-122.93	-514.3	4.61:1
$4.5H_2O + C_6H_6 \Rightarrow 2.25CO_{2,g} + 3.75CH_4$ *Benzene oxidation / methanogenesis*	-32.40	-135.6	0.77:1[b]

Coupled Toluene Oxidation Reactions	$\Delta G°_r$ (kcal/mole Toluene)	$\Delta G°_r$ (kJ/mole Toluene)	Stoichiometric Mass Ratio of Electron Acceptor to Compound
$9O_2 + C_6H_5CH_3 \Rightarrow 7CO_{2,g} + 4H_2O$ *Toluene oxidation /aerobic respiration*	-913.76	-3823	3.13:1
$7.2NO_3^- + 7.2H^+ + C_6H_5CH_3 \Rightarrow 7CO_{2,g} + 7.6H_2O + 3.6N_{2,g}$ *Toluene oxidation / denitrification*	-926.31	-3875	4.85:1
$72H^+ + 36Fe(OH)_{3,s} + C_6H_5CH_3 \Rightarrow 7CO_2 + 36Fe^{2+} + 94H_2O$ *Toluene oxidation / iron reduction*	-667.21	-2792	21.86:1[a]
$9H^+ + 4.5SO_4^{2-} + C_6H_5CH_3 \Rightarrow 7CO_{2,g} + 4.5H_2S° + 4H_2O$ *Toluene oxidation / sulfate reduction*	-142.86	-597.7	4.7:1
$5H_2O + C_6H_5CH_3 \Rightarrow 2.5CO_{2,g} + 4.5CH_4$ *Toluene oxidation / methanogenesis*	-34.08	-142.6	0.78:1[b]

TABLE 4.5 (Continued)
COUPLED OXIDATION REACTIONS FOR BTEX COMPOUNDS
PUMPHOUSE 75
Intrinsic Remediation TS
MacDill Air Force Base, Florida

Coupled Ethylbenzene Oxidation Reactions	$\Delta G°_r$ (kcal/mole Ethyl-benzene)	$\Delta G°_r$ (kJ/mole Ethyl-benzene)	Stoichiometric Mass Ratio of Electron Acceptor to Compound
$10.5O_2 + C_6H_5C_2H_5 \Rightarrow 8CO_{2(g)} + 5H_2O$ *Ethylbenzene oxidation /aerobic respiration*	-1066.13	-4461	3.17:1
$8.4NO_3^- + 8.4H^+ + C_6H_5C_2H_5 \Rightarrow 8CO_{2(g)} + 9.2H_2O + 4.2N_{2(g)}$ *Ethylbenzene oxidation / denitrification*	-1080.76	-4522	4.92:1
$84H^+ + 42Fe(OH)_{3(s)} + C_6H_5C_2H_5 \Rightarrow 8CO_2 + 42Fe^{2+} + 110H_2O$ *Ethylbenzene oxidation / iron reduction*	-778.48	-3257	22:1 [a]
$10.5H^+ + 5.25SO_4^{2-} + C_6H_5C_2H_5 \Rightarrow 8CO_{2(g)} + 5.25H_2S^\circ + 5H_2O$ *Eth* *Ethylbenzene oxidation / sulfate reduction*	-166.75	-697.7	4.75:1
$5.5H_2O + C_6H_5C_2H_5 \Rightarrow 2.75CO_{2(g)} + 5.25CH_4$ *Ethylbenzene oxidation / methanogenesis*	-39.83	-166.7	0.79:1 [b]

Coupled m-Xylene Oxidation Reactions	$\Delta G°_r$ (kcal/mole *m*-xylene)	$\Delta G°_r$ (kJ/mole *m*-xylene)	Stoichiometric Mass Ratio of Electron Acceptor to Compound
$10.5O_2 + C_6H_4(CH_3)_2 \Rightarrow 8CO_{2(g)} + 5H_2O$ *m-Xylene oxidation /aerobic respiration*	-1063.25	-4448	3.17:1
$8.4NO_3^- + 8.4H^+ + C_6H_4(CH_3)_2 \Rightarrow 8CO_{2(g)} + 9.2H_2O + 4.2N_{2(g)}$ *m-Xylene oxidation / denitrification*	-1077.81	-4509	4.92:1
$84H^+ + 42Fe(OH)_{3(s)} + C_6H_4(CH_3)_2 \Rightarrow 8CO_2 + 42Fe^{2+} + 110H_2O$ *m-Xylene oxidation / iron reduction*	-775.61	-3245	22:1 [a]
$10.5H^+ + 5.25SO_4^{2-} + C_6H_4(CH_3)_2 \Rightarrow 8CO_{2(g)} + 5.25H_2S^\circ + 5H_2O$ *m-Xylene oxidation / sulfate reduction*	-163.87	-685.6	4.75:1
$5.5H_2O + C_6H_4(CH_3)_2 \Rightarrow 2.75CO_{2(g)} + 5.25CH_4$ *m-Xylene oxidation / methanogenesis*	-36.95	-154.6	0.79:1 [b]

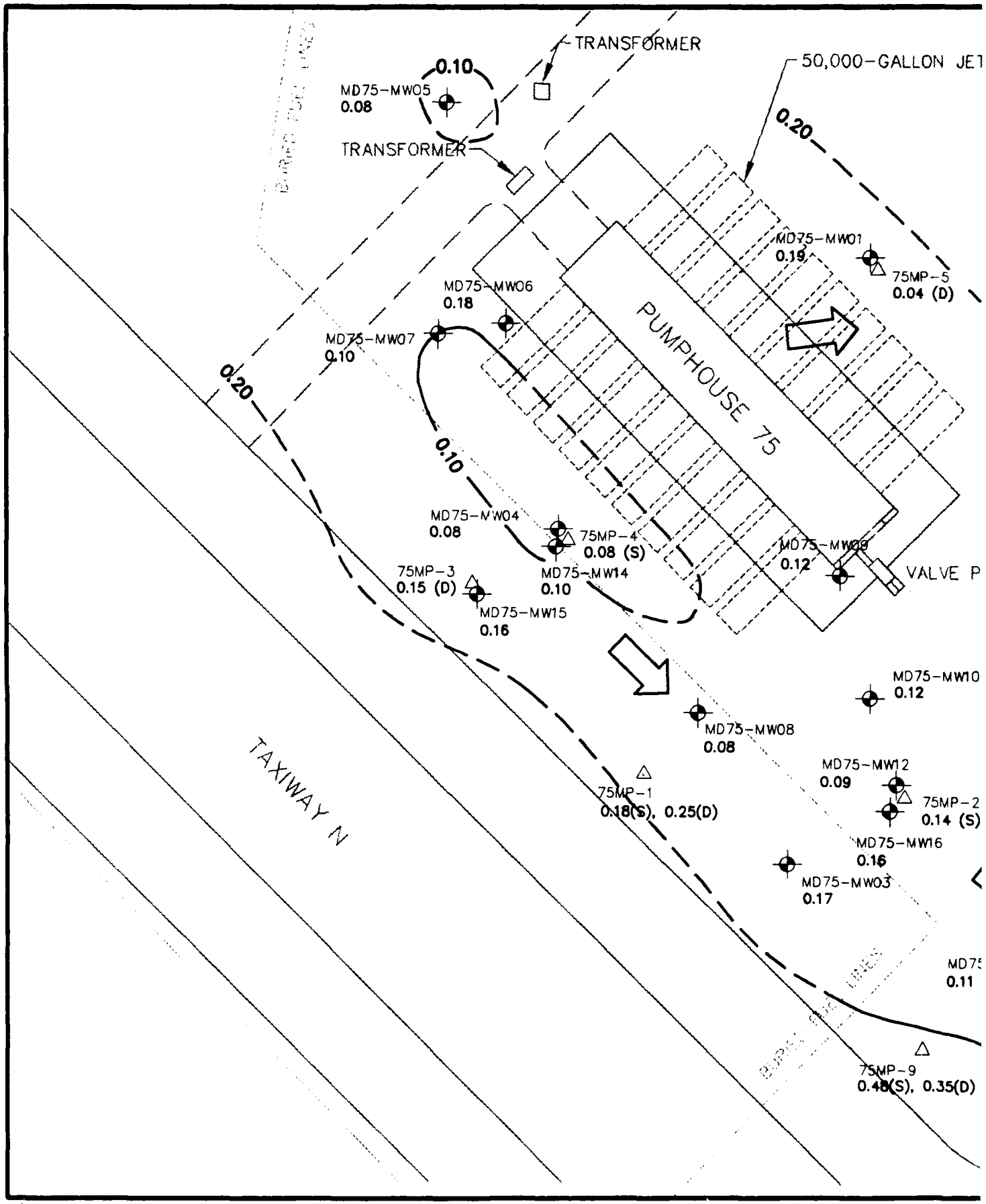
[a] Mass of ferrous iron produced during microbial respiration.

[b] Mass of methane produced during microbial respiration.

TABLE 4.6
1995 GROUNDWATER GEOCHEMICAL DATA
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Sample Location	Water Temp (°C)	pH	Conductivity (µs/cm)[a]	Dissolved Oxygen (mg/L)[b]	Redox Potential (mV)[c]	Total Alkalinity (mg/L)	Chloride (mg/L)	Ferrous Iron (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Total Iron (mg/L)	Sulfate (mg/L)	Manganese (mg/L)	Sulfide (mg/L)	Ammonia (mg/L)[e]	Carbon Dioxide (mg/L)	Methane (mg/L)
75MP-1S	22.8	7.69	270	0.18	21.4	110	13.4	0.09	ND	ND	0.12	35.8	ND[d]	0.047	NA[e]	NA	NA
75MP-1D	23.1	5.86	90	0.25	-29.2	15	9.75	1.82	ND	ND	1.85	15.1	0.1	1.77	1	<100	NA
75MP-2S	22.5	4.97	170	0.14	-75.9	70	13.4	1.65	0.06	ND	1.65	3.15	0.1	4.125	3	115	6.55
75MP-3D	24.6	4.74	50	0.15	-7.5	10	5.7	0.47	ND	ND	0.44	11.5	ND	0.443	0.2	<100	1.777
75MP-3D dup	24.6	4.74	50	0.15	-7.5	10	NA	0.93	NA	NA	0.97	NA	ND	0.5541[f]	0.21	<100	0.036
75MP-4S	23.4	5.15	550	0.08	-102.1	260	24.8	20.9	0.069	0.125	31.5	1.82	ND	0.303	7	225	14.469
75MP-5D	24.3	6.41	200	0.04	-103.2	100	10.3	2.98	ND	ND	3.01	7.41	ND	0.865	2	<100	7.361
75MP-6D	25.1	5.60	90	0.14	-56.0	35	12.2	2.54	ND	ND	2.52	2.16	ND	0.39	0.3	180	8.613
75MP-7S	23.7	6.74	430	0.14	-169.4	180	16	0.09	ND	ND	0.08	23.4	ND	3.02	1	<100	NA
75MP-7S dup	23.7	6.74	430	0.14	-169.4	200	NA	0.12	NA	NA	0.16	NA	ND	3.175	1	NA	NA
75MP-7D	24.8	6.45	220	0.23	-43.3	15	28.4	3.97	ND	ND	4.05	46.2	0.1	1.55	0.6	100	0.437
75MP-8S	24.3	7.20	360	0.18	-3.2	140	12.5	0.03	0.99	ND	0.09	28.4	0.1	0.045	ND	<100	0.042
75MP-8S dup	NA	NA	NA	NA	NA	NA	12.5	NA	0.973	ND	NA	28.5	NA	NA	NA	NA	0.041
75MP-8D	30.5	7.09	290	2.12	-83.2	160	12.6	5.9	0.06	ND	9.05	9.21	ND	0.182	0.6	<100	0.038
75MP-9S	24.9	7.68	370	0.48	-6.8	200	8.2	0.19	ND	ND	0.24	20.2	ND	0.3181	ND	<100	0.132
75MP-9S dup	24.9	7.68	370	0.48	-6.8	200	NA	0.15	NA	NA	0.15	NA	NA	0.248	ND	<100	NA
75MP-9D	26.7	5.60	70	0.35	-1.3	20	4.8	2.04	ND	ND	2.05	12.1	ND	0.298	0.3	<100	0.072
MD75-MW01	23.4	7.02	180	0.19	35.0	100	6.27	2.12	ND	ND	2.94	15.2	ND	0.034	0.1	<100	NA
MD75-MW02	23.8	6.63	220	0.10	-6.0	80	12.6	0.02	0.08	ND	0.08	25.8	ND	0.024	ND	<100	0.271
MD75-MW02 dup	23.8	6.63	220	0.10	-6.0	80	NA	0.03	NA	NA	0.06	NA	ND	0.012	ND	<100	NA
MD75-MW03	23.9	4.97	220	0.17	-18.4	70	10	0.03	ND	ND	0.14	22.8	ND	0.009	ND	NA	0.038
MD75-MW03 dup	23.9	4.97	220	0.17	-18.4	80	NA	0.03	NA	NA	0.11	NA	ND	0.019	ND	NA	NA
MD75-MW04	23.7	5.60	690	0.08	-71.2	380	16.8	5.25	0.082	ND	5.5	1.91	ND	0.074	8	162	1.89
MD75-MW04 dup	23.7	5.60	690	0.08	-71.2	380	16	4.95	0.061	ND	6	1.57	ND	0.029	8	NA	NA
MD75-MW05	23.7	6.90	340	0.08	-15.4	140	12.3	0.02	ND	ND	0.18	27.8	0.1	ND	ND	<100	0.035
MD75-MW06	23.4	6.57	310	0.18	8.2	120	7.37	0.03	0.162	ND	0.15	26.6	0.1	0.022	ND	NA	2.466
MD75-MW07	23.0	NA	520	0.10	-88.4	215	22.2	0.15	ND	ND	0.13	49.6	ND	0.387	0.4	<100	0.641
MD75-MW08	23.8	4.83	380	0.08	-95.7	200	14.4	0.77	0.07	ND	0.72	1.22	0.2	1.64	4	200	8.962
MD75-MW09	22.8	7.14	290	0.12	-120.8	160	8.21	2.11	0.069	ND	2.05	1.46	ND	0.705	4	<100	2.245
MD75-MW09 dup	22.8	7.14	290	0.12	-120.8	160	NA	2.07	NA	NA	2.06	NA	0.1	0.575	4	<100	NA
MD75-MW10	24.0	6.95	240	0.12	-88.4	120	9.01	0.47	ND	ND	0.43	10.3	0.1	0.446	1	<100	5.394
MD75-MW11	23.7	6.76	310	0.11	-73.9	60	20.8	0.73	ND	ND	0.79	65.8	ND	0.516	1	<100	0.986
MD75-MW12	22.8	4.61	130	0.09	-98.2	55	11	0.61	ND	ND	0.58	11.3	ND	0.266	3	100	7.31
MD75-MW13	24.4	7.29	410	0.11	-22.8	160	14.9	0.09	ND	ND	0.18	30.7	ND	0.033	ND	NA	1.227
MD75-MW14	24.9	5.05	540	0.10	-82.8	280	13.5	5.25	0.072	ND	5.65	1.92	ND	0.403	2	195	15.439
MD75-MW15	22.9	NA	330	0.16	-20.6	125	15.6	0.1	ND	ND	0.29	40.2	ND	0.02	0.1	<100	0.05
MD75-MW16	23.4	5.91	410	0.16	-9.9	240	9.54	8.4	ND	ND	9.95	1.23	0.1	0.175	1	132	6.039

a/ µs/cm = microsiemens per centimeter.
b/ mg/L = milligrams per liter.
c/ mV = millivolts.
d/ ND = compound not detected.
e/ NA = compound not analyzed for.
f/ I = potential turbidity interference.
Note: See Table 2.2 for analysis methods.



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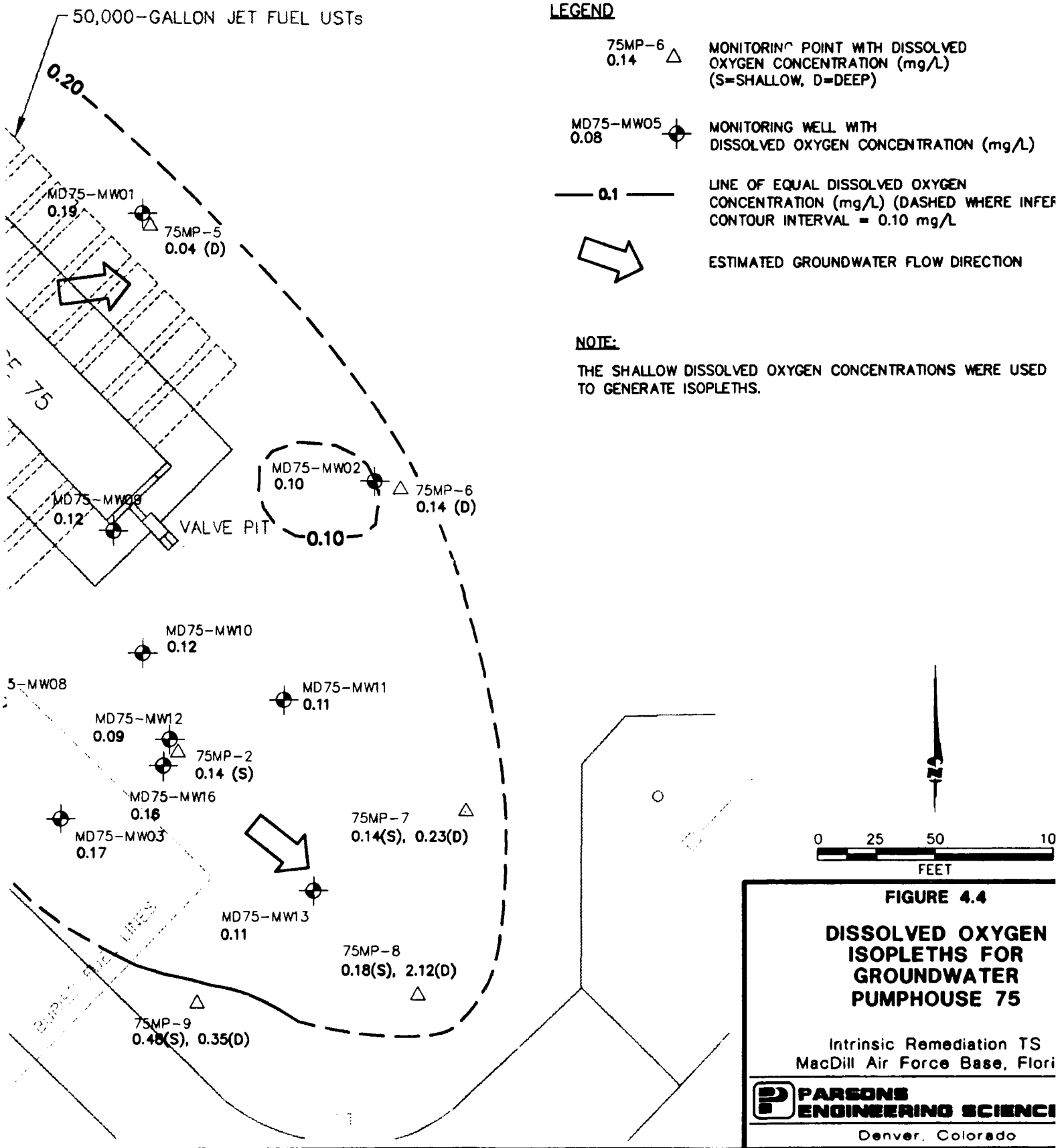


FIGURE 4.4

DISSOLVED OXYGEN ISOPLETHS FOR GROUNDWATER PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Flori

PARSONS ENGINEERING SCIENCE
Denver, Colorado

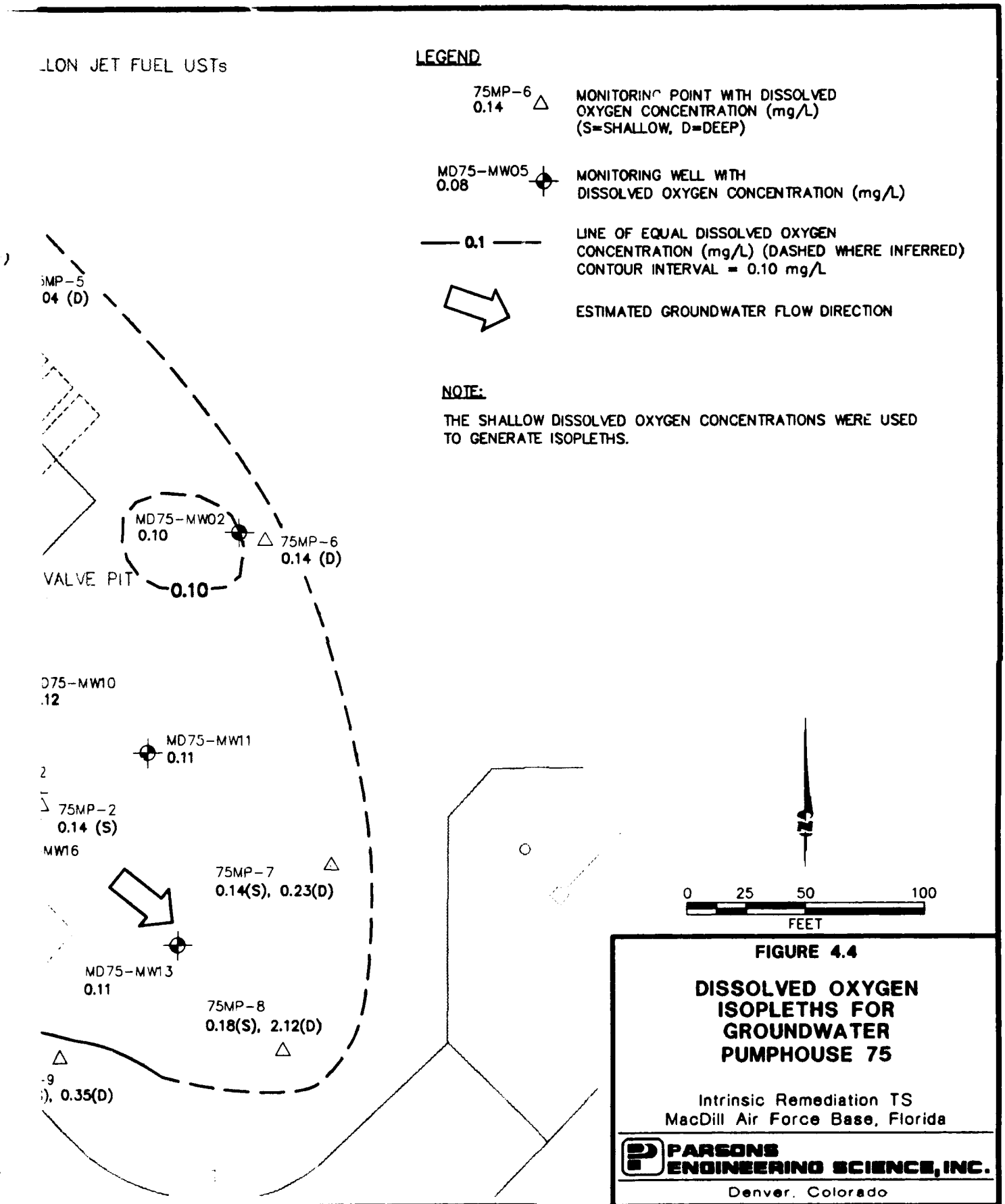


FIGURE 4.4

DISSOLVED OXYGEN ISOPLETHS FOR GROUNDWATER PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

characterized by substantially elevated BTEX concentrations (greater than 100 µg/L), DO concentrations are generally below 0.2 mg/L, and are as low as 0.08 mg/L (at 75MP-4S, MD75-MW04, MD75-MW05, and MD75-MW08). DO levels measured outside or on the margin of the plume range from 0.04 mg/L to 2.12 mg/L. The data do not clearly indicate the magnitude of background DO concentrations; therefore, the assimilative capacity calculations contained in the following paragraphs are speculative. In the two monitoring well/point clusters (MP-4S/MW04/MW14 and MP-2S/MW12/MW16), the DO values are generally similar at all depths. Therefore, this parameter does not shed any light on the validity of the BTEX detections in the deep wells.

The stoichiometry of BTEX mineralization to carbon dioxide and water caused by aerobic microbial biodegradation is presented in Table 4.5. The average mass ratio of oxygen to total BTEX is approximately 3.14 to 1. This translates to the mineralization of approximately 0.32 mg of BTEX for every 1.0 mg of DO consumed. With a maximum observed shallow groundwater DO concentration of approximately 0.48 mg/L, and a minimum observed DO concentration within the plume of 0.08 mg/L, the shallow groundwater at this site may have the capacity to assimilate a maximum of 0.13 mg/L (130 µg/L) of total BTEX through aerobic biodegradation. This may be a conservative estimate of the assimilative capacity of DO because microbial cell mass production was not taken into account by the stoichiometry presented in Table 4.5.

When cell mass production is accounted for, the mineralization of benzene to carbon dioxide and water is given by:

$$C_6H_6 + 2.5O_2 + HCO_3 + NH_4 \rightarrow C_5H_7O_2N + 2CO_2 + 2H_2O$$

This equation indicates that 5.0 fewer moles of DO are required to mineralize 1 mole of benzene when cell mass production is taken into account. On a mass basis, the ratio of DO to benzene is given by:

Benzene	6(12) + 6(1) = 78 gm
Oxygen	2.5(32)= 80 gm

Mass Ratio of Oxygen to Benzene = 80/78 = 1.03:1

On the basis of these stoichiometric relationships, 1.03 mg of oxygen is required to mineralize 1 mg of benzene. Similar calculations can be made for toluene, ethylbenzene, and the xylenes. Based on these calculations, approximately 0.97 mg of BTEX is mineralized to carbon dioxide and water for every 1.0 mg of DO consumed. With a maximum background DO concentration of approximately 0.48 mg/L and a minimum DO concentration within the plume of 0.08 mg/L, the shallow groundwater at this site may have the capacity to assimilate up to 0.39 mg/L (390 µg/L) of total BTEX if microbial cell mass production is taken into account.

4.3.2.2 Nitrate/Nitrite

Concentrations of nitrate and nitrite were measured at groundwater monitoring wells and monitoring points in March 1995 (Table 4.6). Nitrite was detected only in the

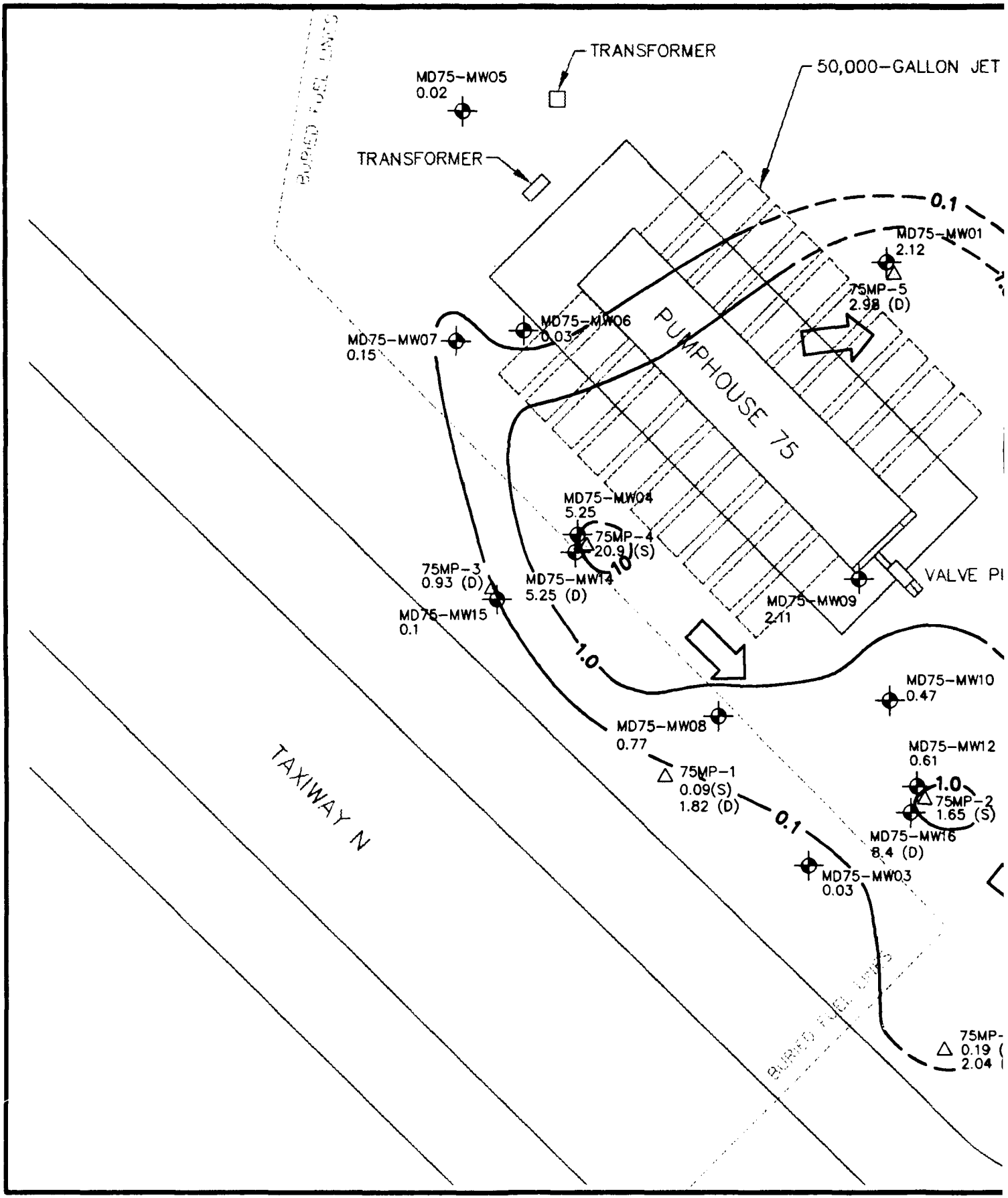
sample from monitoring point 75MP-4S, while nitrate was detected in 12 samples from 10 wells at concentrations ranging from 0.06 mg/L to 0.99 mg/L (Table 4.6). Nitrate concentrations in areas characterized by the presence of elevated BTEX concentrations were less than 0.1 mg/L. The highest concentration of nitrate was detected in monitoring point 75MP-8S, which had no detectable BTEX concentration. However, nitrate concentrations do not appear to be significantly depleted in areas containing elevated dissolved BTEX concentrations, as evidenced by the lack of nitrate detections in more outlying areas. Conversely, the majority of nitrate detections were located within the BTEX plume area. Therefore, the nitrate data suggest that denitrification is not a significant process contributing to BTEX biodegradation at this site.

The stoichiometry of BTEX mineralization to carbon dioxide, water, and nitrogen caused by denitrification (in the absence of microbial cell production) is presented in Table 4.5. The average mass ratio of nitrate to total BTEX is approximately 4.9 to 1. This translates to the mineralization of approximately 0.20 mg of BTEX for every 1.0 mg of nitrate consumed. With a maximum observed nitrate concentration of 0.99 mg/L, the shallow groundwater at this site may have the capacity to assimilate 0.20 mg/L (200 µg/L) of total BTEX during denitrification. This may be a conservative estimate of the assimilative capacity of nitrate because microbial cell mass production has not been taken into account by the stoichiometry shown above. However, the lack of clear correspondence between depleted nitrate concentrations and elevated BTEX concentrations suggest that denitrification is not a primary biodegradation mechanism at this site.

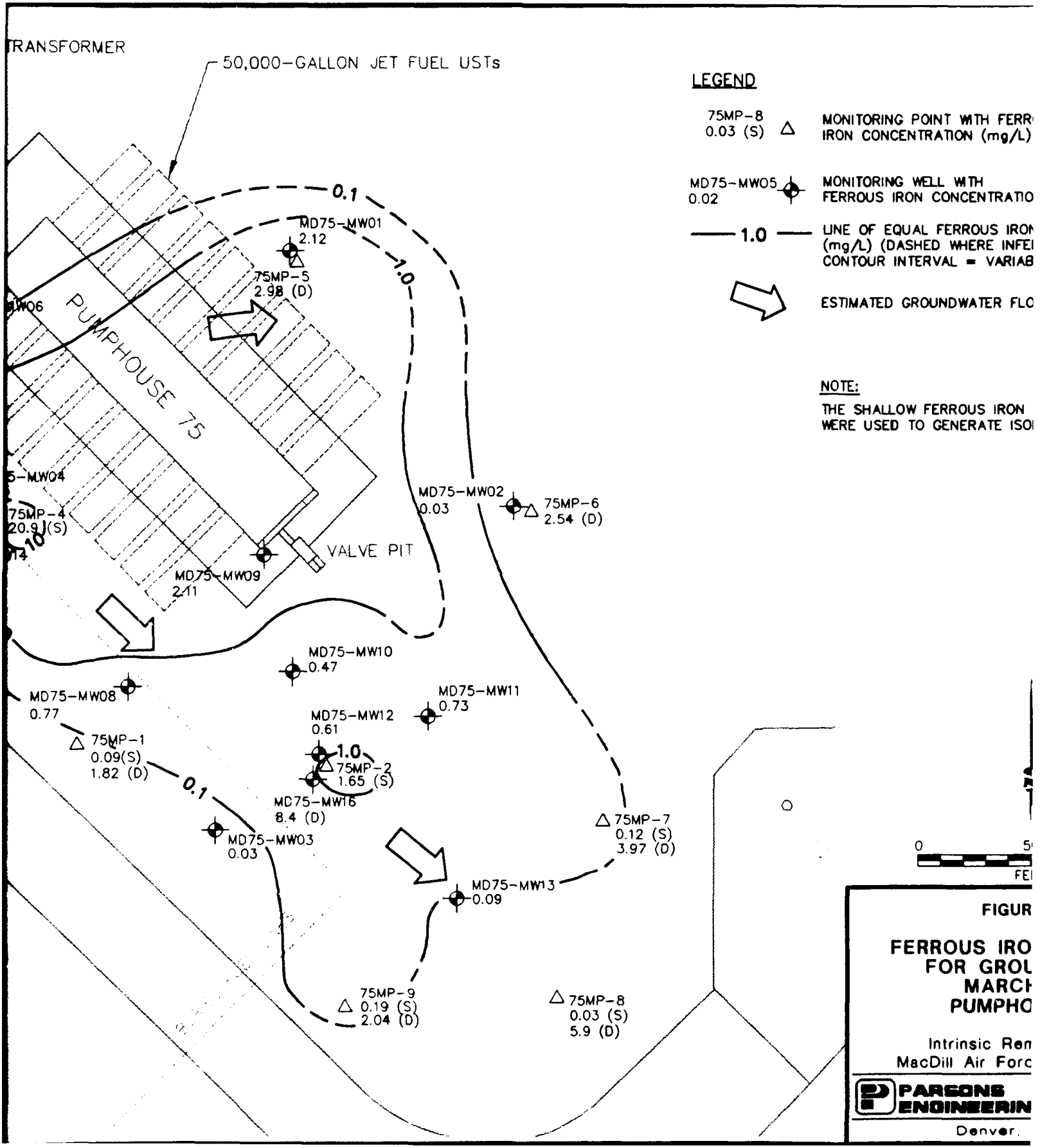
4.3.2.3 Ferrous Iron

Figure 4.5 is an isopleth map showing the distribution of ferrous iron in groundwater in the upper portion of the saturated zone, and Table 4.6 summarizes ferrous iron concentrations. Comparison of Figure 4.3 and 4.5 indicates that ferrous iron is being produced in the area of the BTEX plume via the reduction of ferric iron during anaerobic biodegradation of BTEX compounds. Ferrous iron concentrations detected within the area bounded by the 100-µg/L BTEX isopleth (Figure 4.3) range from 0.61 mg/L at monitoring well MD75-MW12 to 20.9 mg/L at monitoring point 75MP-4S. Background levels of ferrous iron, measured in shallow wells that are hydraulically upgradient or cross-gradient from the BTEX plume, ranged from 0.02 mg/L at MD75-MW05 to 0.15 mg/L at MD75-MW07. In well cluster MP-4S/MW04/MW14, the highest ferrous iron concentration was detected in MP-4S, which is screened in the top 5 feet of the saturated zone. Conversely, the deep well at cluster MP-2S/MW12/MW16 had the highest ferrous iron concentration. In the remaining well clusters, the deeper sample had the highest ferrous iron concentration, even where the shallow sample contained the highest BTEX concentration. Therefore, the measured concentrations of this parameter do not provide a consistent indication of the co-occurrence of iron reduction and BTEX contamination with depth in the shallow aquifer.

The stoichiometry of BTEX oxidation to carbon dioxide, ferrous iron, and water by iron reduction through anaerobic microbial biodegradation is presented in Table 4.5. On average, 37.5 moles of ferric iron hydroxide are required to metabolize one mole of total BTEX. Conversely, an average of 37.5 moles of ferrous iron are produced for



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TRANSFORMER
50,000-GALLON JET FUEL USTs
LEGEND
75MP-8
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MONITORING POINT WITH FERR
IRON CONCENTRATION (mg/L)
MD75-MW05
0.02
MONITORING WELL WITH
FERROUS IRON CONCENTRATIO
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LINE OF EQUAL FERROUS IRON
(mg/L) (DASHED WHERE INFEI
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ESTIMATED GROUNDWATER FLO
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WERE USED TO GENERATE ISO
PUMPHOUSE 75
VALVE PIT
0.1
1.0
MD75-MW01
2.12
75MP-5
2.98 (D)
MD75-MW02
0.03
75MP-6
2.54 (D)
75MP-4
20.9 (S)
MD75-MW09
2.11
MD75-MW10
0.47
MD75-MW08
0.77
MD75-MW11
0.73
MD75-MW12
0.61
75MP-1
0.09(S)
1.82 (D)
75MP-2
1.65 (S)
MD75-MW16
8.4 (D)
MD75-MW03
0.03
75MP-7
0.12 (S)
3.97 (D)
MD75-MW13
0.09
75MP-9
0.19 (S)
2.04 (D)
75MP-8
0.03 (S)
5.9 (D)
FIGUR
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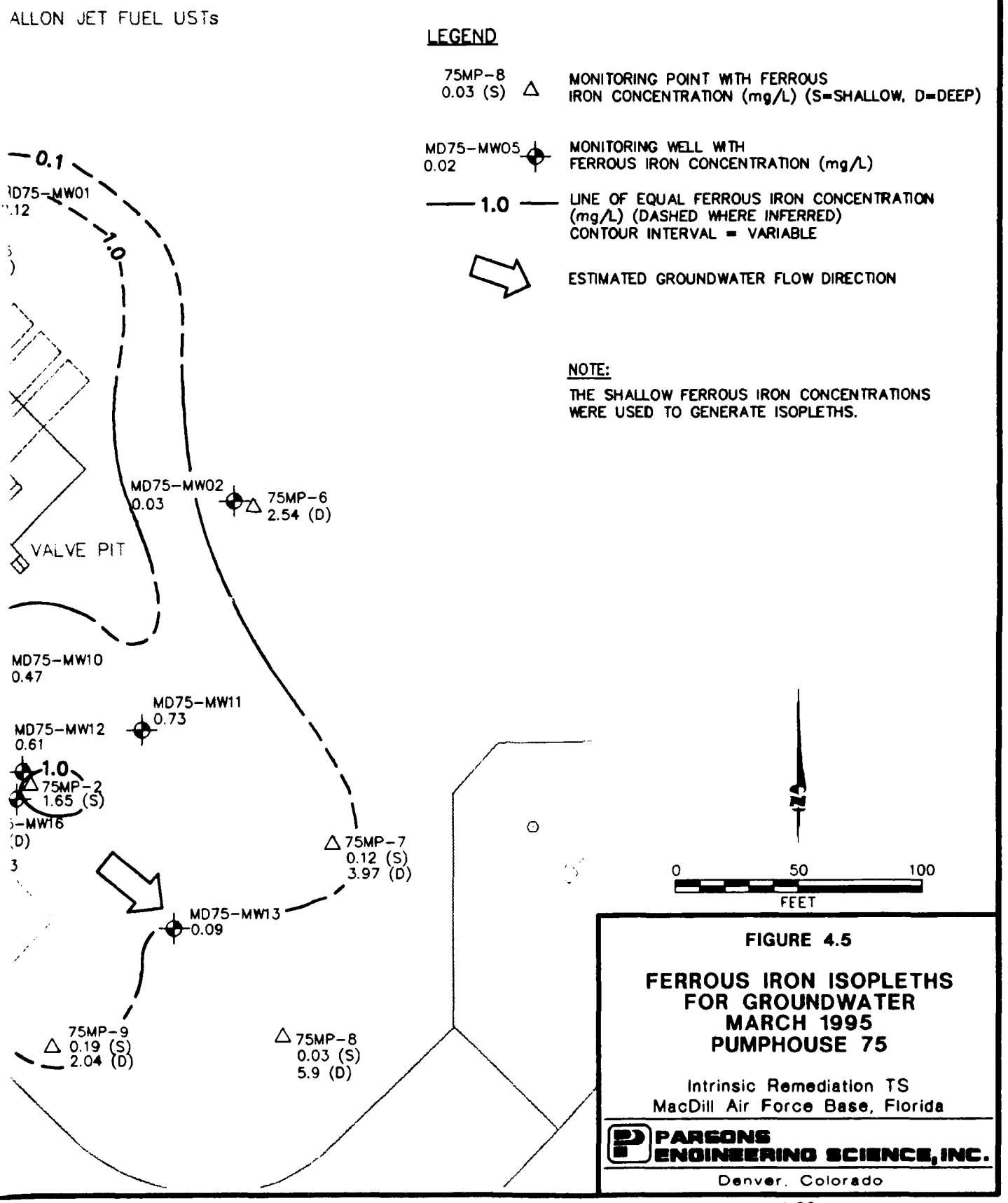


FIGURE 4.5

FERROUS IRON ISOPLETHS FOR GROUNDWATER MARCH 1995 PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

each mole of total BTEX consumed. On a mass basis, this translates to approximately 21.8 mg ferrous iron produced for each 1 mg of total BTEX metabolized.

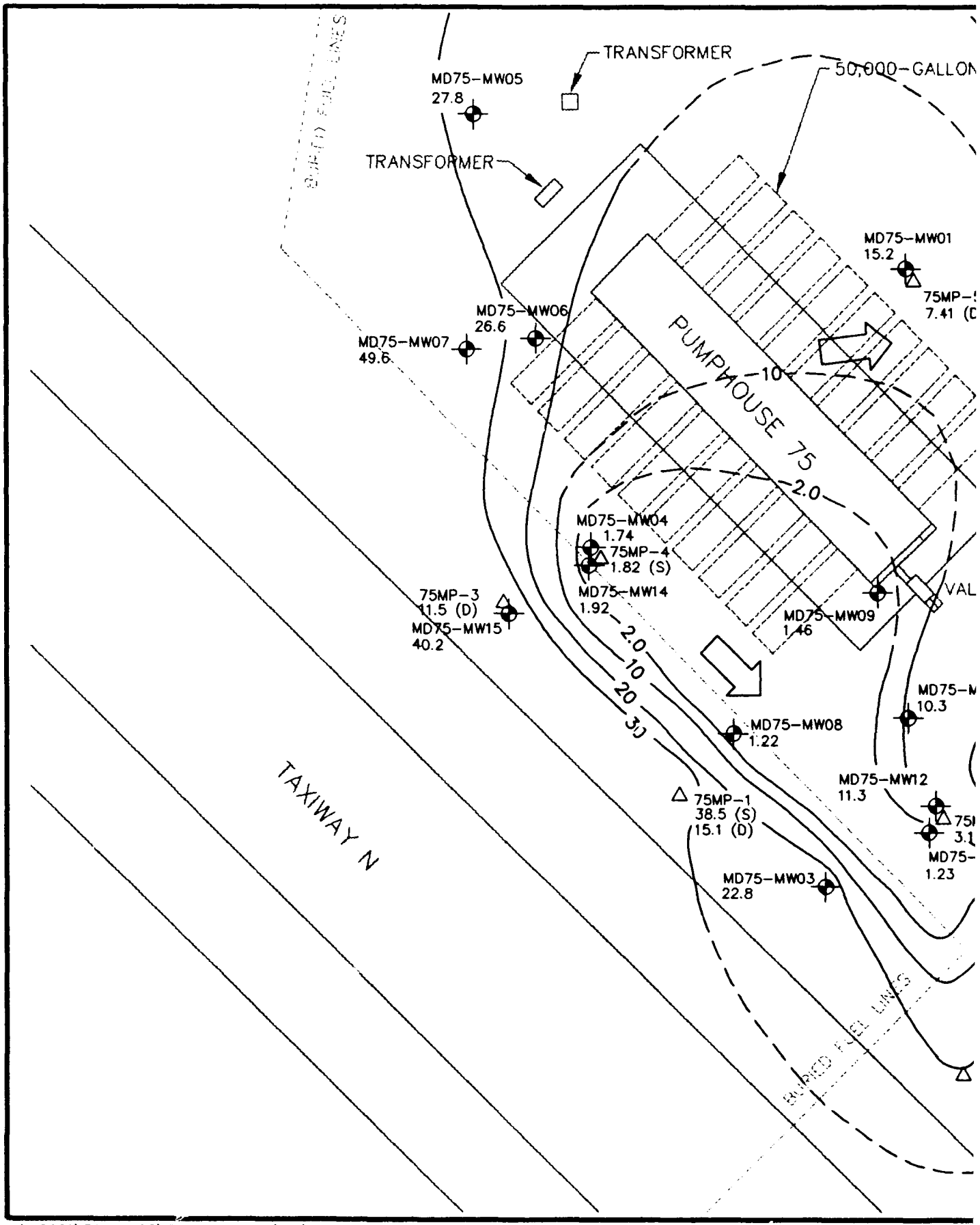
The highest measured Fe^{2+} concentration was 20.9 mg/L, measured at monitoring point 75MP-4S. Assuming an average background ferrous iron concentration of 0.1 mg/L, this suggests that the shallow groundwater at this site has the capacity to assimilate 0.95 mg/L (950 µg/L) of total BTEX during iron reduction. This may be a conservative estimate of the assimilative capacity of iron because microbial cell mass production has not been taken into account by the stoichiometry shown in Table 4.5. In addition, this calculation is based on observed ferrous iron concentrations and not on the amount of ferric hydroxide available in the aquifer. Therefore, iron assimilative capacity could be much higher.

Recent evidence suggests that the reduction of ferric iron to ferrous iron cannot proceed at all without microbial mediation (Lovley and Phillips, 1988; Lovley *et al.*, 1991; Chapelle, 1993). None of the common organic compounds found in low-temperature, neutral, reducing groundwater could reduce ferric oxyhydroxides to ferrous iron under sterile laboratory conditions (Lovley *et al.*, 1991). This means that the reduction of ferric iron requires microbial mediation by microorganisms with the appropriate enzymatic capabilities. Because the reduction of ferric iron cannot proceed without microbial intervention, the elevated concentrations of ferrous iron that were measured in the contaminated groundwater at the site are very strong indicators of microbial activity.

4.3.2.4 Sulfate

Sulfate concentrations in shallow groundwater at the site ranged from 1.22 mg/L to 65.8 mg/L. Figure 4.6 is an isopleth map showing the distribution of sulfate in shallow groundwater in March 1995. Comparison of Figures 4.3 and 4.6 shows graphically that areas with elevated total BTEX concentrations have depleted sulfate concentrations. This is a strong indication that anaerobic biodegradation of BTEX compounds is occurring at the site through the microbially mediated process of sulfate reduction. In well cluster MP-4S/MW04/MW14, sulfate concentrations are consistently low at all depth intervals. At cluster MP-2S/MW12/MW16 however, sulfate concentrations are lowest (and BTEX concentrations are highest) in the deepest well, indicating that sulfate reduction is most prevalent deeper in the aquifer at this location. At most of the remaining monitoring well/point clusters, sulfate concentrations were lowest in the deeper interval, regardless of the distribution of dissolved BTEX concentrations. At 75MP-7S/7D however, sulfate concentrations were most elevated in the deep sample.

The stoichiometry of BTEX mineralization to carbon dioxide, sulfur, and water by sulfate reduction through anaerobic microbial biodegradation is presented in Table 4.5. The average mass ratio of sulfate to total BTEX is approximately 4.7 to 1. This translates to the mineralization of approximately 0.21 mg of total BTEX for every 1.0 mg of sulfate consumed.



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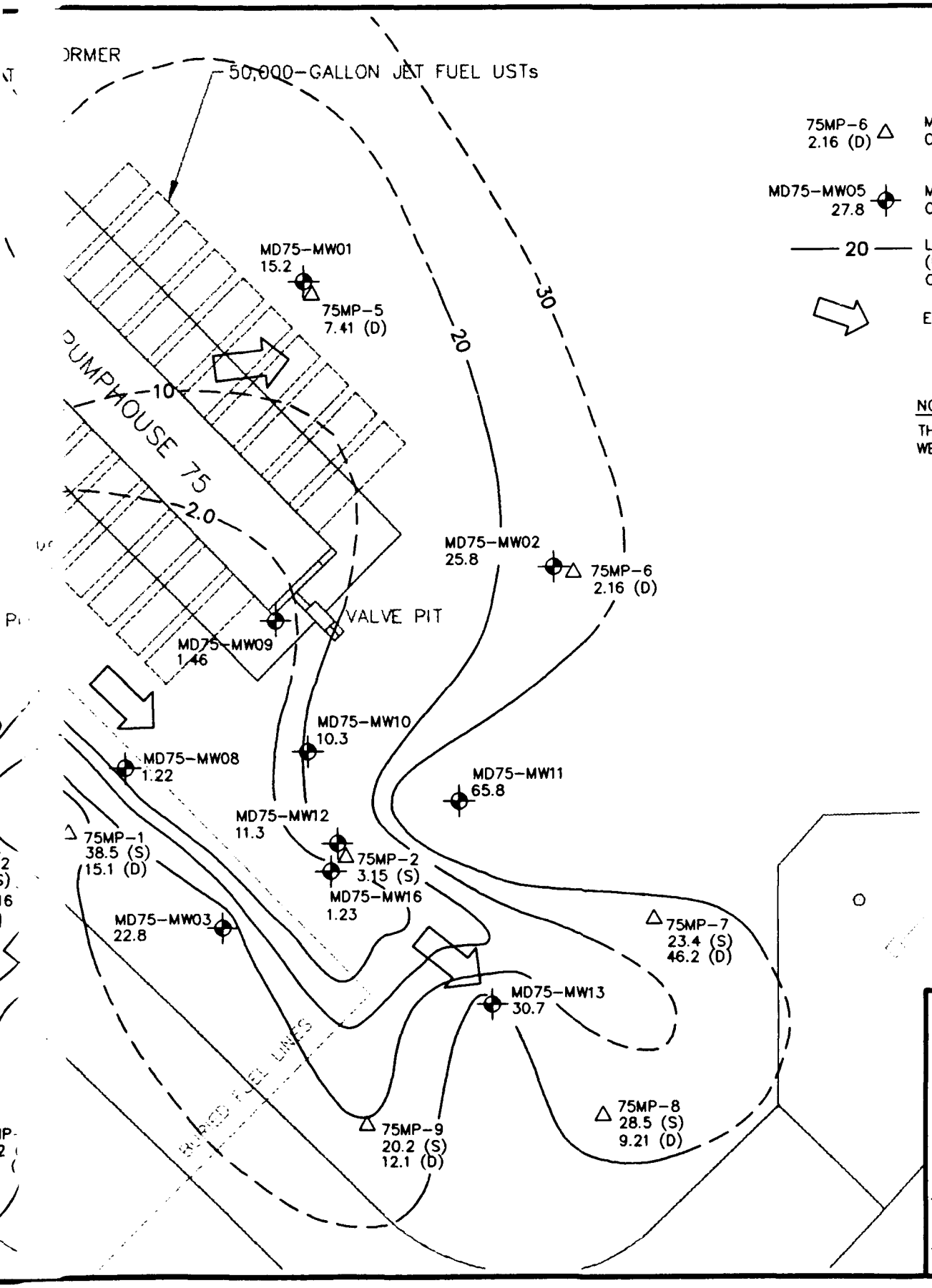


FIGURE 4

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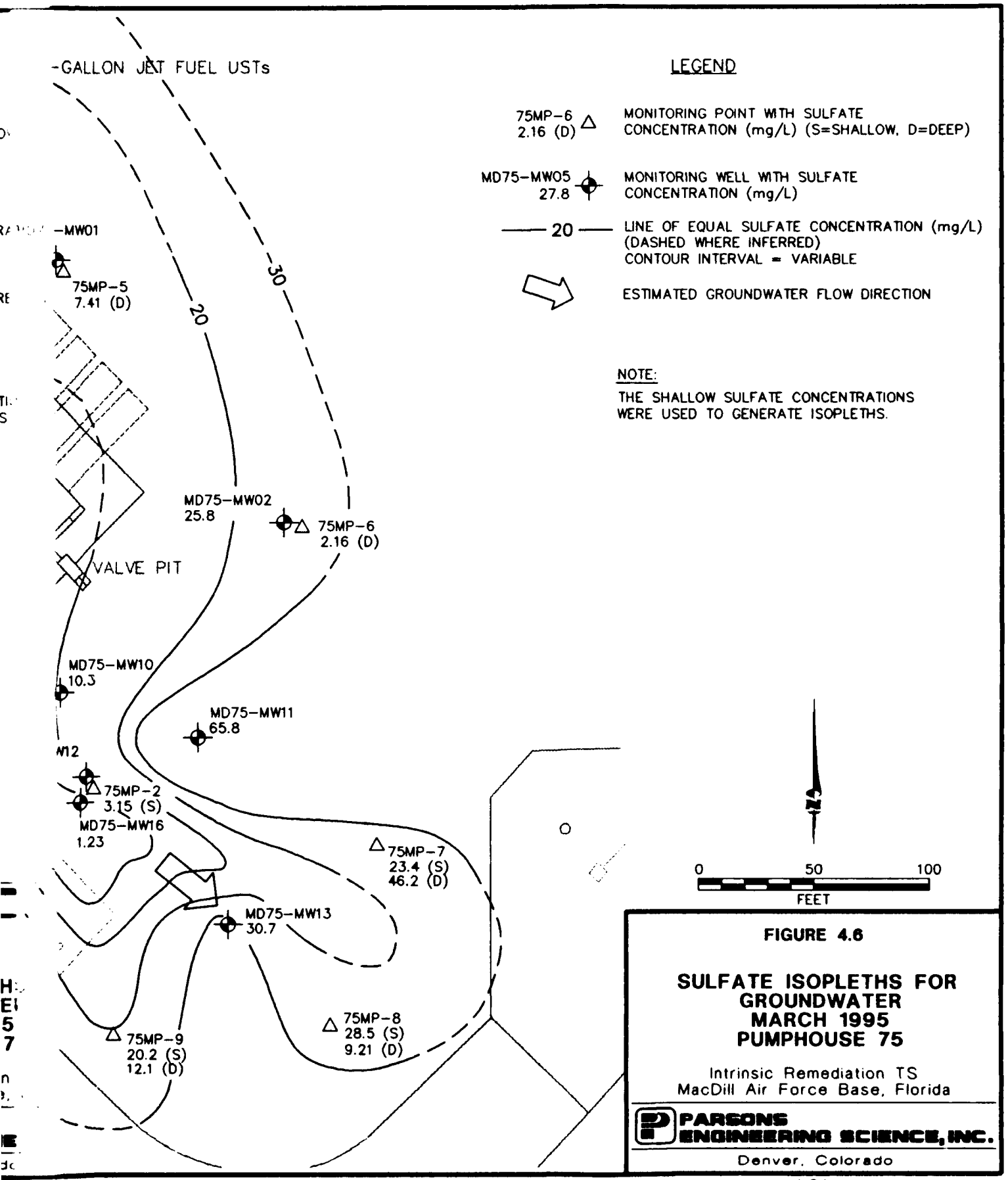


FIGURE 4.6

SULFATE ISOPLETHS FOR GROUNDWATER MARCH 1995 PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

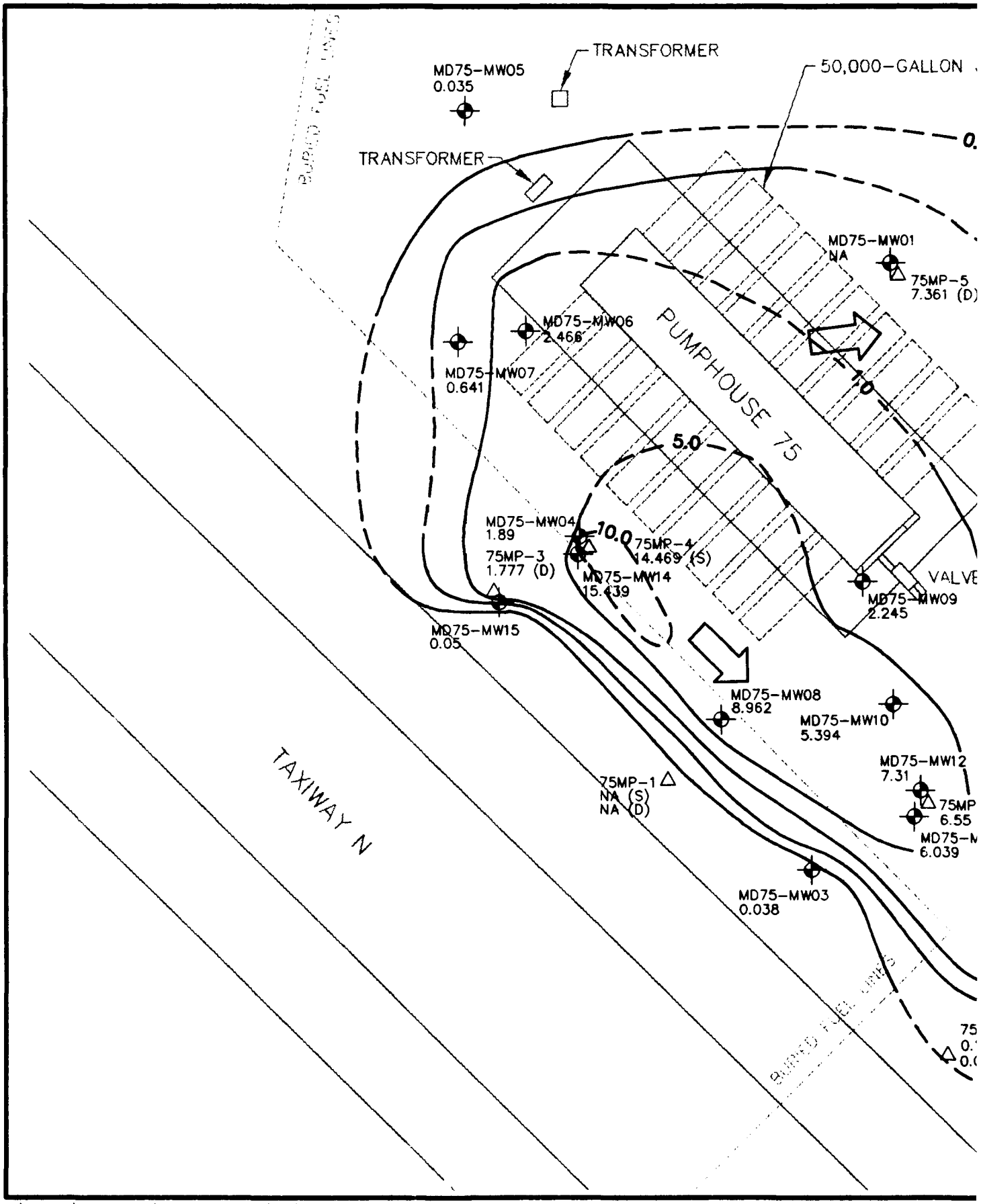
Shallow sulfate concentrations at five background locations upgradient or crossgradient from the BTEX plume ranged from 22.8 mg/L to 65.8 mg/L and averaged 33.4 mg/L (at MD75-MW05, MD75-MW07, MD75-MW06, MD75-MW15, and MD75-MW03). Assuming a conservative average background sulfate concentration of 25 mg/L, the shallow groundwater at this site has the capacity to assimilate approximately 5.25 mg/L (5,250 µg/L) of total BTEX during sulfate reduction. This may be a conservative estimate of the assimilative capacity of sulfate in the groundwater because microbial cell mass production has not been taken into account by the stoichiometry presented in Table 4.5.

4.3.2.5 Methane

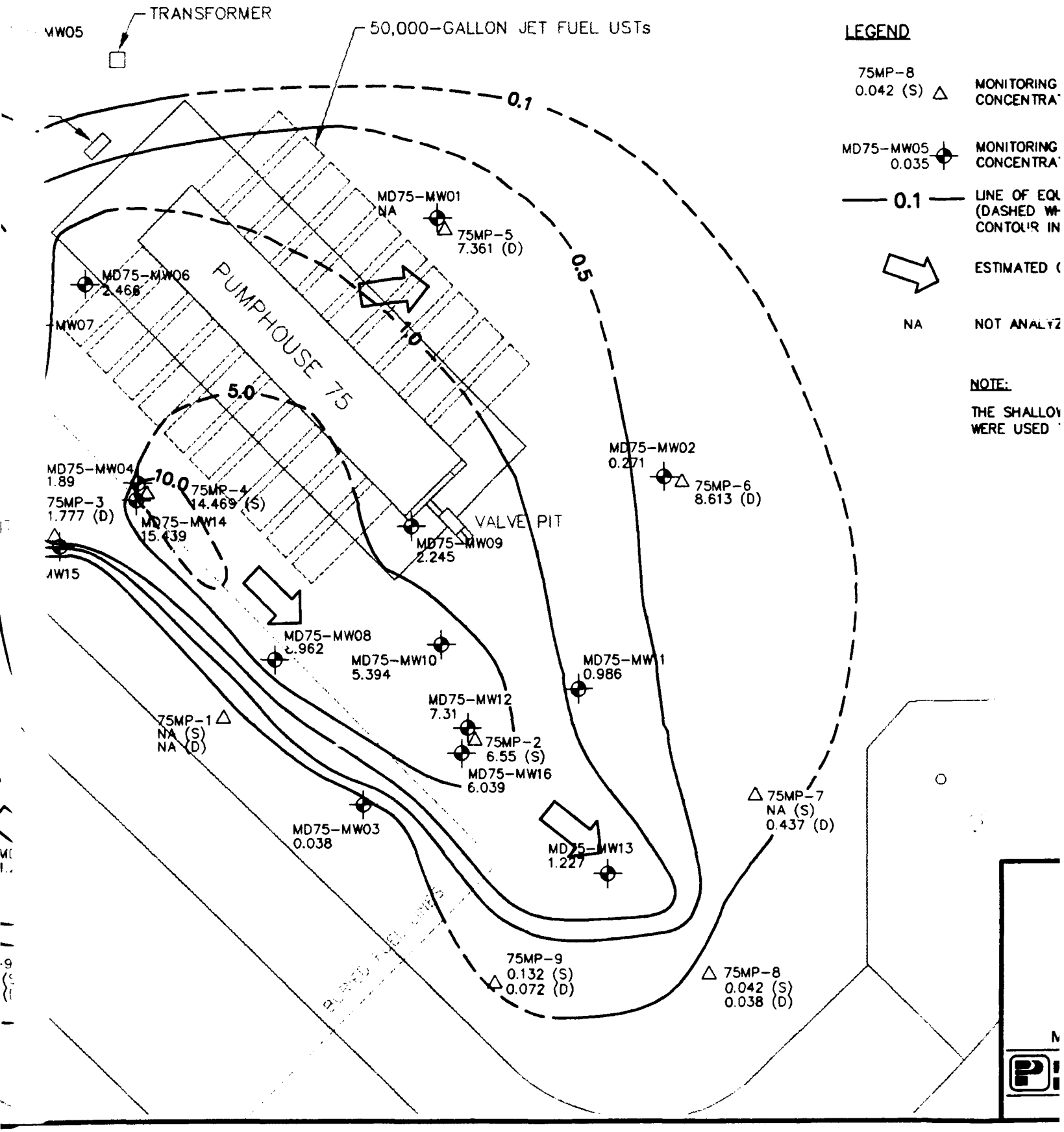
Figure 4.7 is an isopleth map showing the distribution of methane in groundwater in the shallow aquifer. Comparison of Figures 4.3 and 4.7 shows graphically that areas with elevated total BTEX concentrations correlate with elevated methane concentrations. This is a strong indication that anaerobic biodegradation of the BTEX compounds by methanogenesis is occurring at the site.

Methane concentrations detected in shallow groundwater ranged from 0.035 mg/L to 14.47 mg/L. The average background groundwater methane concentration in wells MD75-MW05, MD75-MW15, MD75-MW03, and monitoring point 75MP-8 is 0.04 mg/L. Samples collected from monitoring wells and monitoring points located near the areas with the highest BTEX concentrations contain the highest methane concentrations. At five shallow wells (MD75-MW04, 75MP-4S, MD75-MW08, MD75-MW12, and 75MP-2S) located within the 100-µg/L BTEX isopleth (Figure 4.3), methane concentrations range from 1.89 to 14.5 mg/L. The highest detected methane concentration of 15.4 mg/L occurred in the sample from deep well MW14. The concentration in the paired shallow well (MW04) and monitoring point (MP-4S) were 1.89 and 14.5 mg/L, respectively. At the other well cluster (MP-2S/MW12/MW16), methane concentrations were very similar at all depth intervals. At the remaining monitoring well/point clusters for which methane data are available, the deep sample exhibited the highest methane concentration at clusters MW02/MP-6D and MW15/MP-3D, and the methane concentrations in the shallow and deep samples were similar at MP-9S/9D and MP-8S/8D. Therefore, analysis results for this parameter do not provide a consistent indication of the validity of the BTEX detections in the deeper portions of the shallow aquifer.

The stoichiometry of BTEX oxidation to carbon dioxide and methane by methanogenesis is presented in Table 4.5. On average, approximately 1 mg of total BTEX is degraded for every 0.78 mg of methane produced. Given a maximum detected shallow methane concentration of 14.5 mg/L and an assumed background concentration of 0.04 mg/L, the shallow groundwater has the capacity to assimilate approximately 18.5 mg/L (18,500 µg/L) of total BTEX through methanogenesis. This may be a conservative estimate of the assimilative capacity due to methanogenesis because these calculations are based on observed methane concentrations and not on the amount of carbon dioxide available in the aquifer, and microbial cell mass production was not taken into account by the stoichiometry shown in Table 4.5. Because methanogenesis produces more carbon dioxide than it consumes, an unlimited supply of carbon dioxide is theoretically available once the process of methanogenesis has been initiated. Therefore, methanogenic assimilative capacity could be much higher.



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MW05
TRANSFORMER
50,000-GALLON JET FUEL USTs
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MONITORING
CONCENTRA
MD75-MW05
0.035
MONITORING
CONCENTRA
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LINE OF EQU
(DASHED WH
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NOTE:
THE SHALLOW
WERE USED
0.1
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PUMPHOUSE 75
VALVE PIT
MD75-MW01
NA
75MP-5
7.361 (D)
MD75-MW06
2.468
MW07
MD75-MW04
1.89
75MP-3
1.777 (D)
75MP-4
14.469 (S)
MD75-MW14
15.439
MW15
MD75-MW09
2.245
MD75-MW02
0.271
75MP-6
8.613 (D)
MD75-MW08
.962
MD75-MW10
5.394
MD75-MW11
0.986
MD75-MW12
7.31
75MP-2
6.55 (S)
MD75-MW16
6.039
75MP-1
NA (S)
NA (D)
MD75-MW03
0.038
MD75-MW13
1.227
75MP-7
NA (S)
0.437 (D)
75MP-9
0.132 (S)
0.072 (D)
75MP-8
0.042 (S)
0.038 (D)

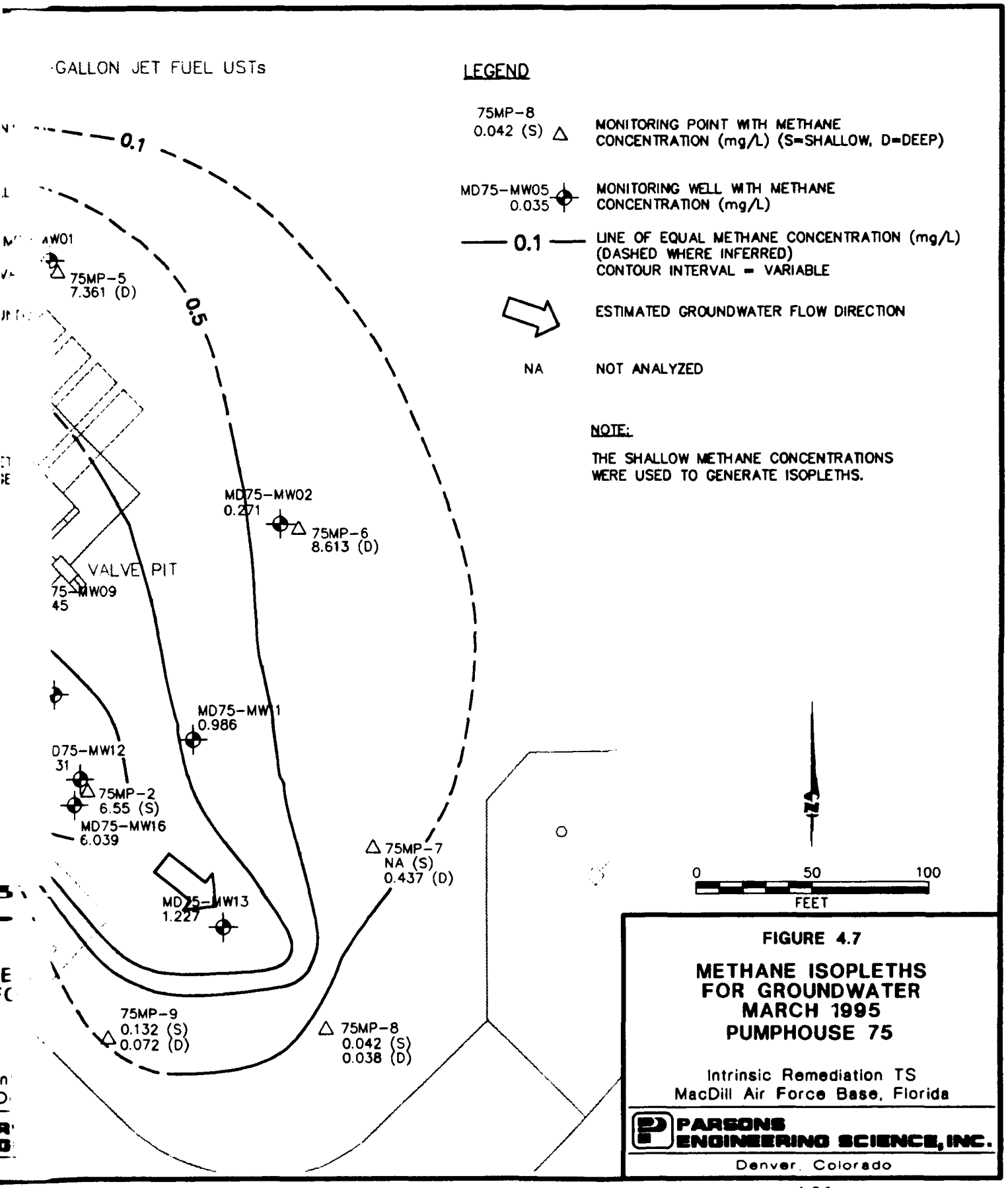


FIGURE 4.7

METHANE ISOPLETHS FOR GROUNDWATER MARCH 1995 PUMPHOUSE 75

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4.3.2.6 Reduction/Oxidation Potential

Redox potentials were measured at groundwater monitoring wells/points in March 1995 (Table 4.6). Redox potential is a measure of the relative tendency of a solution to accept or transfer electrons. The redox potential of a groundwater system depends on which electron acceptors are being reduced by microbes during BTEX oxidation. The redox potential at the site in March 1995 ranged from -169.4 millivolts (mV) at monitoring point 75MP-7S to 35 mV at well MD75-MW01. The preponderance of low measurements indicates that the groundwater in the shallow aquifer is generally reducing. This is consistent with the electron acceptor data, which indicate that the groundwater system beneath the study site has moved through the progression of redox reactions indicated on Table 4.5 and discussed in Section 4.3.2. As expected, there is a general tendency for the lowest redox potentials to occur within and along the flowpath of the BTEX plume (Figure 4.8).

At monitoring well/point cluster MP-4S/MW04/MW14, redox potentials are relatively similar at all of the sampled depth intervals, although the lowest redox potential was measured in the shallowest interval (75MP-4S). At well/point cluster MP-2S/MW12/MW16, redox potentials increase with depth, suggesting that dissolved BTEX contamination is more prevalent in the shallower intervals. Redox potentials were lowest in the shallow interval at three of the remaining seven well/point clusters (MW15/MP-3D, MP-9S/9D, and MP-7S/7D), while the reverse was true at the remaining four clusters (MW01/MP-5D, MW02/MP-6D, MP-8S/8D, and MP-1S/1D).

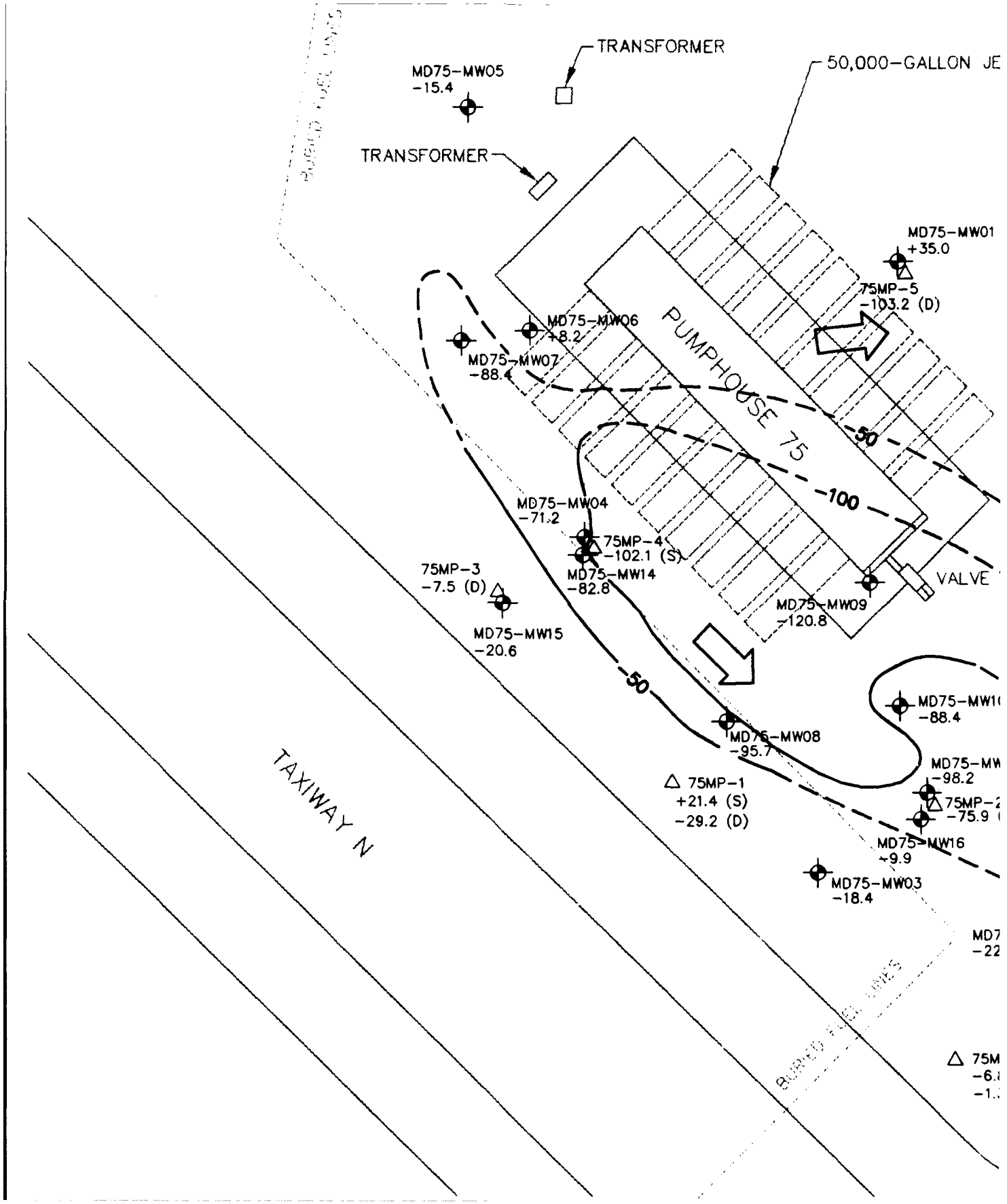
The redox potentials measured at the site are higher than the theoretical ranges of redox potentials that are favorable for sulfate reduction and methanogenesis. This discrepancy is a common problem associated with measuring oxidizing potential using field instruments. It is likely that the platinum electrode probes are not sensitive to some of the redox couples (e.g., sulfate/sulfide). Many authors have noted that field measured redox data alone cannot be used to reliably predict the electron acceptors that may be operating at a site (e.g., Stumm and Morgan, 1981; Godsey, 1994; Lovley *et al.*, 1994).

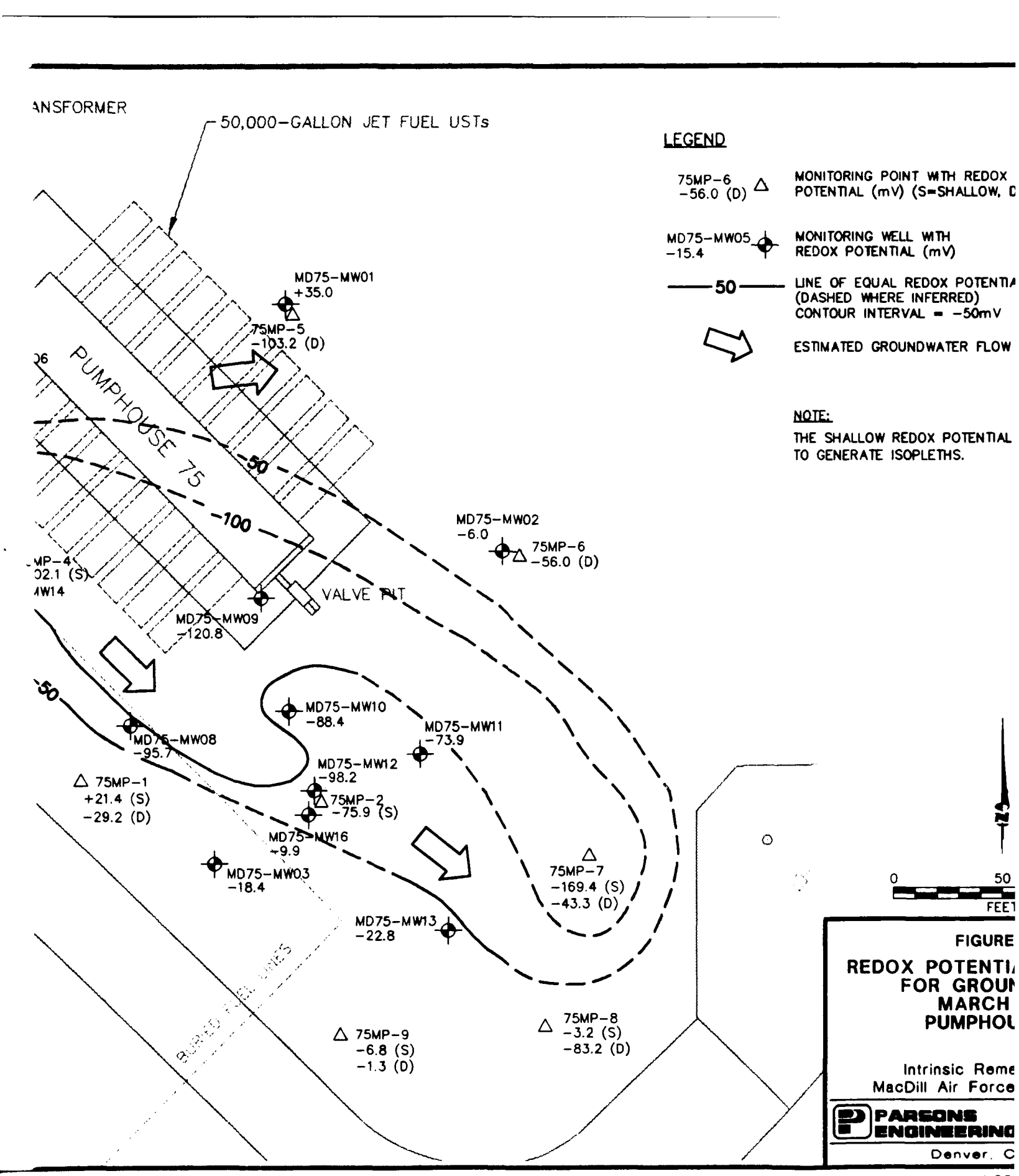
4.3.2.7 Alkalinity

Total alkalinity (as calcium carbonate) was measured at groundwater monitoring wells/points in March 1995 (Table 4.6). Alkalinity is a measure of the ability of water to buffer changes in pH caused by the addition of biologically generated acids. In general, as the amount of total dissolved BTEX that is being oxidized increases, the total alkalinity increases. This is expected because the microbially mediated reactions causing biodegradation of fuel hydrocarbons produce carbon dioxide. Changes in alkalinity are most pronounced during aerobic respiration, denitrification, iron reduction, and sulfate reduction, and less pronounced during methanogenesis (Morel and Hering, 1993). In addition, Willey *et al* (1975) show that short-chain aliphatic acid ions, which can be produced during biodegradation of fuel hydrocarbons as intermediates, can contribute to alkalinity in groundwater.

Assuming complete mineralization, the alkalinity-enhancing reactions follow the generalized stoichiometry:

$$CH \rightarrow CO_2 + H_2O \rightarrow H_2CO_3 + CaCO_3 \rightarrow Ca^{2+} + 2HCO_3^-$$


TRANSFORMER
50,000-GALLON JE
MD75-MW05
-15.4
TRANSFORMER
MD75-MW01
+35.0
75MP-5
-103.2 (D)
MD75-MW06
+8.2
MD75-MW07
-88.4
PUMPHOUSE 75
-50
-100
MD75-MW04
-71.2
75MP-4
-102.1 (S)
MD75-MW14
-82.8
75MP-3
-7.5 (D)
MD75-MW15
-20.6
MD75-MW09
-120.8
VALVE
-50
MD75-MW08
-95.7
MD75-MW
-88.4
MD75-MW
-98.2
75MP-1
+21.4 (S)
-29.2 (D)
75MP-2
-75.9
MD75-MW16
-9.9
MD75-MW03
-18.4
TAXIWAY N
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FIGURE

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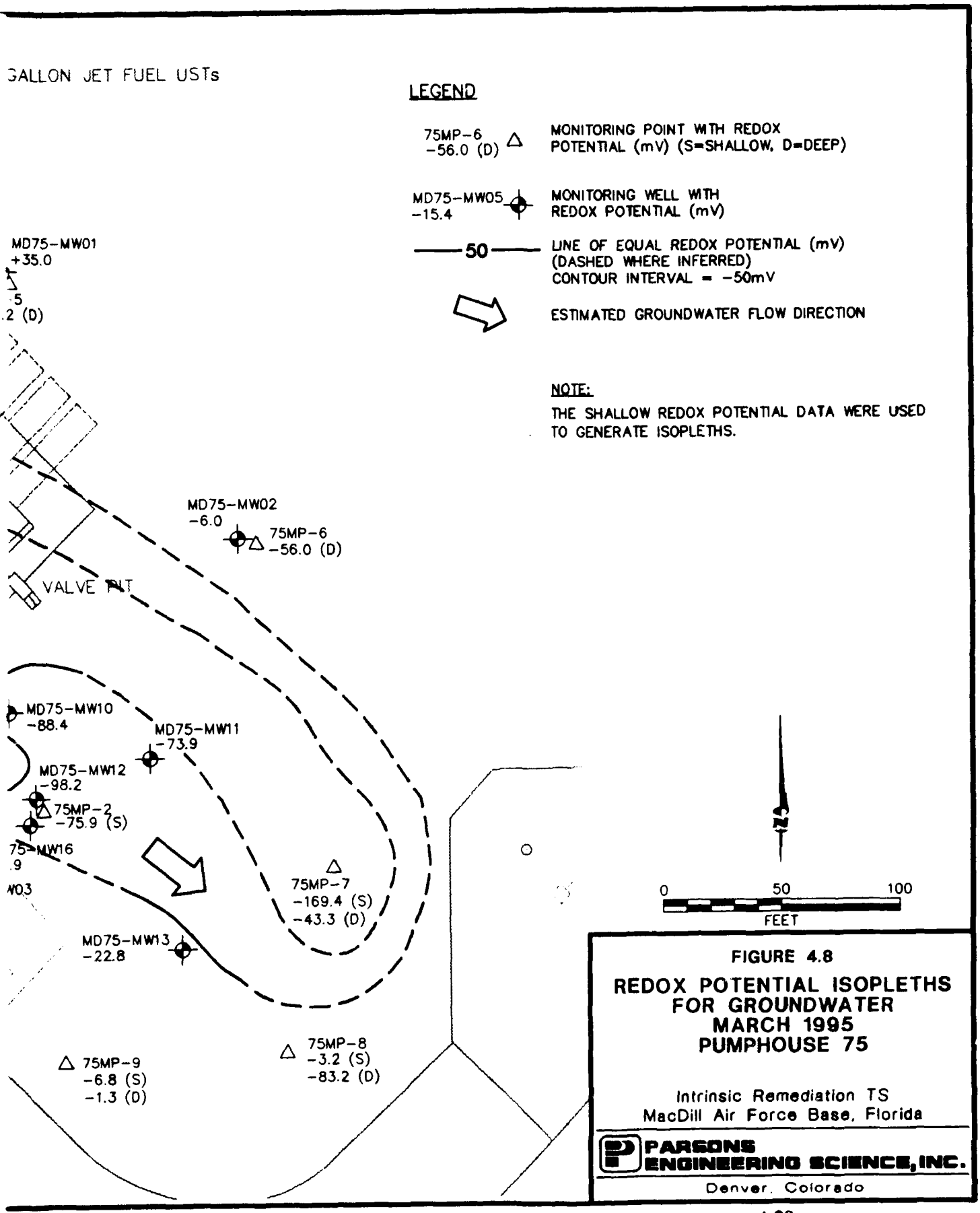


FIGURE 4.8

REDOX POTENTIAL ISOPLETHS FOR GROUNDWATER MARCH 1995 PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

The mass ratio of alkalinity produced during oxidation of BTEX can be calculated. The molar ratio of alkalinity (as $CaCO_3$) produced during benzene oxidation via aerobic respiration, denitrification, iron (III) reduction, and sulfate reduction is given by:

$$C_6H_6 \rightarrow 6CO_2 \rightarrow 6CaCO_3$$

Therefore, 6 moles of $CaCO_3$ are produced during the metabolism of 1 mole of benzene. On a mass basis, the ratio of alkalinity to benzene is given by:

Molecular weights:	Benzene	6(12)+6(1) = 78 gm
	Alkalinity (as $CaCO_3$)	6(40)+6(12)+18(16)=600 gm

Mass ratio of alkalinity to benzene = 600:78 = 7.69:1

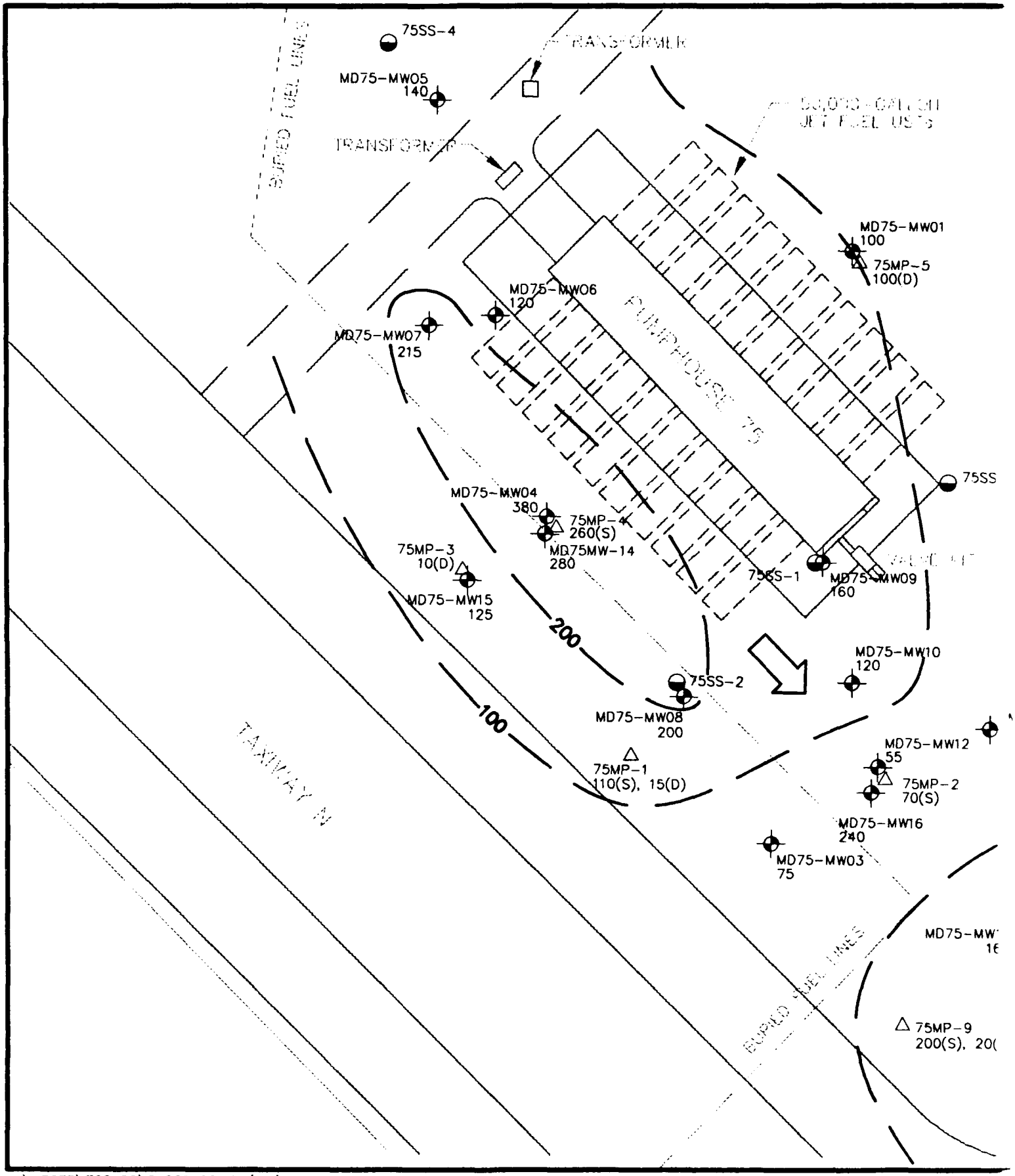
Therefore, 7.69 mg of alkalinity (as $CaCO_3$) are produced during the metabolism of 1 mg of benzene. This means that for every 1 mg of alkalinity produced, 0.13 mg of BTEX is destroyed. Similar calculations can be made for toluene, ethylbenzene, and xylene. Table 4.7 summarizes the results of these calculations for all of the BTEX compounds during aerobic respiration, denitrification, iron (III) reduction, and sulfate reduction. Methanogenesis does not cause significant changes in alkalinity.

As shown in Figure 4.9, total alkalinity at Pumphouse 75 is in the low to moderate range for groundwater, varying from 10 mg/L at monitoring point 75MP-3D to 380 mg/L at MD75-MW04. This level of alkalinity might not be sufficient to buffer potential changes in pH caused by biologically mediated BTEX oxidation reactions; therefore, it might not be possible to utilize some electron receptors to their full availability. At monitoring well/point cluster MP-4S/MW04/MW14, alkalinity values are similar at all of the sampled depth intervals. Conversely, alkalinity values are lowest in the shallower intervals at cluster MP-2S/MW12/MW16, suggesting that microbial biodegradation of hydrocarbons is most prevalent in the deepest interval at this location. At the remaining well/point clusters, alkalinity values in the shallow and deep intervals tend to be either similar or higher in the shallower interval.

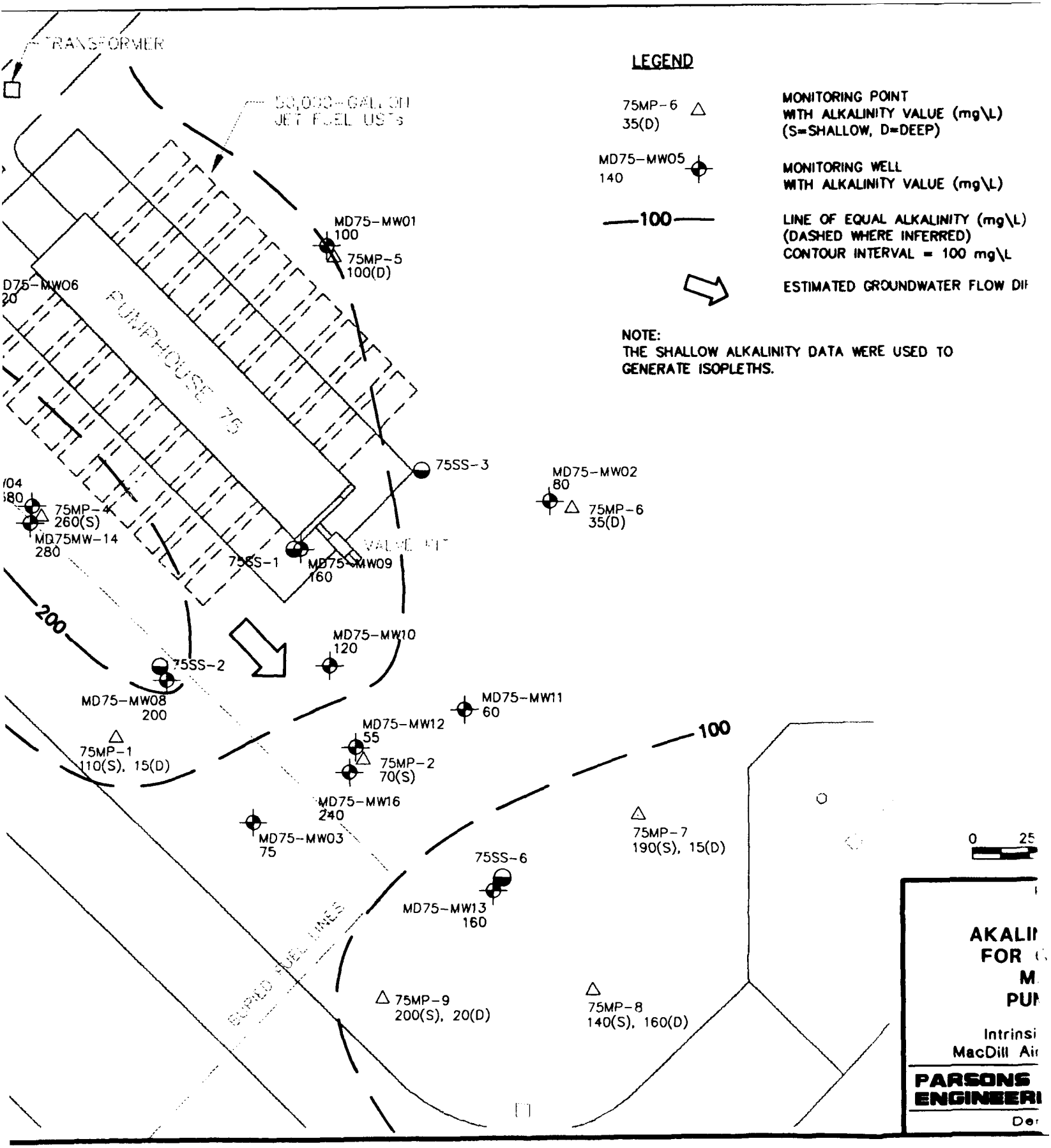
The mass ratio of alkalinity (as $CaCO_3$) produced to BTEX degraded during aerobic respiration, denitrification, ferric iron reduction, and sulfate reduction is shown in Table 4.7. On average, approximately 7.69 mg of alkalinity (as $CaCO_3$) is produced for every 0.13 mg of BTEX destroyed. Given a maximum detected alkalinity of 380 mg/L and an assumed background concentration of 100 mg/L, the shallow groundwater has the capacity to assimilate approximately 4.7 mg/L (4,700 µg/L) of total BTEX. This calculation is speculative due to the uncertainty associated with background alkalinity values.

TABLE 4.7
MASS RATIO OF ALKALINITY (AS $CACO_3$) PRODUCED TO BTEX DEGRADED DURING AEROBIC RESPIRATION, DENITRIFICATION, IRON (III) REDUCTION, AND SULFATE REDUCTION
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Alkalinity Production Reaction	Stoichiometric Mass Ratio of Alkalinity Produced to BTEX Degraded	Mass of Compound Degraded (mg) per unit mass of Alkalinity Produced (mg)
$C_6H_6 \rightarrow 6CO_2 \rightarrow 6CaCO_3$ *Benzene Oxidation*	600:78	0.13
$C_7H_8 \rightarrow 7CO_2 \rightarrow 7CaCO_3$ *Toluene Oxidation*	700:92	0.13
$C_8H_{10} \rightarrow 8CO_2 \rightarrow 8CaCO_3$ *Ethylbenzene Oxidation*	800:104	0.13
$C_8H_{10} \rightarrow 8CO_2 \rightarrow 8CaCO_3$ *Xylene Oxidation*	800:104	0.13



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TRANSFORMER
50,000-GALLON JET FUEL USTs
PUMPHOUSE 75
VALVE PIT
MD75-MW01
100
75MP-5
100(D)
D75-MW06
20
75SS-3
MD75-MW02
80
75MP-6
35(D)
75MP-4
260(S)
MD75MW-14
280
75SS-1
MD75-MW09
160
200
MD75-MW10
120
75SS-2
MD75-MW08
200
MD75-MW11
60
MD75-MW12
55
75MP-2
70(S)
75MP-1
110(S), 15(D)
100
MD75-MW16
240
MD75-MW03
75
75MP-7
190(S), 15(D)
75SS-6
MD75-MW13
160
BURIED FUEL LINES
75MP-9
200(S), 20(D)
75MP-8
140(S), 160(D)
LEGEND
75MP-6
35(D)
MONITORING POINT WITH ALKALINITY VALUE (mg\L) (S=SHALLOW, D=DEEP)
MD75-MW05
140
MONITORING WELL WITH ALKALINITY VALUE (mg\L)
100
LINE OF EQUAL ALKALINITY (mg\L) (DASHED WHERE INFERRED) CONTOUR INTERVAL = 100 mg\L
ESTIMATED GROUNDWATER FLOW DI
NOTE:
THE SHALLOW ALKALINITY DATA WERE USED TO GENERATE ISOPLETHS.
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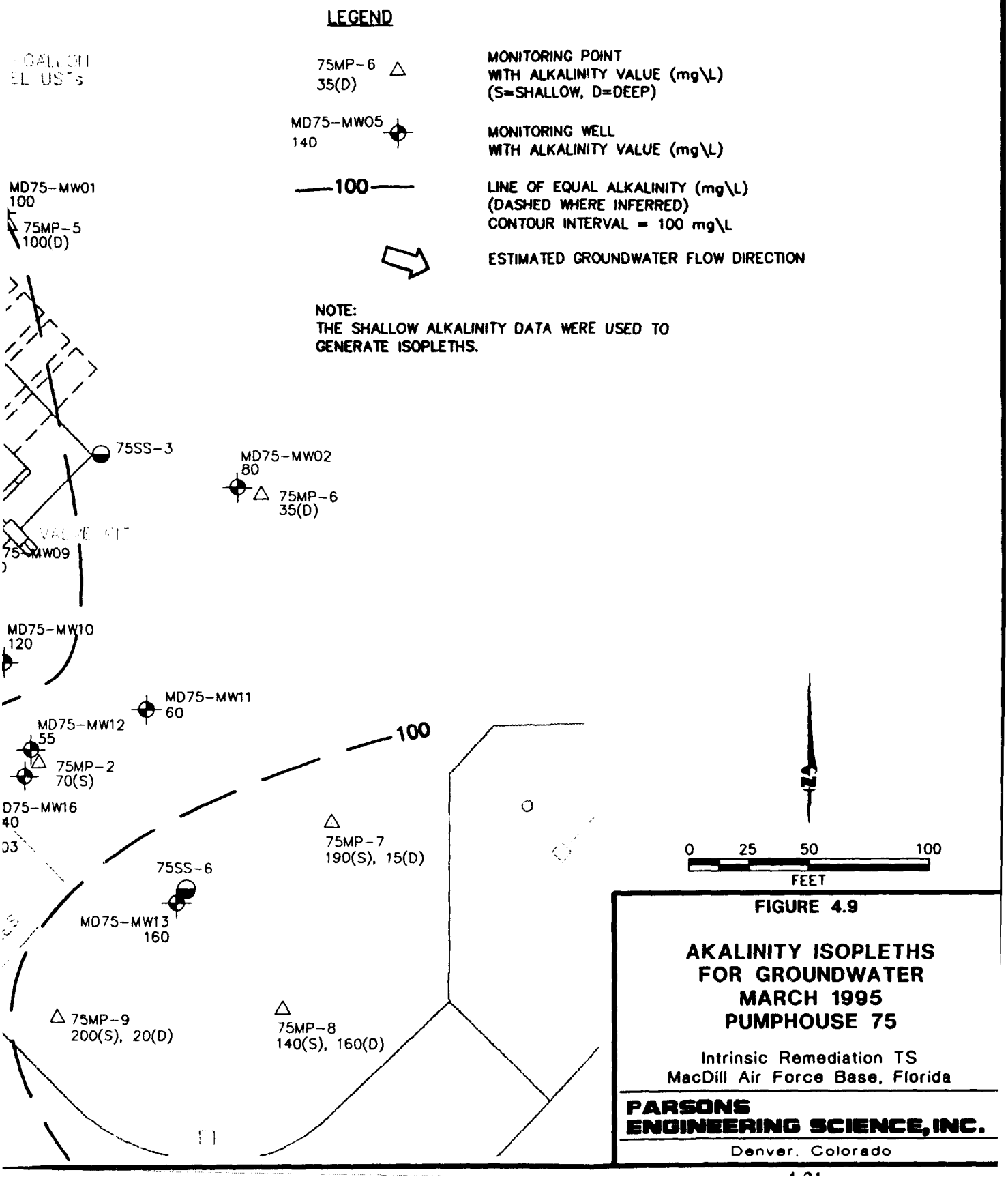


FIGURE 4.9

AKALINITY ISOPLETHS FOR GROUNDWATER MARCH 1995 PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.

Denver, Colorado

4.3.2.8 pH

Measurements of groundwater pH made in March 1995 are summarized in Table 4.6 and illustrated on Figure 4.10. Measured pH values ranged from 4.61 to 7.69 standard units; the majority of the values are within the optimal pH range of 5 to 9 standard units for BTEX-degrading microbes in groundwater Denitrification and methanogenic biodegradation rates are usually optimum between pH 7 and 8, and may drop off rapidly (but not cease altogether) below pH 6. As shown on Figure 4.10, all of the pH values measured within the 100-µg/L BTEX isopleth (Figure 4.3) are relatively low (below 6.0), possibly because of the acids produced during the biodegradation of petroleum hydrocarbons. pH values measured upgradient, crossgradient, and downgradient from the BTEX plume are mostly greater than 6.0.

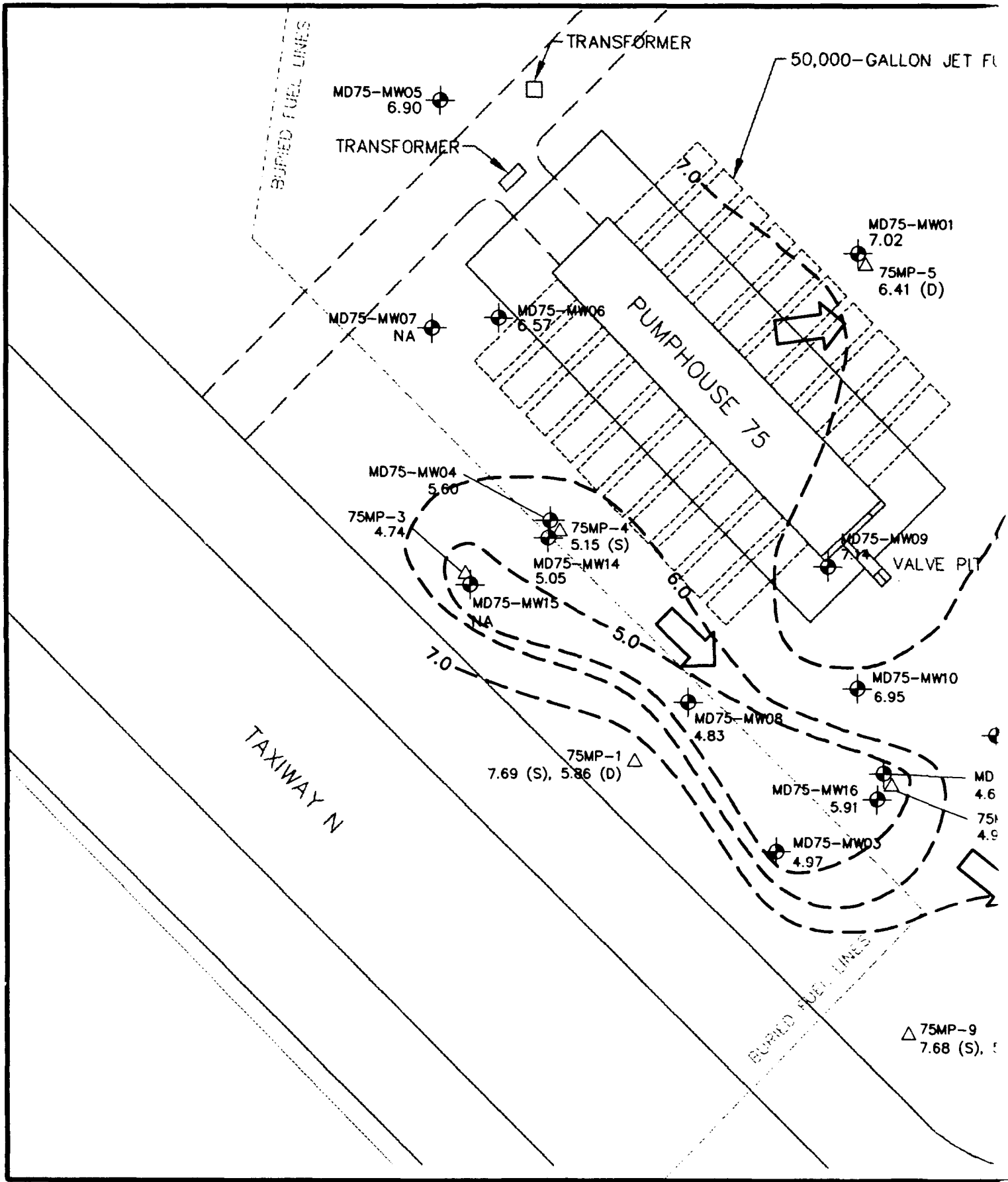
4.3.2.9 Temperature

Groundwater temperature measurements made in March 1995 are summarized in Table 4.6. Temperature affects the types and growth rates of bacteria that can be supported in the groundwater environment, with high temperatures generally resulting in higher growth rates. For every 10-degree-Celsius (°C) increase in groundwater temperature, the biodegradation rate should approximately double. Temperatures in the shallow aquifer varied from 22.5°C to 30.5°C. These are relatively warm temperatures for shallow groundwater, suggesting that bacterial growth rates should be enhanced.

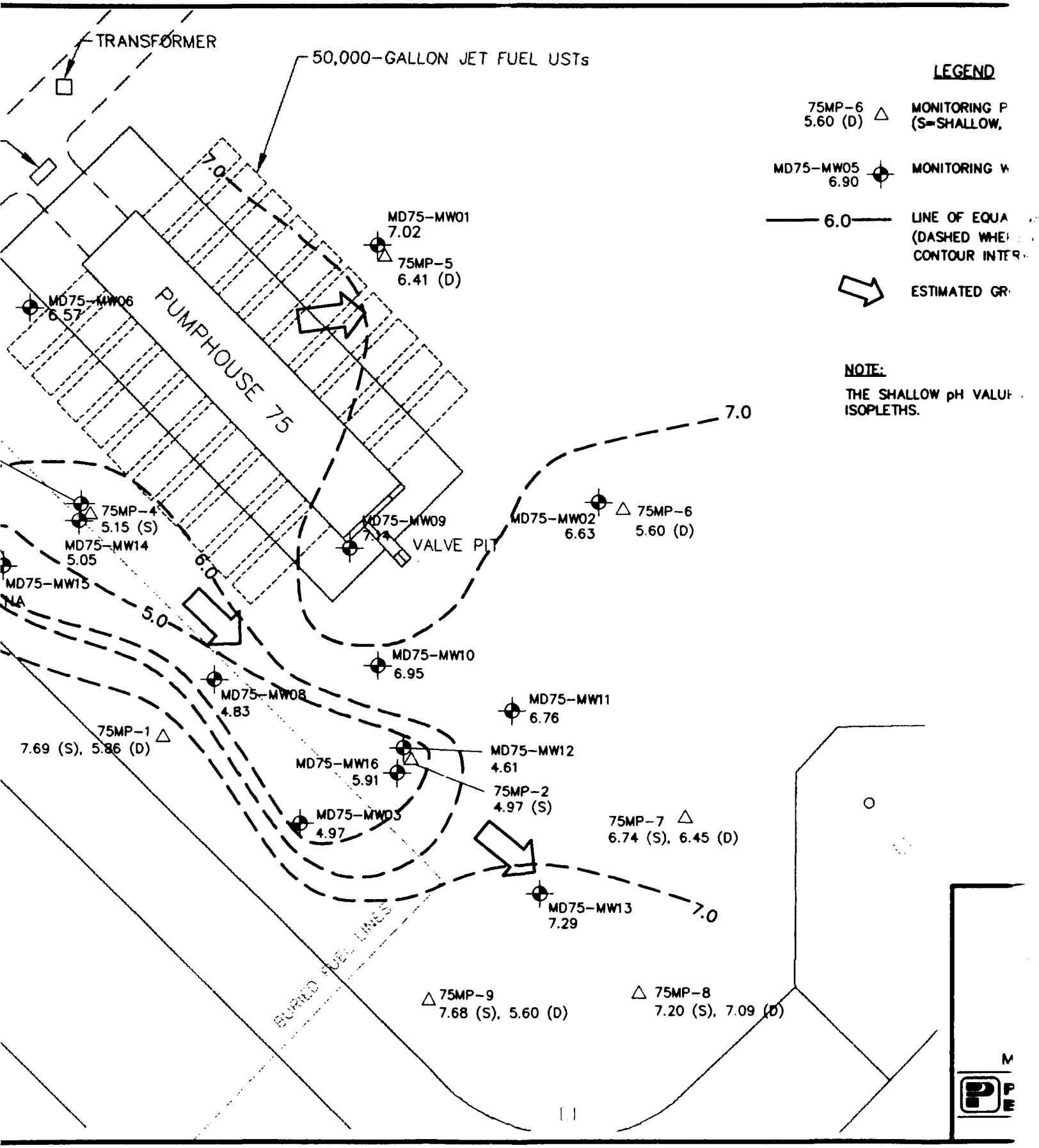
4.3.2.10 Expressed Assimilative Capacity

The data presented in the preceding sections suggest that degradation of BTEX compounds is occurring primarily through the microbially mediated anaerobic processes of sulfate reduction and methanogenesis. Based on the stoichiometry presented in Table 4.5, the expressed BTEX assimilative capacity of groundwater at Pumphouse 75 is at least 23,900 µg/L (Table 4.8). This value does not include the computed assimilative capacities associated with DO (aerobic biodegradation) and nitrate (denitrification) due to the speculative nature of those calculations and the apparent relative insignificance of these processes. An expressed assimilative capacity of 4,700 µg/L was calculated using alkalinity data. This value may be low due to the predominance of methanogenesis as a biodegradation mechanism, which does not enhance the alkalinity of the groundwater.

A closed system with 2 liters of water can be used to help visualize the physical meaning of assimilative capacity. Assume that the first liter contains no fuel hydrocarbons, but it contains fuel-degrading microorganisms and has an assimilative capacity of exactly "x" µg of fuel hydrocarbons. The second liter has no assimilative capacity; however, it contains fuel hydrocarbons. As long as these 2 liters of water are kept separate, biodegradation of the fuel hydrocarbons will not occur. If these 2 liters are combined in a closed system, biodegradation will commence and continue until the fuel hydrocarbons are depleted, the electron acceptors are depleted, or the environment becomes acutely toxic to the fuel-degrading microorganisms. Assuming a nonlethal environment, if fewer than "x" µg of fuel hydrocarbons were in the second liter, all of the fuel hydrocarbons will eventually degrade given a sufficient time; likewise, if



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TRANSFORMER
50,000-GALLON JET FUEL USTs
PUMPHOUSE 75
VALVE PIT
MD75-MW01
7.02
75MP-5
6.41 (D)
MD75-MW06
6.57
75MP-4
5.15 (S)
MD75-MW14
5.05
MD75-MW15
NA
MD75-MW09
MD75-MW02
6.63
75MP-6
5.60 (D)
MD75-MW10
6.95
MD75-MW08
4.83
75MP-1
7.69 (S), 5.86 (D)
MD75-MW11
6.76
MD75-MW12
4.61
MD75-MW16
5.91
75MP-2
4.97 (S)
MD75-MW03
4.97
75MP-7
6.74 (S), 6.45 (D)
MD75-MW13
7.29
75MP-9
7.68 (S), 5.60 (D)
75MP-8
7.20 (S), 7.09 (D)
BURIED FUEL LINES
7.0
6.0
5.0
LEGEND
75MP-6
5.60 (D)
MONITORING P
(S=SHALLOW,
MD75-MW05
6.90
MONITORING W
6.0
LINE OF EQUA
(DASHED WHE
CONTOUR INTE
ESTIMATED GR
NOTE:
THE SHALLOW pH VALU
ISOPLETHS.

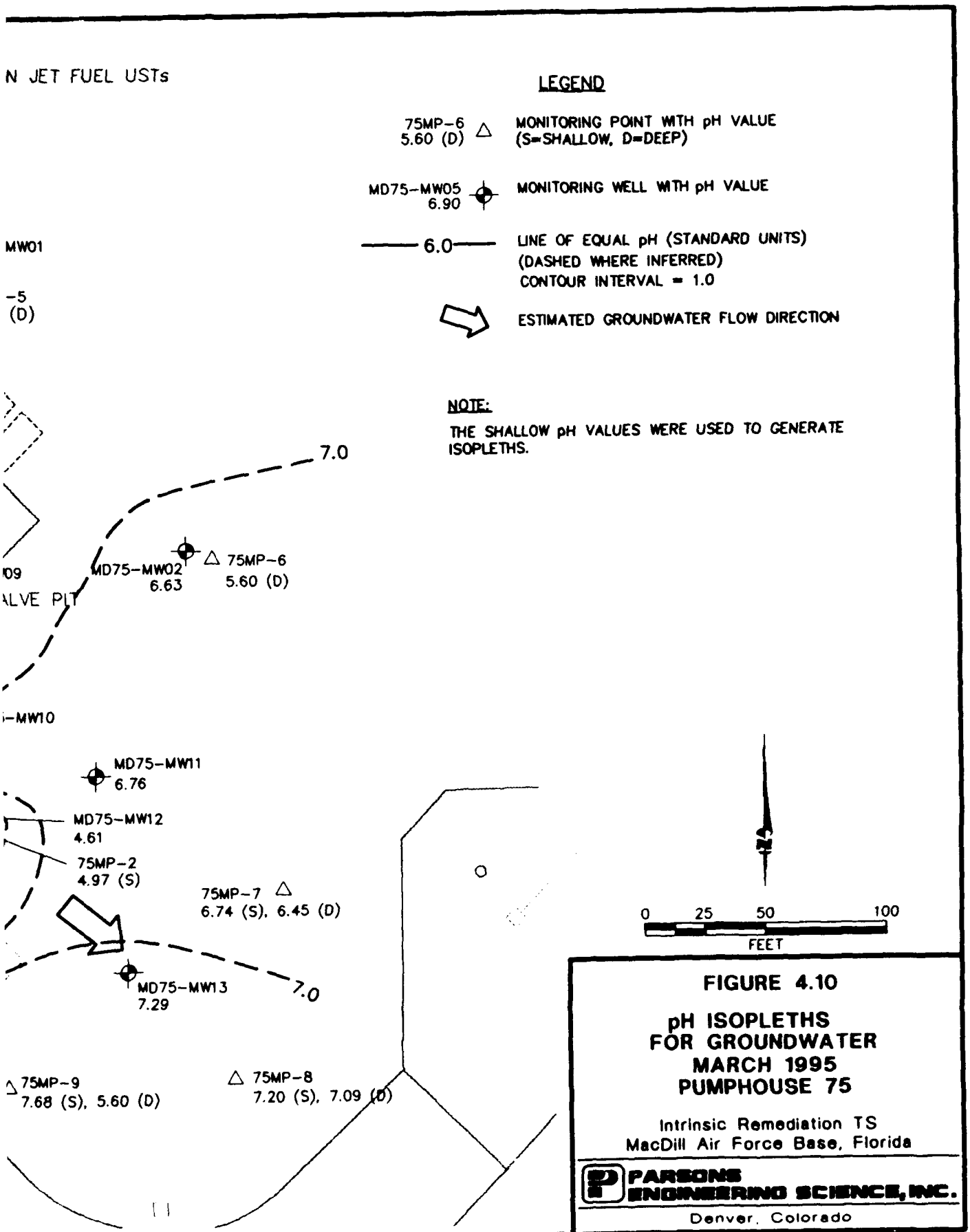


FIGURE 4.10

pH ISOPLETHS FOR GROUNDWATER MARCH 1995 PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

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Denver, Colorado

TABLE 4.8
EXPRESSED ASSIMILATIVE CAPACITY OF SITE GROUNDWATER
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Biodegradation Process	Expressed BTEX Assimilative Capacity (µg/L)
Iron Reduction	950
Sulfate Reduction	5,250
Methanogenesis	18,500
Expressed Assimilative Capacity	24,700
Expressed Assimilative Capacity using Alkalinity Data	4,700

greater than "x" μg of fuel hydrocarbons were in the second liter of water, only "x" μg of fuel hydrocarbons would ultimately degrade. The groundwater beneath Pumphouse 75 is an open system that continually receives additional electron receptors from flow through the aquifer and infiltration of precipitation. This means that the assimilative capacity is not fixed as it is in a closed system, and therefore cannot be compared directly to contaminant concentration in the groundwater. Rather, the expressed assimilative capacity of groundwater is intended to serve as a qualitative tool. Although the expressed assimilative capacity at this site is greater than the highest measured total BTEX concentration, the fate of BTEX in groundwater and the potential impact on receptors are dependent on the relationship between the kinetics of biodegradation and the solute transport velocity (Chapelle, 1994). This significant expressed assimilative capacity is a strong indicator that biodegradation is occurring; however, it is not confirmation that biodegradation will proceed to completion before potential downgradient receptors are impacted.

SECTION 5

GROUNDWATER MODEL

5.1 GENERAL OVERVIEW AND MODEL DESCRIPTION

In order to help estimate degradation rates for dissolved BTEX compounds at Pumphouse 75 and to help predict the future migration of these compounds, Parsons ES modeled the fate and transport of the dissolved BTEX plume. The modeling effort had three primary objectives: 1) to predict the future extent and concentration of the dissolved contaminant plume by modeling the combined effects of advection, dispersion, sorption, and biodegradation; 2) to assess the potential for downgradient receptors to be exposed to contaminants at concentrations above regulatory levels of concern; and 3) to provide technical support for the natural attenuation remedial option at post-modeling regulatory negotiations. The model was developed using site-specific data and conservative assumptions about governing physical and chemical processes. Because of the conservative nature of model input, the reduction in contaminant mass caused by natural attenuation is expected to exceed model predictions. This analysis is not intended to represent a baseline assessment of potential risks posed by site contamination.

The Bioplume II code was used to estimate the potential for dissolved BTEX migration and degradation by naturally occurring mechanisms operating at Pumphouse 75. The Bioplume II model incorporates advection, dispersion, sorption, and biodegradation to simulate contaminant plume migration and degradation. The model is based upon the US Geological Survey (USGS) Method of Characteristics (MOC) two-dimensional (2-D) solute transport model of Konikow and Bredehoeft (1978). The model was modified by researchers at Rice University to include a biodegradation component that is activated by a superimposed DO plume. Incorporating the work of Borden and Bedient (1986), the model assumes a reaction between DO and BTEX that is instantaneous relative to the advective groundwater velocity. Bioplume II solves the USGS 2-D solute transport equation twice, once for hydrocarbon concentrations in the aquifer and once for a DO plume. The two plumes are combined using superposition at every particle move to simulate the instantaneous, biologically-mediated, reaction between hydrocarbons and oxygen.

In recent years it has become apparent that anaerobic processes such as denitrification, iron reduction, sulfate reduction, and methanogenesis can be important BTEX degradation mechanisms (Grbic´-Galic´, 1990; Beller *et al.*, 1992; Edwards *et al.*, 1992; Edwards and Grbic´-Galic´, 1992, Grbic´-Galic´ and Vogel, 1987; Lovely *et al.*, 1989; Hutchins, 1991). Because there is evidence that anaerobic biodegradation processes are occurring at the Pumphouse 75 site, these processes were accounted for during Bioplume II modeling using a first-order anaerobic decay coefficient. The following subsections discuss in more detail the model setup, input parameters and assumptions, model calibration, and simulation results.

5.2 CONCEPTUAL MODEL DESIGN AND ASSUMPTIONS

Prior to developing a groundwater model, it is important to determine if sufficient data are available to provide a reasonable estimate of aquifer conditions. In addition, it is important to ensure that any limiting assumptions can be justified. The most important assumption made when using the Bioplume II model is that electron-acceptor-limited biodegradation is occurring at the site. The Bioplume II model assumes that the limiting factors for biodegradation are: 1) the presence of an indigenous hydrocarbon degrading microbial population, and 2) sufficient background electron acceptor concentrations. Data and information presented in Sections 3 and 4 suggest that sulfate and carbon dioxide (methanogenesis) are being used as the primary electron acceptors for anaerobic biodegradation. The model assumes that DO is the only electron acceptor that reacts instantaneously with the BTEX plume. Anaerobic biodegradation of petroleum hydrocarbons was simulated using a first-order decay constant. Selection of this constant is discussed in Section 5.3.5.

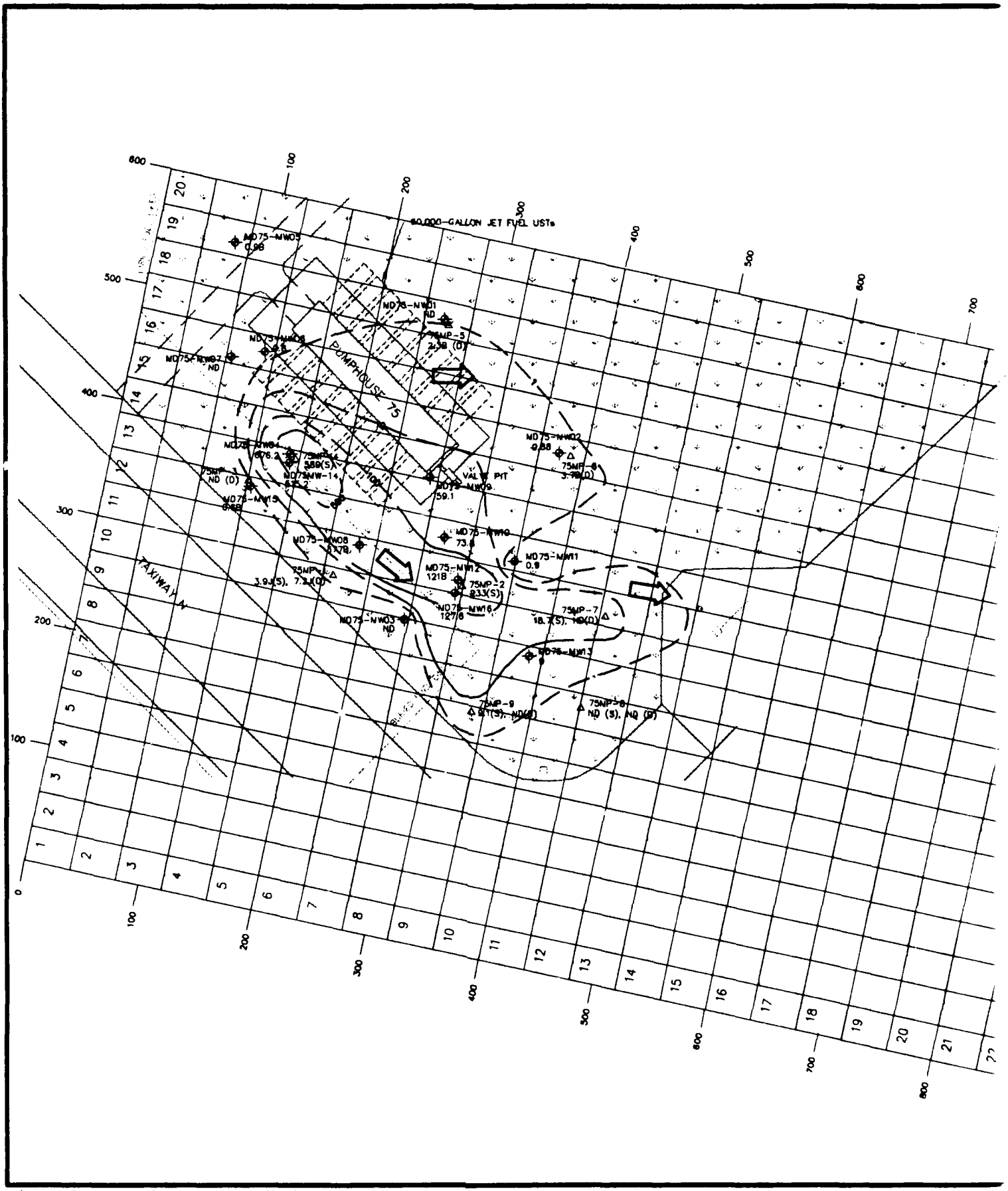
On the basis of the data presented in Section 3, the shallow saturated zone was conceptualized and modeled as a shallow unconfined aquifer comprised primarily of sand (Figures 3.2 and 3.3). As discussed in Section 4.3.1.1, detections of BTEX in two monitoring wells screened in sand and clayey limestone layers below the shallow sand zone suggest that vertical migration of dissolved BTEX may be occurring. In some cases (e.g., ferrous iron and alkalinity levels in well cluster MP-2S/MW12/MW16), the geochemical data support the detections of significant BTEX concentrations at depth in the shallow aquifer (Table 4.3). Overall however, the geochemical data are inconclusive, and the validity of the contaminant detections in the two deep wells could not be confirmed. In general, there are insufficient hydrogeologic and contaminant data for this deeper interval to justify the use of a three-dimensional numerical model. Therefore, a 2-D model was considered to be appropriate for modeling the horizontal migration of the identified BTEX plume at the Pumphouse 75 site. Recommendations for additional investigation of deeper intervals to better characterize any vertical migration of fuel hydrocarbons are contained in Section 8. Available evidence suggests that mobile LNAPL is not present at the site. However, continuing sources of dissolved BTEX contamination remain as residual LNAPL in the soil.

5.3 INITIAL MODEL SETUP

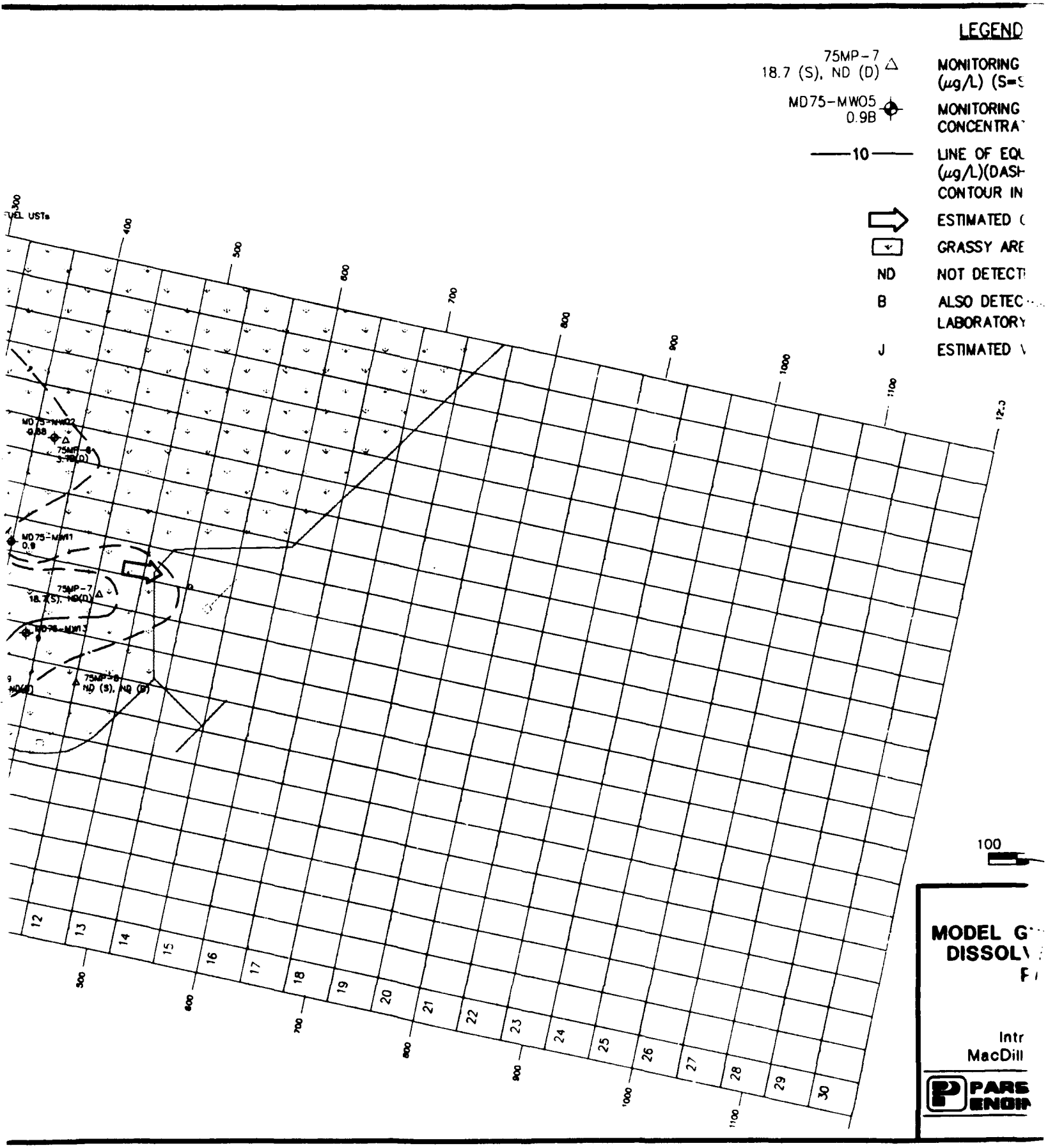
Where possible, the initial setup for this model was based on site-specific data. Where site-specific data were not available (e.g., effective porosity), reasonable assumptions were made on the basis of widely accepted literature values for materials similar to those found in the shallow aquifer. The following sections describe the basic model setup. Those Bioplume II model parameters that were varied during model calibration are discussed in Section 5.4.

5.3.1 Grid Design and Boundary Conditions

The maximum grid size for the Bioplume II model is limited to 20 columns by 30 rows. The dimension of each column and row can range from 0.1 to 999.9 feet. A 20- by 30-cell grid was used to model the Pumphouse 75 site. Each grid cell was 40 feet long by 30 feet wide. The grid was oriented with the longest dimension parallel to the overall direction of groundwater flow. The model grid covers an area of 720,000 square feet, or approximately 16.5 acres. The full extent of the model grid is indicated on Figure 5.1.



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LEGEND
75MP-7
18.7 (S), ND (D)
MONITORING
(µg/L) (S=S
MD75-MW05
0.9B
MONITORING
CONCENTRA
10
LINE OF EQU
(µg/L)(DASH
CONTOUR IN
ESTIMATED (
GRASSY ARE
ND
NOT DETECTI
B
ALSO DETEC
LABORATORY
J
ESTIMATED V
MD75-MW02
0.9B
75MP-8
3.7B(D)
MD75-MW01
0.9
75MP-7
18.7(S), ND(D)
MD75-MW03
9
ND(D)
75MP-9
ND (S), ND (D)
100
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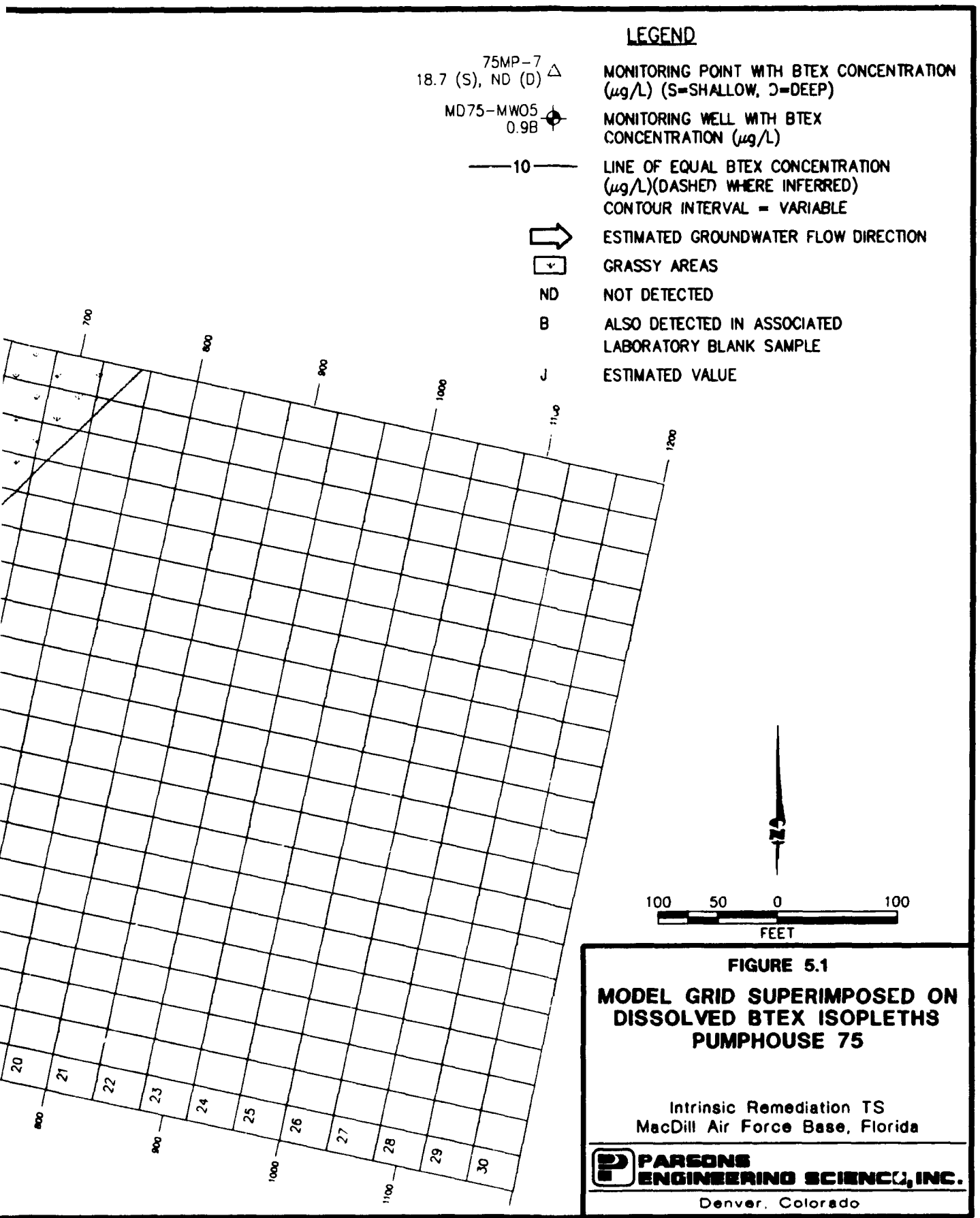


FIGURE 5.1

MODEL GRID SUPERIMPOSED ON DISSOLVED BTEX ISOPLETHS PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

Model boundaries are mathematical statements that represent hydrogeologic boundaries, such as areas of specified head (e.g., surface water bodies or contour lines of constant hydraulic head) or specified flux. Hydrogeologic boundaries are represented by three mathematical statements that describe the hydraulic head at the model boundaries. These include:

- Specified-head boundaries (Dirichlet condition) for which the head is determined as a function of location and time only. Surface water bodies exhibit constant head conditions. Specified-head boundaries are expressed mathematically as:

$$Head = f(x, y, z, t)$$

- Specified-flow boundaries (Neumann conditions) for which the mathematical description of the flux across the boundary is given. The flux is defined as a volumetric flow rate per unit area (e.g., $ft^3/ft^2/day$). No-flow boundaries are a special type of specified flow boundary and are set by specifying the flux to be zero. Examples of no-flow boundaries include groundwater divides and impermeable hydrostratigraphic units. Specified-flux boundaries are expressed mathematically as:

$$Flux = f(x, y, z, t)$$

- Head-dependent flow boundaries (Cauchy or mixed-boundary conditions) where the flux across the boundary is calculated from a given boundary head value. This type of flow boundary is sometimes referred to as a mixed-boundary condition because it is a combination of a specified-head boundary and a specified-flow boundary. Head-dependent flow boundaries are used to model leakage across semipermeable boundaries. Head-dependent flow boundaries are expressed mathematically as (Bear, 1979):

$$Flux = \frac{(H_0 - H)K'}{B'}$$

where:

H = Head in the zone being modeled (generally the zone containing the contaminant plume),

H_0 = Head in external zone (separated from plume by semipermeable layer),

K' = Hydraulic conductivity of semipermeable layer, and

B' = Thickness of semipermeable layer.

Natural hydraulic boundaries are modeled using a combination of the three types of model boundary conditions listed above. When possible, hydrologic boundaries such as surface water bodies, groundwater divides, contour lines, or hydrologic barriers should coincide with the perimeter of the model. In areas lacking obvious hydrologic boundaries, specified-head or specified-flux boundaries can be specified at the model perimeter if the boundaries are far enough removed from the contaminant plume that transport calculations are not affected. Bioplume II requires the entire model domain to be bounded by zero-flux cells (also known as

no-flow cells), with other boundary conditions established within the subdomain specified by the no-flow cells.

Specified-head boundaries for the model were set on the western and eastern perimeter of the model grid to simulate the west to east groundwater flow observed at the site. The hydraulic heads along the western boundary were estimated to range from 5.27 to 5.39 feet msl. The heads along the eastern model boundary ranged from 4.24 to 4.26 feet msl. These constant-head cells were placed far enough away from the BTEX plume to avoid potential boundary interferences.

The northern and southern model boundaries were configured as no-flow (specified flux) boundaries. In this case, the flux through these boundaries is assumed to be zero because flow is generally parallel to these boundaries. A few selected cells adjacent to the northern and southern boundaries were designated as constant-head cells to assist in the calibration of the groundwater flow model. The base or lower boundary of the model is also assumed to be no-flow, and is defined by the upper surface of the confining clay layer (Figure 3.2). An aquifer thickness of 20 feet was assumed based on the stratigraphic information presented in Section 3. The upper model boundary is defined by the simulated water table surface.

5.3.2 Groundwater Elevation and Gradient

The March 1995 water table elevation map presented in Figure 3.5 was used to define the starting heads input into the Bioplume II model. Groundwater flow in the vicinity of the Pumphouse 75 site is to the east and southeast with an average gradient of approximately 0.0009 ft/ft. Additional groundwater flow direction and gradient data are presented by BVWS (1995). These data suggest that there are temporal variations in groundwater flow direction, but the overall trend at the site is toward the east and southeast. Historic hydraulic gradients are consistent with those calculated by Parsons ES using the March 1995 groundwater elevation data. Therefore, it was assumed that the observed water levels were representative of steady-state conditions. As described in Section 5.4.1, the model was calibrated to the observed March 1995 water table.

5.3.3 BTEX Concentrations

The total dissolved BTEX concentrations obtained from laboratory analytical results for each well location were used for model development. At well nests, the highest BTEX concentration observed at that location was used. Table 4.3 presents dissolved BTEX concentration data for March 1995, and Figure 4.3 shows the spatial distribution of dissolved BTEX compounds.

A comparison between the November 1994 and March 1995 BTEX plumes (see Appendix A for the 1994 plume) indicates that the areal extents of the two plumes are similar. The most significant difference between the plumes is the apparent reduction in contaminant concentrations at monitoring wells MD75-MW04 and MD75-MW08 from November 1994 to March 1995. In addition, as described in Section 4.3.1.1, the BTEX concentrations detected in the deeper wells MD75-MW14 and MD75-MW16 were observed to increase during that time period. The shape and distribution of the total BTEX plume is the result of advective-dispersive transport and biodegradation of dissolved BTEX contamination. As described in Section 5.4.2, the simulated BTEX plume was calibrated to match the observed BTEX plume in March 1995, starting from the BTEX plume that was observed in November 1994.

5.3.4 Dissolved Oxygen

As discussed previously, the Bioplume II model assumes an instantaneous reaction between the BTEX plume and the DO plume. The discussion presented in Section 4 suggests that sulfate and carbon dioxide (methanogenesis) are being used as primary electron acceptors for biodegradation of BTEX compounds at the Pumphouse 75 site. The total BTEX plume at the site was modeled assuming that DO was the only electron acceptor being utilized at a rate that is instantaneous relative to the advective ground water flow velocity for the biodegradation of the BTEX compounds. As described in Section 5.3.5, anaerobic biodegradation was accounted for through the use of a first-order decay rate constant.

The measured DO concentrations in monitoring wells/points MD75-MW05, MD75-MW06, MD75-MW07, 75MP-3, MD75-MW15, 75MP-1, 75MP-9, 75MP-8, and MD75-MW01 (which were all either on the edge or outside of the March 1995 dissolved BTEX plume) ranged from 0.08 mg/L to 0.48 mg/L and averaged 0.19 mg/L. Within and directly downgradient from the BTEX plume, DO concentrations in shallow groundwater ranged from 0.08 to 0.14 mg/L, and averaged 0.10 mg/L. The highest (shallow) DO concentration of 0.48 mg/L was measured in monitoring point 75MP-9S, adjacent to the buried fuel lines southeast of the pumphouse (Figure 4.4). For model development, initial DO concentrations directly upgradient and crossgradient from the plume were assumed to equal 0.15 mg/L, and areas within and downgradient from the plume were assigned an initial DO concentration of 0.10 mg/L. In addition, it was assumed that background DO concentrations further upgradient of the site were at least 0.2 mg/L. Therefore, the water input into the model via the upgradient constant-head cells was assigned a DO concentration of 0.2 mg/L. This is a reasonable assumption considering the perimeter DO concentrations presented above and the measured background DO concentrations in very similar hydrogeologic conditions at Site 56, the Army Air Force Exchange Service (AAFES) service station at MacDill AFB, of 0.8 mg/L.

Due to the shallow water table and the presence of sandy soils with a relatively low natural organic carbon content, it is reasonable to assume that the precipitation that percolates through the vadose zone contains some DO when it reaches the water table. Assuming that the average temperature of precipitation falling on the site is 21°C (70 °F), the precipitation would have a DO concentration of approximately 8.7 mg/L. Some percentage of this DO is most likely consumed as the water percolates through the vadose zone as a result of microbial processes which utilize naturally occurring organic carbon in the soil. Therefore, the recharge was assigned a DO concentration of 3 mg/L. DO was not added to the recharge water in grid cells where the soils were believed to be contaminated with petroleum, as it possible that the DO would be largely consumed prior to reaching the water table. Oxygen input data are included in Appendix C.

5.3.5 Anaerobic Degradation Rates

Available data strongly suggest that anaerobic degradation is occurring at the Pumphouse 75 site, and that aerobic degradation processes are relatively insignificant (Table 4.7). Anaerobic degradation must therefore be simulated with Bioplume II to make solute transport predictions that are meaningful. The Bioplume II model simulates anaerobic biodegradation by assuming that such degradation follows first-order kinetics. As with a large number of biological processes, anaerobic biodegradation can generally be described using a first-order rate constant and the equation:

$$\frac{C}{C_0} = e^{-kt}$$

where: C = Contaminant Concentration at Time t,

C_0 = Initial Contaminant Concentration,

k = Coefficient of Anaerobic Decay (anaerobic rate constant), and

t = time.

A convenient way of estimating biodegradation rate constants is to use compounds present in the dissolved contaminant plume that that are biologically recalcitrant. One such compound that is useful in some, but not all, groundwater environments is trimethylbenzene (TMB). The three isomers of this compound (*1,2,3*-TMB, *1,2,4*-TMB, and *1,3,5*-TMB) are generally present in sufficient quantities in fuel mixtures to be readily detectable when dissolved in groundwater. In addition, the TMB isomers are fairly recalcitrant to biodegradation under anaerobic conditions; however, the TMB isomers do not make good tracers under aerobic conditions (because they are readily biodegraded in aerobic environments). The degree of recalcitrance of TMB is site-specific, and the use of this compound as a tracer must be evaluated on a case-by-case basis. Another compound of potential use as a conservative tracer is tetramethylbenzene (tetraMB); however, detectable dissolved tetraMB concentrations are generally less common than detectable dissolved TMB concentrations.

An ideal tracer would have Henry's Law and soil sorption coefficients identical to the contaminant of interest; however, TMB and tetraMB are more hydrophobic than BTEX, chlorinated ethenes, and chlorinated ethanes, resulting in higher soil sorption coefficients. This causes preferential sorption of TMB and tetraMB, and an increase in the coefficients of retardation for these compounds in the aquifer. Therefore, for these compounds it is advisable to account for the difference in contaminant and tracer velocity resulting from the higher soil sorption and consequent retardation of TMB and tetraMB. Otherwise, using TMB and tetraMB as tracers can be so conservative that estimated biodegradation rates can be negative.

The corrected concentration at point *i* can be represented by the following equation:

$$C_{i,corr} = C_{i-1,corr}\left(\frac{C_i}{C_{i-1}}\right)\left(\frac{1}{\left(1-\frac{R_c}{R_i}\left(1-\frac{T_i}{T_{i-1}}\right)\right)}\right)$$

where: $C_{i,corr}$ = corrected contaminant concentration at point i

$C_{i-1,corr}$ = corrected contaminant concentration at point i-1. (If point i-1 is the first or most upgradient point, $C_{i-1,corr}$ is equivalent to the observed contaminant concentration.)

C_i=observed contaminant concentration at point i

C_{i-1}=observed contaminant concentration at point i-1

T_i=observed tracer concentration at point i

T_{i-1}=observed tracer concentration at point i-1

R_c, R_t = the coefficient of retardation for the contaminant and tracer, respectively

Note: This assumes that $R_t/R_c + T_i/T_{i-1} > 1$.

Alternatively, Buscheck and Alcantar (1995) derived a relationship that allows calculation of first-order decay rate constants for steady-state plumes. This method involves coupling the regression of contaminant concentration (plotted on a logarithmic scale) versus distance downgradient (plotted on a linear scale) to an analytical solution for one-dimensional, steady-state, contaminant transport that includes advection, dispersion, sorption, and biodegradation.

Decay rate constants for Pumphouse 75 were calculated using 1995 TMB and tetraMB data. In addition, three decay constants were calculated using the method of Buscheck and Alcantar (1995). Two constants were calculated using March 1995 data obtained by Parsons ES along two different flow paths, and the third constant was calculated using November 1994 data from BVWS (1995). Calculations are contained in Appendix D. The magnitudes of the calculated rate constants are listed below:

Buscheck and Alcantar (1995) (March 1995 data)	0.00080-0.00085 day^{-1}
Buscheck and Alcantar (1995) (November 1994 data)	0.00073 day^{-1}
Total TMB concentrations	0.0006 day^{-1}
TetraMB concentrations	0.0006 day^{-1}

A value of 0.0005 day^{-1} was selected for use as the anaerobic decay coefficient in the model. This value is less than decay constants frequently cited in the literature (Table 5.1), and therefore is potentially conservative. For example, Chapelle (1994) reported that at two different sites with anaerobic conditions, the anaerobic decay rate constants both were approximately 0.01 day^{-1}. Wilson *et al.* (1994) report first-order anaerobic biodegradation rates of 0.007 to 0.185 day^{-1}. Stauffer *et al.* (1994) report rate constants of 0.01 and 0.018 day^{-1} for benzene and p-xylene, respectively. The selected anaerobic decay rate also is less than the rates computed for Site 56 at MacDill AFB (0.003 day^{-1}) (Parsons ES, 1995b) and for a site having similar hydrogeologic conditions at Eglin AFB in Florida (0.009 day^{-1}) (Parsons ES, 1995c).

TABLE 5.1
REPRESENTATIVE FIRST-ORDER RATE CONSTANTS
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Reference	Decay Rate (day^{-1})
Chapelle (1994)	0.01[a/]
Buscheck *et al.* (1993)	0.001 to 0.01[a/]
Wiedemeier *et al.* (1996)	0.01 to 0.03[a/]
Wiedemeier *et al.* (1996)	0.03 to 0.04[b/]
Wiedemeier *et al.* (1996)	0.02 to 0.04[c/]
Wiedemeier *et al.* (1996)	0.01 to 0.03[d/]
Wiedemeier *et al.* (1996)	0.006 to 0.03[e/]
Stauffer *et al.* (1994)	0.01[b/] to 0.02[e/]
MacIntyre *et al.* (1993)	0.01 to 0.02[e/]
MacIntyre *et al.* (1993)	0.007 to 0.012[b/]
MacIntyre *et al.* (1993)	0.006 to 0.012[f/]
Barker *et al.* (1987)	0.007[b/]
Kemblowski *et al.* (1987)	0.0085[b/]
Chiang *et al.* (1989)	0.095[b/]
Wilson *et al.* (1990)	0.007 to 0.024[b/]
Howard *et al.* (1991)	0.009 to 0.069[b/]

a/ For total BTEX.
b/ For benzene.
c/ For toluene.
d/ For ethylbenzene.
e/ For xylene.
f/ For naphthalene.

It should be noted that comparison of anaerobic decay rate coefficients with reported values from other sites is most valid if the site geochemical (e.g., redox and pH) conditions are similar. Negative redox values (measured at Pumphouse 75, indicating reducing conditions) were also measured at Site 56, the Eglin AFB site, and at the Hill AFB, Utah site described in Wiedemeier et al., (1996), and each of these sites contained sandy soils. The pH values at Site 56, Eglin AFB, and Hill AFB ranged from 6.2 to 7.3, 5.6 to 6.7, and 6.3 to 8.3, respectively. Measured pH values at Pumphouse 75 ranged from 4.6 to 7.7. Geochemical conditions for the remaining studies listed in Table 5.1 were not specified in the referenced documents.

5.4 MODEL CALIBRATION

Model calibration is an important component in the development of any numerical groundwater model. Calibration of the flow model demonstrates that the model is capable of matching hydraulic conditions observed at the site; calibration of a contaminant transport model superimposed upon the calibrated flow model helps verify that contaminant loading and transport conditions are being appropriately simulated. The numerical flow model presented herein was calibrated by altering transmissivity and recharge in a trial-and-error fashion until simulated heads approximated observed field values within a prescribed accuracy. After calibration of the flow model, the numerical solute transport model was calibrated by altering contaminant transport parameters and contaminant source term concentrations in a trial-and-error fashion until the simulated BTEX plume approximated observed field values. Table 5.2 lists input parameters used for the modeling effort. Model input and output is included in Appendix E.

5.4.1 Water Table Calibration

The shallow water table at Pumphouse 75 was assumed to be influenced by continuous recharge and discharge at the constant-head cells established at the upgradient and downgradient model boundaries. In addition, it was assumed that recharge entered the subsurface in the unpaved portions of the site. Potential recharge from other sources was omitted because of a lack of reliable data. According to BVWS (1995), the average annual precipitation at the Base is approximately 44 inches per year, and the average annual ET rate is 39 inches per year (89 percent of precipitation). The recharge rate for the calibrated groundwater flow model was 3 inches per year. During the calibration process, it was determined that use of higher recharge rates necessitated proportional increases in the transmissivity in order to obtain an acceptable water table simulation.

Hydraulic conductivity is an important aquifer characteristic that represents the ability of the water-bearing strata to transmit groundwater. Transmissivity is the product of the hydraulic conductivity and the thickness of the aquifer. An accurate estimate of hydraulic conductivity is important to help quantify advective groundwater flow velocities and to define the flushing potential of the aquifer and the quantity of electron-acceptor-charged groundwater that is entering the site from upgradient locations. According to Rifai *et al.* (1988), the Bioplume II model is particularly sensitive to variations in hydraulic conductivity. Lower values of hydraulic conductivity result in a slower-moving plume with a relatively small areal extent and higher average BTEX concentrations. Higher values of hydraulic conductivity result in a faster-moving plume that is spread over a larger area and contains lower average BTEX concentrations.

TABLE 5.2

BIOPLUME II MODEL INPUT PARAMETERS
PUMPHOUSE 75
INSTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

		Model Runs			
Parameter	Description	Calibrated Model Setup	PH75A	PH75B	PH75C
NTIM	Maximum number of time steps in a pumping period	1	1	1	1
NPMP	Number of Pumping Periods	1	20	16	16
NX	Number of nodes in the X direction	20	20	20	20
NY	Number of nodes in the Y direction	30	30	30	30
NPMAX	Maximum number of Particles NPMAX=(NX-2)(NY-2)(NPTPND) + (Ns^{w})(NPTPND) + 250	5300	5300	5300	5300
NPNT	Time step interval for printing data	1	1	1	1
NITP	Number of iteration parameters	7	7	7	7
NUMOBS	Number of observation points	5	5	5	5
ITMAX	Maximum allowable number of iterations in ADIP [w]	200	200	200	200
NREC	Number of pumping or injection wells	16	16	16	16
NPTPND	Initial number of particles per node	9	9	9	9
NCODES	Number of node identification codes	3	3	3	3
NPNTMV	Particle movement interval (IMOV)	0	0	0	0
NPNTVL	Option for printing computed velocities	1	1	1	1
NPNTD	Option to print computed dispersion equation coefficients	0	0	0	0
NPDELC	Option to print computed changes in concentration	0	0	0	0
NPNCHV	Option to punch velocity data	0	0	0	0
NREACT	Option for biodegradation, retardation and decay	1	1	1	1
PINT	Pumping period (years)	0.33	1	1	1
TOL	Convergence criteria in ADIP	0.001	0.001	0.001	0.001
FOROS	Effective porosity	0.25	0.25	0.25	0.25
BETA	Characteristic length (long. dispersivity; feet)	40	40	40	40

TABLE 5.2 (Continued)

BIOPLUME II MODEL INPUT PARAMETERS
PUMPHOUSE 75
INSTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

		Model Runs			
S	Storage Coefficient	0 (Steady-State)	0	0	0
TIMX	Time increment multiplier for transient flow	-	-	-	-
TINIT	Size of initial time step (seconds)	-	-	-	-
XDEL	Width of finite difference cell in the x direction (feet)	30	30	30	30
YDEL	Width of finite difference cell in the y direction (feet)	40	40	40	40
DLTRAT	Ratio of transverse to longitudinal dispersivity	0.025	0.025	0.025	0.025
CELDIS	Maximum cell distance per particle move	0.5	0.5	0.5	0.5
ANFCTR	Ratio of Tyy to Txx (1 = isotropic)	1	1	1	1
DK	Distribution coefficient	0.047	0.047	0.047	0.047
RHOB	Bulk density of the solid (grams/cubic centimeter)	1.6	1.6	1.6	1.6
THALF	Half-life of the solute	-	-	-	-
DEC1	Anaerobic decay coefficient (day^{-1})	0.0005	0.0005	0.0005	0.0005
DEC2	Reaeration coefficient (day^{-1})	0	0	0	0
F	Stoichiometric Ratio of Hydrocarbons to Oxygen	3.1	3.1	3.1	3.1

a/ Ns - Number of nodes that represent fluid sources (wells or constant-head cells).

b/ ADIP = Alternating-direction implicit procedure (subroutine for solving groundwater flow equation).

Saturated thickness data from previous reports, geologic logs, and water level measurements were used in conjunction with the average hydraulic conductivity as determined from slug tests (BVWS, 1995 and this field effort) to estimate an initial uniform transmissivity for the entire model domain. As stated in Section 3.5, hydraulic conductivities derived from slug tests performed in the shallow sandy aquifer at Pumphouse 75 ranged from 5.2 to 90.7 ft/day. To better match heads in the model to observed values, the transmissivities were progressively varied in blocks and rows until the simulated water levels for cells corresponding to the selected well locations matched the observed water levels to an acceptable degree. Figure 5.2 shows the calibrated water table. Calibrated model hydraulic conductivities ranged between 1 and 114 ft/day, with the majority of conductivities ranging between 14 and 114 feet per day. Simulated advective velocities were variable, but generally ranged from 0.10 ft/day to 0.26 ft/day (36 to 95 feet per year). These velocities are slightly higher than the average velocity of 0.06 ft/day (22 feet per year) estimated prior to the start of the modeling using BVWS (1995) data.

Water level elevation data from 16 monitoring well/point locations were used to compare measured and simulated heads for calibration. The 16 selected locations were MD75-MW01, MD75-MW02, MD75-MW03, MD75-MW04, MD75-MW05, MD75-MW06, MD75-MW08, MD75-MW09, MD75-MW10, MD75-MW12, MD75-MW13, MD75-MW15, 75MP-1S, 75MP-7S, 75MP-8S, AND 75MP-9S.

The root mean squared (RMS) error is commonly used to express the average difference between simulated and measured heads. RMS error is the average of the squared differences between measured and simulated heads, and can be expressed as:

$$\mathrm{RMS} = \left[\frac{1}{n} \sum_{i=1}^{n} \left(h_m - h_s \right)_i^2 \right]^{0.5}$$

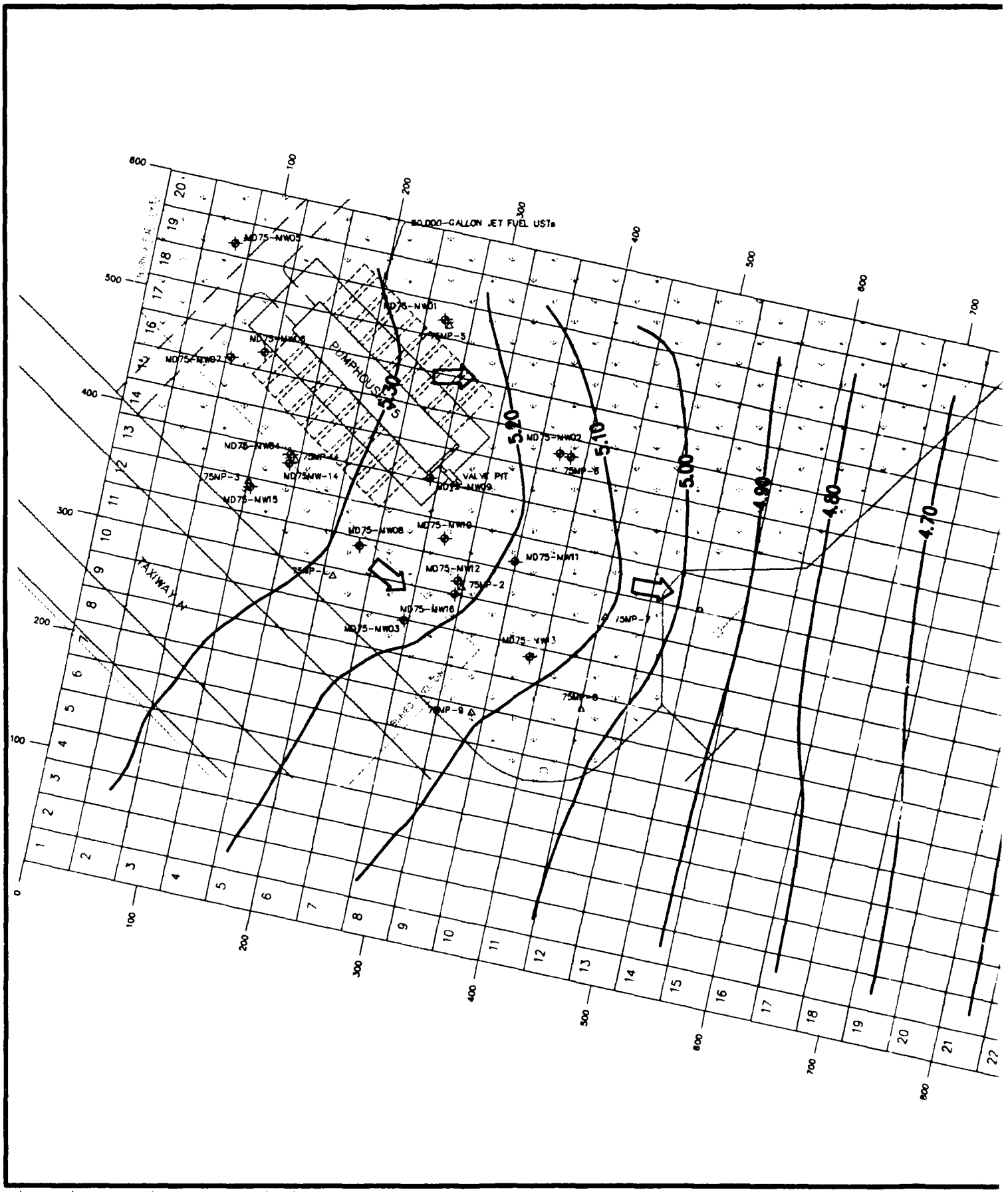
where: n = the number of points where heads are being compared,

h_m = measured head value, and

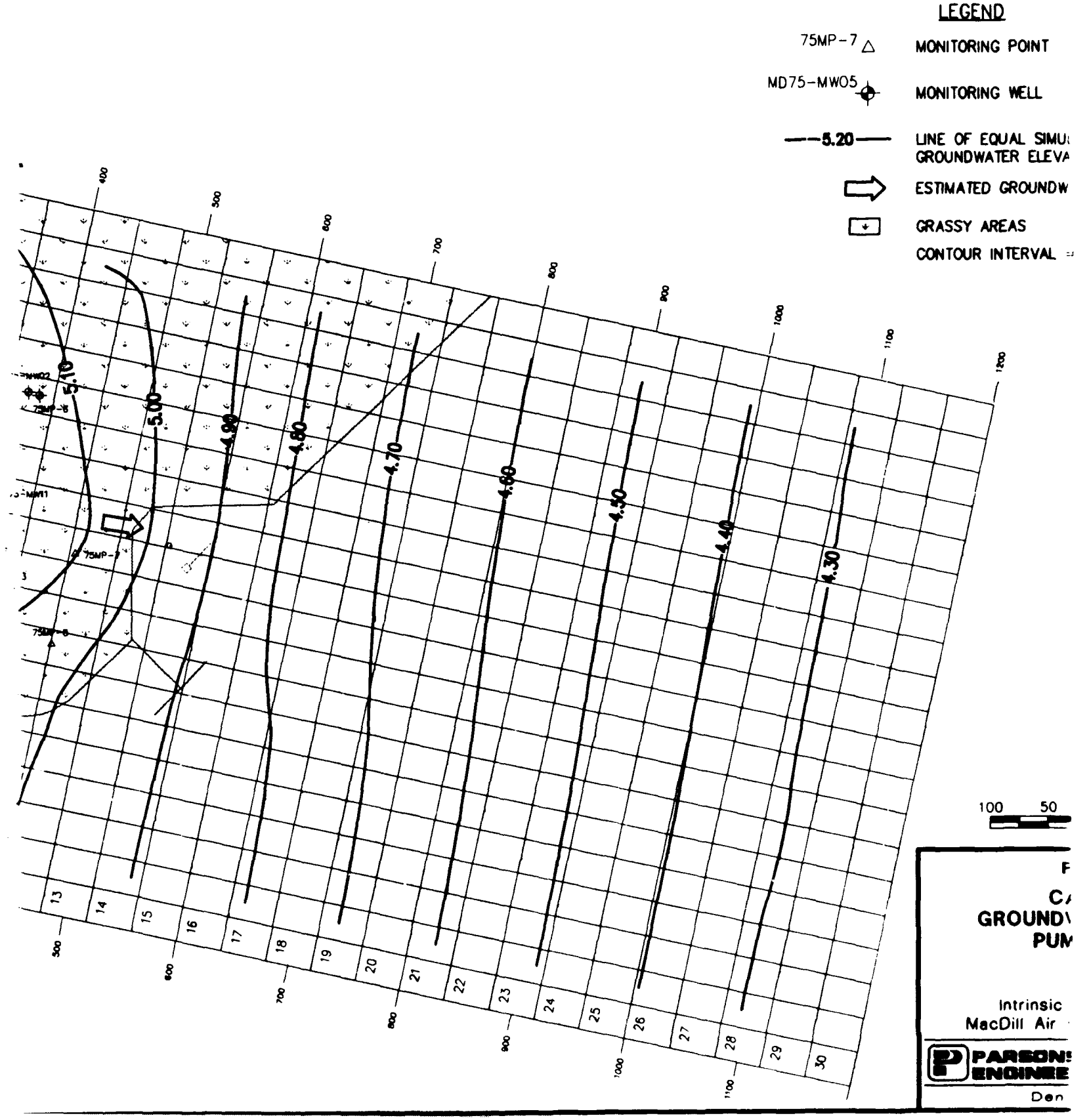
h_s = simulated head value.

The RMS error between observed and calibrated values at the 16 comparison points was 0.024 foot, which corresponds to a calibration error of 2.2 percent (water levels dropped approximately 1.1 feet over the length of the model grid). RMS error calculations are summarized in Appendix D.

In solving the groundwater flow equation, Bioplume II establishes the water table surface and calculates an overall hydraulic balance that accounts for the numerical difference between flux into and out of the system. The hydraulic mass balance for the calibrated model was adequate to accomplish the objectives of this modeling effort, with 98.02 percent of the water flux into and out of the system being numerically accounted for (i.e., a 1.98-percent error). According to Anderson and Woessner (1992), a mass balance error of around 1 percent is acceptable, while Konikow (1978) indicates an error of less than 0.1 percent is ideal.



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LEGEND
75MP-7
MONITORING POINT
MD75-MW05
MONITORING WELL
5.20
LINE OF EQUAL SIMU
GROUNDWATER ELEVA
ESTIMATED GROUNDW
GRASSY AREAS
CONTOUR INTERVAL
5.10
5.00
4.90
4.80
4.70
4.60
4.50
4.40
4.30
100
50
F
CA
GROUNDV
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MacDill Air
PARSON
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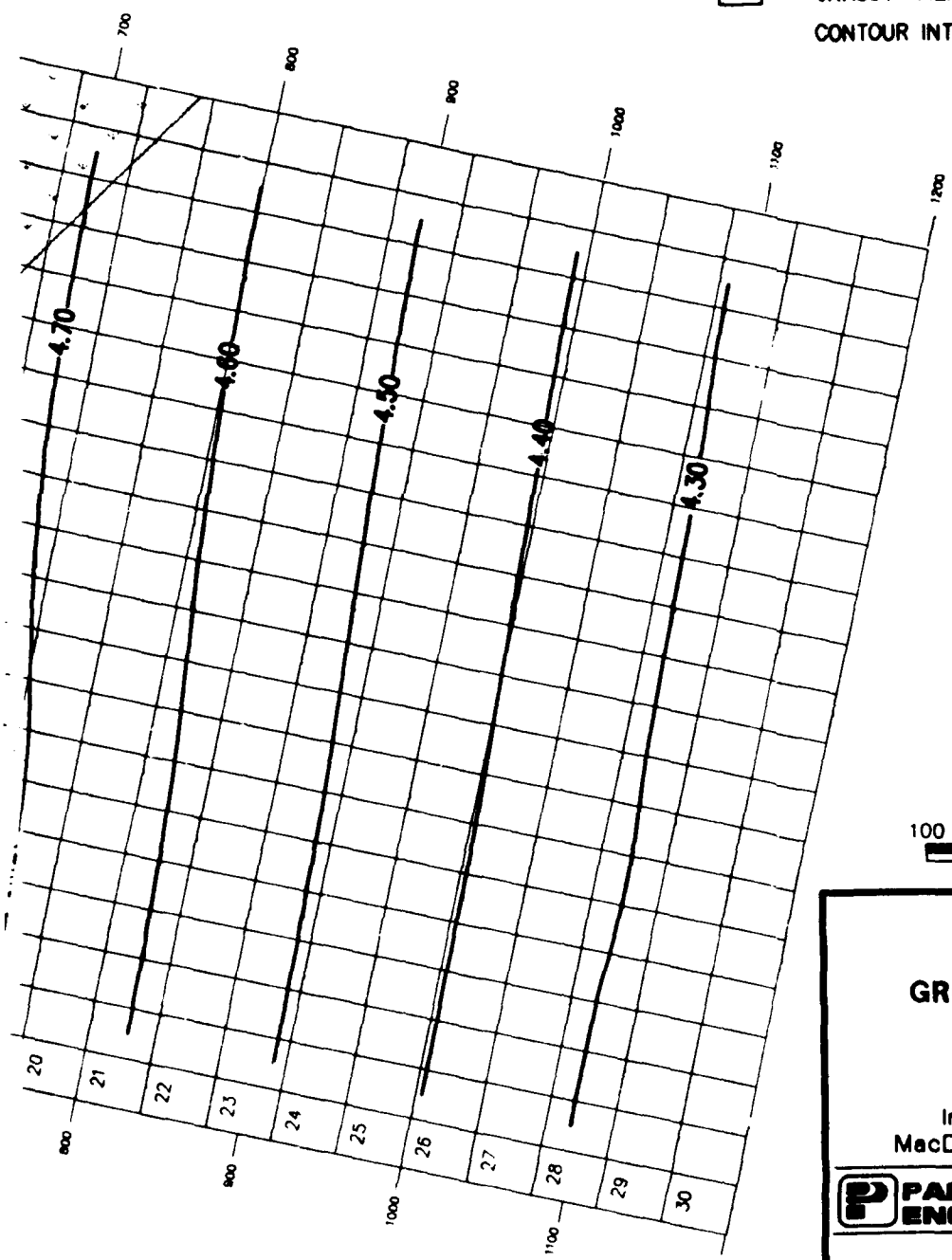


FIGURE 5.2

CALIBRATED GROUNDWATER SURFACE PUMPHOUSE 75

Intrinsic Remediation TS
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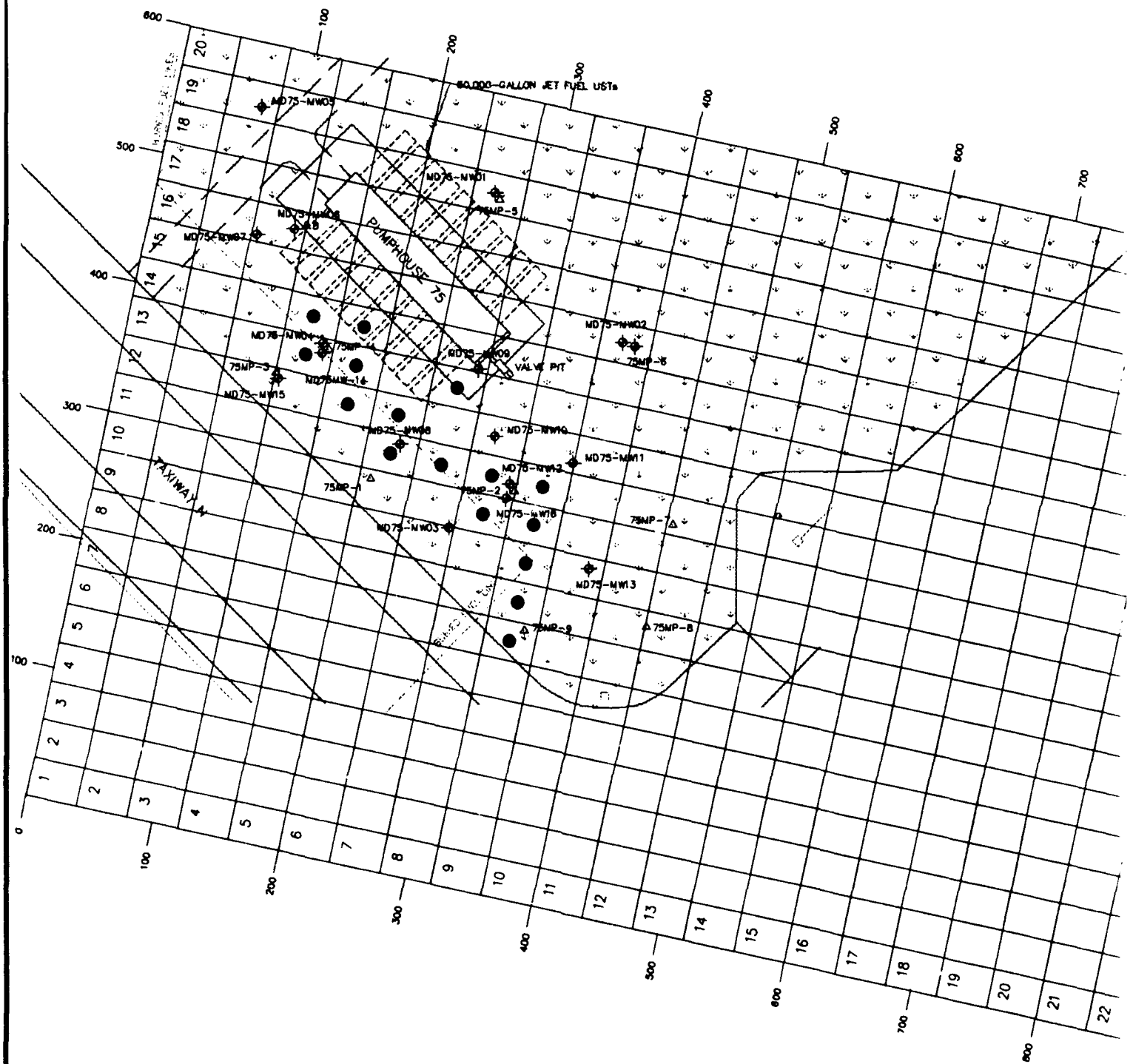
5.4.2 BTEX Plume Calibration

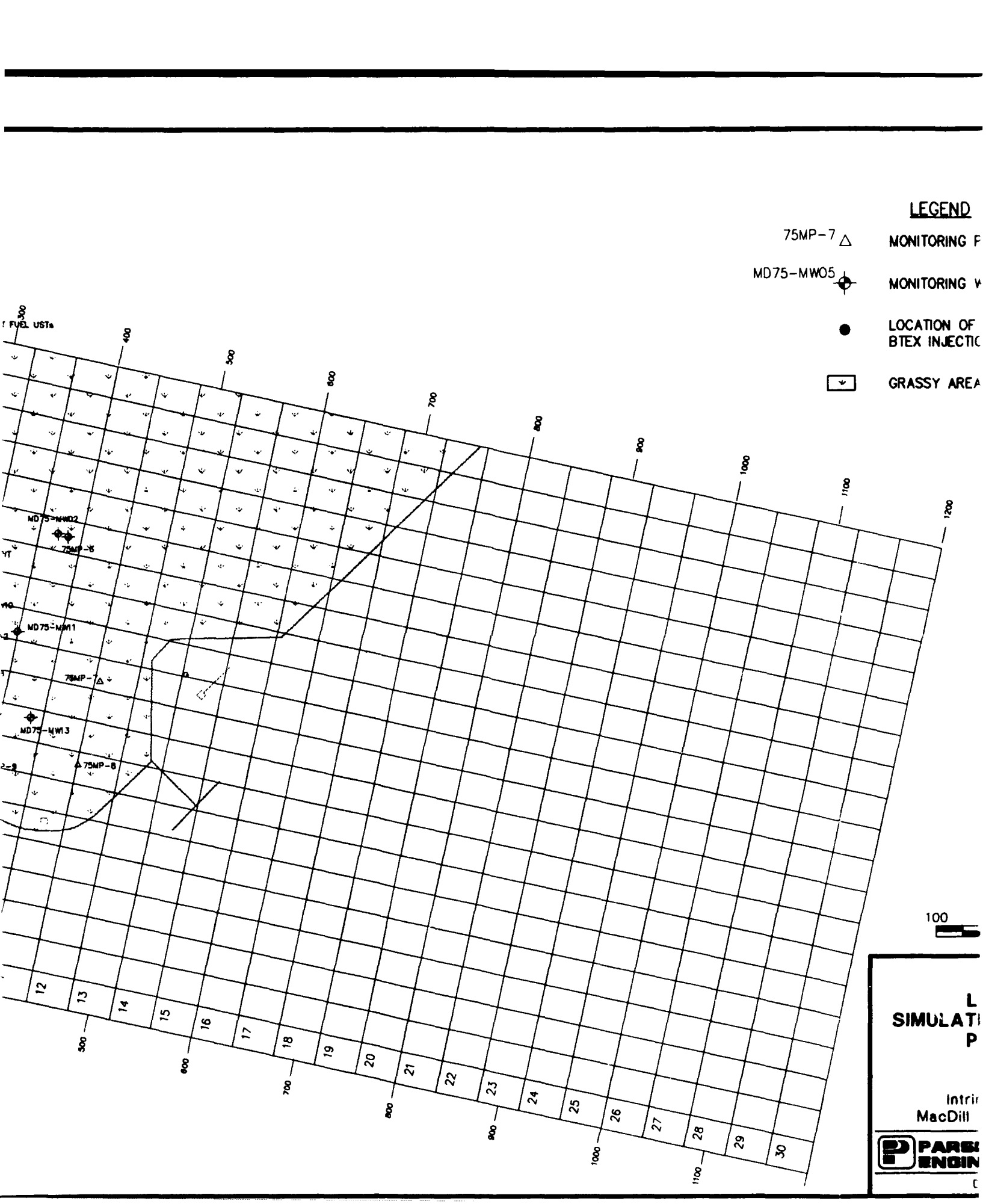
Model input parameters affecting the distribution and concentration of the simulated BTEX plume were modified so that model predictions were similar to dissolved total BTEX concentrations measured in March 1995. To do this, model runs were made using the calibrated steady-state hydraulic parameters. Calibration of the fate and transport portion of a Bioplume II model generally requires that the contaminant distribution be known for two different times. Therefore, BTEX concentrations measured in groundwater during November 1994 were input as initial conditions, and the model was run for a period of 4 months to obtain a March 1995 plume. In addition, because residual LNAPL is present in the vicinity of the water table at Pumphouse 75 (Section 4.2.2), it was necessary to include simulated injection wells to model partitioning of BTEX compounds from the residual LNAPL into the groundwater. The locations of the injection wells are shown on Figure 5.3. Locations of injection wells were based on the soil quality data obtained by BVWS (1995) and Parsons ES (Section 4.2.2). In addition, the distribution of dissolved BTEX in groundwater also was used to help locate injection wells. The groundwater quality data strongly suggest that the most significant soil contamination is present in the vicinity of the jet fuel pipelines located southwest of the pumphouse, and that any soil contamination in the immediate vicinity of the USTs is not substantially impacting groundwater quality. Therefore, the majority of injection wells in the model were placed near the pipelines.

While the term "injection well" suggests that contaminants are being introduced at a point, Bioplume II assumes that contamination introduced at a well instantly equilibrates throughout the entire cell in which the well is located. The injection rate for the cells was set at 1×10^{-6} cubic foot per second (ft^3/sec), a value low enough that the flow calibration and water balance were not affected. The injected BTEX concentrations were proportional to the groundwater BTEX concentrations measured in March 1995, with the maximum injected BTEX concentration occurring in the vicinity of the highest detected dissolved BTEX concentrations. The injected BTEX concentrations were reduced in other areas where the measured BTEX concentrations in groundwater were lower. Due to the low DO concentrations measured in groundwater, the injected water was assumed to be oxygen-free. By varying the injection well concentrations, the anaerobic decay coefficient, the coefficient of retardation, and dispersivity, the BTEX plume was calibrated reasonably well to the existing plume in terms of plume extent and the magnitude and distribution of BTEX concentrations in the plume area. The calibrated plume configuration is shown on Figure 5.4.

The calibrated BTEX plume calculated by the model is similar, but not identical, to the observed March 1995 BTEX plume (Figure 4.3). The following differences are observed:

- The width of the simulated plume (i.e., the distance between the 10-µg/L contour lines measured in a northeast-southwest direction) is greater than measured in March 1995. This difference can be attributed primarily to the fact that the BTEX plume measured in November 1994, and used as initial conditions in the model, appeared to be wider than the plume measured in March 1995. This difference could not be overcome by reasonable manipulation of contaminant transport parameters. As a result, the simulated plume contains a greater contaminant mass than the measured March 1995 plume, and this difference contributes to the conservative nature of the model.


50,000-GALLON JET FUEL USTs
MD75-MW05
MD75-MW01
75MP-5
MD75-MW08
MD75-MW07
PUMPHOUSE 75
MD75-MW02
75MP-6
MD75-MW04
75MP-4
MD75-MW09
VALVE PIT
75MP-3
MD75-MW14
MD75-MW15
MD75-MW06
MD75-MW10
MD75-MW11
MD75-MW12
75MP-1
75MP-2
MD75-MW16
MD75-MW03
75MP-7
MD75-MW13
75MP-9
75MP-8
TAXIWAY M


LEGEND
75MP-7
MONITORING P
MD75-MW05
MONITORING W
LOCATION OF
BTEX INJECTIC
GRASSY AREA
FUEL USTs
MD75-MW02
75MP-5
MD75-MW11
75MP-7
MD75-MW13
75MP-6
100
SIMULATI
P
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PARSI
ENGIN

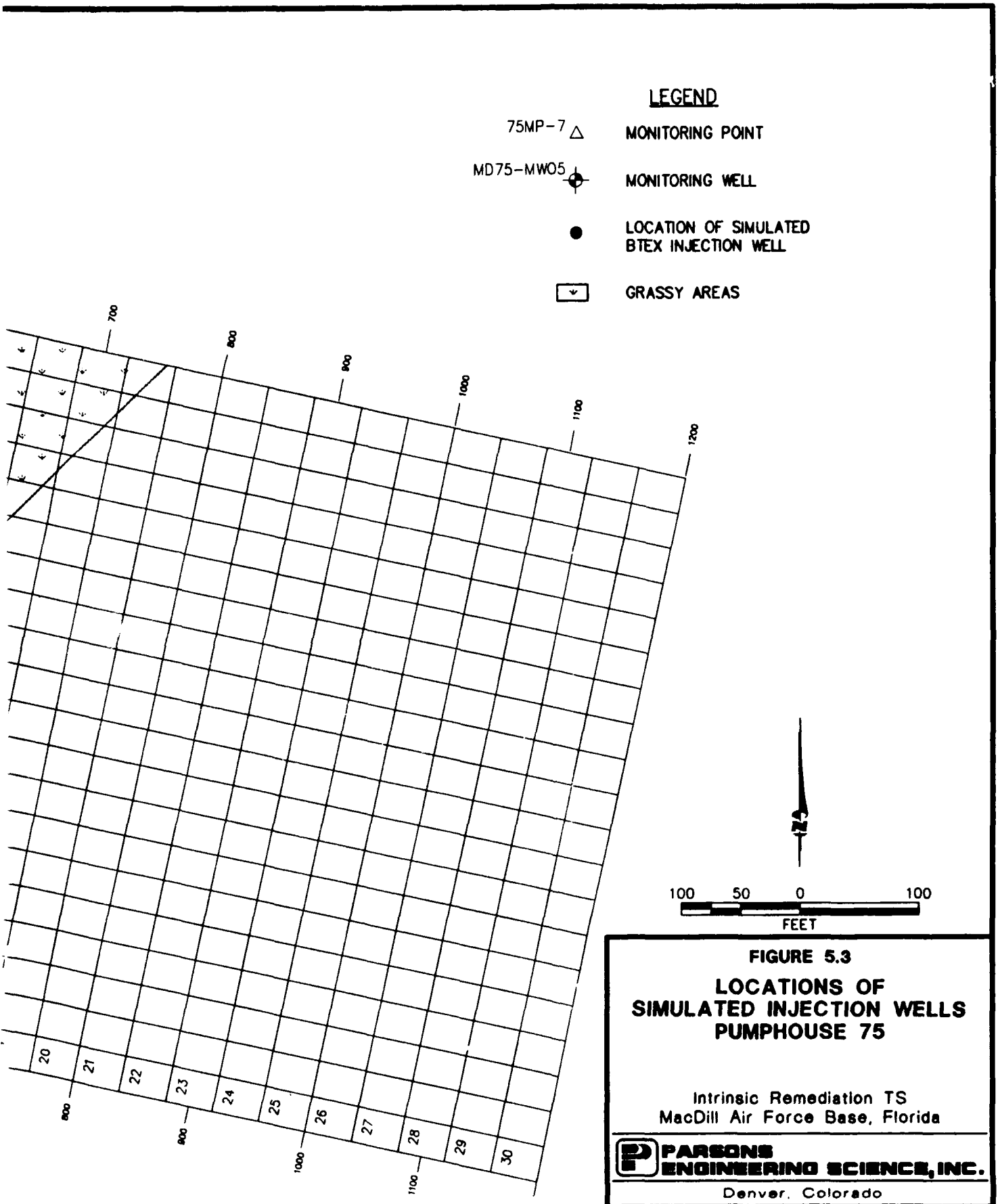
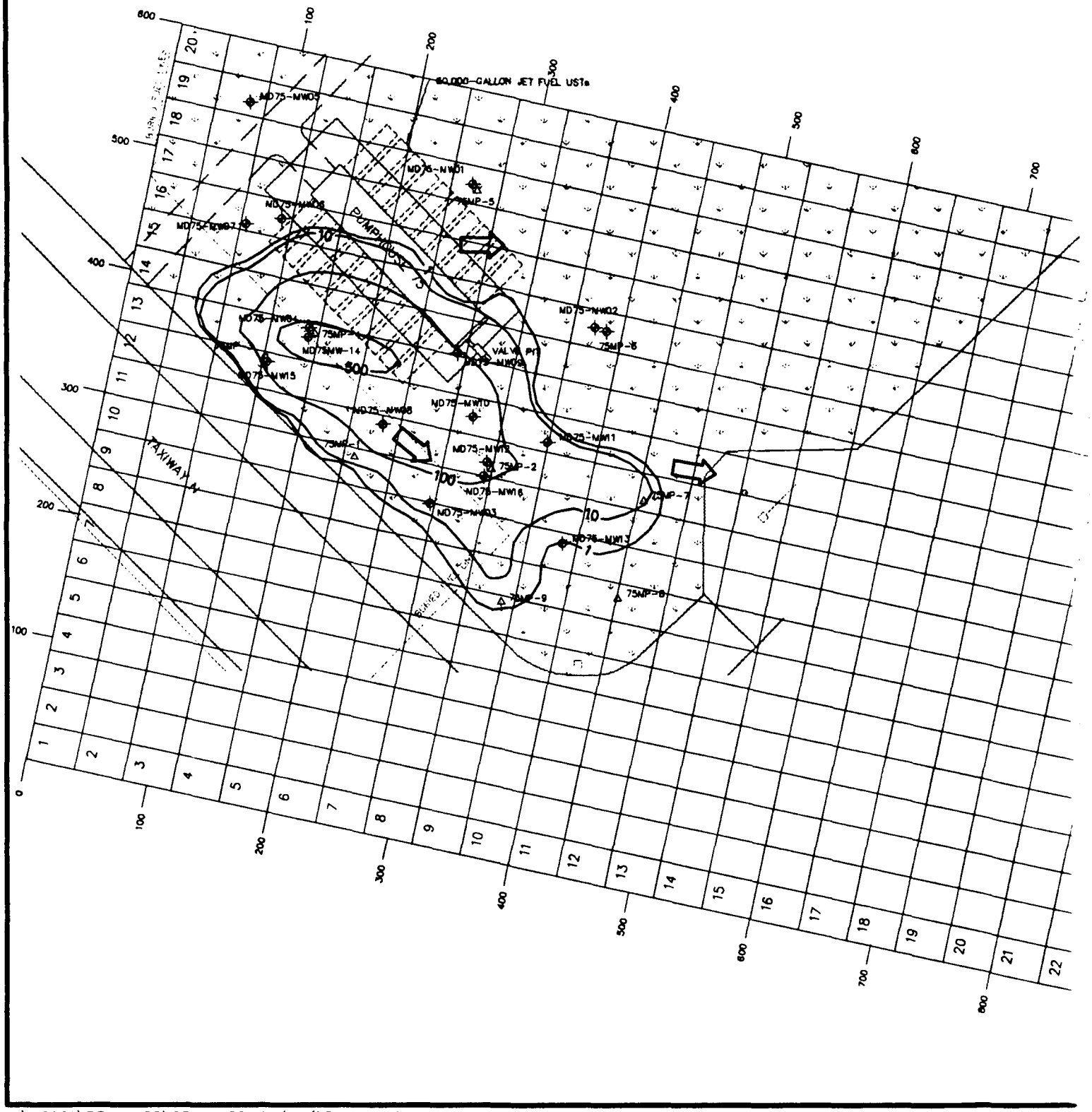


FIGURE 5.3

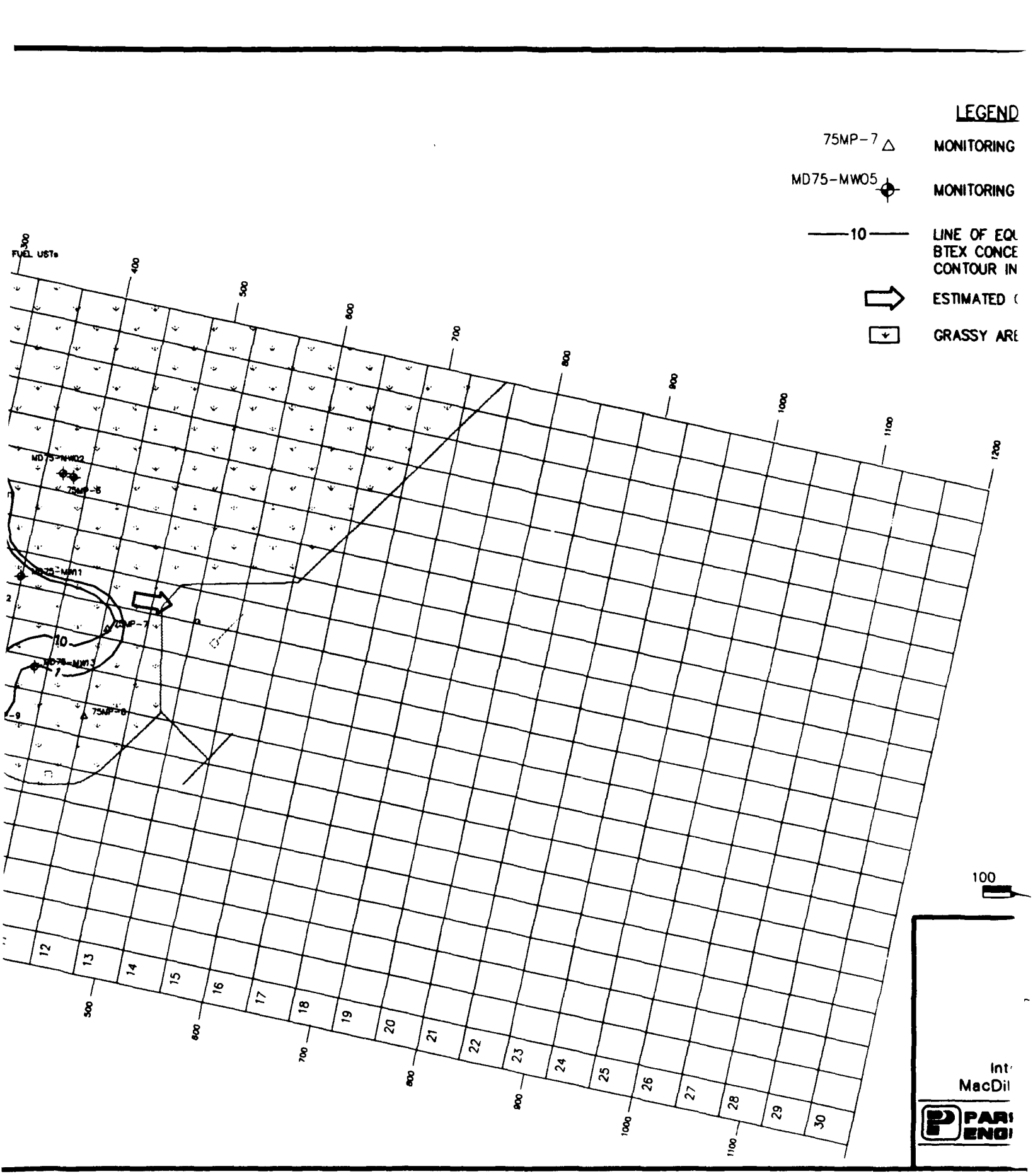
LOCATIONS OF SIMULATED INJECTION WELLS PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

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LEGEND
75MP-7 △ MONITORING
MD75-MW05 MONITORING
10 LINE OF EQU
BTEX CONCE
CONTOUR IN
ESTIMATED
GRASSY ARE
FUEL USTs
MD75-MW02
75MP-6
MD75-MW01
75MP-7
10
MD75-MW03
75MP-8
100
300
400
500
600
700
800
900
1000
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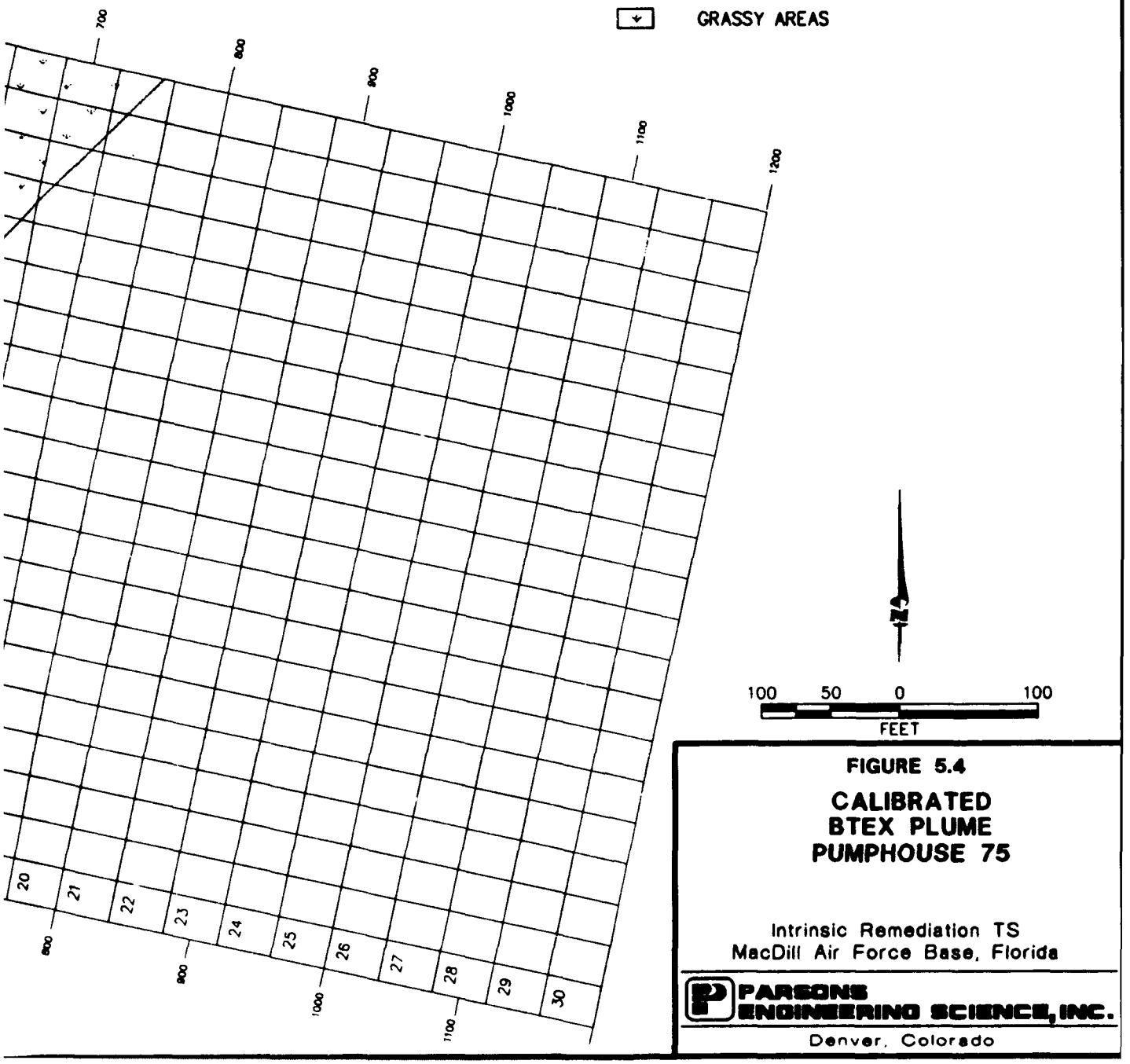


FIGURE 5.4

CALIBRATED BTEX PLUME PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

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Denver, Colorado

- Low (less than 5 µg/L) BTEX concentrations were measured at several outlying wells located north and east of the pumphouse in March 1995 (Figure 4.3). Despite the low crossgradient DO concentrations used in the model, these low BTEX concentrations fringing the plume could not be reproduced by manipulation of contaminant transport parameters within reasonable limits. Therefore, the detected concentrations may be resulting from relatively minor amounts and low concentrations of soil contamination in the vicinity of the USTs. Due to the low magnitude of the concentrations however, this difference is considered to be relatively insignificant. In addition, laboratory methodblanks associated with most of these northern and eastern sampling locations also had detectable BTEX concentrations (Table 4.3), suggesting that the detected BTEX concentrations in the environmental samples may, at least in part, reflect laboratory-introduced contamination.

5.4.2.1 Discussion of Parameters Varied During Plume Calibration

As noted previously, the transport parameters varied during plume calibration were dispersivity, the anaerobic decay coefficient, and the coefficient of retardation. In addition, the BTEX source term injection concentrations were varied. These parameters generally were varied with intent of limiting plume migration to the observed extents, because the original estimates for the parameters resulted in a calculated BTEX plume that did not reasonably reproduce the original plume. In general, slight to moderate variations of these parameters did not affect the plume substantially due to the short (4-month) calibration period. If the calibration period had been longer, there would have been more time for the parameter adjustment to have a noticeable effect on the model results. However, some variations in plume configuration were observed during the calibration process.

Dispersivity. Much controversy surrounds the concepts of dispersion and dispersivity. Longitudinal dispersivity was originally estimated as 7 feet, using one-tenth the distance between the upgradient margin of the 500-µg/L isopleth and the longitudinal centroid of the March 1995 plume (see Figure 4.3). Longitudinal dispersivity also was determined, using a method presented by Domenico and Schwartz (1990), to be approximately 79 feet. During plume calibration, longitudinal dispersivity was varied between 14 and 60 feet, and the calibrated model used a value of 40 feet. During the calibration process, the model was found to be relatively insensitive to changes in dispersivity (changes in this parameter did not have a significant impact on the distribution of BTEX concentrations). Transverse dispersivity values typically are estimated as one-tenth (0.1) of the longitudinal dispersivity values (Domenico and Schwartz, 1990). However, because the 1995 plume was relatively narrow, the ratio of transverse to longitudinal dispersivity was reduced to 0.025.

Anaerobic Decay Coefficient. As discussed in Section 5.3.5, the anaerobic decay coefficient was originally estimated to range from 0.0004 to 0.00085 day^{-1}. This value was varied within this range during plume calibration, and the calibrated model used a value of 0.0005 day^{-1}. The model was found to be relatively insensitive to small changes in the decay coefficient within the 4-month calibration period from November 1994 to March 1995. The value of 0.0005 day^{-1} used in the calibrated model is believed to be reasonably conservative, as described in Section 5.3.5.

Coefficient of Retardation. Retardation of the BTEX compounds relative to the advective velocity of the groundwater occurs when BTEX molecules are sorbed to organic carbon, silt, or clay in the aquifer matrix. TOC was not detected in the three soil samples analyzed for this

parameter (Table 4.2); therefore, site-specific retardation coefficients were not calculated. The lack of detectable quantities of TOC suggests that retardation of the dissolved BTEX plume may be minimal. TOC was detected in six of seven samples collected from the surficial sand aquifer at two other sites at the Base (Site 56 and OT 24), with concentrations ranging from 0.10 to 2.68 percent. On the basis of these TOC concentrations, retardation coefficients for benzene, which is the least retarded of the BTEX compounds, ranged from 1.0 to 10.1. It is probable that some retardation of the dissolved BTEX plume at Pumphouse 75 will occur at and/or downgradient from the site along the plume flowpath. Therefore, a low retardation coefficient of 1.3 was used in the calibrated model. This is the value that would be obtained for benzene assuming an average TOC content of 0.06 percent (the detection limit for this study), a bulk density of 1.6 grams per cubic centimeter (g/cc) (Freeze and Cherry, 1979), and published values of the soil sorption coefficient (K_{oc}) for the BTEX compounds (as compiled by Wiedemeier *et al.*, 1995). The lower the assumed coefficient of retardation, the farther the BTEX plume will migrate downgradient. The calibrated flow and transport model subsequently was used to simulate plume migration for a period of 20 years using slightly lower retardation values to determine whether small changes in this value significantly affected model predictions. The results of these simulations are discussed in Section 5.6.1.

Source Injection Concentration. Sixteen injection wells were used to simulate the partitioning of BTEX from contaminated soil in the vicinity of the plume. The water injection rate ($1x10^{-6}$ ft^3/sec) was sufficiently low that the calibrated flow system was not altered. The injected BTEX concentrations were varied until the calibrated plume matched measured conditions reasonably well. The detected BTEX concentrations are highest in the immediate vicinity of monitoring well MD75-MW04, suggesting that the most significant soil contamination is located in this area. During the calibration process, it became evident that maintenance of relatively high BTEX injection concentrations in this area were necessary to simulate the measured dissolved BTEX concentration in well 75MD-MW04.

5.5 SENSITIVITY ANALYSIS

The purpose of the sensitivity analysis is to determine the effect of varying model input parameters on model output. According to Rifai *et al.* (1988), the Bioplume II model is most sensitive to changes in the coefficient of reaeration, the coefficient of anaerobic decay, and the hydraulic conductivity of the media, and is less sensitive to changes in the retardation factor, porosity, and dispersivity. The sensitivity analysis was conducted by varying transmissivity, the coefficient of retardation, the coefficient of anaerobic decay, dispersivity, and BTEX injection concentrations. The coefficient of reaeration was not included in the sensitivity analyses because it was set to zero in the model.

To perform the sensitivity analyses, the calibrated model was adjusted by systematically changing the aforementioned parameters individually, and then comparing the new simulations to the results of the original calibrated model. The models were run for a 0.33-year period, just as the original was, so that the independent effect of each variable could be assessed. Ten sensitivity runs of the calibrated model were made, with the following variations:

1) Transmissivity uniformly increased by a factor of 5;

2) Transmissivity uniformly decreased by a factor of 5;

3) Coefficient of retardation increased from 1.3 to 3.0;

4) Coefficient of retardation decreased from 1.3 to 1.0 (no retardation);

5) Coefficient of anaerobic decay increased by a factor of 5;

6) Coefficient of anaerobic decay decreased by a factor of 5;

7) Dispersivity increased by a factor of 3;

8) Dispersivity decreased by a factor of 3;

9) Injected BTEX concentrations increased by a factor of 5; and

10) Injected BTEX concentrations decreased by a factor of 5.

The results of the sensitivity analyses are shown in Figures 5.5 through 5.9. These figures display three-dimensional representations of modeled BTEX concentrations. The vertical axis of each three-dimensional figure represents the BTEX concentration in µg/L. With the exceptions of transmissivity and the injected BTEX concentrations, parameter modification did not greatly affect the plume, in part because the calibration period was short (4 months). More significant differences may have been apparent if a longer time period had been simulated. However, the sensitivity analyses do indicate how variations in key hydraulic and transport parameters affect the BTEX plume.

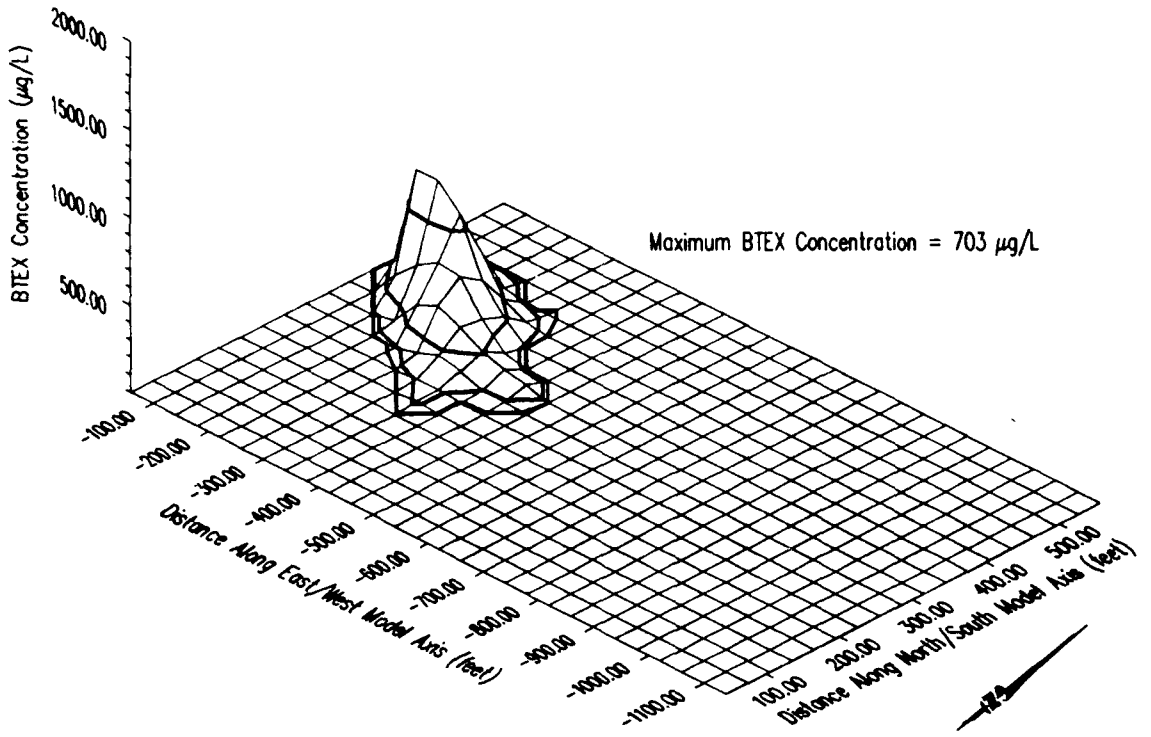
5.5.1 Sensitivity to Variations in Transmissivity

The effects of varying transmissivity are shown in Figure 5.5. Uniformly increasing the transmissivity by a factor of five increased the lateral dispersal of the plume such that the maximum observed concentrations in the source cell area were only 252 µg/L, compared to the calibrated maximum of 703 µg/L. In addition, the leading edge of the BTEX plume advanced more than 100 feet further downgradient than in the calibrated model. The faster groundwater velocity produced by the higher transmissivity initially results in greater plume travel rates and distances, diluting and further exposing the BTEX plume to electron acceptors.

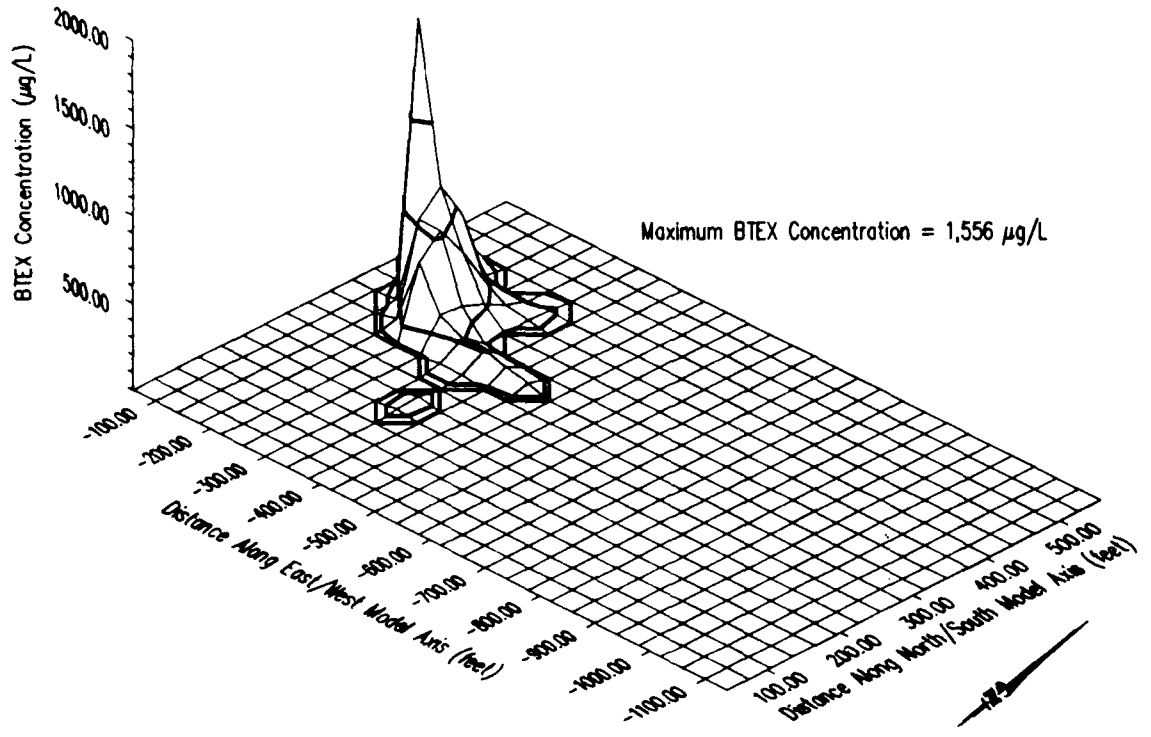
In contrast, decreasing the transmissivity by a factor of five slowed overall plume migration, caused the plume shape to be relatively irregular and lobate, and caused an increase in maximum BTEX levels to 1,556 µg/L. Increased BTEX concentrations in the plume area are primarily caused by reductions in the plume travel rate (i.e., the existing BTEX mass is concentrated within a smaller area).

5.5.2 Sensitivity to Variations in the Coefficient of Retardation

The effects of varying the coefficient of retardation (R) are shown on Figure 5.6. Increasing R to 3.0 from the value of 1.3 used in the calibrated model resulted in a plume configuration that was not greatly different from the observed plume. In addition, the maximum BTEX concentration of 714 µg/L was very similar to the maximum calibrated concentration of 703 µg/L. Increasing R causes the contaminant migration velocity to decrease relative to the advective groundwater velocity. One difference that was noted was that the downgradient portion of the plume simulated using the higher R value was narrower than the observed plume, and the modeled plume did not reach monitoring point 75MP-9, where BTEX was detected. Decreasing R to 1.0 (no retardation) also produced a plume that



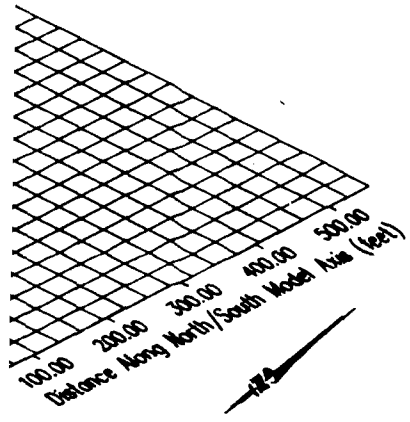
CALIBRATED MODEL



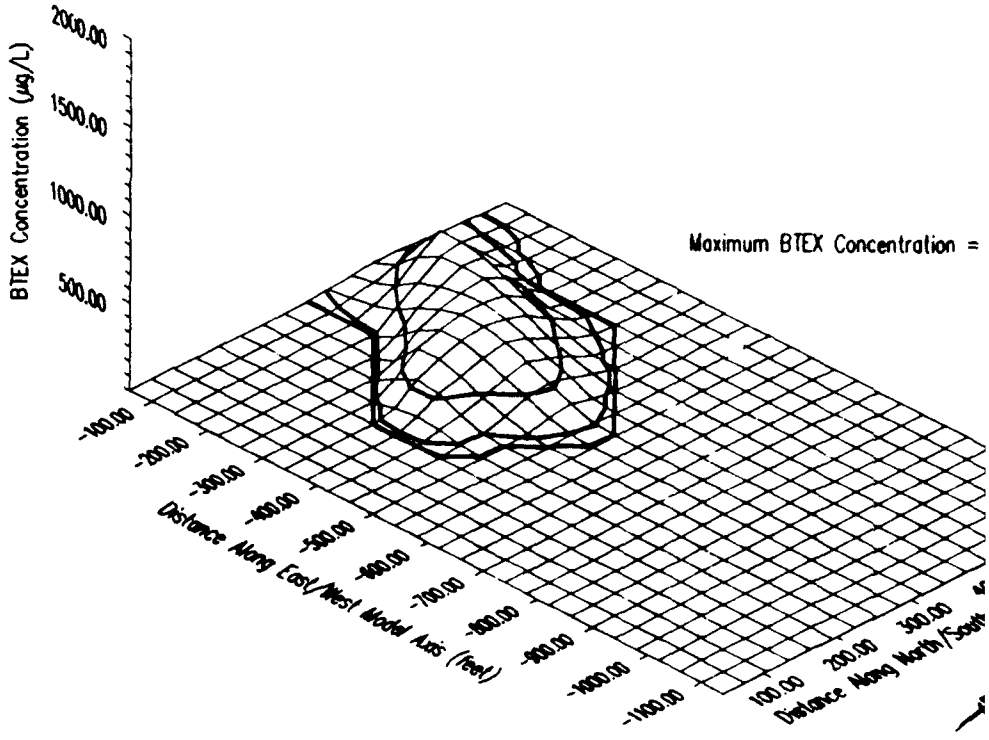
TRANSMISSIVITY DECREASED 5X

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BTEX Concentration = 703 µg/L



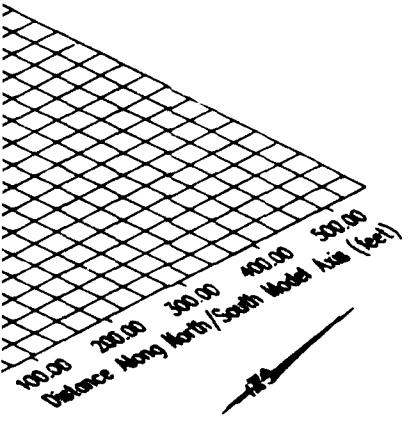
ED MODEL



Maximum BTEX Concentration =

TRANSMISSIVITY INCREASED 5X

BTEX Concentration = 1,556 µg/L



DECREASED 5X

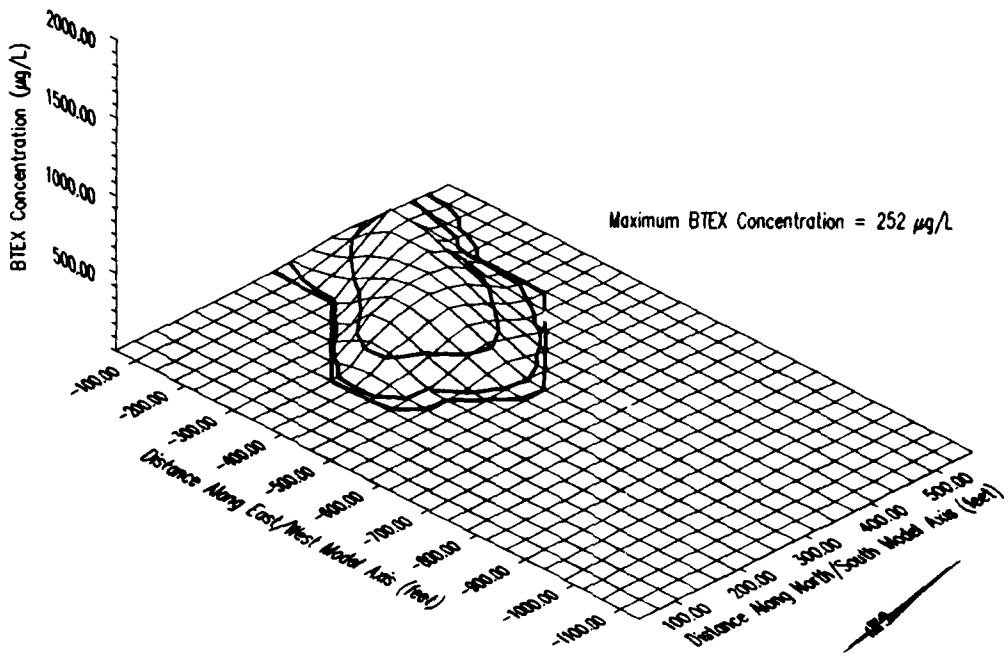
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TRANSMISSIVITY INCREASED 5X

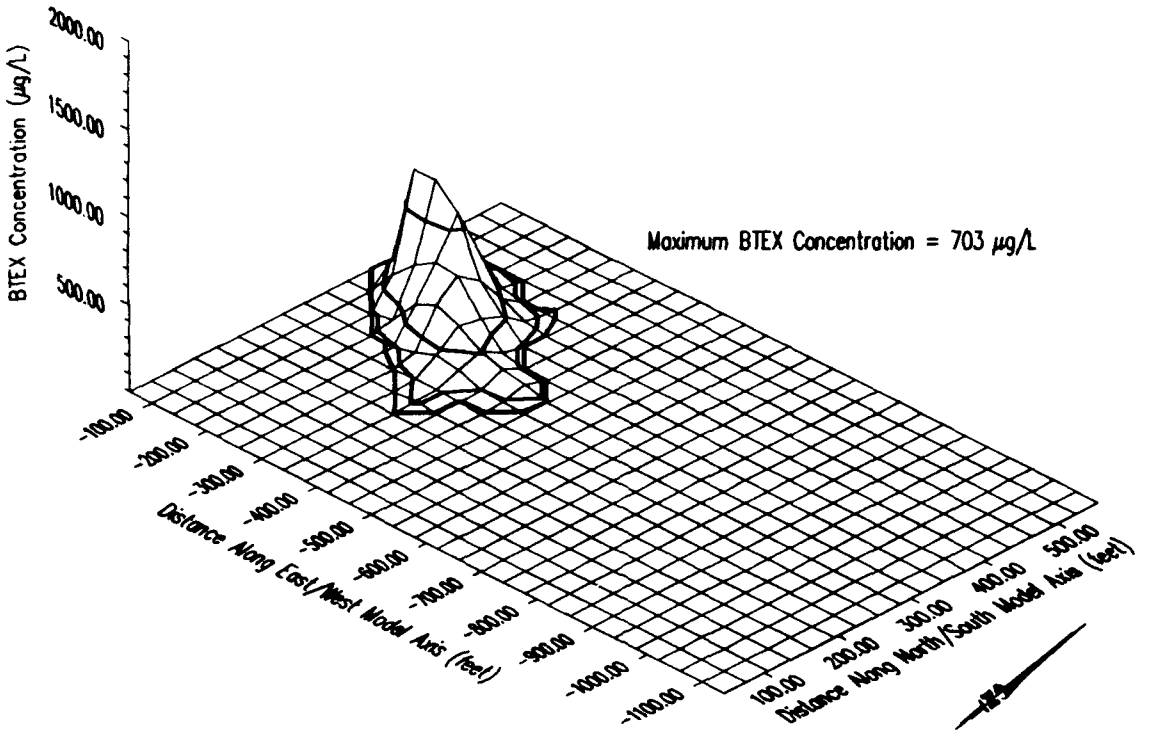
FIGURE 5.5

MODEL SENSITIVITY TO VARIATIONS IN TRANSMISSIVITY PUMPHOUSE 75

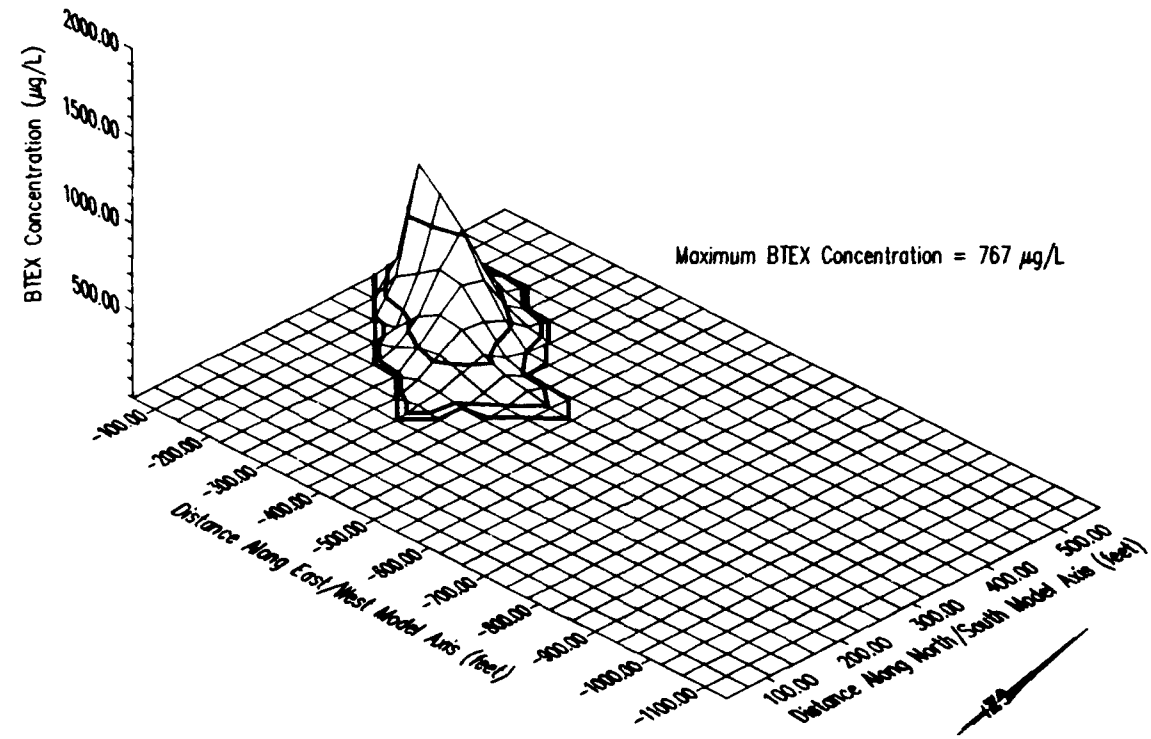
Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.

Denver, Colorado



CALIBRATED MODEL

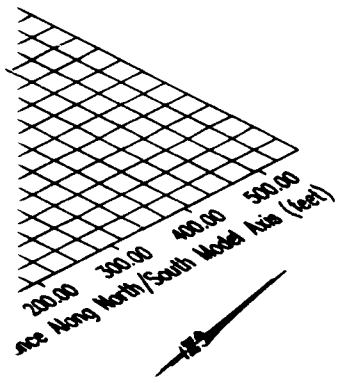


RETARDATION COEFFICIENT = 1.0

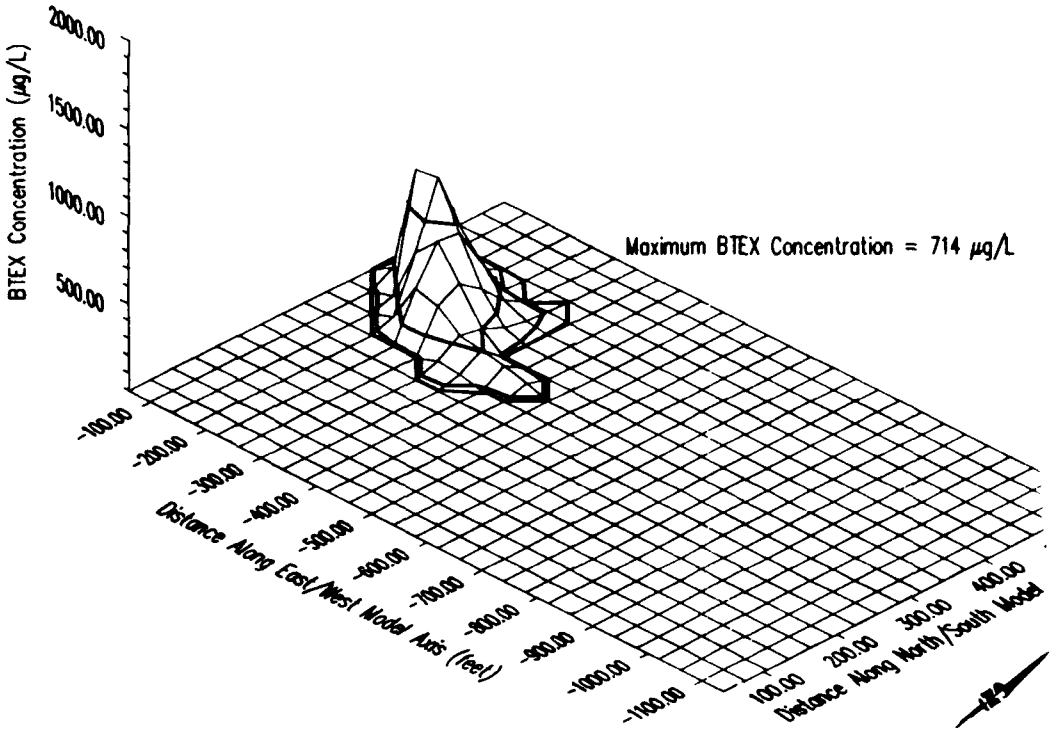
BTEX Concentration (µg/L)

K:\AFCEE\722450\24500002, 11/29/95 at 08:40

ncentration = 703 µg/L

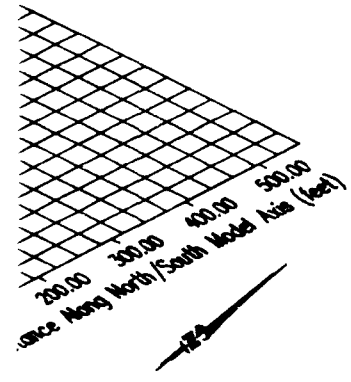


ODEL



RETARDATION COEFFICIENT = 3.0

Concentration = 767 µg/L



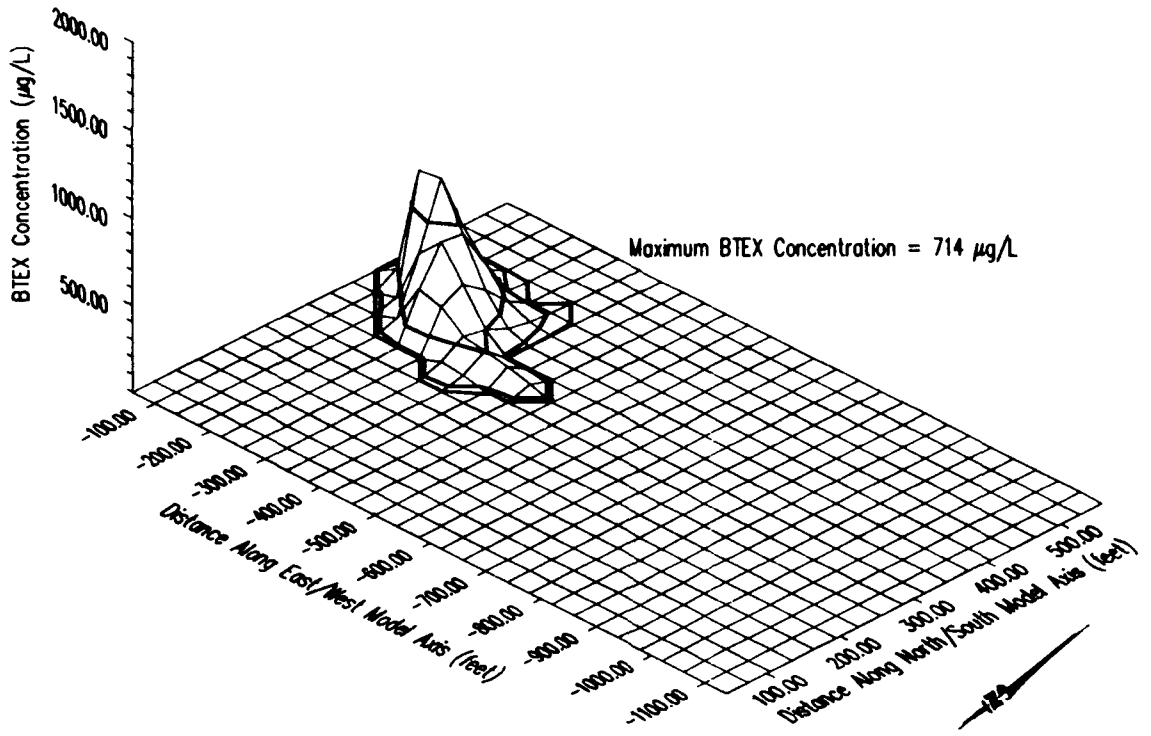
VT = 1.0

FIGURE

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RETARDATION COEFFICIENT = 3.0

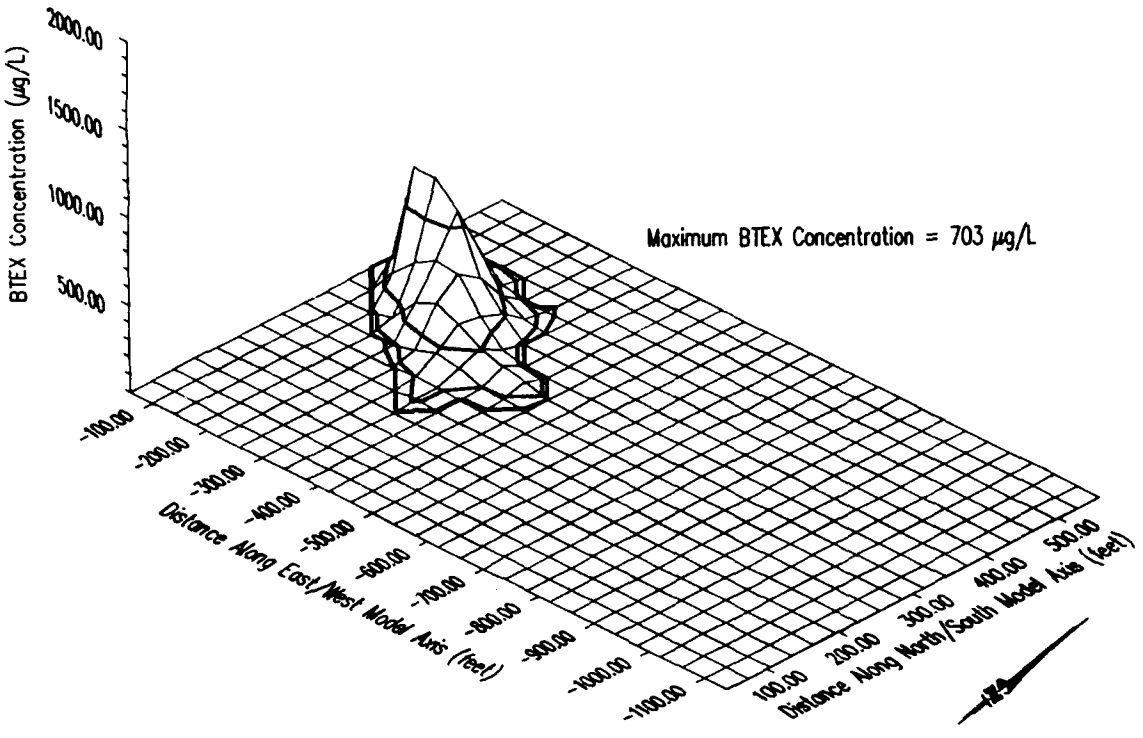
FIGURE 5.6

MODEL SENSITIVITY TO VARIATIONS IN RETARDATION COEFFICIENT PUMPHOUSE 75

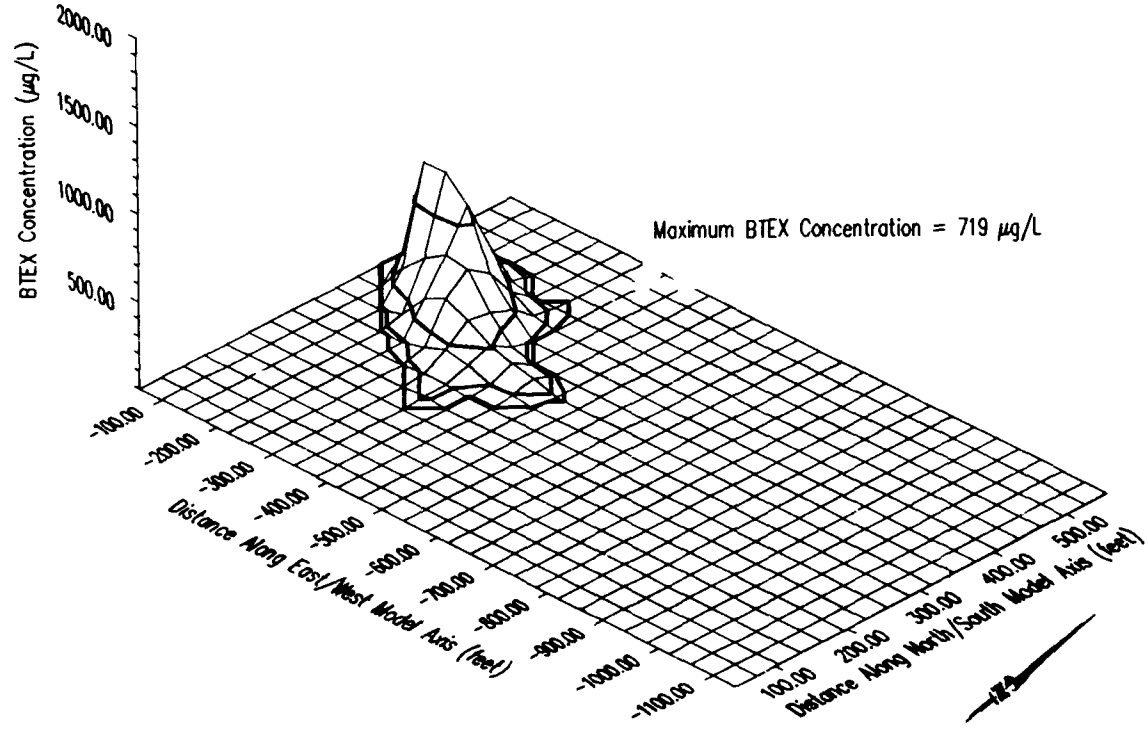
Intrinsic Remediation TS
MacDill Air Force Base, Florida

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Denver, Colorado

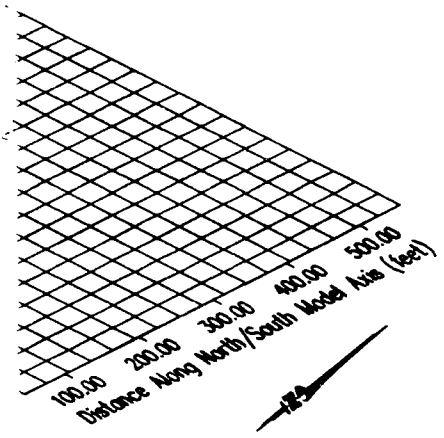


CALIBRATED MODEL

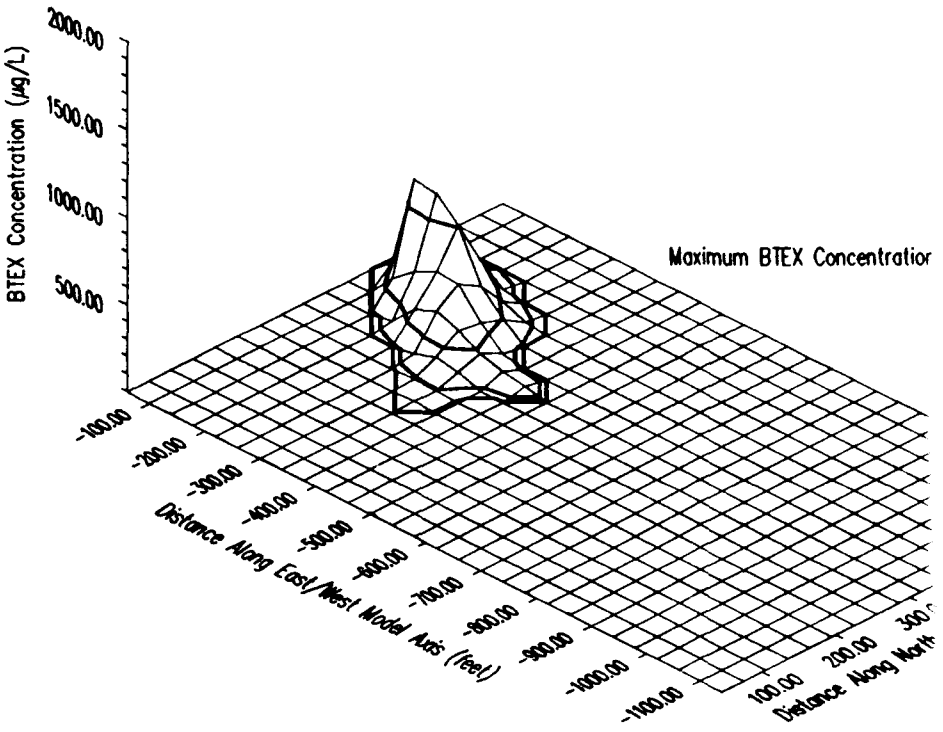


ANAEROBIC DECAY COEFFICIENT DECREASED 5X

n BTEX Concentration = 703 µg/L

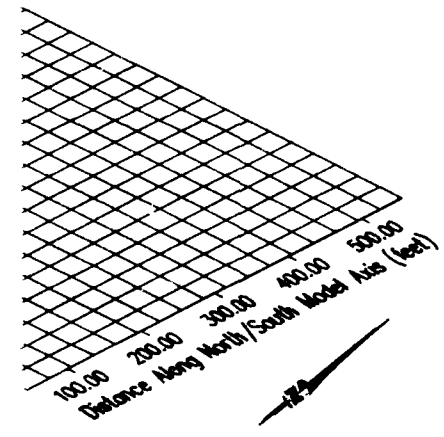


ATED MODEL



ANAEROBIC DECAY COEFFICIENT INC

n BTEX Concentration = 719 µg/L



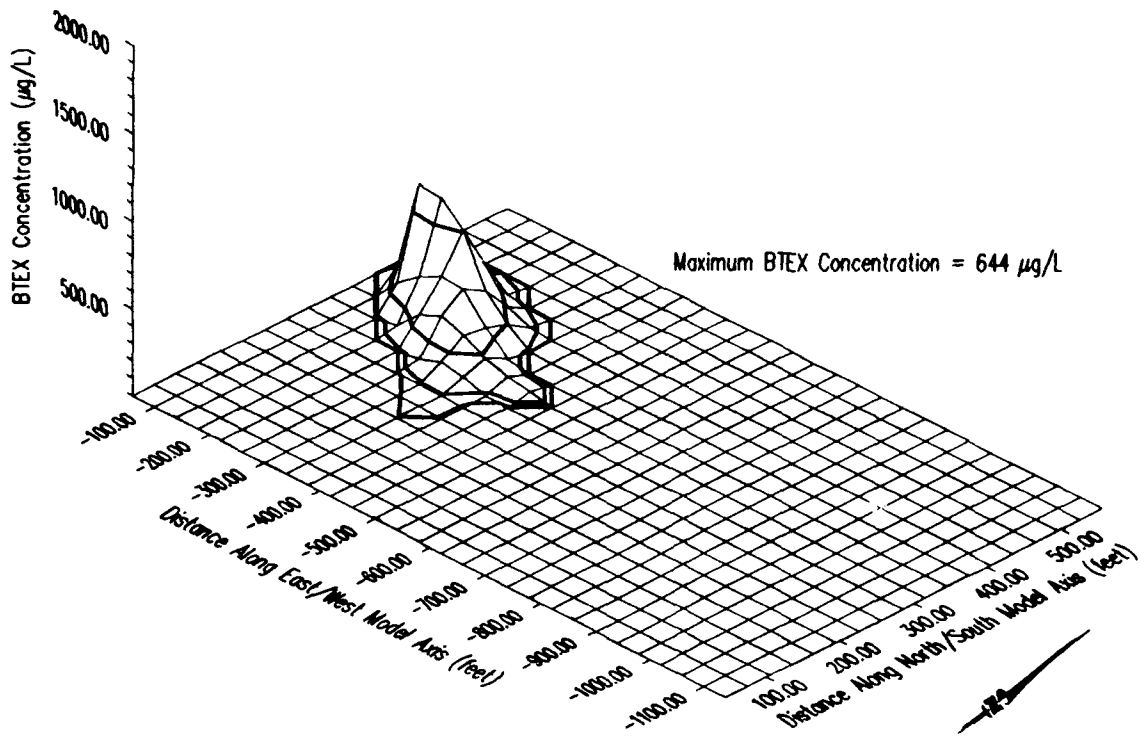
COEFFICIENT DECREASED 5X

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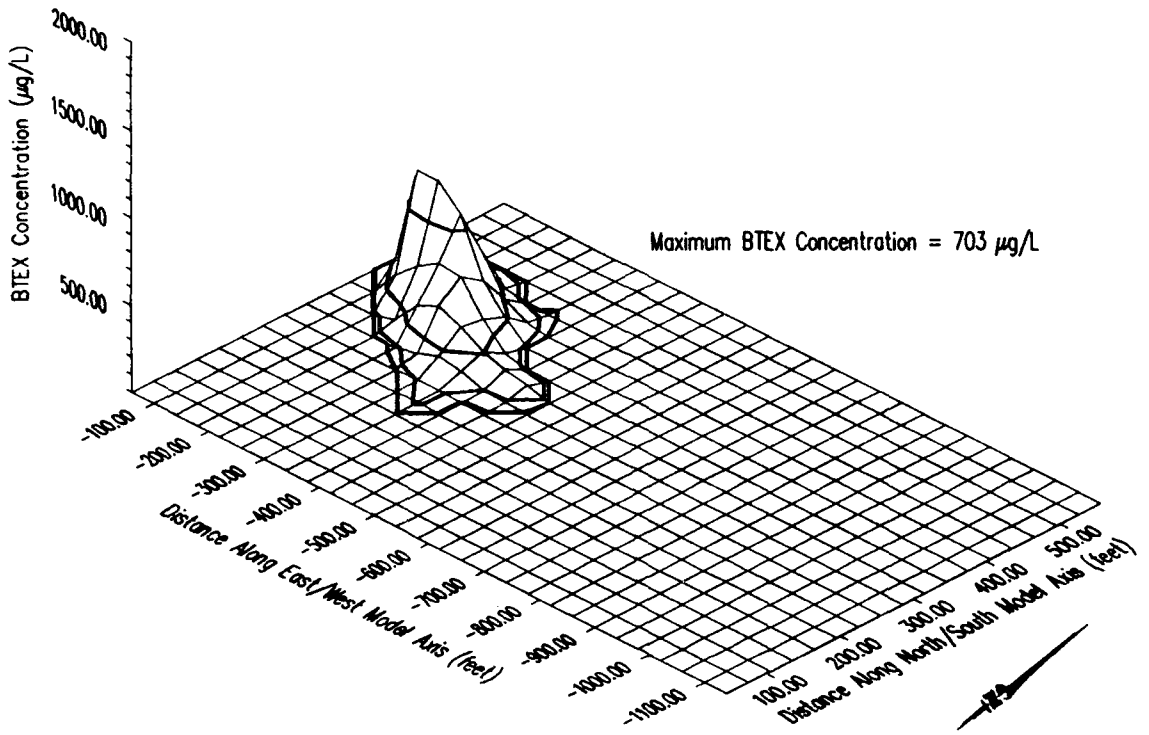
ANAEROBIC DECAY COEFFICIENT INCREASED 5X

FIGURE 5.7

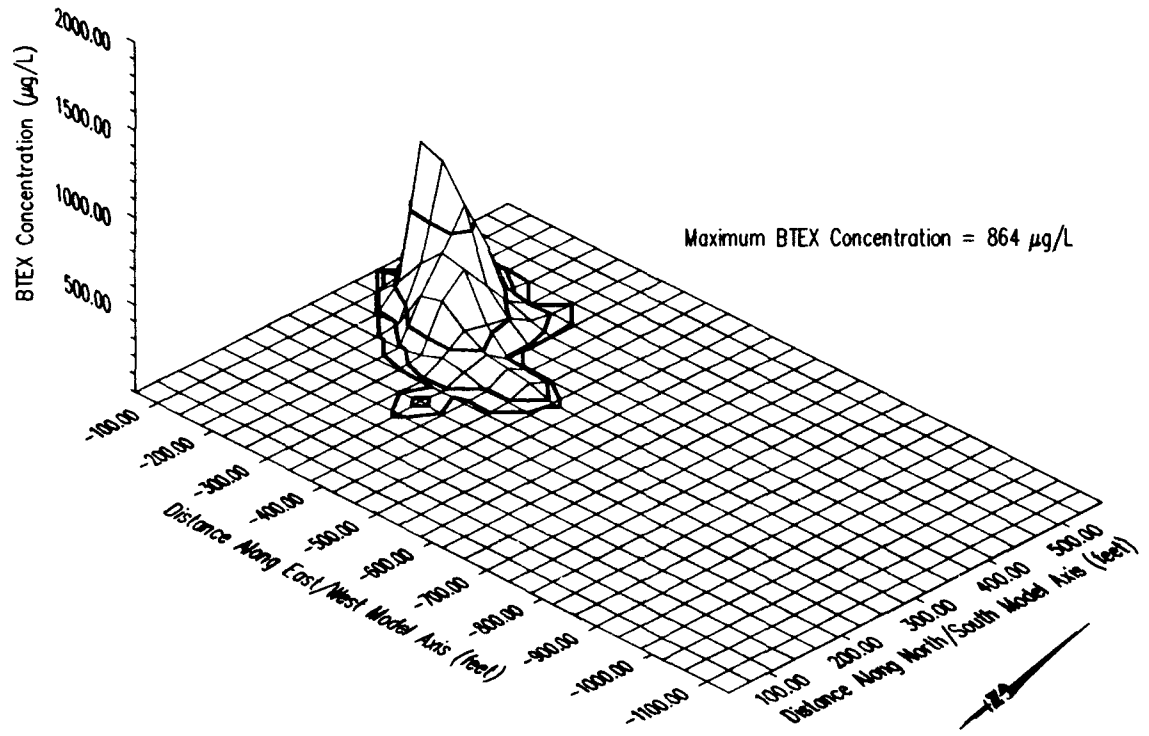
MODEL SENSITIVITY TO VARIATIONS IN ANAEROBIC DECAY COEFFICIENT PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado



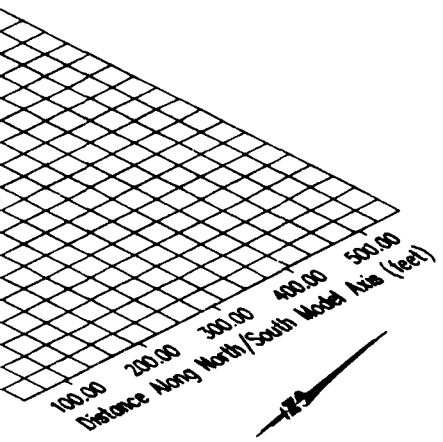
CALIBRATED MODEL



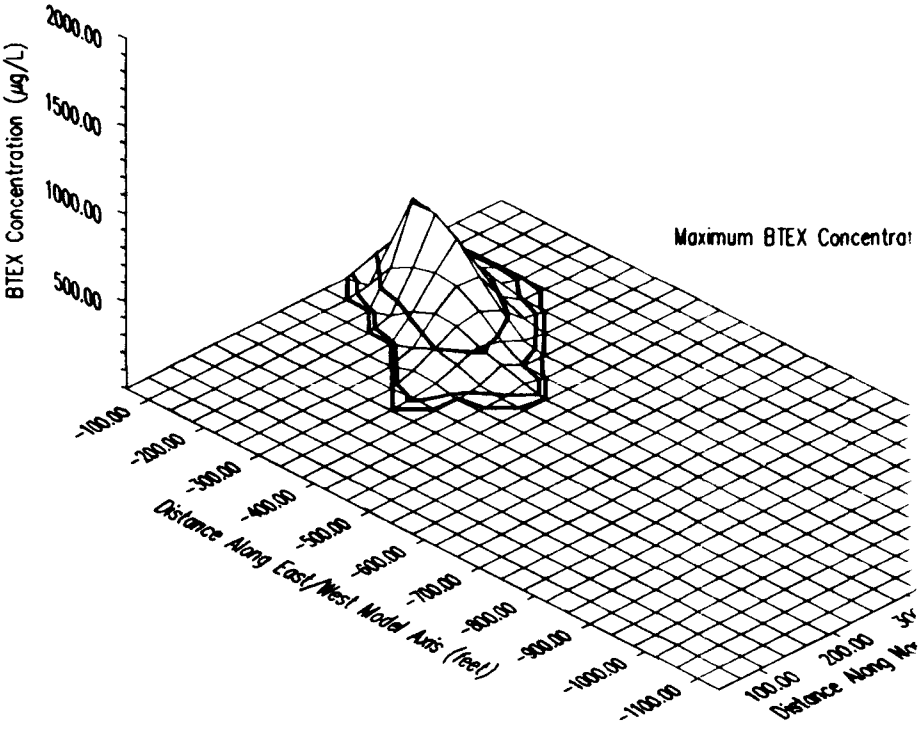
DISPERSIVITY DECREASED 3X

K:\AFCEE\722450\24500004, 11/29/95 at 09:00

um BTEX Concentration = 703 µg/L



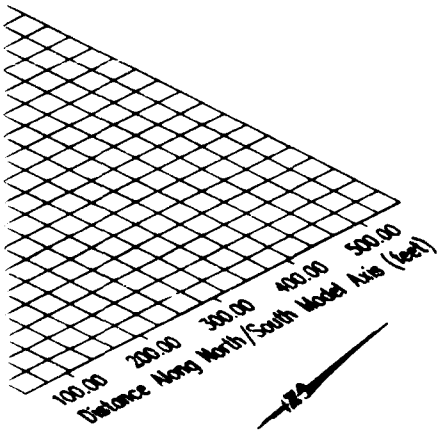
RATED MODEL



Maximum BTEX Concentrat

DISPERSIVITY INCREASED

ximum BTEX Concentration = 864 µg/L



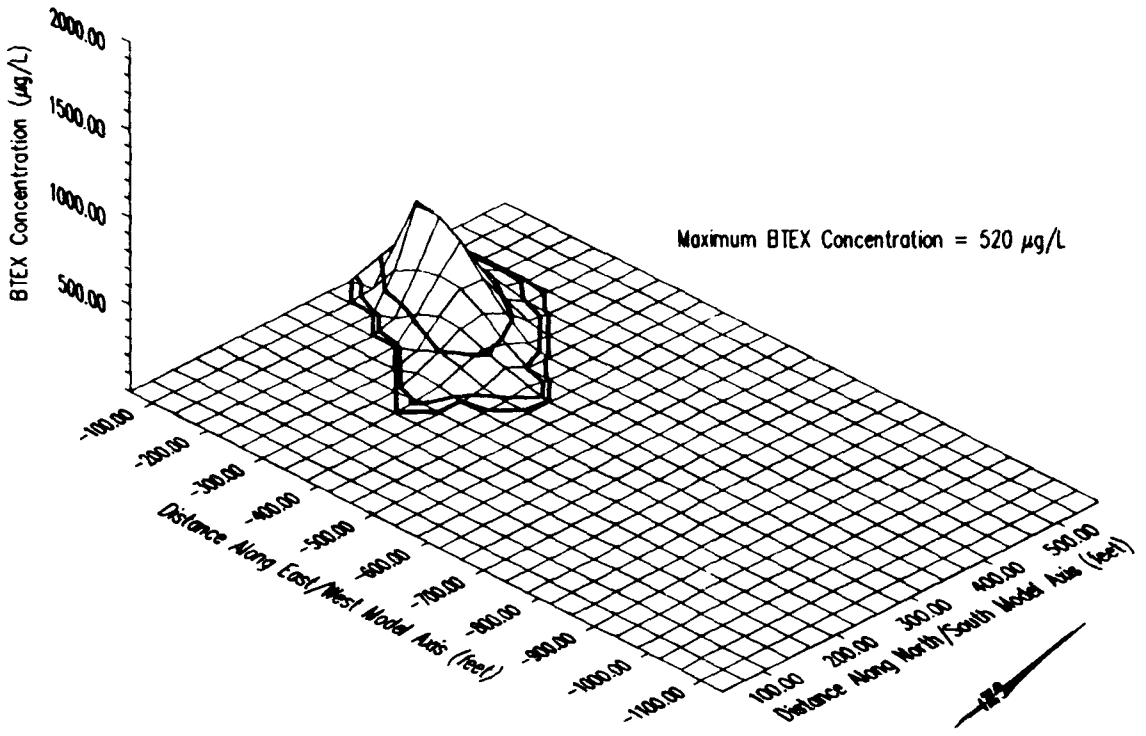
Y DECREASED 3X

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DISPERSIVITY INCREASED 3X

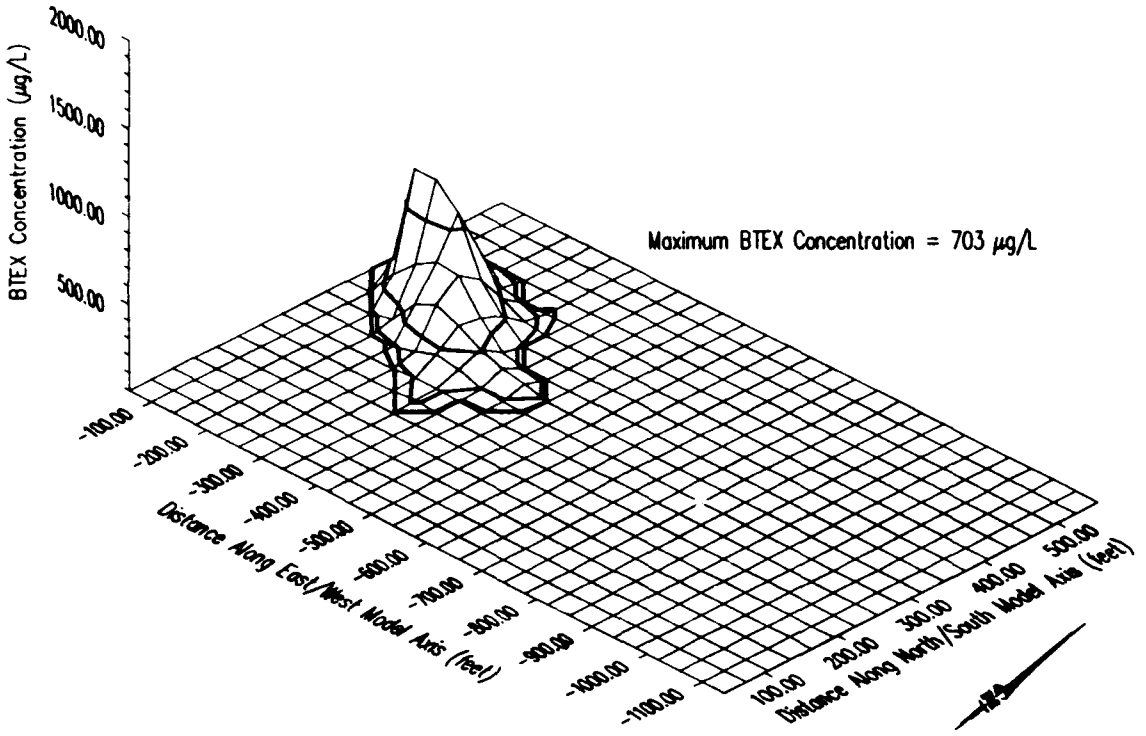
FIGURE 5.8

MODEL SENSITIVITY TO VARIATIONS IN DISPERSIVITY PUMPHOUSE 75

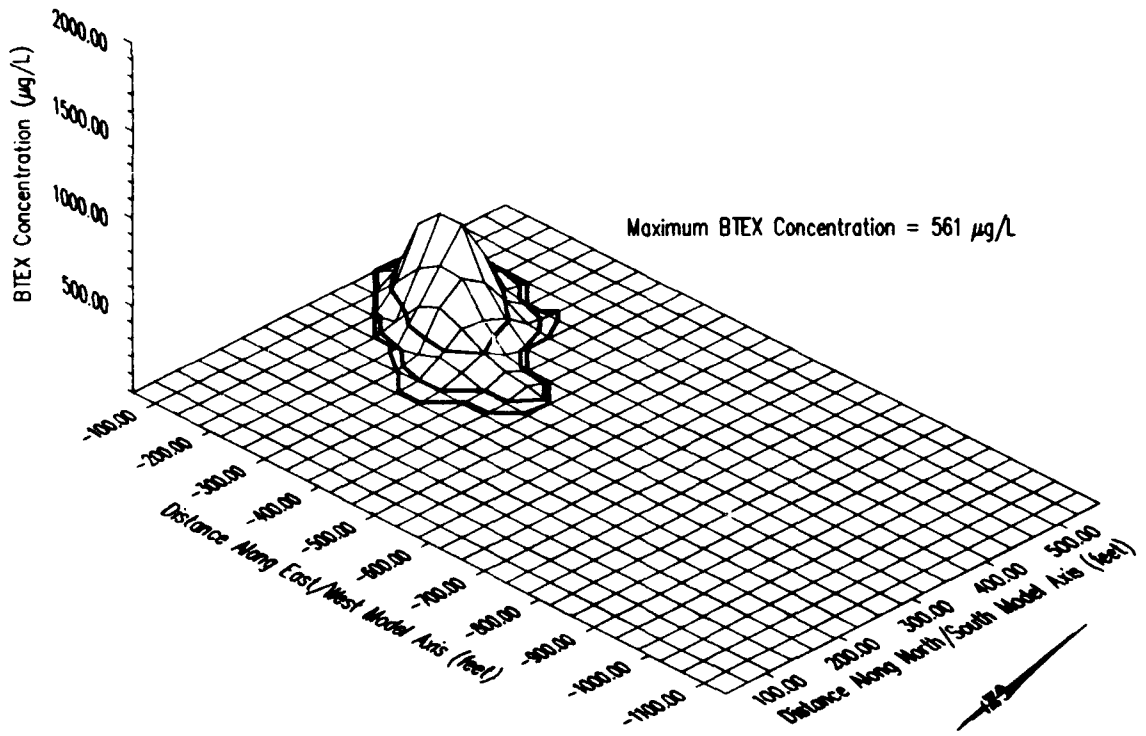
Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.

Denver, Colorado



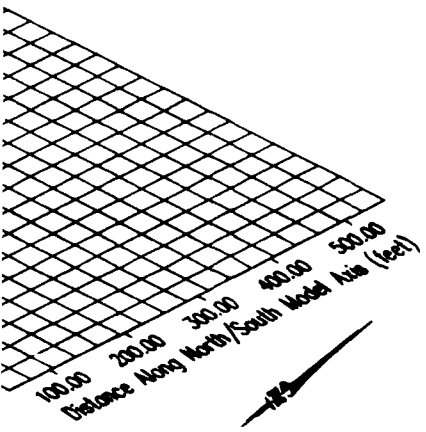
CALIBRATED MODEL



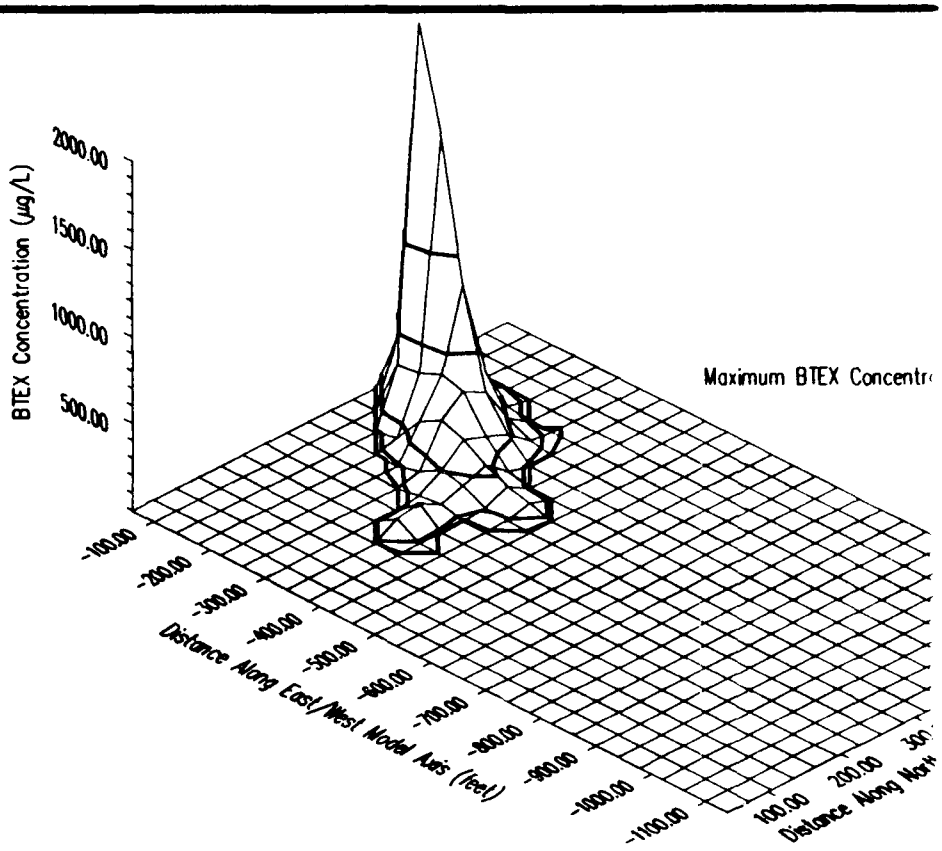
INJECTED BTEX CONCENTRATIONS DECREASED 5X

K:\AFCEE\722450\24500005, 11/29/95 at 09:15

n BTEX Concentration = 703 µg/L

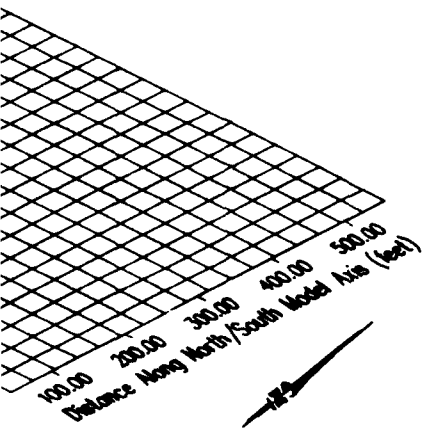


ATED MODEL



INJECTED BTEX CONCENTRATIONS INCF

BTEX Concentration = 561 µg/L



CENTRATIONS DECREASED 5X

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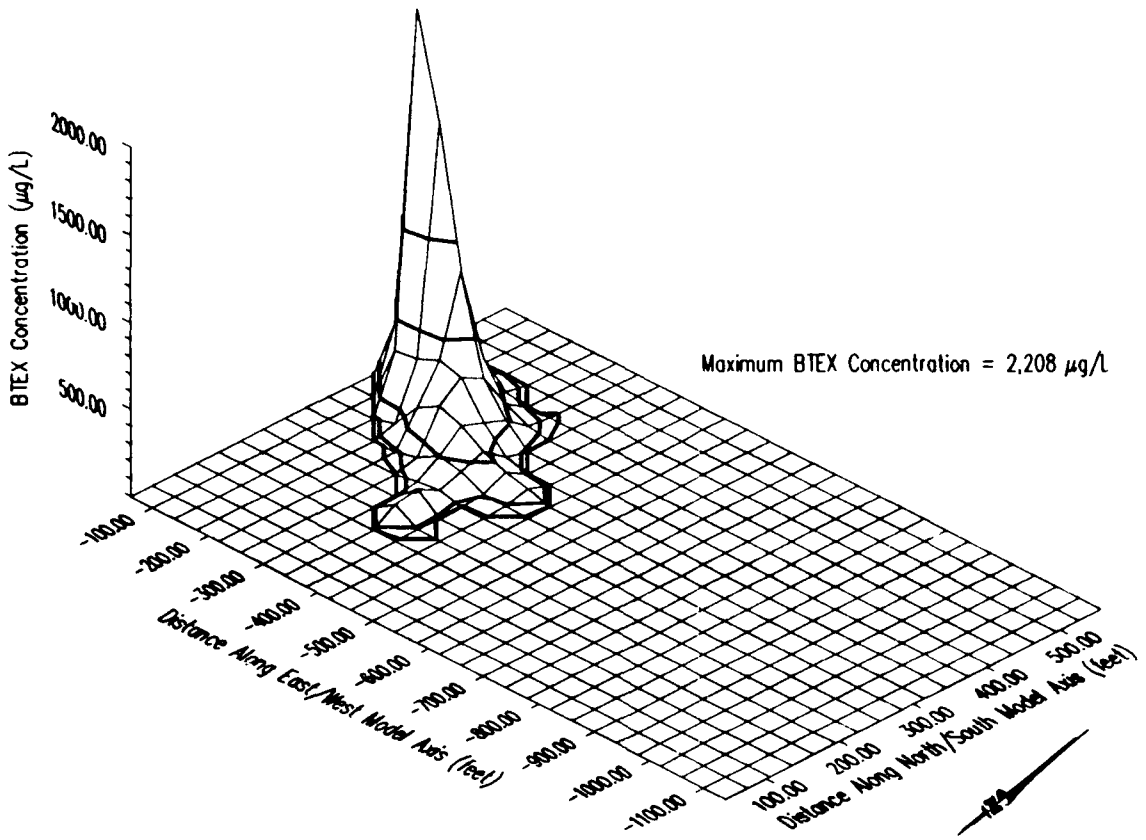


FIGURE 5.9

MODEL SENSITIVITY TO VARIATIONS IN BTEX INJECTION CONCENTRATIONS PUMPHOUSE 75

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MacDill Air Force Base, Florida

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Denver, Colorado

was similar to the calibrated model plume, but that extended approximately 25 feet further downgradient. The maximum BTEX concentration in the source area of the unretarded plume was slightly elevated (767 µg/L). The similarity between the unretarded and calibrated plumes can be attributed primarily to the low R value of 1.3 used in the calibrated model. Based on these analyses, the selected R value of 1.3 appears to be reasonably conservative.

5.5.3 Sensitivity to Variations in the Coefficient of Anaerobic Decay

Figure 5.7 shows the effects of varying the anaerobic decay coefficient. Increasing this parameter by a factor of five results in more rapid degradation of dissolved BTEX. The reduction in contaminant mass is the result of the relatively large increase in the decay rate caused by increasing the coefficient, because the anaerobic decay coefficient is exponentiated in the equation expressing the decay rate (see Section 5.3.5). Still, the resulting BTEX plume is very similar to the calibrated plume due to the short (4-month) calibration time and the fact that anaerobic decay in the model is rate-limited rather than instantaneous. As a result, there was not sufficient time for the anaerobic decay reactions to significantly affect BTEX concentrations. In addition, the small magnitude of the calibrated decay coefficient (0.0005 day^{-1}) meant that multiplying and dividing this value by a factor of five resulted in values that were not greatly different in magnitude than the calibrated value. However, the tested range (0.0001 to 0.0025 day^{-1}) represents a feasible range of decay coefficients for the Pumphouse 75 site on the basis of available data. Two differences in the plume simulated using the larger decay coefficient were that contaminant concentrations in the vicinity of monitoring point 75MP-9 were reduced over those actually measured in the field, and the maximum source area dissolved BTEX concentration decreased from 703 µg/L to 644 µg/L, which is below the measured maximum value of 676 µg/L. Therefore, use of a lower decay coefficient contributes to the conservative nature of the model.

Conversely, decreasing the anaerobic decay coefficient by a factor of five decreases the rate of degradation, resulting in a slight overall increase in the computed BTEX concentrations to levels that were slightly above observed concentrations. Again, however, as a result of the short duration of the calibration period and the low magnitude of the anaerobic decay rate, the BTEX plume simulated using the lower decay rate is very similar to the calibrated plume. This sensitivity analysis indicates that the model is not extremely sensitive to relatively small variations in the anaerobic decay coefficient over the short term. The value used in the calibrated model is reasonably conservative based on comparisons with decay values computed for other sites (Section 5.3.5), and adequately simulates the measured March 1995 plume.

5.5.4 Sensitivity to Variations in Dispersivity

The effects of varying dispersivity are illustrated in Figure 5.8. Both longitudinal and transverse dispersivity were varied for this analysis, as the ratio of the two values was kept constant at 0.025. Increasing the dispersivity by a factor of three resulted in a relatively low maximum BTEX concentration in the source area (520 µg/L), and an increase in concentrations upgradient from the source area above observed concentrations. In addition, there was a slight spreading of the plume longitudinally, and the areal extent of dissolved BTEX concentrations greater than 500 µg/L was substantially reduced. The results of this analysis indicate that the increased dispersivity produces a plume that does not match the measured plume as well as the dispersivity value used by the calibrated model. Decreasing dispersivity by a factor of three produced a plume with an areal extent similar to the calibrated plume, but with higher concentrations (maximum BTEX concentration of 864 µg/L). In

addition, the plume shape was relatively irregular, departing from the more elliptical shape of the measured plume. Based on these analyses, the model appears to be moderately sensitive to variations in dispersivity of this magnitude, and the value of 40 feet used in the calibrated model appears to be reasonable.

5.5.5 Sensitivity to Variations in Injected BTEX Concentrations

The results of increasing and decreasing the injected BTEX concentrations by a factor of five are shown on Figure 5.9. Increasing the injected concentrations by a factor of five more than triples the maximum plume concentration to 2,208 µg/L, and generally increases BTEX concentrations in the vicinity of monitoring well MD75-MW04 and monitoring point 75MP-9 over those measured in the field. Decreasing the injected BTEX concentrations by a factor of five decreases the maximum concentration by 142 µg/L to 561 µg/L, and substantially decreases the area bounded by the 500-µg/L isopleth relative to the calibrated model. In addition, dissolved BTEX concentrations near monitoring point MP75-9 are reduced by an excessive amount. Based on these analyses, the model appears to be moderately to very sensitive to variations in injected BTEX concentrations of this magnitude, and the values used in the calibrated model appear to be reasonable.

5.5.6 Summary of Sensitivity Analysis Results

The results of the sensitivity analysis suggest that the calibrated model used for this report is reasonable. The calibrated model is most sensitive to variations in transmissivity and BTEX injection concentrations. Increasing or decreasing the transmissivity substantially diminishes or enhances the simulated BTEX concentrations, and lengthens or shortens the plume relative to the plume configuration measured in March 1995. Simulated BTEX concentrations in the vicinity of well MD75-MW04, located near what appears to be the primary contaminant source area, are significantly affected by variations in BTEX injection concentrations. The sensitivity analysis results indicate that increasing or decreasing these concentrations by a factor of five would increase or decrease maximum dissolved BTEX concentrations to an unacceptable degree, and therefore the concentrations used in the calibrated model appear to be reasonable.

Relatively minor effects on the plume configuration are obtained when the retardation coefficient, anaerobic decay coefficient, and dispersivity are varied within reasonable ranges. The values used in the calibrated model are believed to be conservative, and reasonable changes in these values would most likely not improve the model calibration significantly. The sensitivity analysis results suggest that the use of a larger retardation factor would improve the calibration by narrowing the plume. The value used in the model was intentionally conservative for representing total BTEX migration. The selected value is most representative of benzene in order to more effectively simulate the migration of this compound (which typically poses the most risk to potential receptors) to a greater degree than the other BTEX compounds.

5.6 MODEL RESULTS

To predict fate and transport of dissolved BTEX compounds at the Pumphouse 75 site, three Bioplume II simulations (PH75A, PH75B, and PH75C) were run using the calibrated, steady-state groundwater flow system. The first simulation (PH75A) assumed that the rates at which the BTEX compounds were introduced into the aquifer through injection wells decreased by 15

percent per year (injected BTEX concentrations were decreased by 15 percent from the concentration used for the previous year to account for natural weathering of fuel residuals). At this rate, the BTEX injection rate is reduced by 80 percent after approximately 10 years, and by 90 percent after approximately 15 years. The rate of BTEX decrease was increased from the 10-percent rate used in the MacDill AFB Site 56 model (Parsons ES, 1995b) due to the lack of pavement overlying the contaminated soils at Pumphouse 75. The lack of pavement should enhance the decrease in shallow soil BTEX concentrations due to volatilization, aerobic biodegradation, and precipitation-induced leaching. These BTEX reduction rates are slightly lower than calculated BTEX reduction rates for a site at Eglin AFB, Florida that also is characterized by shallow contamination and sandy soils. At the Eglin site, where a fuel spill occurred in 1986, soil sampling performed in 1993 indicated a substantial reduction in BTEX concentrations within 7 years. Using the computed reduction rates, it was determined that nearly 100 percent of the BTEX in the vadose zone soils should disappear within approximately 10 years (Parsons ES, 1995c).

The second simulation (PH75B) assumes that all of the contaminated soils in the model cells containing simulated injection wells are actively remediated via bioventing for 3 years, at the end of which the source area is no longer contributing BTEX to the groundwater. In this scenario, there is a 45-percent reduction in contaminant concentrations during both years 1 and 2, with the remaining 10 percent disappearing by the end of year 3. The third simulation (PH75C) is similar to simulation PH75B, but assumes a more limited bioventing system that remediates only the soils in seven model grid cells (in the vicinity of and between monitoring wells MD75-MW14 and MD75-MW08). The rates of decrease in injected BTEX concentrations for the biovented grid cells in this simulation are identical to those described above for simulation PH75B. Complete input and output files are presented in Appendix D. Model results are described in the following sections. Model time for the predictive simulations is described using the term "simulation time", which refers to model time after the initial 0.33-year calibration period (i.e., simulation time after March 1995).

5.6.1 Diminishing BTEX Source (Model PH75A)

To predict the fate and transport of dissolved BTEX compounds at Pumphouse 75, model PH75A was run for a period of 20 years. The concentrations of BTEX introduced into the shallow aquifer at the 16 injection well locations shown on Figure 5.3 were decreased at a rate of 15 percent per year, as described above. The temporal variations in the maximum dissolved BTEX concentrations in the plume and at the downgradient model boundary (model grid row 29) are shown in Figures 5.10 and 5.11, respectively. As shown in Figure 5.10, the maximum simulated dissolved BTEX concentration in the plume peaks at 874 µg/L following the first simulation year (early 1996), then decreases steadily until it is below 50 µg/L by the end of simulation year 14, and equals 3 µg/L at the end of year 20. Figure 5.11 shows that the leading edge of the BTEX plume reaches the downgradient model boundary [actually, the farthest downgradient row of active model cells (model grid row 29)] in simulation year 14, with the BTEX concentrations peaking at 8 µg/L in year 17 and decreasing to 2 µg/L in year 20.

Plume isopleth maps for simulation years 5, 10, and 15 are shown in Figure 5.12. The lobate shape of the downgradient edge of the plume after 5 years may be caused by the unequal distribution of BTEX injection concentrations in model grid row 9, and by the presence of a low-transmissivity zone in the model surrounded by relatively high-transmissivity zones. Groundwater (and dissolved contaminants) would preferentially migrate toward and

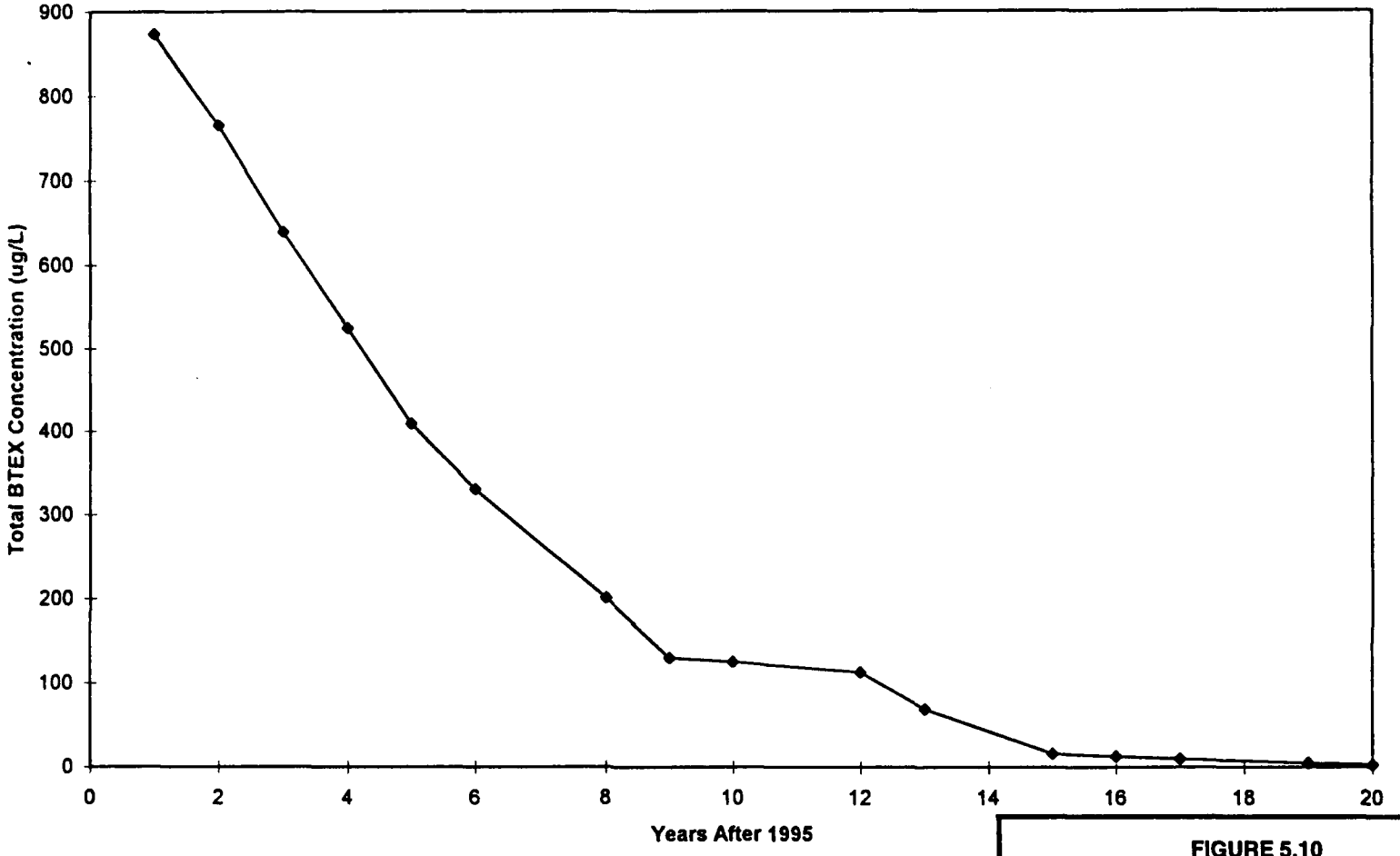


FIGURE 5.10

SIMULATED MAXIMUM BTEX CONCENTRATIONS MODEL PH75A PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

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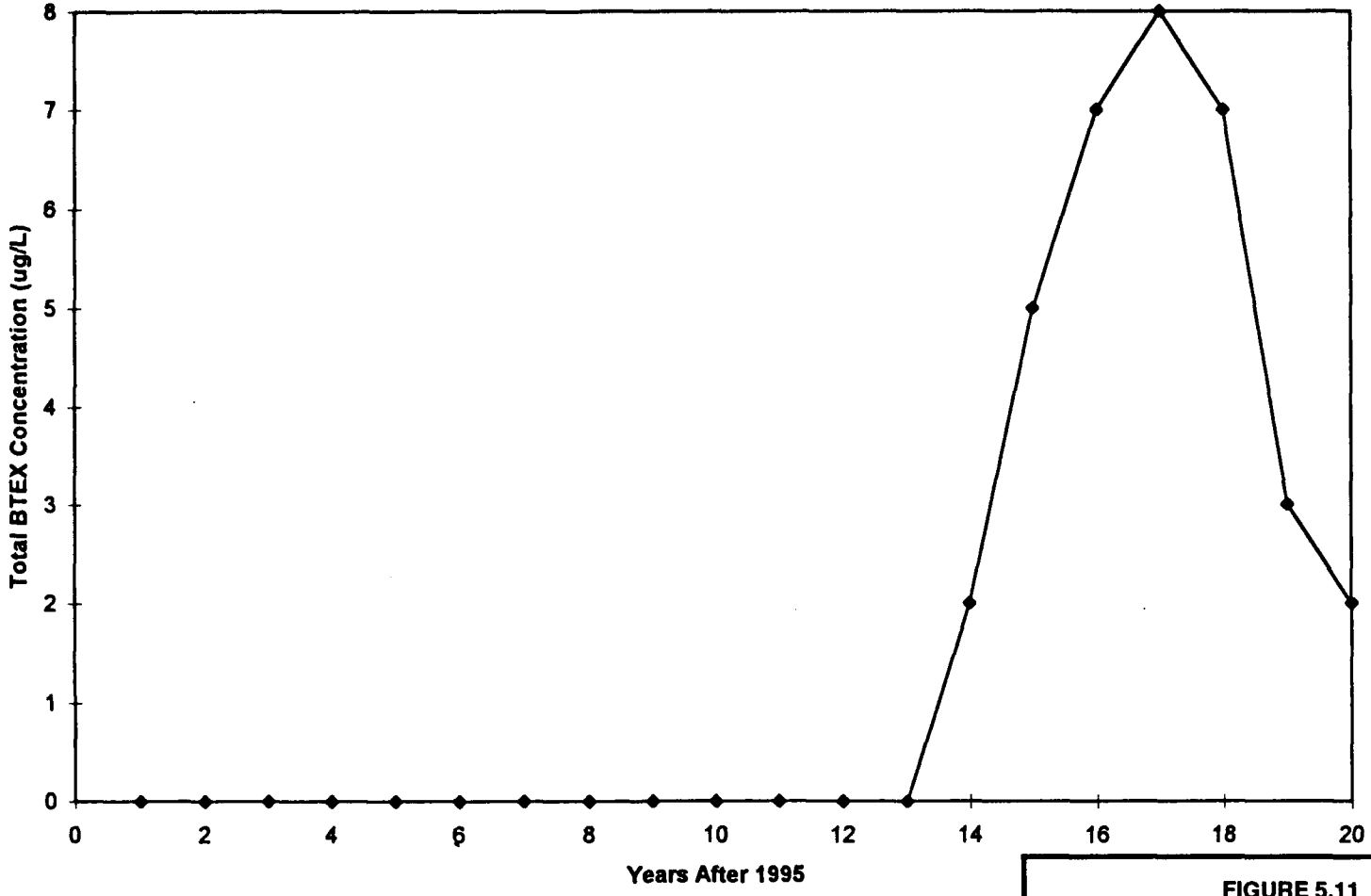
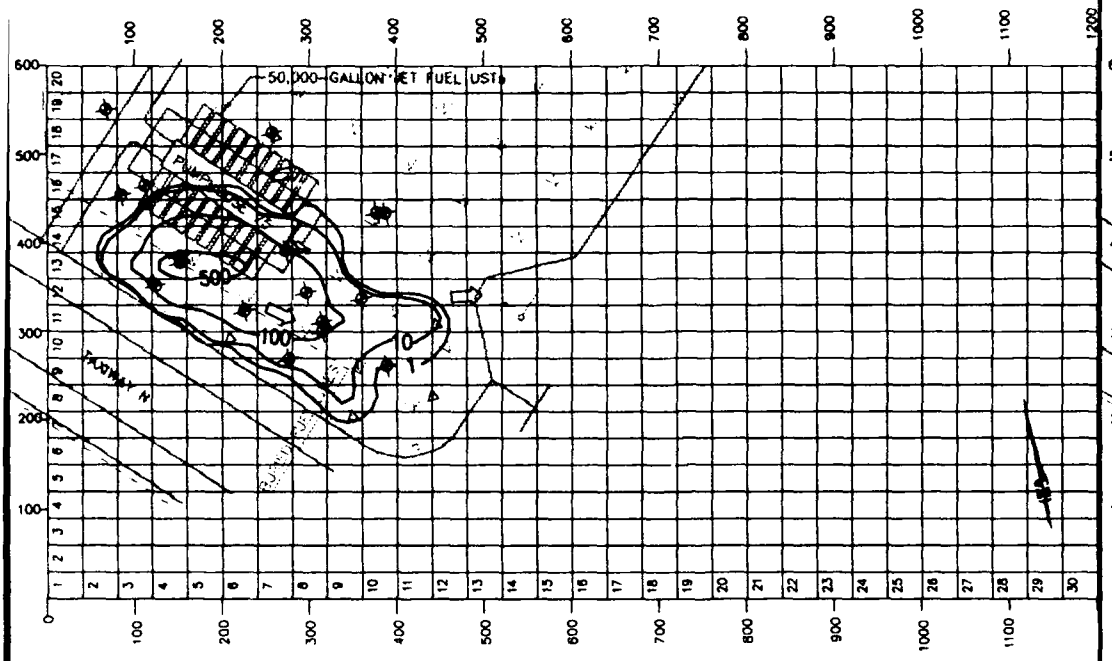


FIGURE 5.11

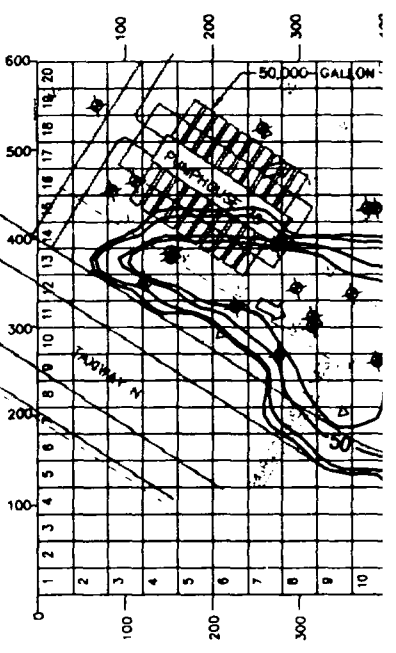
SIMULATED MAXIMUM BTEX CONCENTRATIONS AT DOWNGRADIENT MODEL BOUNDARY MODEL PH75A

Intrinsic Remediation TS
MacDill Air Force Base, Florida

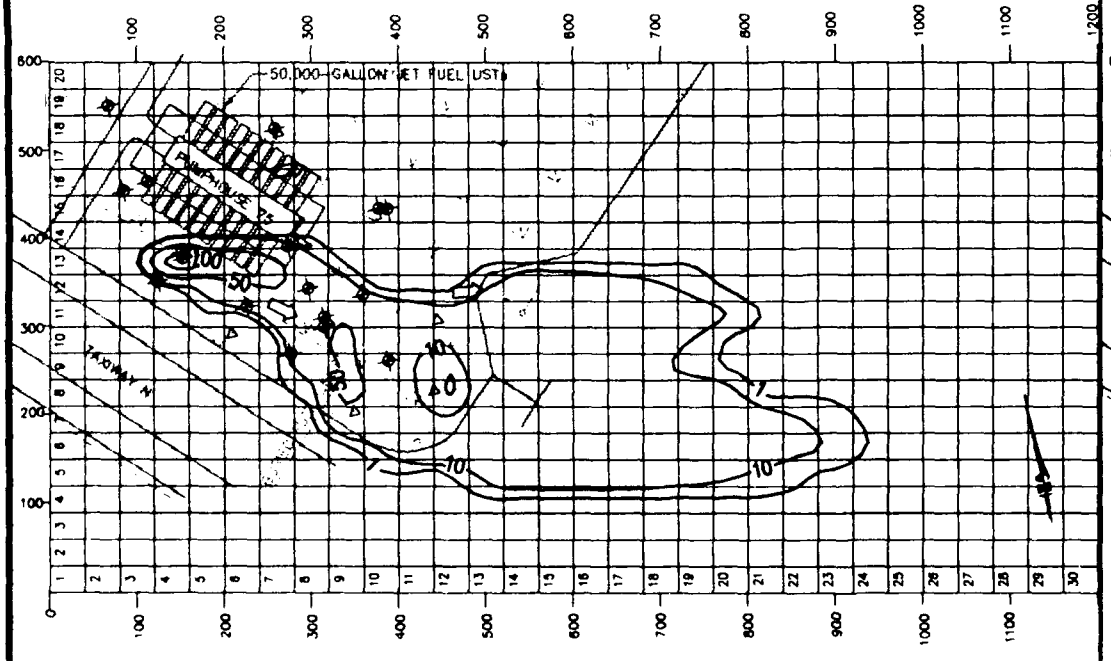
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Denver, Colorado



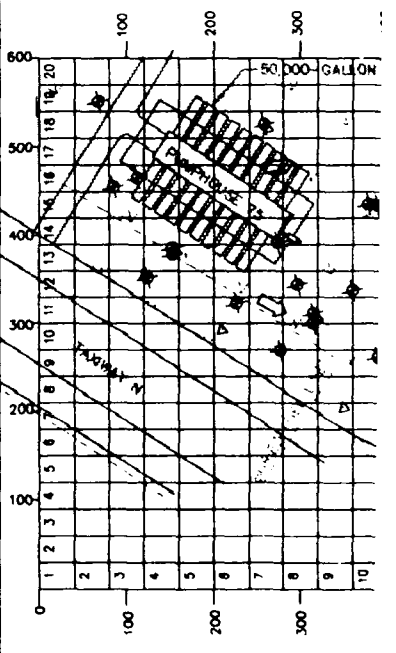
CALIBRATED MODEL (1995)



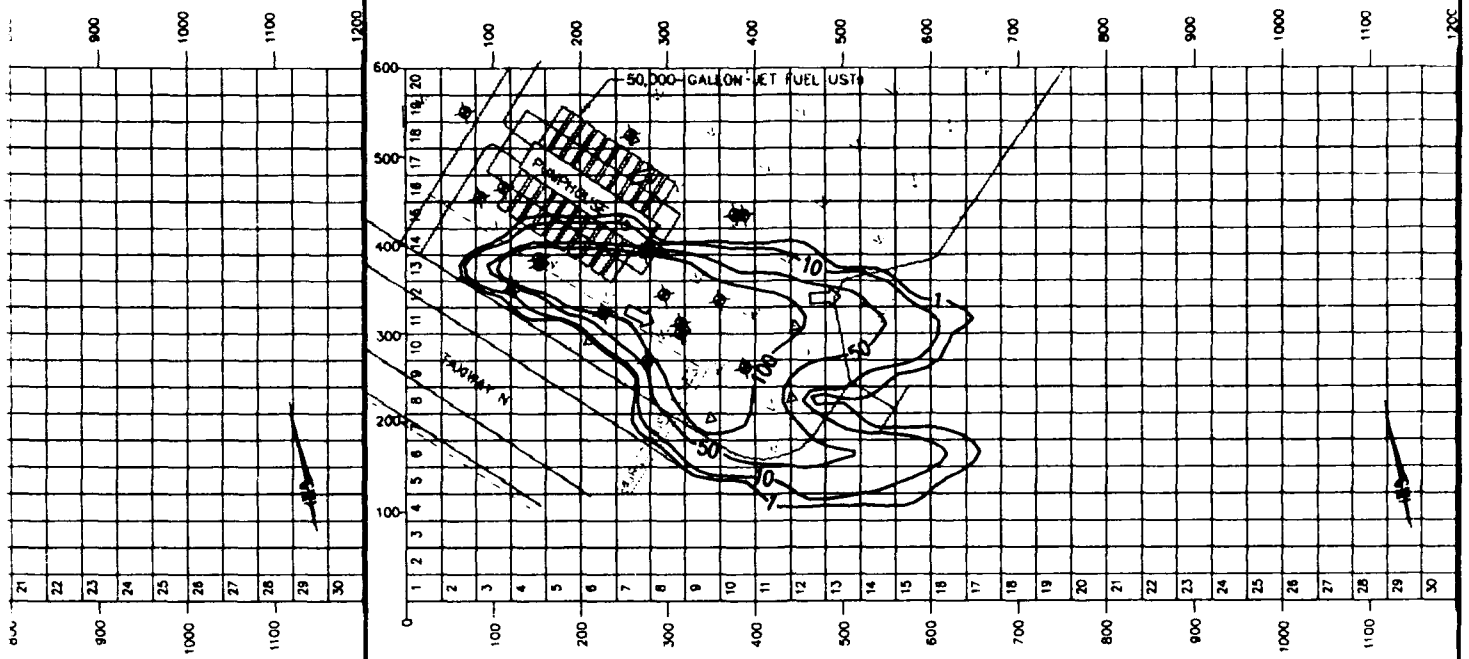
5 YEA



10 YEARS OF SIMULATION (2005)

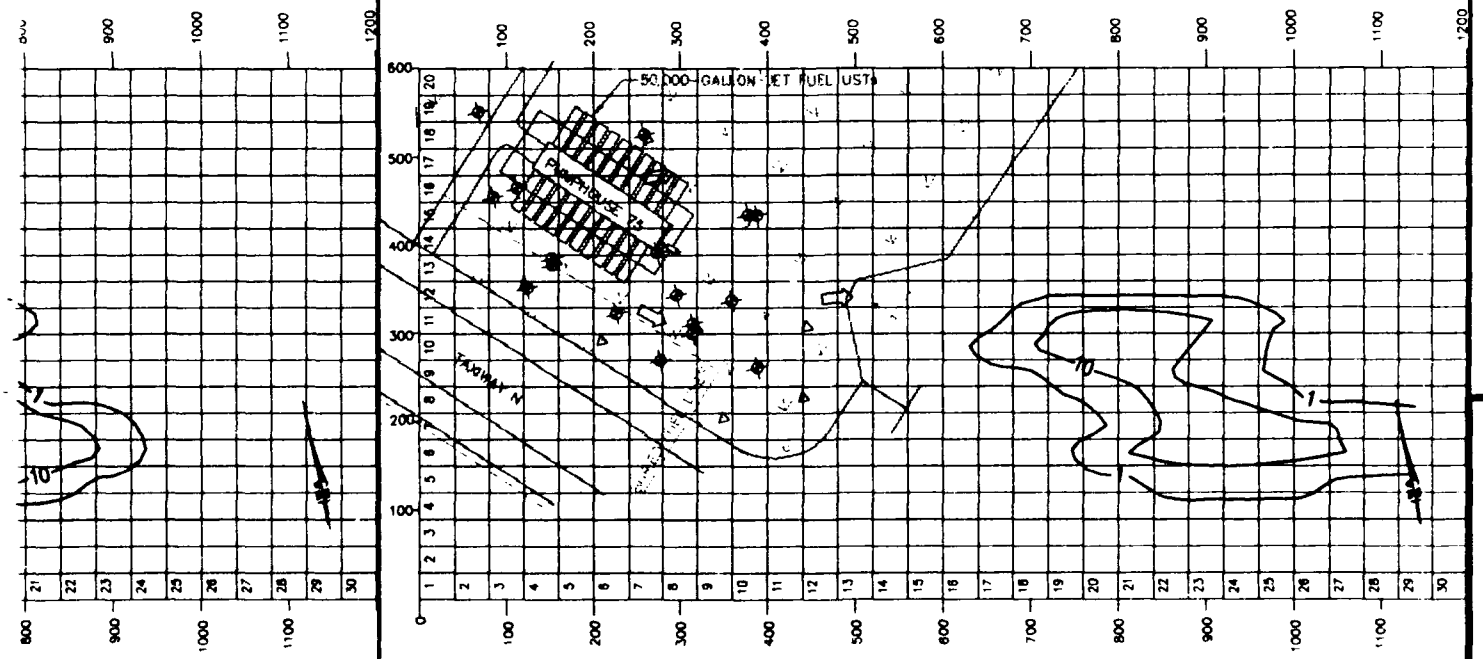


15 YE



)5)

5 YEARS OF SIMULATION (2000)



2005)

15 YEARS OF SIMULATION (2010)

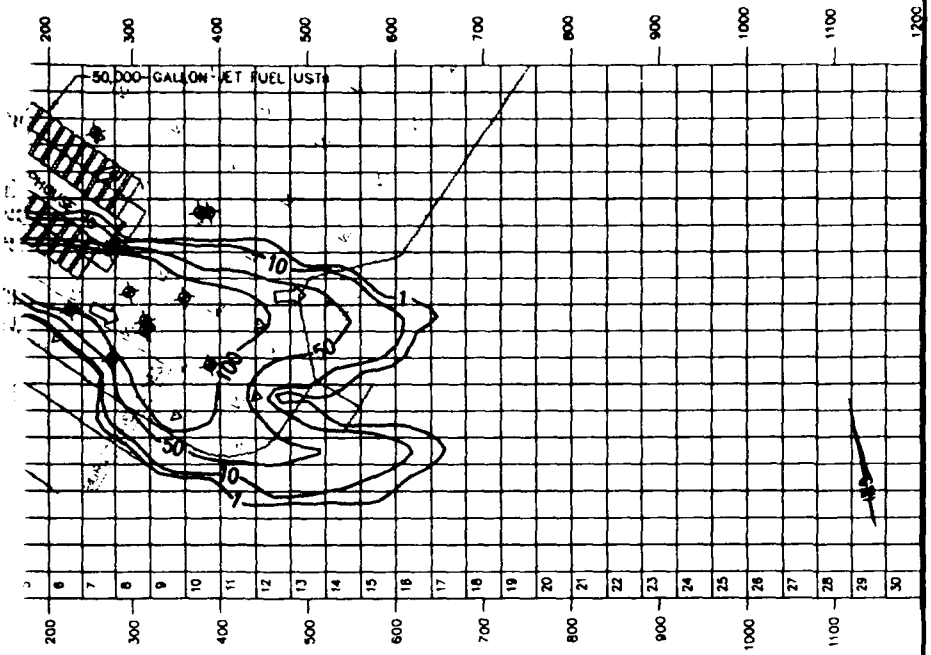
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200

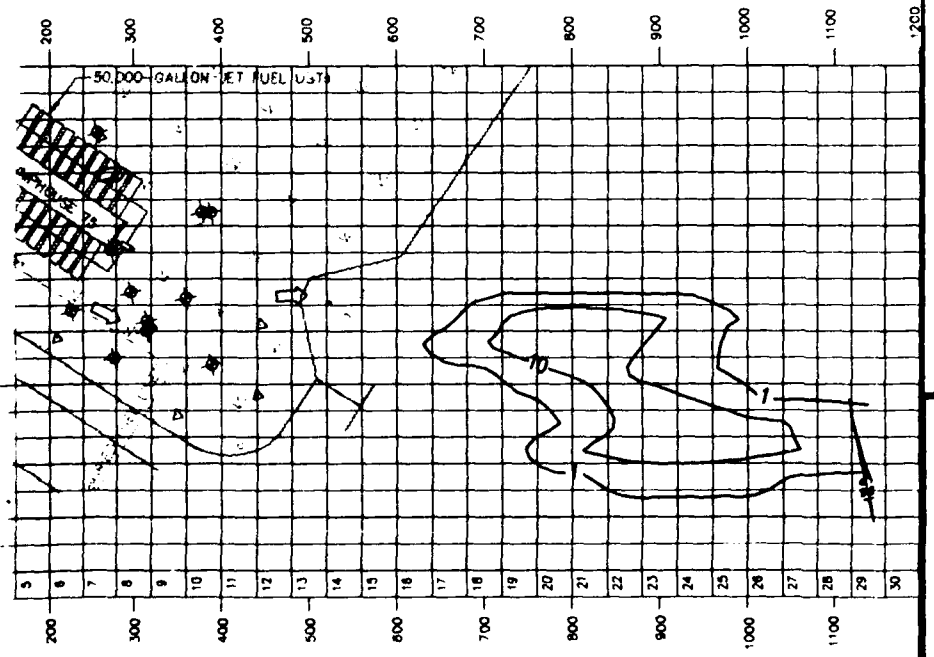
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5 YEARS OF SIMULATION (2000)



15 YEARS OF SIMULATION (2010)

LEGEND

- △ MONITORING POINT
- ⊕ MONITORING WELL
- —10— LINE OF EQUAL BTEX CONCENTRATION (μg\L) CONTOUR INTERVAL = VARIABLE
- ⇨ ESTIMATED GROUNDWATER FLOW DIRECTION
- ▭ GRASSY AREAS

200 100 0 200
FEET

FIGURE 5.12

SIMULATED PLUME MIGRATION MODEL PH75A PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
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through high-transmissivity zones. As shown on Figure 5.12, the BTEX plume separates from the source area by year 15 due to decreases in source area BTEX injection rates, and is wholly contained in the downgradient portion of the model grid. From years 15 to 20, the plume continues to migrate toward the downgradient model boundary and decreases in both magnitude (concentration) and areal extent. A discussion of mass balance errors obtained during this simulation is contained in Appendix D.

As described in Section 5.4.2.1, model PH75A was rerun using retardation coefficients of 1.0 and 1.15 rather than 1.3 to assess the degree to which small variations in this parameter significantly affected model predictions. Using a value of 1.0 caused the maximum dissolved BTEX concentration in the plume to decrease below 50 µg/L by simulation year 13, and the plume disappeared completely after simulation year 15. The maximum BTEX concentration in model grid row 29 was 3 µg/L. Using a retardation of 1.15 caused the maximum BTEX concentration to decrease below 50 µg/L by simulation year 14. The maximum concentration in model grid row 29 was 18 µg/L after simulation year 16, decreasing to 7 µg/L after 20 years. These simulations indicate that small variations in the retardation coefficient do not significantly affect model predictions. In all cases, low BTEX concentrations migrated to the model grid boundary, and the temporal changes in the magnitudes of BTEX concentrations within the plume were similar.

5.6.2 Engineered Source Reduction (Models PH75B and PH75C)

To illustrate the impact of engineered source reduction activities upon dissolved BTEX migration, models PH75B and PH75C incorporated more rapidly decreasing BTEX loading rates, assuming that bioventing or a similar *in situ* method would be used to remediate the source areas. Bioventing is an *in situ* process in which low-flow air injection is used to enhance the aerobic biodegradation of organic contaminants in subsurface soils by supplying oxygen to indigenous microbes. Both of the models referenced above assumed complete remediation of vadose zone soils in the source area after 3 years. Bioventing pilot tests at the Patrick AFB, Florida BX Service Station resulted in a BTEX removal rate of over 95 percent during the first year of testing (Parsons ES, 1995d). In model PH75B, remediation of all BTEX-contaminated vadose zone soils in the vicinity of the fuel pipelines is assumed. This is modeled through source term reductions at all 16 simulated BTEX injection wells. In model PH75C, only the soils within model grid cells (13,4), (14,4), (12,5), (13,5), (11,6), (12,6),and (11,7) were remediated within a 3-year period; BTEX loading resulting from the remaining nine injection wells decayed at a rate of 15 percent per year, as in model PH75A.

Model PH75B was run for a period of 16 years. As shown on Figure 5.13, this model predicts that the maximum dissolved BTEX concentrations in the plume would decrease dramatically following remediation of source area soils, declining to below 50 µg/L after 7 years. The plume reaches its furthest downgradient extent (approximately 450 feet downgradient of the estimated March 1995 plume front) during simulation years 11 and 12, and never migrates beyond model grid row 24. After 15 years of simulation time, the BTEX plume is completely biodegraded. The simulated configurations of the dissolved BTEX plume after 3, 7, and 11 years are shown on Figure 5.14.

Model PH75C was also run for a period of 16 years. As shown on Figure 5.13, the results of this model are very similar to those of model PH75B, suggesting that if bioventing is performed, it should be focused in the vicinity of model cells (14,4), (13,4), (12,5), (13,5), (12,6), (11,6), and (11,7), because this is where the most significant soil contamination

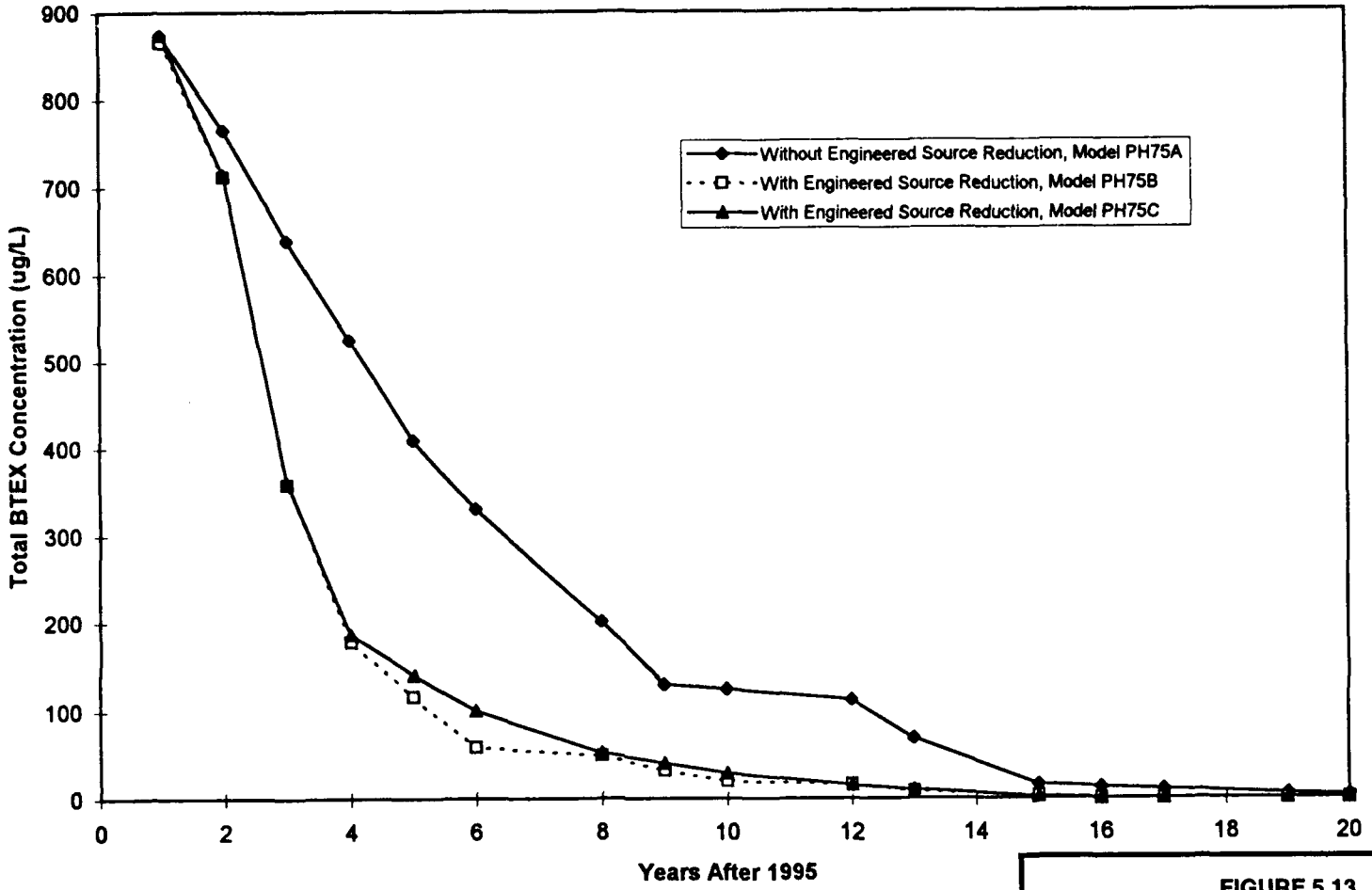
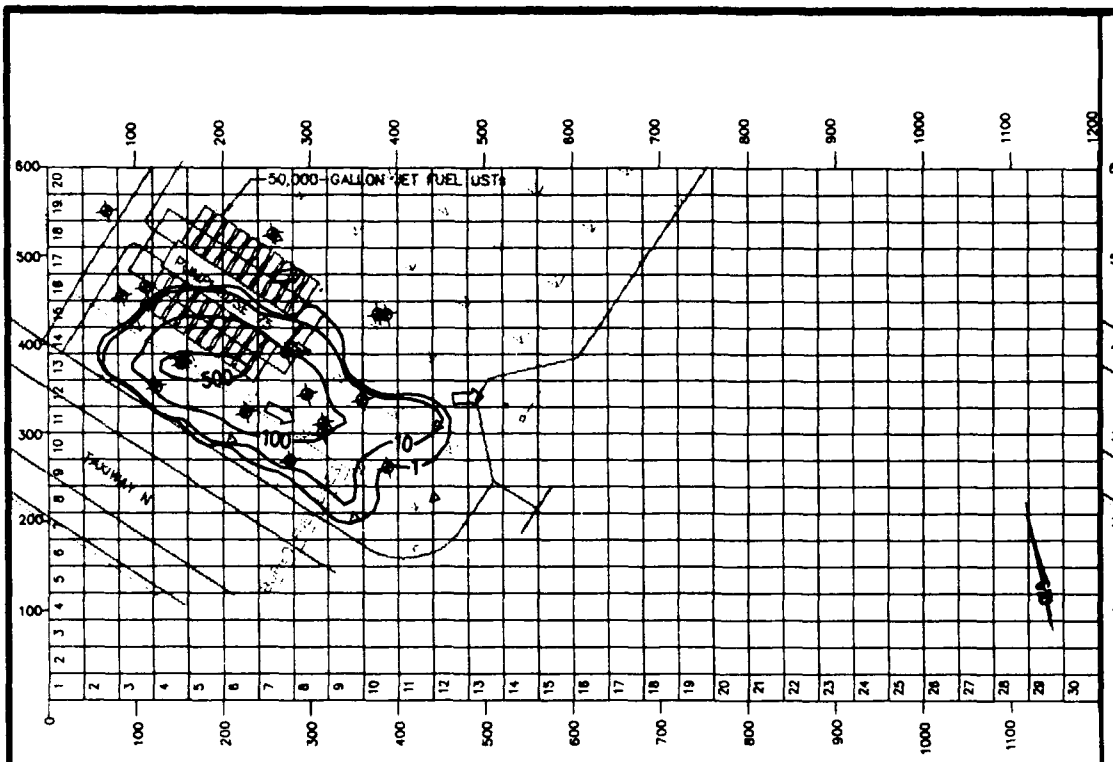


FIGURE 5.13

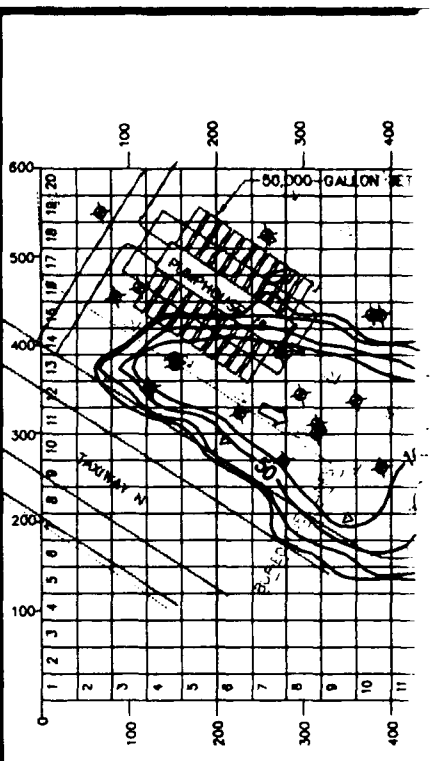
COMPARISON OF SIMULATED MAXIMUM BTEX CONCENTRATIONS MODELS PH75A, PH75B, AND PH75C

Intrinsic Remediation TS
MacDill Air Force Base, Florida

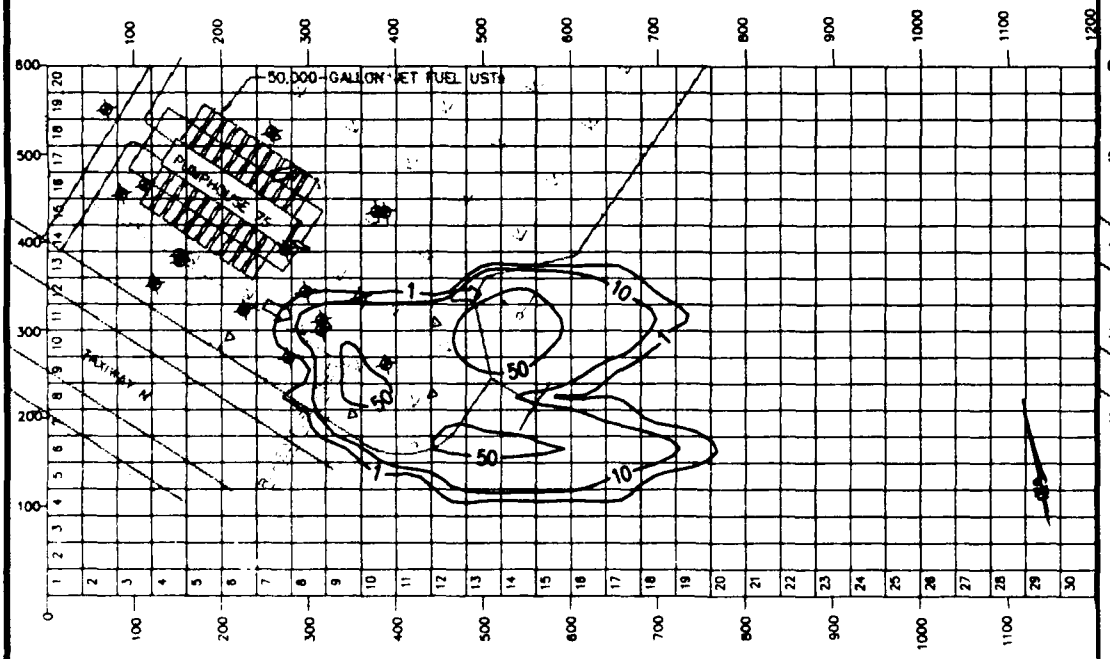
PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado



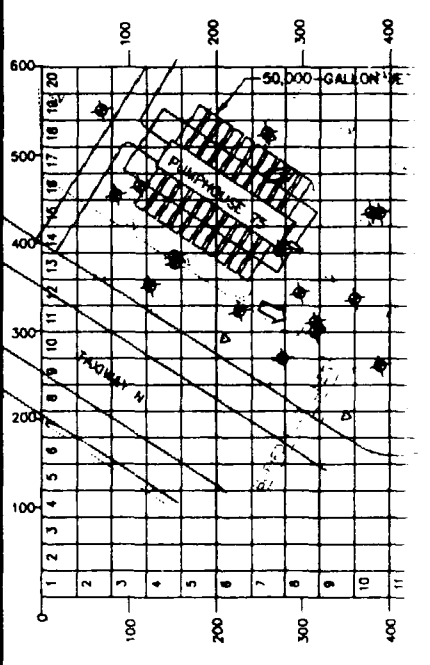
CALIBRATED MODEL (1995)



3 YEARS

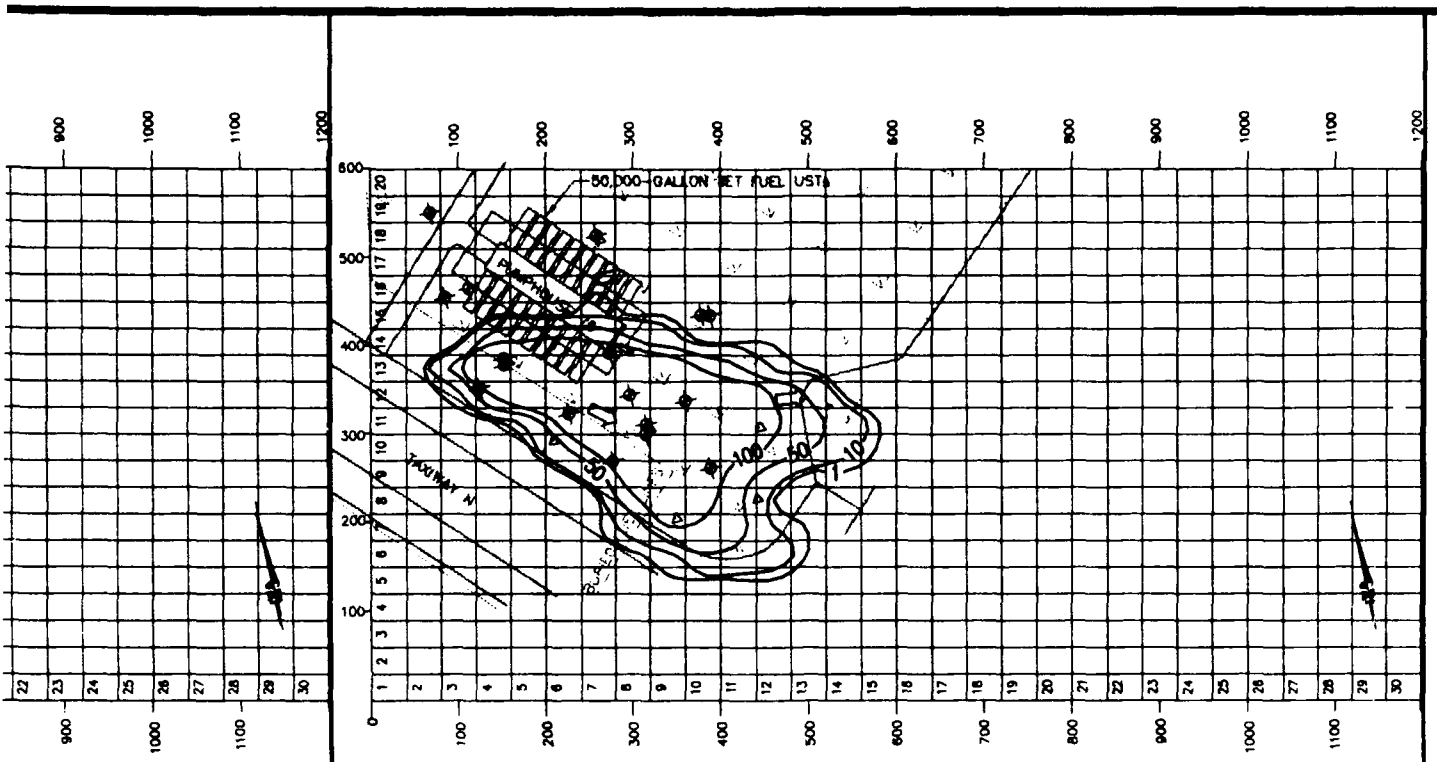


7 YEARS OF SIMULATION (2002)

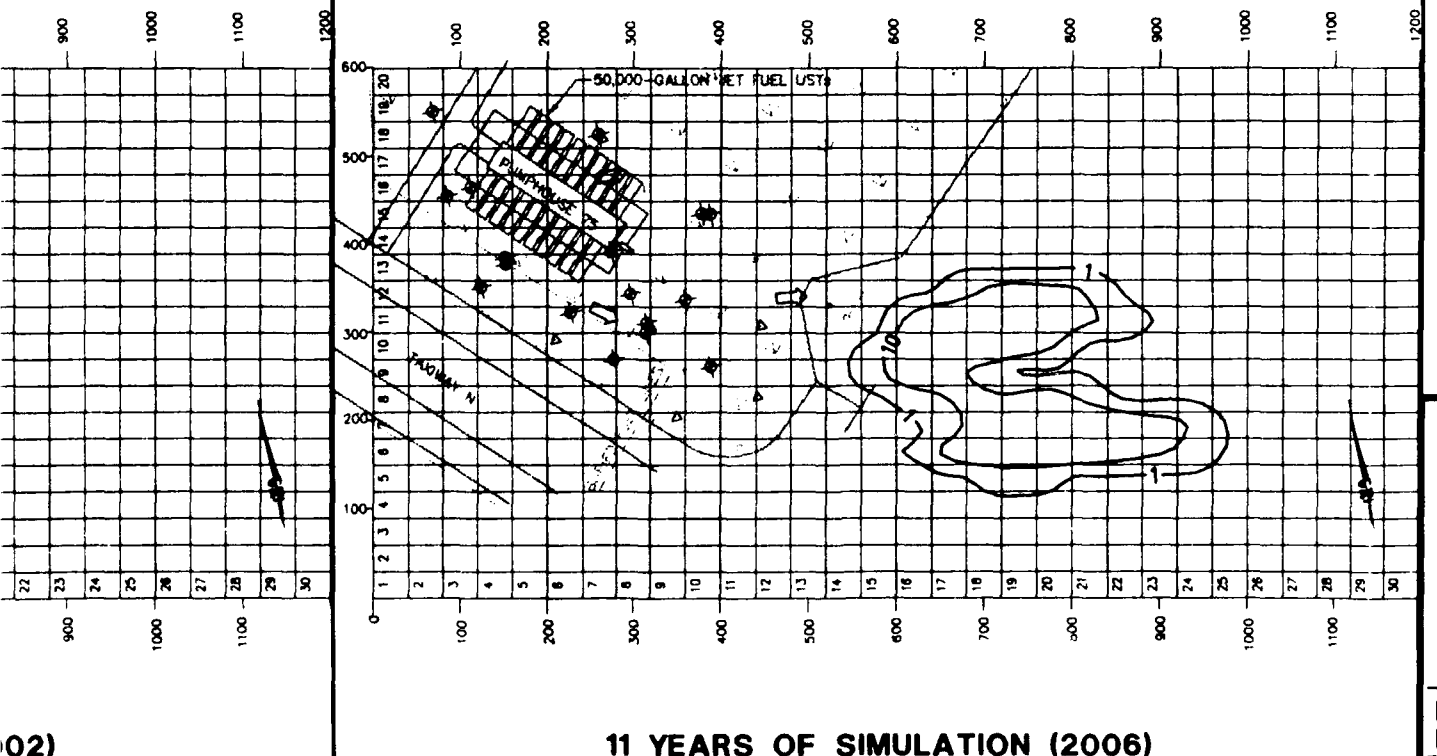


11 YEARS

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3 YEARS OF SIMULATION (1998)



11 YEARS OF SIMULATION (2006)

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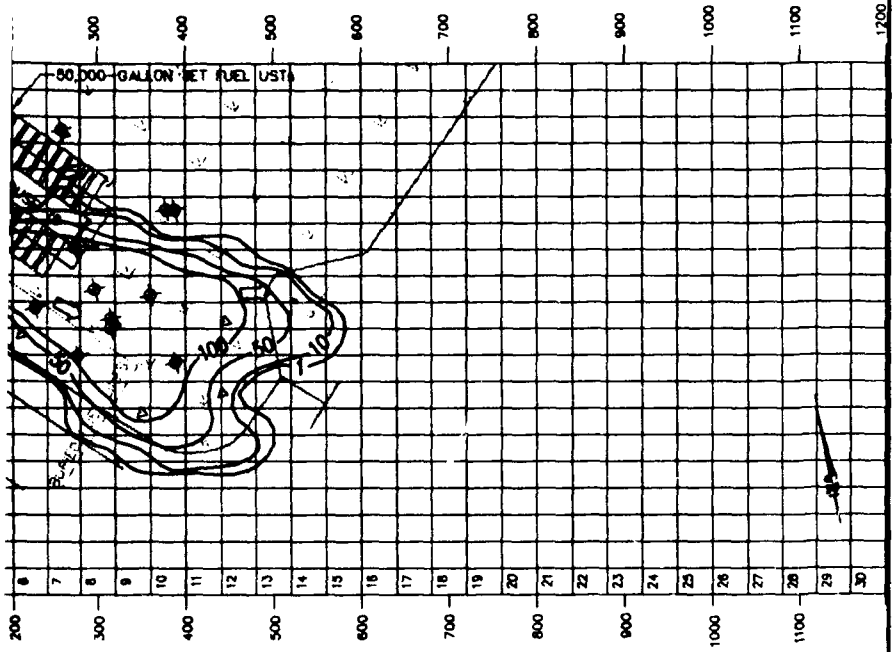
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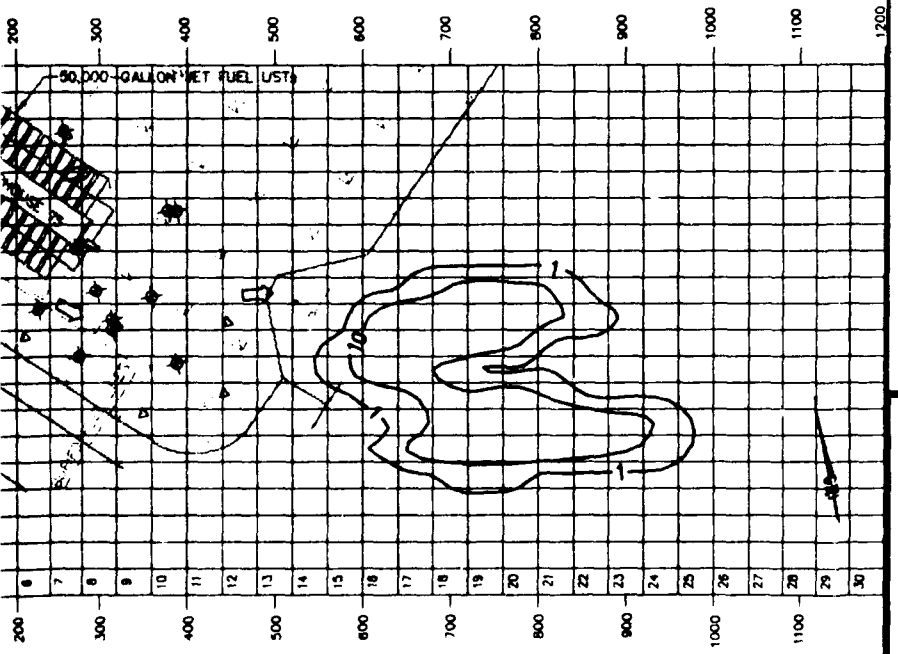
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3 YEARS OF SIMULATION (1998)



11 YEARS OF SIMULATION (2006)

LEGEND

- MONITORING POINT
- MONITORING WELL
- —10— LINE OF EQUAL BTEX CONCENTRATION (μg\L) CONTOUR INTERVAL = VARIABLE
- ESTIMATED GROUNDWATER FLOW DIRECTION
- GRASSY AREAS

200 100 0 200
FEET

FIGURE 5.14

SIMULATED PLUME MIGRATION MODEL PH75B PUMPHOUSE 75

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appears to be located. This model predicts that the maximum dissolved BTEX concentration in the plume will decrease below 50 µg/L after simulation year 8, and the plume is completely biodegraded after 15 years of simulation time. A dissolved BTEX concentration of 2 µg/L reaches the most downgradient row of active model cells (model grid row 29) during year 15 before the plume disappears completely.

5.7 Conclusions and Discussion

Three model simulations were run to simulate a variety of conditions. Model PH75A assumed natural attenuation of BTEX in source area soils. Models PH75B and PH75C were identical to PH75A except that they simulated the effects of rapid remediation of source area soils through bioventing or another *in situ* method.

The results of the Bioplume II model simulations described in Section 5.6 suggest that the dissolved BTEX contamination will primarily remain in the modeled area and decrease in concentration to below 50 µg/L after 14 years, even if no engineered remediation is performed. The modeling suggests that engineered remediation of source area soils would further restrict the downgradient migration of the dissolved BTEX plume, and promote a relatively rapid decrease in dissolved BTEX concentrations. If an engineered soil remediation technology is employed, consideration should be given to limiting its use to the area near and between monitoring wells 75MD-MW04 and 75MD-MW08.

The removal of dissolved BTEX compounds predicted by the simulations is largely a function of anaerobic biodegradation and sorption. Influxes of fresh groundwater enhance biodegradation by flushing water containing electron acceptors through the BTEX plume, which is retarded with respect to the advective groundwater velocity. As a result, biodegradation processes are maintained due to the continuous influx of electron acceptors. This is further enhanced by the additional influxes of electron acceptors in the grassy areas where precipitation recharge of the groundwater system occurs.

In all cases, model simulations are conservative for several reasons, including:

1) Aerobic respiration, denitrification, iron reduction, sulfate reduction, and methanogenesis are all occurring at this site; however, only DO is considered as an electron acceptor during model simulations, and the anaerobic decay coefficient used in the calibrated model is lower than common literature values and values computed for similar sites both at MacDill AFB and Patrick AFB, Florida.

2) The stoichiometry used to determine the ratio between DO and total BTEX assumed that no microbial cell mass is produced during the reaction. As discussed in Section 4.3.2.1, this approach may be too conservative by a factor of up to three.

3) A low coefficient of retardation which is most representative of benzene (1.3) was used for model simulations. The use of the low coefficient of retardation tends to increase the distance traveled by the simulated BTEX plume, but may provide a more accurate estimate of benzene transport.

In summary, the strong geochemical evidence of anaerobic biodegradation, and the reasonably conservative nature of the Bioplume II models, suggest that natural attenuation will substantially reduce dissolved BTEX concentrations and limit plume migration. It is important

to note that the modeled scenarios incorporate the assumption that the contaminant source is not continuous, but that any leaks have been remedied. The simulated injection wells are intended to represent continuing partitioning of BTEX from measured concentrations of residual LNAPL into the groundwater. Bioplume II assumes that the migration of BTEX compounds is predominantly in the horizontal direction. Further investigation of the vertical migration of BTEX compounds at this site should be performed. Recommendations for additional investigations of this nature are described in Section 8.

SECTION 6

COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

This section presents the development and comparative analysis of two groundwater remedial alternatives for Pumphouse 75 at MacDill AFB. The intent of this evaluation is to determine if intrinsic remediation is an appropriate and cost-effective remedial approach to consider when developing final remedial strategies for the site, especially when combined with other innovative and conventional remedial technologies.

Section 6.1 presents the evaluation criteria used to evaluate groundwater remedial alternatives. Section 6.2 discusses the development of remedial alternatives considered as part of this demonstration project. Section 6.3 provides a brief description of each of these remedial alternatives. Section 6.4 provides a more detailed analysis of the remedial alternatives using the defined remedial alternative evaluation criteria. The results of this evaluation process are summarized in Section 6.5.

6.1 REMEDIAL ALTERNATIVE EVALUATION CRITERIA

The evaluation criteria used to identify appropriate remedial alternatives for shallow groundwater contamination at the site were adapted from those recommended by the USEPA (1988) for selecting remedies for Superfund sites [Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-01]. These criteria included (1) long-term effectiveness and permanence, (2) technical and administrative implementability, and (3) relative cost. The following sections briefly describe the scope and purpose of each evaluation criterion. This report focuses on the potential use of intrinsic remediation and source reduction technologies to reduce BTEX concentrations within the shallow groundwater to levels that meet regulatory standards intended to be protective of human health and the environment.

6.1.1 Long-Term Effectiveness and Permanence

Each remedial approach or remedial alternative (which can be a combination of remedial approaches such as intrinsic remediation and institutional controls) was analyzed to determine how effectively it will minimize groundwater plume expansion so that applicable groundwater quality standards can be achieved at a downgradient POC. The expected remedial effectiveness based on case histories from other sites with similar conditions also is evaluated. The ability to minimize potential impacts to surrounding facilities and operations is considered. Also, the ability of each remedial alternative to protect both current and potential future receptors from potential exposures associated with site-related contamination in shallow groundwater is qualitatively assessed by conservatively evaluating the potential for completion of

exposure pathways involving groundwater, either now or in the future. This evaluation criterion also included permanence and the ability to reduce contaminant mass, toxicity, and volume. Time to implementation and estimated time until protection is achieved are described. Long-term reliability for providing continued protection, including an assessment of potential for failure of the technology and the potential threats resulting from such a failure, also is evaluated.

6.1.2 Implementability

The technical implementation of each remedial technology/approach or remedial alternative was evaluated in terms of technical feasibility and availability. Potential logistical shortcomings and difficulties in construction, operations, and monitoring are presented and weighed against perceived benefits. Requirements for any post-implementation site controls such as LTM and land or groundwater use restrictions are described. Details on administrative feasibility in terms of the likelihood of public acceptance and the ability to obtain necessary approvals are discussed.

6.1.3 Cost

The total cost (present worth) of each remedial alternative was estimated for relative comparison following USEPA (1993) guidance. An estimate of capital costs, and operations and post-implementation costs for site monitoring and controls is included. An annual discount factor of 7 percent was assumed in present worth calculations (USEPA, 1993).

6.2 FACTORS INFLUENCING ALTERNATIVES DEVELOPMENT

Several factors were considered during the identification and screening of remedial technologies for addressing shallow groundwater contamination at the site. Factors considered included the objectives of the natural attenuation demonstration program; contaminant, groundwater, and soil properties; present and future land uses; and potential receptor exposure pathways. The following section briefly describes each of these factors and how they were used to narrow the list of potentially applicable remedial technologies to the final remedial alternatives considered for the site.

6.2.1 Program Objectives

The intent of the intrinsic remediation demonstration program sponsored by AFCEE is to develop a systematic process for scientifically investigating and documenting naturally occurring subsurface attenuation processes that can be factored into overall site remediation plans. The objective of this program and the specific Pumphouse 75 study is to provide solid evidence of intrinsic remediation of dissolved fuel hydrocarbons so that this information can be used to develop an effective groundwater remediation strategy. A secondary goal of this multi-site initiative is to provide a series of regional case studies that demonstrate that natural processes of contaminant degradation can often reduce contaminant concentrations in groundwater to below acceptable cleanup standards before completion of potential exposure pathways.

Because the objective of this program is to study natural processes in the saturated zone rather than all contaminated media (soil, soil gas, etc.), approaches and technologies have been evaluated based primarily on their potential impact on shallow groundwater and phreatic soils. Technologies that can reduce vadose zone contamination and partitioning of contaminants into groundwater have also been evaluated. Many of the source removal technologies evaluated in this section will also reduce soil and soil gas contamination, but it is important to emphasize that the remedial alternatives developed in this document are not necessarily intended to remediate all contaminated media.

Additional program objectives set forth by AFCEE include cost effectiveness and minimization of waste. Approaches and technologies that may meet these criteria include institutional controls, soil vapor extraction, bioventing, biosparging, groundwater pump and treat, and intrinsic remediation. Soil excavation, slurry walls, sheet piling, carbon adsorption, *ex situ* biological or chemical treatment, and onsite/offsite disposal are generally not attractive technology candidates under this program.

6.2.2 Contaminant Properties

The site-related contaminants considered as part of this demonstration at Pumphouse 75 are the BTEX compounds. The source of this contamination is AVGAS, JP-4, and/or JP-8 present as residual contamination in capillary fringe and saturated soil in the vicinity of Pumphouse 75. The physiochemical characteristics of these fuels and the individual BTEX compounds will greatly influence the effectiveness and selection of a remedial technology.

Petroleum hydrocarbon mixtures, such as AVGAS, JP-4, and JP-8, are comprised of over 300 compounds with different physiochemical characteristics. These fuels are classified as a LNAPLs with liquid densities ranging from 0.73 to 0.80 gram per cubic centimeter (g/cc) at 20°C (Arthur D. Little, Inc., 1987). Many compounds in these fuels sorb very well to soil and are concentrated in the capillary fringe because the mixtures are less dense than water. AVGAS, JP-4, and JP-8 are slightly soluble in water, with maximum solubilities ranging from 5 to 300 mg/L. These fuels are also a primary substrate for biological metabolism. Simultaneous biodegradation of aliphatic, aromatic, and alicyclic hydrocarbons has been observed. In fact, mineralization rates of hydrocarbons in mixtures such as JP-4 may be faster than mineralization of the individual constituents as a result of cometabolic pathways (Jamison *et al.*, 1975; Perry, 1984).

The BTEX compounds are generally volatile, highly soluble in water, and adsorb less strongly to soil than other hydrocarbons in a petroleum mixture. These characteristics allow the BTEX compounds to leach more rapidly from mobile LNAPL and contaminated soil into groundwater, and to migrate as dissolved contamination (Lyman *et al.*, 1992). All of the BTEX compounds are highly amenable to *in situ* degradation by both biotic and abiotic mechanisms.

Benzene is very volatile, with a vapor pressure of 76 millimeters of mercury (mm Hg) at 20°C and a Henry's Law Constant of approximately 0.0054 atmosphere-cubic

meters per mole (atm-m^3/mol) at 25°C (Hine and Mookerjee, 1975; Jury *et al.*, 1984). The solubility of pure benzene in water at 20°C has been reported to be 1,780 mg/L (Verschueren, 1983). Benzene is normally biodegraded to carbon dioxide, with catechol as a short-lived intermediate (Hopper, 1978; Ribbons and Eaton, 1992).

Toluene is also volatile, with a vapor pressure of 22 mm Hg at 20°C and a Henry's Law Constant of about 0.0067 atm-m^3/mol at 25°C (Pankow and Rosen, 1988; Hine and Mookerjee, 1975). Toluene sorbs more readily to soil media relative to benzene, but still is very mobile. The solubility of pure toluene in water at 20°C is approximately 515 mg/L at 20°C (Verschueren, 1983). Toluene has been shown to degrade to pyruvate, acetaldehyde, and completely to carbon dioxide via the intermediate catechol (Hopper, 1978; Wilson *et al.*, 1986; Ribbons and Eaton, 1992).

Ethylbenzene has a vapor pressure of 7 mm Hg at 20°C and a Henry's Law Constant of 0.0066 atm-m^3/mol (Pankow and Rosen, 1988; Valsaraj, 1988). Ethylbenzene tends to sorb more strongly to soils than benzene but less strongly than toluene (Abdul *et al.*, 1987). Pure ethylbenzene is also less soluble than benzene and toluene in water at 152 mg/L at 20°C (Verschueren, 1983; Miller *et al.*, 1985). Ethylbenzene ultimately degrades to carbon dioxide via its intermediate 3-ethylcatechol (Hopper, 1978; Ribbons and Eaton, 1992).

The three isomers of xylene have vapor pressures ranging from 7 to 9 mm Hg at 20°C and Henry's Law Constants of between 0.005 and 0.007 atm-m^3/mol at 25°C (Mackay and Wolkoff, 1973; Hine and Mookerjee, 1975; Pankow and Rosen, 1988). Of all of the BTEX compounds, xylenes sorb most strongly to soil, but still can leach from soil into the groundwater (Abdul *et al.*, 1987). Pure xylenes have water solubilities of 152 to 160 mg/L at 20°C (Bohon and Claussen, 1951; Mackay and Shiu, 1981; Isnard and Lambert, 1988). Xylenes can degrade to carbon dioxide via pyruvate carbonyl intermediates (Hopper, 1978; Ribbons and Eaton, 1992).

On the basis of these physiochemical characteristics, intrinsic remediation, soil vapor extraction, bioventing, biosparging/air sparging, groundwater extraction, and air stripping technologies could all be effective options for collecting, destroying, and/or treating BTEX contaminants at Pumphouse 75.

6.2.3 Site-Specific Conditions

Two general categories of site-specific characteristics were considered when identifying remedial technologies for comparative evaluation as part of this demonstration project. The first category was physical characteristics such as groundwater depth, gradient, flow direction, and soil type, which influence the types of remedial technologies most appropriate for the site. The second category involved assumptions about future land uses and potential exposure pathways. Each of these site-specific characteristics have influenced the selection of remedial alternatives included in the comparative evaluation.

6.2.3.1 Groundwater and Soil Characteristics

Site geology and hydrogeology will have a profound effect on the transport of contaminants and the effectiveness and scope of required remedial technologies at a given site. Hydraulic conductivity is perhaps the most important aquifer parameter governing groundwater flow and contaminant transport in the subsurface. The velocity of the groundwater and dissolved contamination is directly related to the hydraulic conductivity of the saturated zone. Slug tests conducted in the vicinity of the Pumphouse 75 site indicate a moderate conductivity within the sand unit present in the vicinity of the source area and dissolved plume. Estimated conductivity values ranged from 5.2 to 90.7 ft/day, characteristic of sand or silty sand. The hydraulic conductivity at this site directly influences the fate and transport of contaminants. The shallow groundwater migrates to the east-southeast, increasing the extent of contamination (i.e., the plume has expanded) but decreasing the average BTEX concentration within the aquifer through dilution and biodegradation.

Although higher hydraulic conductivities can result in plume expansion and migration, this same characteristic also will enhance the effectiveness of other remedial technologies, such as groundwater extraction, biosparging, and intrinsic remediation. For example, it should be less expensive and time-consuming to capture and treat the contaminant plume using a network of extraction wells in areas of high hydraulic conductivity. Contaminant recovery also may be maximized when contaminants are not significantly sorbed to and retarded by phreatic soil. The effectiveness of biosparging may also be increased in highly conductive aquifers because of reduced entry pressures and increased radius of influence. Greater hydraulic conductivity also would increase the amount of contaminant mass traveling through a biosparging network. The DO introduced through biosparging can enhance aerobic degradation of the dissolved contaminant mass, particularly at a site such as Pumphouse 75 where oxygen-deficient groundwater predominates.

The movement of contaminants within the subsurface away from the source also will increase the effectiveness of natural biodegradation processes by distributing the contaminant mass into areas enriched with electron acceptors. In addition, because BTEX compounds are retarded relative to the advective flow velocity, relatively fresh groundwater containing DO and other electron acceptors will migrate through the plume area, further increasing biodegradation.

To satisfy the requirements of indigenous microbial activity and intrinsic remediation, the aquifer must also provide an adequate and available carbon or energy source, electron acceptors, essential nutrients, and proper ranges of pH, temperature, and redox potential. Data collected as part of the field work phase of this demonstration project and described in Sections 3 and 4 of this document indicate that this site is characterized by adequate and available carbon/energy sources and electron acceptors to support measurable biodegradation of fuel hydrocarbon contamination by indigenous microorganisms. Sulfate and carbon dioxide (which is utilized during methanogenesis) represent primary sources of electron acceptor capacity for the biodegradation of BTEX compounds at the site. Relatively minor electron acceptors include DO and ferric iron. Further, because fuel-hydrocarbon-degrading microorganisms have been known to thrive under a wide range of temperature and pH

conditions (Freeze and Cherry, 1979), the physical and chemical conditions of the groundwater and phreatic soil at the site are not likely to inhibit microorganism growth.

Fuel-hydrocarbon-degrading microorganisms are ubiquitous, and as many as 28 hydrocarbon-degrading isolates (bacteria and fungi) have been identified in different soil environments (Davies and Westlake, 1977; Jones and Eddington, 1968). Indigenous microorganisms have a distinct advantage over microorganisms injected into the subsurface to enhance biodegradation because indigenous microorganisms are well adapted to the physical and chemical conditions of the subsurface in which they reside (Goldstein *et al.*, 1985). Therefore, microbe addition was not considered a viable remedial technology for this site.

6.2.3.2 Potential Exposure Pathways

A pathways analysis identifies the human and ecological receptors that could potentially come into contact with site-related contamination and the pathways through which these receptors might be exposed. To have a completed exposure pathway, there must be a source of contamination, a potential mechanism(s) of release, a pathway of transport to an exposure point, an exposure point, and a receptor. If any of these elements do not exist, the exposure pathway is considered incomplete, and receptors will not come into contact with site-related contamination. Evaluation of the potential long-term effectiveness of any remedial technology or remedial alternative as part of this demonstration project includes determining if the approach will be sufficient and adequate to minimize plume expansion so that potential receptor exposure pathways involving shallow groundwater contaminants are incomplete.

Assumptions about current and future land uses at a site form the basis for identifying potential receptors, potential exposure pathways, reasonable exposure scenarios, and appropriate remediation goals. USEPA (1991) advises that the land use associated with the highest (most conservative) potential level of exposure and risk that can reasonably be expected to occur should be used to guide the identification of potential exposure pathways and to determine the level to which the site must be remediated. The current land use at the site is industrial. The primary source area appears to be the fuel supply pipelines located immediately southwest of the pumphouse. Additional, relatively minor, sources may include the fuel USTs and related pipelines beneath and adjacent to the pumphouse.

Pumphouse 75 is surrounded by flight aprons, taxiways, fueling stations (fuel pits), other pumphouses, and intervening relatively undeveloped areas for at least 800 feet in all directions. In the hydraulically downgradient directions (southeast, east, and northeast), these features extend for at least 1,500 feet before the nearest more developed areas are encountered. These more developed areas, which border Hangar Loop Drive, primarily contain flight hangars, maintenance buildings, and office buildings. Therefore, the current land use within and downgradient of the contaminant plume is entirely commercial/industrial. The head of a northwest/southeast-trending drainage ditch is located approximately 1,100 feet southeast of the Pumphouse 75. This ditch does not appear to be directly hydraulically downgradient of the pumphouse based on the available data, but general local groundwater flow direction information suggests that groundwater contamination from the pumphouse could migrate toward the

ditch. Water in the ditch flows approximately 2.4 miles via a series of ditches into Tampa Bay. The shallow drainage swale located immediately east of the pumphouse trends to the north-northeast, and may discharge into a northeast-trending drainage ditch located approximately 2,400 feet northeast of the pumphouse. This drainage ditch is approximately 3,000 feet long and flows into Hillsborough Bay. The shallow drainage swale adjacent to the pumphouse contains water only during precipitation events, and could potentially receive groundwater discharge only during extremely wet periods when the groundwater table is very near the ground surface.

Under reasonable current land use assumptions, potential receptors include only Base worker populations, because the Bioplume II model results indicate that the dissolved BTEX plume will not migrate far enough to pose a threat to potential receptors exposed at the nearest downgradient drainage ditch, and will not migrate off Base. Workers could be exposed to site-related contamination in phreatic soils or shallow groundwater if these materials are removed or exposed during future construction excavations or remedial activities. Groundwater from the shallow aquifer is not currently used to meet any demands at MacDill AFB. All Base potable water is supplied by the city of Tampa. There are no private wells located on the Base, and the Hillsborough County designated Wellhead Protection Area nearest to Site 57 is located approximately 13 miles north of the Base (BVWS, 1995). The nearest private well, reportedly located at least 0.6 mile north of Pumphouse 75, is used for irrigation (BVWS, 1995). Exposure pathways involving other environmental media such as vadose zone soils and soil gas in the source area were not considered as part of this project, but should be considered in overall site remediation decisions.

Assumptions about hypothetical future land uses also must be made to ensure that the remedial technology or alternative considered for shallow groundwater at the site is adequate and sufficient to provide long-term protection. The future use of Pumphouse 75 and the surrounding area is projected to be unchanged from the current uses described above. Therefore, potential future receptors are the same as those listed in the preceding paragraph. The potential future exposure pathways involving Base workers are identical to those under current conditions provided shallow groundwater is not used to meet industrial water demands. In summary, the use of the intrinsic remediation technology at this site will require that the source area be maintained as industrial property and that restrictions on shallow groundwater use be enforced in areas downgradient from the site until natural attenuation reduces contaminants to concentrations that meet regulatory standards. If source removal technologies such as soil vapor extraction, bioventing, biosparging, or groundwater pump and treat are implemented, they will have some impact on the short- and long-term land use options and will require some level of institutional control and worker protection during remediation.

6.2.3.3 Remediation Goals for Shallow Groundwater

The results of model PH75A suggest that BTEX compounds are not likely to move more than 150 feet downgradient from the downgradient model boundary (or approximately 850 feet downgradient from the estimated March 1995 plume front. Therefore, an area approximately 900 feet beyond the current leading edge of the BTEX plume has been identified as the POC for groundwater remedial activities

because this is the projected maximum extent of future contaminant migration. This is a suitable location for monitoring and for demonstrating compliance with protective groundwater quality standards.

This remedial strategy assumes that compliance with promulgated, single-point remediation goals is not necessary if site-related contamination does not pose a threat to human health or the environment (i.e., exposure pathways are incomplete). Thus, the magnitude of required remediation in areas that can and will be placed under institutional control is different from the remediation that is required in areas that may be available for unrestricted use. The primary remedial action objective (RAO) for shallow groundwater at and downgradient of Pumphouse 75 is limited plume expansion to prevent exposure of downgradient receptors to concentrations of BTEX in groundwater at levels that exceed regulatory standards or guidelines. This means that viable remedial alternatives must be able to achieve concentrations that minimize plume migration and/or expansion. The ultimate RAO for shallow groundwater at the POC is attainment of state no-further-action guidelines for G-II groundwater in an area where there are no drinking water wells within 0.25 mile of the site, and no public water supply wells within 0.50 mile of the site. These guidelines are contained in *No Further Action and Monitoring Only Guidelines for Petroleum Contaminated Sites* [Florida Department of Environmental Regulation (DER), 1990)], and are summarized in Table 6.1. An interim RAO for attainment of "monitoring only" status for shallow groundwater are the "monitoring only" guidelines presented in Florida DER (1990). These interim guidelines could be used to determine when to discontinue an aggressive remedial action such as source removal via bioventing or a groundwater pump-and-treat system and allow intrinsic remediation with monitoring to remediate to no-further-action levels.

In summary, available data suggest that there is no completed potential exposure pathway involving shallow groundwater under current conditions. Moreover, it is likely that no additional potential exposure pathways involving shallow groundwater would be completed under future land use assumptions, provided use of shallow groundwater as a potable or industrial source of water is prohibited by institutional controls within the plume area and within an area approximately 1,500 feet downgradient from the March 1995 downgradient plume boundary. Thus, institutional controls are likely to be a necessary component of any groundwater remediation strategy for this site. The required duration of these institutional controls may vary depending on the effectiveness of the selected remedial technology at reducing contaminant mass and concentration in the groundwater.

6.2.4 Summary of Remedial Technology Screening

Several remedial technologies were identified and screened for use in treating the shallow groundwater at the site. Table 6.2 identifies the initial remedial technologies considered as part of this demonstration and those retained for detailed comparative analysis. Screening was conducted systematically by considering the program objectives of the AFCEE intrinsic remediation demonstration, physiochemical properties of the BTEX compounds, and other site-specific characteristics such as hydrogeology, land use assumptions, potential exposure pathways, and appropriate remediation goals. All of these factors will influence the technical effectiveness,

TABLE 6.1
POINT-OF-COMPLIANCE REMEDIATION GOALS FOR GROUNDWATER
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Compound	Groundwater RAO[a/] (µg/L)[b/]	Groundwater RAO (µg/L)
	(no further action)	(monitoring only)
Benzene	50	50 (perimeter) 500 (source area)
Total BTEX[c/]	50	50 (perimeter) 1,000 (source area)

a/ RAO = remedial action objective.
b/ µg/L = micrograms per liter.
c/ BTEX = benzene, toluene, ethylbenzene, and xylenes.

Source: Florida DER, 1990

TABLE 6.2
INITIAL TECHNICAL IMPLEMENTABILITY SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS FOR GROUNDWATER REMEDIATION
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

General Response Action	Technology Type	Process Option	Implementability	Retain
Long-Term Monitoring	Periodic Groundwater Monitoring	Confirmation Wells	Many existing wells are available to confirm the progress of remediation. .	Yes
		Point-of-Compliance Wells	Sufficient distance exists between the plume and point-of-compliance to locate several wells.	Yes
Institutional Controls	Groundwater Use Control	Land Use Control/Regulate Well Permits	Plume area is currently within the Base boundary, and land and groundwater use are under Base jurisdiction.	Yes
		Seal/Abandon Existing Wells	No production wells are known to exist in the existing or predicted plume area.	No
		Point-of-Use Treatment	No shallow groundwater is extracted from the plume area for any use.	No
	Public Education	Meetings/ Newsletters	Base public relations and environmental management offices have many information avenues to workers and residents.	Yes
Containment of Plume	Hydraulic Controls	Passive Drain Collection	Hydraulic conductivity of site soils favors pumping. Passive collection could feasibly be implemented, but relatively low dissolved BTEX concentrations indicate that this more aggressive remedial option is not necessary.	No
		Minimum Pumping/Gradient Control	Hydraulic conductivities of site soils are moderate to high and would allow extraction of sufficient volumes. Treatment of extracted water would probably be necessary. Relatively low dissolved BTEX concentrations indicate that this more aggressive remedial option is not necessary.	No
	Physical Controls	Slurry Walls/Grout Curtains	Requires significant disruption of site. Limited effectiveness.	No
		Sheet Piling	Requires significant disruption of site. Limited effectiveness.	No
	Reactive/Semi-Permeable Barriers	Biologically Active Zones	Natural biodegradation of BTEX compounds can be stimulated by allowing contaminated groundwater to flow through an aquifer zone which has enhanced oxygen and nutrient conditions. A new, unproven technology.	No

TABLE 6.2 (Continued)
INITIAL TECHNICAL IMPLEMENTABILITY SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS FOR GROUNDWATER REMEDIATION
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

General Response Action	Technology Type	Process Option	Implementability	Retain
In Situ Treatment	Biological	Oxygen and/or Nutrient Enhanced Biodegradation (Biosparging)	Differs from biologically active zone in that oxygen and/or nutrients are injected in or downgradient of plume to limit plume migration by enhancing biodegradation and reducing BTEX concentrations as the plume moves downgradient from the source area. Limited radius of influence and short-circuiting are common problems.	Yes
	Chemical/Physical	Intrinsic Remediation	A combination of natural biological, chemical, and physical removal mechanisms which occur to varying degrees on every site. Groundwater sampling at Pumphouse 75 indicates that this is a major, ongoing remediation process.	Yes
		Air Sparging (Volatilization)	Injection of air into contaminated aquifer creating a mass transfer of BTEX into air bubbles and into vadose zone. Limited radius of influence and short-circuiting are common problems.	Yes
Aboveground Groundwater Treatment	Groundwater Extraction	Vertical Pumping Wells	Groundwater plume "hot spot" is pumped by installing wells with submersible pumps. Option is implementable, and would constitute an aggressive remedial option, but relatively low dissolved BTEX concentrations indicate that less aggressive and expensive options would be adequate to remediate the groundwater.	No
		Downgradient Horizontal Drains	See Passive Drain Collection.	No
	Biological	Bioreactors	High flow rates require excessive retention times and large reactors. BTEX is often volatilized in these systems.	No
	Chemical/Physical	Air Stripping	Cost-effective technology for removing varying concentrations of BTEX at higher flow rates. Groundwater extraction not retained as a remedial option.	No
		Activated Carbon	Cost prohibitive for more concentrated BTEX or long system operation times. Creates a carbon disposal problem. Carbon is also used to treat off-gas from air strippers. Groundwater extraction not retained as a remedial option.	No
		UV/Ozone Reactors	High flow rates require excessive retention times and large, expensive reactors. Groundwater extraction not retained as a remedial option.	No

TABLE 6.2 (Continued)
INITIAL TECHNICAL IMPLEMENTABILITY SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS FOR GROUNDWATER REMEDIATION
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

General Response Action	Technology Type	Process Option	Implementability	Retain
Aboveground Treatment	Direct Discharge to Industrial Waste Water Treatment Plant (IWWTP)		Viable option when an IWWTP is readily available and capable of handling BTEX and hydraulic loading. IWWTP not readily available. Groundwater extraction not retained as a remedial option.	No
Treated Ground Water Disposal	Discharge to IWWTP or Sanitary Sewe.	IWWTP	Viable option when an IWTTP is readily available and capable of handling BTEX. IWWTP not readily available. Groundwater extraction not retained as a remedial option.	No
		Sanitary Sewer	Viable option when access to sanitary sewer exists and hydraulic loading is acceptable. Groundwater extraction not retained as a remedial option.	No
	Treated Groundwater Reinjection	Vertical Injection Wells	Not recommended due to clogging and high maintenance. Groundwater extraction not retained as a remedial option.	No
		Injection Trenches	Require large trenches and can be subject to injection well permitting. Groundwater extraction not retained as a remedial option.	No
	Discharge to Surface Waters	Storm Drains	Viable option but generally requires NPDES or other discharge permit. Groundwater extraction not retained as a remedial option.	No
Source Removal/Soil Remediation	Excavation/ Treatment	Biological Landfarming	Excavation may be feasible at this site, but source removal could also be accomplished using less intrusive methods.	No
		Thermal Desorption	Offsite thermal treatment potentially implementable. Soil excavation not retained as a remedial option.	No
	In Situ	Bioventing	Air injection to stimulate biodegradation of fuel residuals. Soils in source areas should not limit effectiveness.	Yes
		Soil Vapor Extraction	Vapor extraction has been successfully implemented at other sites. Requires source definition and off-gas treatment. Bioventing is preferred, but vapor extraction may be necessary before bioventing can be implemented.	Yes
		Soil Amendments	The primary limiting factor in natural biodegradation is lack of oxygen. Supplementing other electron acceptor concentrations through the use of soil amendments would not significantly increase biodegradation rates to the extent that oxygen addition would.	No

implementation, and relative cost of technologies for remediating shallow groundwater underlying and migrating from the site. The remedial approaches and source removal technologies retained for development of remedial alternatives and comparative analysis include institutional controls, intrinsic remediation combined with LTM, and bioventing/biosparging/soil vapor extraction.

6.3 BRIEF DESCRIPTION OF REMEDIAL ALTERNATIVES

This section describes how remedial technologies retained from the screening process were combined into two remedial alternatives for Pumphouse 75. Sufficient information on each remedial alternative is provided to facilitate a comparative analysis of effectiveness, implementability, and cost in Section 6.4.

6.3.1 Alternative 1—Intrinsic Remediation and Institutional Controls with Long-Term Groundwater Monitoring

Intrinsic remediation is achieved when naturally occurring attenuation mechanisms bring about a reduction in the total mass of a contaminant in the soil or dissolved in groundwater. Intrinsic remediation results from the integration of several subsurface attenuation mechanisms that are classified as either destructive or nondestructive. Destructive attenuation mechanisms include biodegradation, abiotic oxidation, and hydrolysis. Nondestructive attenuation mechanisms include sorption, dilution (caused by dispersion and infiltration) and volatilization. In some cases, intrinsic remediation will reduce dissolved contaminant concentrations below numerical concentration goals intended to be protective of human health and the environment. As indicated by the evidence of intrinsic remediation described in Section 4, these processes are occurring in the vicinity of Pumphouse 75 and will continue to reduce contaminant mass in the plume area.

Results of the Bioplume II model PH75A suggest that the dissolved BTEX concentrations will decrease below 50 µg/L during simulation year 14 (2009), and that the plume will reach a maximum downgradient extent after approximately 17 years of simulation time. During simulation year 17, the model predicts that the dissolved BTEX concentration at the downgradient model boundary will peak at 8 µg/L, which is well below the groundwater RAOs, even if the entire estimated BTEX concentration is assumed to consist of benzene (Table 6.1). In subsequent years, the model predicts that intrinsic remediation within the BTEX plume and along the plume margins will prevent further plume migration, assuming BTEX loading in the source area decreases at a rate of 15 percent per year, as described in Section 5.6. The model suggests that the plume will not migrate further than approximately 150 feet beyond the downgradient model boundary, as described in Section 5.6.

Implementation of Alternative 1 would require the use of institutional controls such as land use restrictions and LTM. Land use restrictions may include placing long-term restrictions on soil excavation in the source area and long-term restrictions on groundwater well installations within and downgradient of the plume area. The intent of these restrictions would be to reduce potential receptor exposure to contaminants by legally restricting activities within areas affected by site-related contamination.

At a minimum, groundwater monitoring within the plume area would be conducted annually as part of the implementation of this remedial alternative to evaluate the progress of natural attenuation processes. Based on the potential plume migration suggested by the modeling, it is unlikely that benzene concentrations exceeding the most stringent Florida standard of 1 µg/L [Florida Department of Environmental Protection (DEP), 1994] would be present more than approximately 850 feet downgradient from the 1995 plume front (approximately 150 feet downgradient from the model boundary). This would be true even if it were assumed that simulated contaminant concentrations consist entirely of benzene rather than a mixture of the BTEX compounds. It is unlikely that benzene and dissolved BTEX concentrations exceeding the no-further-action guideline of 50 µg/L (Table 6.1) would be present more than approximately 550 feet downgradient from the 1995 plume front. The recommended components of LTM, including well locations, are described in Section 7.2.

Public education on the selected alternative would be developed to inform Base personnel and residents of the scientific principles underlying source reduction and intrinsic remediation. This education could be accomplished through public meetings, presentations, press releases, and posting of signs where appropriate. Periodic site reviews also could be conducted using data collected during the LTM program. The purpose of these reviews would be to evaluate the extent of contamination, assess contaminant migration and attenuation through time, document the effectiveness of source removal and/or institutional controls at the site, and reevaluate the need for additional remedial actions at the site.

6.3.2 Alternative 2--Bioventing/Biosparging in Source Area, Intrinsic Remediation, and Institutional Controls with Long-Term Groundwater Monitoring

This alternative is identical to Alternative 1 except that bioventing would be used to enhance the biodegradation of organic contaminants in subsurface soils by supplying oxygen to indigenous microbes using low-flow air injection in the vicinity of Pumphouse 75. Bioventing is preferred over soil vapor extraction because bioventing uses a low rate of air injection that significantly reduces emissions into the atmosphere while maximizing *in situ* biodegradation. However, bioventing using standard air injection techniques could create uncontrolled migration of potentially combustible vapors within the vadose zone. Therefore, bioventing should be preceded by approximately 1 to 2 months of soil vapor extraction (SVE) to reduce VOC concentrations in the soil vapor.

On the basis of Parsons ES experience in the application of bioventing technology, one horizontal air injection well installed in a shallow trench within the area of contaminated vadose zone soils should be sufficient to remediate the most significantly contaminated vadose zone soils in the vicinity of the fuel pipelines. The length of the well would be approximately 180 feet. Approximately four shallow vapor monitoring points also would be installed to allow measurement of the effectiveness of the injection well. Parsons ES has installed a similar bioventing system at the BX Service Station at Patrick AFB, Florida, where subsurface conditions are similar to those encountered at Pumphouse 75.

A bioventing system should remove at least 95 percent of residual soil BTEX compounds within 1 to 3 years. Operation of the bioventing system during a relatively dry year, when water levels are low, may be required to substantially decrease residual BTEX concentrations in the capillary fringe. The effect of this relatively rapid source removal on the migration of the groundwater BTEX plume was evaluated using the Bioplume II model, as described in Section 5.6.2. The simulation PH75B assumes that such a decrease in soil concentrations will produce a similar decrease in BTEX dissolution into the groundwater. The results of this models suggest that remediation of source area soils would further restrict the downgradient migration of the dissolved benzene plume, and promote a relatively rapid decrease in dissolved BTEX concentrations. After approximately 7 years, the maximum dissolved BTEX concentrations would drop below 50 µg/L. The results of simulation PH75C, which assumes remediation of a smaller volume of soil nearest the estimated primary contamination source area, suggest that this more limited remediation would be a cost-effective means of accomplishing source removal objectives.

An alternative design option would be to inject air below the groundwater surface and allow the air (oxygen) to move upward through the capillary fringe and into the contaminated vadose zone. This process, known as air sparging or biosparging, also would increase the DO content of the groundwater and promote more rapid degradation of dissolved BTEX compounds in the plume. Installation of the horizontal air injection well within 1 foot of the average groundwater surface would allow it to function as a sparging well during periods of relatively high water levels when the well would be submerged, and as a bioventing well during periods of relatively normal and low water levels. This configuration would promote biodegradation of residual BTEX both above and below the groundwater surface, seasonally increase the DO content of the groundwater, and be compatible with system operation in an SVE mode.

As with Alternative 1, institutional controls and LTM would be required. POC and LTM wells would be installed in the locations indicated in Section 7.2. At a minimum, groundwater monitoring would be conducted annually as part of this remedial alternative to evaluate the progress of source removal and natural attenuation processes.

6.4 EVALUATION OF ALTERNATIVES

This section provides a comparative analysis of each of the remedial alternatives based on the effectiveness, implementability, and cost criteria. A summary of this evaluation is presented in Section 6.5.

6.4.1 Alternative 1–Intrinsic Remediation and Institutional Controls with Long-Term Groundwater Monitoring.

6.4.1.1 Effectiveness

Section 5 of this document presents the results of the Bioplume II modeling completed to support the intrinsic remediation alternative at Pumphouse 75. Model PH75A results predict that natural attenuation mechanisms will significantly limit contaminant migration and reduce contaminant mass and toxicity. The Bioplume II model is based upon reasonably conservative assumptions, as described in Section 5.7.

Groundwater monitoring at the LTM and POC wells will ensure the protectiveness of this alternative. While this alternative would not cease to be protective if the BTEX plume is intercepted at the POC wells, such an instance would indicate that site conditions should be reevaluated.

The effectiveness of this remedial alternative requires that excavations or drilling within the source area be conducted only by properly protected site workers. Reasonable land use assumptions for the plume area indicate that exposure is unlikely unless excavation or drilling activities bring saturated soil to the surface. Long-term land use restrictions would be required to ensure that shallow groundwater will not be pumped or removed for potable use in the vicinity of the plume (within approximately 1,000 feet in the upgradient and crossgradient directions and 1,500 feet in the downgradient direction). Existing health and safety plans should be enforced to reduce risks from additional excavation or from installing and monitoring additional POC wells.

Compliance with program goals is one component of the long-term effectiveness evaluation criterion. Alternative 1 would satisfy program objectives designed to promote intrinsic remediation as a component of site remediation and to scientifically document naturally occurring processes. This alternative also satisfies program goals for cost effectiveness and waste minimization.

Alternative 1 is based on the effectiveness of naturally occurring processes that minimize contaminant migration and reduce contaminant mass over time, and the effectiveness of institutional controls. As described earlier, an investigation of the potential effectiveness of naturally occurring processes at Pumphouse 75 using field data and the Bioplume II model demonstrated that the BTEX plume migration will be significantly limited and the extent eventually reduced.

Apart from the administrative concerns associated with enforcement of long-term land use restrictions and long-term groundwater and surface water monitoring programs, this remedial alternative should provide reliable, continued protection. It is assumed for cost comparison purposes that dissolved benzene concentrations would exceed state guidelines throughout the plume for approximately 14 years under Alternative 1, and that sampling would be performed annually. An additional 4 years of annual sampling is recommended to demonstrate that intrinsic remediation has uniformly reduced BTEX concentrations to below applicable guidelines.

6.4.1.2 Implementability

Alternative 1 is not technically difficult to implement. Installation of LTM and POC wells and periodic groundwater sampling and analysis are standard procedures. Long-term management efforts would be required to ensure that proper sampling procedures are followed. Periodic site reviews should be conducted to confirm the adequacy and completeness of LTM data and to verify the effectiveness of this remediation approach. There also may be administrative concerns associated with long-term enforcement of groundwater use restrictions. Future land use within the source area may be impacted by leaving contaminated soil and groundwater in place. Regulators and the public will

have to be informed of the benefits and limitations of the intrinsic remediation option, but educational programs are not difficult to implement.

6.4.1.3 Cost

The cost of Alternative 1 is summarized in Table 6.3. Capital costs are limited to the construction of four new POC wells and three new LTM wells. Two LTM wells would be screened at the bottom of the surficial aquifer, assumed to be present at a depth of 25 feet. Included in the $263,000 total present worth cost estimate for Alternative 1 are the costs of maintaining institutional controls and long-term groundwater monitoring for a total of 18 years. Cost calculations are contained in Appendix E.

6.4.2 Alternative 2 - Bioventing/Biosparging in Source Area, Intrinsic Remediation, and Institutional Controls with Long-Term Groundwater Monitoring

6.4.2.1 Effectiveness

The effectiveness of the intrinsic remediation, institutional controls, and LTM components of this alternative have been described under Alternative 1. Bioventing is an established technology that effectively remediates fuel hydrocarbons in the unsaturated zone via the addition of oxygen to stimulate biodegradation by naturally-occurring microorganisms. The application of bioventing for 1 year at the Patrick AFB, Florida BX gasoline station resulted in a 95-percent reduction in the total BTEX in soil residuals impacting groundwater (Parsons ES, 1995d). Given the Bioplume II Models PH75B and PH75C results discussed in Section 5.6, reduction in the mass of BTEX compounds that dissolve into groundwater should further limit plume migration and ultimately reduce the extent of the dissolved BTEX plume. If a combination bioventing/biosparging system is installed, as described in Section 6.3.2, the resulting increase in the DO content of the groundwater should further enhance the attenuation of the BTEX plume. As with Alternative 1, this alternative would require long-term land use restrictions, as well as enforcement of health and safety plans to reduce risks to workers during installation of the bioventing/biosparging system and installation and monitoring of LTM and POC wells.

Alternative 2 should provide reliable, continuous protection with little risk from temporary system failures. This alternative also complies with the program goals because intrinsic remediation remains the predominant remedial method for fuel hydrocarbons dissolved in groundwater at the site. However, this remedial alternative may result in the generation of potentially contaminated soil requiring treatment and/or disposal, unless the Base is allowed to use these soils as backfill material in the excavated vent well trenches.

It is assumed that dissolved benzene and total BTEX concentrations will exceed applicable state guidelines for no further action (Table 6.1) throughout the plume for approximately 8 years under Alternative 2. An additional 4 years of annual groundwater monitoring is recommended to ensure that intrinsic remediation has uniformly reduced all BTEX compounds to levels below state guidelines.

TABLE 6.3
ALTERNATIVE 1 - COST ESTIMATE
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Capital Costs	Cost
Design/Construct Four POC Wells and Five LTM Wells	$17,435
Operation, Maintenance, and Monitoring Costs (Annual)	**Annual Cost**
Conduct Annual Groundwater Monitoring of 11 wells (years 1-4)	$8,323
Conduct Annual Groundwater Monitoring of 15 wells (years 5-18)	$9,905
Maintain Institutional Controls/Public Education (18 years)	$5,000
Project Management and Reporting (18 years)	$10,175
Present Worth of Alternative 1 [a/]	**$263,157**

[a/] Based on an annual discount factor of 7 percent (USEPA, 1993).
Note: Costs assume that well installation and LTM are performed by Tampa-area personnel.

6.4.2.2 Implementability

Installing and operating a bioventing/biosparging system to reduce source area BTEX concentrations at Pumphouse 75 could present additional implementability concerns. Installation would involve shallow trench excavation for well installation, piping, and manifold connections; therefore, implementation in and around the pumphouse could be disruptive to fueling operations. However, onsite facility operational activity appears to be minimal, and disruption of regular site activities would probably be relatively insignificant. Bioventing equipment is readily available, and the technology used to construct such systems is proven and reliable. Use of an internal combustion engine to extract and combust vapors during SVE is assumed; therefore, air emissions permitting activities should be minimal. The technical and administrative implementability concerns associated with the intrinsic remediation and LTM component of this remedial alternative are similar to those discussed in Alternative 1. Installation and operation of a full-scale bioventing/biosparging system would require an increased commitment of man-hours and other resources to maintain and monitor the system. Public acceptance of this alternative may be more positive than Alternative 1 because source removal actions would be implemented.

6.4.2.3 Cost

The estimated capital and operating costs of Alternative 2 are shown in Table 6.4. The total present worth cost of Alternative 2 is approximately $317,000. The cost of Alternative 2 is greater than Alternative 1 because of the addition of the bioventing/biosparging system, even though the length of LTM is reduced from 18 to 12 years. It is assumed that the bioventing/biosparging system would be operated for 3 years after installation. Annual LTM would continue for a total of 12 years to ensure that intrinsic remediation is reducing BTEX concentrations below state G-II requirements (Table 6.1) throughout the plume, and to verify that contamination above these requirements does not reach the POC wells.

6.5 RECOMMENDED REMEDIAL APPROACH

Two remedial alternatives have been evaluated for remediation of the shallow groundwater at Pumphouse 75. Components of the alternatives evaluated include SVE, bioventing/biosparging, intrinsic remediation with LTM, and institutional controls. Table 6.5 summarizes the results of the evaluation based upon effectiveness, implementability, and cost criteria.

Alternative 1 makes maximum use of intrinsic remediation mechanisms to reduce plume migration and toxicity. Alternative 2 would provide additional protection against further plume migration by reducing the magnitude of continuing sources while still relying on intrinsic remediation mechanisms to reduce plume mass and toxicity in

TABLE 6.4
ALTERNATIVE 2 - COST ESTIMATE
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Capital Costs	Cost
Design/Construct Four POC Wells and Five LTM Wells	$17,435
Design/Construct SVE/Bioventing/Biosparging System, Including Manifolding and Blowers (assuming one horizontal well 180 feet long plus 100 feet to the Pumphouse)	$65,000
Operation, Maintenance and Monitoring Costs (Annual)	**Annual Cost**
Operate and Maintain SVE/Bioventing/Biosparging System (3 years)	$15,435
Conduct Annual Groundwater Monitoring of 11 wells (years 1-4)	$8,323
Conduct Annual Groundwater Monitoring of 15 wells (years 5-12)	$9,905
Maintain Institutional Controls/Public Education (12 years)	$5,000
Project Management and Reporting (12 years)	$10,175
Present Worth of Alternative 2 [a/]	**$316,647**

[a/] Based on an annual discount factor of 7 percent (USEPA, 1993).
Note: Costs assume that LTM and bioventing system maintenance are performed by Tampa-area personnel.

TABLE 6.5
SUMMARY OF REMEDIAL ALTERNATIVES EVALUATION
GROUNDWATER REMEDIATION
PUMPHOUSE 75
INSTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Remedial Alternative	Effectiveness	Implementability	Present Worth Cost Estimate
Alternative 1			
- Intrinsic Remediation - Long-Term Monitoring - Institutional Controls	Contaminant mass, volume, and toxicity will be significantly reduced and plume migration should be halted. Groundwater quality guidelines for BTEX not likely to be exceeded at POC wells.	Readily implementable. Long-term management, groundwater use controls, and monitoring required for an estimated 18 years. Minimal exposure of site workers if excavation is carefully controlled in source area. If water quality guidelines are exceeded at POC or in drainage ditch, additional remedial work may be required.	$263,157
Alternative 2			
- Bioventing/Biosparging - Soil Vapor Extraction (SVE) - Intrinsic Remediation - Long-Term Monitoring - Institutional Controls	Similar to Alternative 1, with the addition of a SVE bioventing system (with or without biosparging) to address residual LNAPL in soil. Contaminant mass, volume, and toxicity will be reduced more rapidly than in Alternative 1. Less likely that groundwater quality guidelines will be exceeded at POC wells.	Readily implementable. Installation of a bioventing system should pose no problems. Bioventing estimated to continue for 3 years. Long-term site management, groundwater controls, and monitoring required for an estimated 12 years. If water quality standards are exceeded at POC wells, additional remedial work may be required.	$316,647

the groundwater. Implementation of Alternative 2 would decrease the time frame for remediation, but would require a greater capital expenditure.

Both of the remedial alternatives are implementable, and each of them would effectively reduce potential hydrocarbon migration and toxicity. Both alternatives should be acceptable to the public and regulatory agencies because they are protective of human health and the environment and reduce soil and groundwater contamination to below cleanup guidelines. Implementation of either alternative will require land use and groundwater use controls to be enforced for at least 12 to 18 years, depending on the alternative selected and its effectiveness. Groundwater monitoring would be required for the same period.

On the basis of this evaluation, the Air Force recommends Alternative 1 as achieving the best combination of risk reduction and cost effectiveness. The final evaluation criterion used to compare each of the two remedial alternatives was cost. It is the opinion of the Air Force that the additional cost of Alternative 2 over Alternative 1 is not justified by the estimated 6-year decrease in remediation time resulting from the implementation of source removal activities. However, Alternative 2 (combination of bioventing and biosparging as described in Section 6.3.2) should be considered as a contingency in the event that land use in this area changes to commercial or residential, or if measured BTEX reductions in the groundwater are substantially slower than predicted by the Bioplume model. In addition, if a substantial length of the fuel pipelines is exposed in the near future to detect leakage and repair damage, then consideration should be given to installing a bioventing/biosparging system in the resulting excavation.

SECTION 7

LONG-TERM MONITORING PLAN

7.1 OVERVIEW

In keeping with the requirements of the preferred remedial alternative for Pumphouse 75 (intrinsic remediation with LTM), a long-term groundwater monitoring plan was developed. The purpose of this component of the preferred remedial alternative for the site is to assess site conditions over time, confirm the effectiveness of naturally occurring processes at reducing contaminant mass and minimizing contaminant migration, and evaluate the need for additional remediation.

The LTM plan consists of identifying the locations of two separate groundwater monitoring networks and developing a groundwater sampling and analysis strategy to demonstrate attainment of site-specific remediation goals (Table 6.1) and to verify the predictions of the Bioplume II model. The strategy described in this section is designed to monitor plume migration over time and to verify that intrinsic remediation is occurring at rates sufficient to protect potential receptors. In the event that data collected under this LTM program indicate that naturally occurring processes are *insufficient* to protect human health and the environment, contingency controls to augment the beneficial effects of intrinsic remediation would be necessary.

7.2 MONITORING NETWORKS

Two separate sets of wells will be utilized at the site as part of the intrinsic remediation with LTM remedial alternative. The first set will consist of 11 LTM wells at six locations within and upgradient and downgradient from the observed BTEX plume to verify the results of the Bioplume II modeling effort and to ensure that natural attenuation is occurring at rates sufficient to minimize plume expansion (i.e., meet the G-II level of remediation concentration goals for the site). This network of wells will include six existing wells screened within the shallow (four wells) and deep (two wells) portions of the surficial aquifer, and five proposed wells within and downgradient from the current BTEX plume to provide short-term confirmation and verification of the quantitative groundwater modeling results.

The second set of POC groundwater monitoring wells will be located along a line perpendicular to the direction of groundwater flow between 800 and 900 feet downgradient from the March 1995 plume front. The purpose of these POC wells is to verify that no BTEX compounds exceeding state groundwater quality guidelines migrate beyond the area under institutional control. Model results suggest that the plume front will not reach these POC locations. This network will consist of three to four shallow groundwater monitoring wells screened across the upper 8 feet of the

shallow aquifer. The LTM and POC well locations are shown on Figure 7.1. A total of six potential POC well locations are shown on this figure, because the groundwater flow direction southeast of Pumphouse 75 is not well established and may be seasonally variable. Once the five proposed LTM wells are installed, groundwater elevation measurements should be obtained from them and other Pumphouse 75 wells quarterly for a period of 1 year to establish the groundwater flow direction(s) downgradient of the pumphouse. This information should be used to select three to four optimum locations for POC well installation.

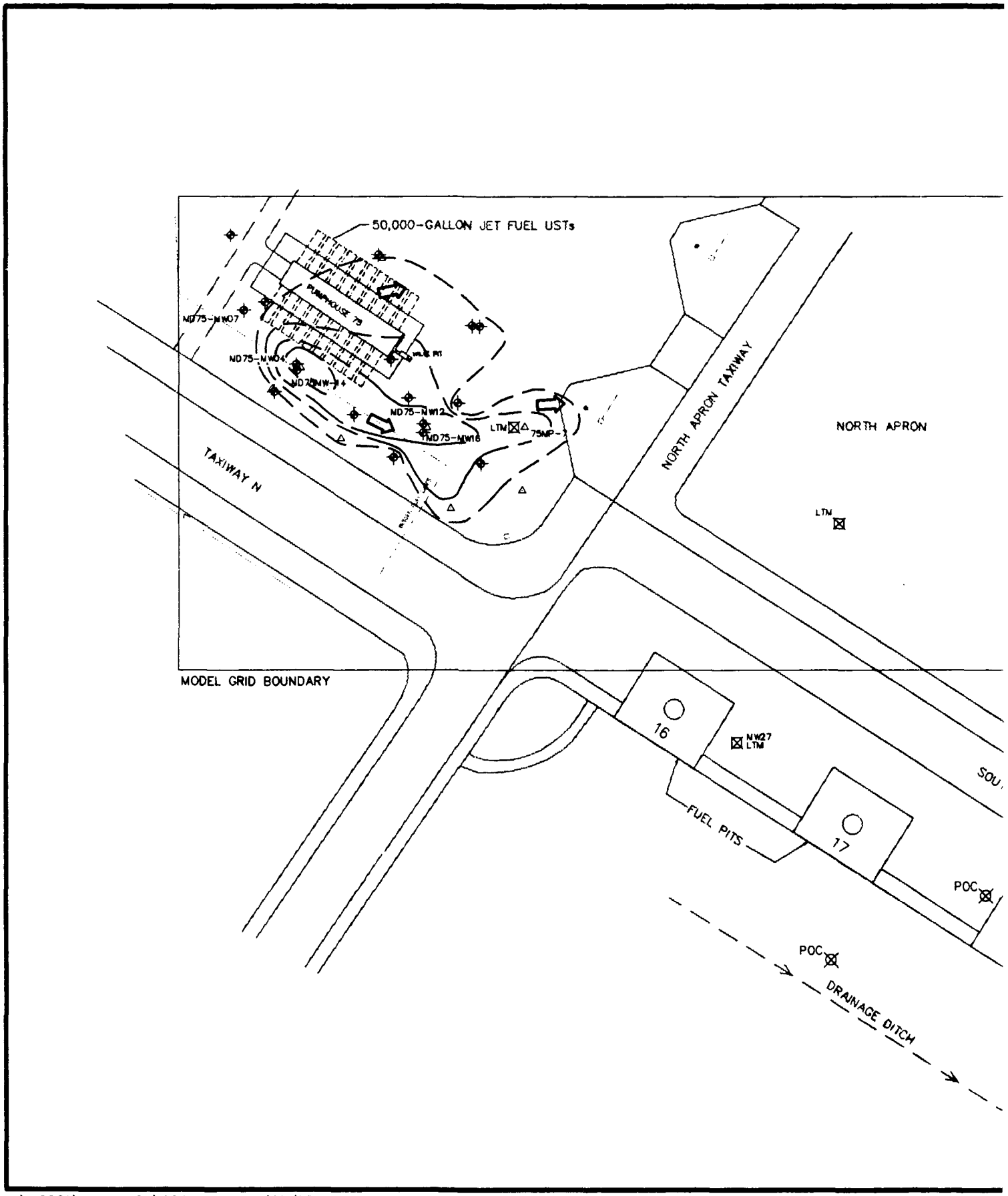
7.2.1 Long-Term Monitoring Wells

At six locations, a total of 11 groundwater monitoring wells within, upgradient from, and downgradient from the existing BTEX contaminant plume will be used to monitor the effectiveness of intrinsic remediation in reducing total contaminant mass and minimizing contaminant migration at Pumphouse 75. The LTM network will supplement the POC wells to provide early confirmation of model predictions and to allow additional response time if necessary.

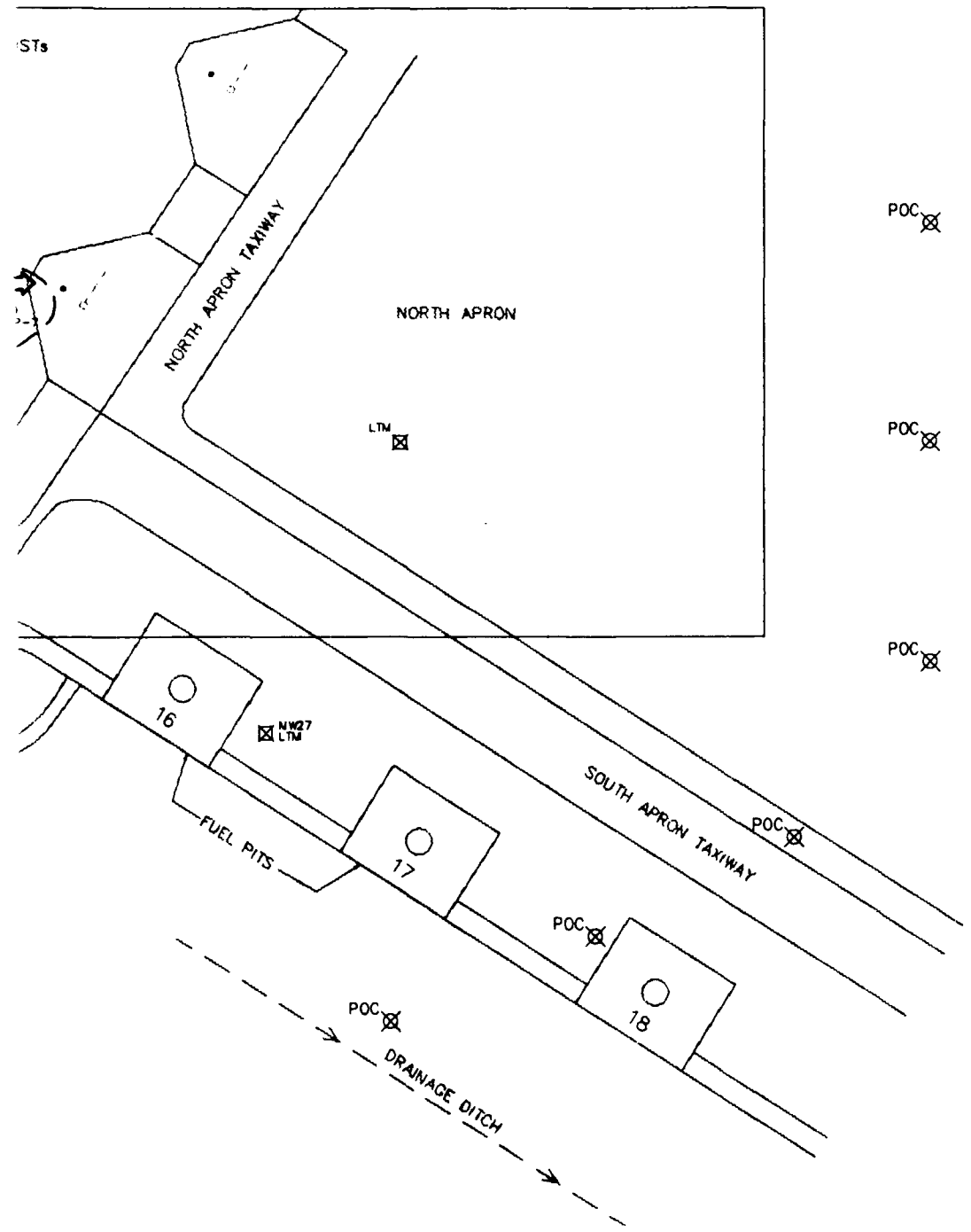
This LTM network will consist of wells screened both at the top and near the base of the surficial aquifer because of the indications that significant concentrations of dissolved BTEX may be migrating vertically as well as horizontally. However, the validity of the deeper BTEX detections should be verified before this LTM plan is fully implemented. Verification of the deeper detections is discussed in Section 8. If vertical migration of dissolved BTEX is found to be relatively insignificant, then the LTM wells should be screened primarily at the top of the surficial aquifer. Otherwise, both the upper and lower portions of the surficial aquifer should be monitored. The LTM plan presented in this section conservatively assumes that monitoring of both portions of the surficial aquifer will be required.

One existing well upgradient from the existing plume (MD75-MW07) will be monitored (Figure 7.1). Six of the remaining 10 LTM wells are located within the plume along its axis, including MD75-MW04 (shallow), MD75-MW14 (deep), MD75-MW12 (shallow), MD75-MW16 (deep), and adjacent to 75MP-7S/7D (shallow and deep). This LTM plan assumes that monitoring points 75MP-7S/7D will be replaced with conventionally constructed monitoring wells for LTM purposes. The shallow replacement for 75MP-7S should be screened across the top 8 feet of the surficial aquifer, with approximately 2 feet of screen above the water table. The deep replacement for 75MP-7D should be screened at a depth similar to the screens of existing wells MD75-MW14 and MD75-MW16 (approximately 20 to 25 feet bgs).

The remaining four LTM wells will be located downgradient from the current plume front along two potential migration pathways. One well pair, consisting of a shallow well screened across the top 8 feet of the surficial aquifer and a deep well screened across 5 feet at the base of the surficial aquifer (assumed for cost estimation purposes to be 25 feet bgs), will be located approximately 400 feet southeast of the current estimated plume front. This location was selected in the event that the plume migrates in the same direction as that observed at the pumphouse in March 1995. A second well pair located adjacent to Fuel Pit 16 also will be monitored. The shallow well of the pair will consist of existing well MW27, and the deep well will be screened at the base of the surficial aquifer. This location was selected in the event that the primary



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LEGEND

75MP-7 △ MONITORING POINT

MD75-MW05 ⊕ MONITORING WELL

LTM ⊠ PROPOSED LONG-TERM MC
WELL PAIR (SHALLOW AND

POC ⊠ POTENTIAL SHALLOW
POINT-OF-COMPLIANCE WE

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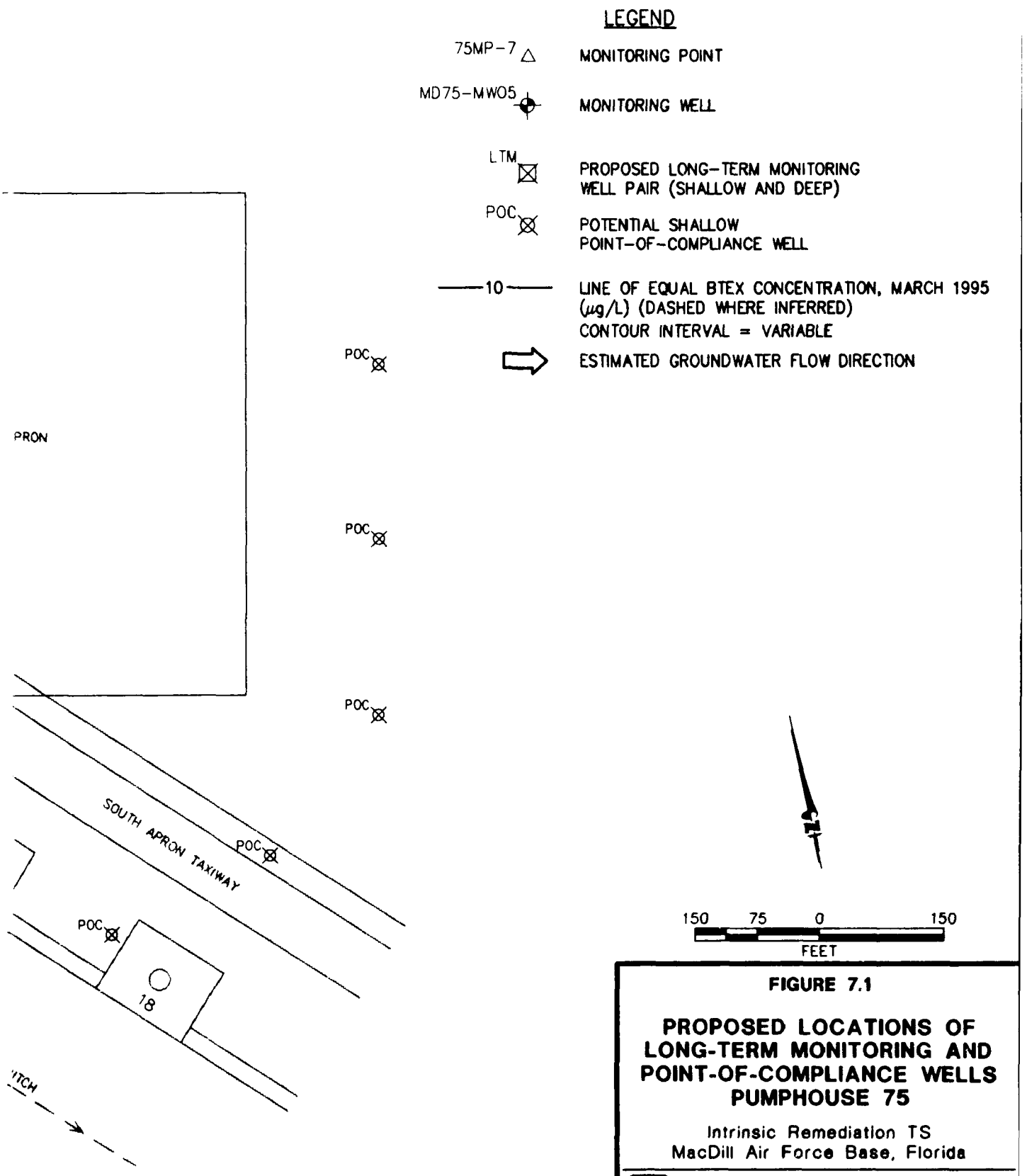


FIGURE 7.1

PROPOSED LOCATIONS OF LONG-TERM MONITORING AND POINT-OF-COMPLIANCE WELLS PUMPHOUSE 75

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

groundwater flow direction southeast of the site is toward the northwest-southeast trending drainage ditch shown on Figure 7.1. Contouring of groundwater elevations measured during different seasons at both Pumphouse 75 and Fuel Pit 16 has indicated that groundwater flow directions may be seasonally variable, at times trending approximately parallel to the long axis of the model grid, and at times trending in a more southeasterly direction toward the drainage ditch (BVWS, 1995). Dissolved BTEX compounds historically have not been detected in groundwater samples from well MW27; therefore, interference from another source of contamination, such as the fuel pit, should not occur.

7.2.2 Point-of-Compliance Wells

A maximum of four POC monitoring wells should be installed approximately 800 to 900 feet downgradient from the existing BTEX plume. As was described above, six potential POC well locations are shown on Figure 7.1 because groundwater flow directions downgradient of the pumphouse have not been well established. Once the groundwater flow direction(s) have been established using data from the LTM wells, up to four POC well locations should be selected. The purpose of the POC wells is to verify that no contaminated groundwater exceeding state guidelines for G-II groundwater at petroleum-contaminated sites migrates beyond the area under institutional control. Model results suggest that the contaminant plume will not migrate beyond the POCs at concentrations exceeding applicable guidelines, and these POC wells are the technical mechanisms used to demonstrate protection of human health and the environment and compliance with site-specific numerical remediation goals. These wells will be installed and monitored to ensure that the selected remedy is providing the anticipated level of risk reduction and remediation at the site.

This LTM plan assumes that, at this distance from the pumphouse, any dissolved contamination will be located primarily in the upper portion of the surficial aquifer, and that the POC wells all will be screened in the uppermost 8 feet of this aquifer. If monitoring of LTM wells closer to the pumphouse indicates that significant concentrations of dissolved BTEX are migrating substantial distances from the site in the deeper portions of the surficial aquifer, then additional (deep) POC wells also should be installed and monitored.

7.3 GROUNDWATER SAMPLING

To ensure that contaminant removal occurring at the Pumphouse 75 site is sufficient to protect human health and the environment and meet site-specific remediation goals, the long-term groundwater monitoring plan includes a comprehensive sampling and analysis plan (SAP). LTM and POC wells will be sampled and analyzed annually to verify that naturally occurring processes are effectively reducing contaminant mass and mobility. However, except for an initial sampling following their installation to confirm that these wells are not being impacted by another contamination source, annual sampling of the POC wells is recommended to begin in year 5 of the LTM program because of the large distance between these wells and the current plume front. The Bioplume II model, which used groundwater velocities that were slightly higher than those calculated using slug test data, predicted that contaminant concentrations would reach the downgradient model boundary during simulation year 14 (calendar year 2009). In the event that actual velocities are twice as high as simulated in the

model (which is unlikely), the plume would still take approximately 7 years (calendar year 2002) to reach this boundary. Therefore, beginning the POC well sampling in year 5 of the LTM program (calendar year 2000 if LTM is begun in 1996) should not compromise the monitoring scheme. Reductions in toxicity will be implied by mass reduction. The SAP also will be aimed at assuring intrinsic remediation can achieve site-specific remediation BTEX concentration goals that are intended to be protective of human health and the environment.

7.3.1 Analytical Protocol

All LTM and POC wells in the LTM program will be sampled and analyzed to determine compliance with chemical-specific remediation goals and to verify the effectiveness of intrinsic remediation at the site. Groundwater level measurements will be made during each sampling event. Groundwater samples from LTM and POC wells will be analyzed for the parameters listed in Tables 7.1 and 7.2, respectively. A site-specific SAP should be prepared as part of a remedial action plan (in compliance with state requirements) prior to initiating the LTM program.

7.3.2 Sampling Frequency

Each of the LTM sampling points will be sampled once each year for an estimated maximum of 18 years. The POC wells should be sampled in year 1 and then annually for 14 years beginning in year 5. If the data collected during this time period support the anticipated effectiveness of the intrinsic remediation alternative at this site, the sampling frequency can be reduced to once every other year for all wells in the LTM program, or eliminated. If the data collected at any time during the monitoring period indicate the need for additional remedial activities at the site, sampling frequency should be adjusted accordingly.

TABLE 7.1
LONG-TERM GROUNDWATER MONITORING ANALYTICAL PROTOCOL
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Analyte	Method/Reference	Comments	Data Use	Recommended Frequency of Analysis	Sample Volume, Sample Container, Sample Preservation	Field or Fixed-Base Laboratory
Ferrous Iron (Fe^{2+})	Colorimetric A3500-Fe D	Field only.	Elevated ferrous iron concentrations may be indicative of the anaerobic biodegradation process of iron reduction.	Every year for 18 years	Collect 100 milliliters (mL) of water in a glass container; acidify with hydrochloric acid per method.	Field
Ferrous Iron (Fe^{2+})	Colorimetric Hach 25140-25	Alternate method; field only.	Same as above.	Every year for 18 years.	Collect 100 mL of water in a glass container.	Field
Temperature	E170.1	Field only.	Metabolism rates for microorganisms depend on temperature.	Every year for 18 years.	N/A	Field
Dissolved Oxygen	Dissolved oxygen meter	Refer to Method A4500 for a comparable laboratory procedure.	The oxygen concentration is a data input to the Bioplume II model; concentrations less than 1 mg/L generally indicate an anaerobic pathway.	Every year for 18 years.	Collect 300 mL of water in biochemical oxygen demand bottles; analyze immediately; alternately, measure dissolved oxygen in situ.	Field
pH	E150.1/SW9040, direct reading meter	Protocol/Handbook methods[a/].	Aerobic and anaerobic processes are pH-sensitive.	Every year for 18 years.	Collect 100–250 mL of water in a glass or plastic container; analyze immediately.	Field
Conductivity	E120.1/SW9050, direct reading meter	Protocol/Handbook methods.	General water quality parameter used as a marker to verify that site samples are obtained from the same groundwater system.	Every year for 18 years.	Collect 100–250 mL of water in a glass or plastic container.	Field
Nitrate (NO_3^{-1})	IC method E300 or method SW9056; colorimetric, method E353.2	Method E300 is a Handbook method; method SW9056 is an equivalent procedure.	Substrate for microbial respiration if oxygen is depleted.	Every year for 18 years.	Collect up to 40 mL of water in a glass or plastic container; cool to 4°C; analyze within 48 hours.	Fixed-base

TABLE 7.1 (Continued)
LONG-TERM GROUNDWATER MONITORING ANALYTICAL PROTOCOL
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Analyte	Method/Reference	Comments	Data Use	Recommended Frequency of Analysis	Sample Volume, Sample Container, Sample Preservation	Field or Fixed-Base Laboratory
Sulfate (SO_4^{2-})	IC method E300 or method SW9056 or Hach SulfaVer 4 method	Method E300 is a Handbook method; method SW9056 is an equivalent procedure. Hach method is Photometric.	Substrate for anaerobic microbial respiration.	Every year for 18 years.	Collect up to 40 mL of water in a glass or plastic container; cool to 4°C.	Fixed-base or field (for Hach method)
Redox potential	A2580 B	Measurements are made with electrodes; results are displayed on a meter; samples should be protected from exposure to atmospheric oxygen.	The redox potential of groundwater influences and is influenced by biologically mediated reactions; the redox potential of groundwater may range from more than 200 mV to less than -400 mV.	Every year for 18 years.	Collect 100–250 mL of water in a glass container, filling container from bottom; analyze immediately.	Field
Methane	RSKSOP-114 modified to analyze water samples for methane by headspace sampling with dual thermal conductivity and flame ionization detection.	Method published and used by the USEPA National Risk Management Research Laboratory.	The presence of methane suggests BTEX degradation via an anaerobic pathway utilizing carbon dioxide (carbonate) as the electron acceptor (methanogenesis).	Every year for 18 years.	Collect water samples in 40 mL volatile organic analysis (VOA) vials with butyl gray/Teflon-lined caps (zero headspace); cool to 4°C.	Fixed-base
Aromatic hydrocarbons (BTEX)	Purge and trap GC method SW8020.	Handbook method; analysis may be extended to higher molecular weight alkylbenzenes.	BTEX is the primary target analyte for monitoring natural attenuation; BTEX concentrations must also be measured for regulatory compliance.	Every year for 18 years.	Collect water samples in a 40 mL VOA vial with zero headspace; cool to 4°C; add hydrochloric acid to pH $\leq$2.	Fixed-base

a/ Protocol methods are presented by Wiedemeier *et al.* (1995).

TABLE 7.2
POINT-OF-COMPLIANCE GROUNDWATER MONITORING ANALYTICAL PROTOCOL
PUMPHOUSE 75
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Analyte	Method/Reference	Comments	Data Use	Recommended Frequency of Analysis	Sample Volume, Sample Container, Sample Preservation	Field or Fixed-Base Laboratory
Temperature	E170.1	Field only.	Well development and purging.	Initially in year 1 and annually in years 5-18 of the LTM program.	N/A	Field
Dissolved Oxygen	Dissolved oxygen meter	Refer to method A4500 for a comparable laboratory procedure.	The oxygen concentration is a data input to the Bioplume model; concentrations less than 1 mg/L generally indicate an anaerobic pathway.	Initially in year 1 and annually in years 5-18 of the LTM program.	Collect 300 mL of water in biochemical oxygen demand bottles; analyze immediately; alternately, measure dissolved oxygen *in situ*.	Field
pH	E150.1/SW9040, direct reading meter	Protocol/Handbook methods[a].	Aerobic and anaerobic processes are pH-sensitive.	Initially in year 1 and annually in years 5-18 of the LTM program.	Collect 100–250 mL of water in a glass or plastic container; analyze immediately.	Field
Conductivity	E120.1/SW9050, direct reading meter	Protocol/Handbook methods.	General water quality parameter used as a marker to verify that site samples are obtained from the same groundwater system.	Initially in year 1 and annually in years 5-18 of the LTM program.	Collect 100–250 mL of water in a glass or plastic container.	Field
Redox potential	A2580 B	Measurements are made with electrodes; results are displayed on a meter; samples should be protected from exposure to atmospheric oxygen.	The redox potential of groundwater influences and is influenced by biologically mediated reactions; the redox potential of groundwater may range from more than 200 mV to less than -400 mV.	Initially in year 1 and annually in years 5-18 of the LTM program.	Collect 100–250 mL of water in a glass container, filling container from bottom; analyze immediately.	Field
Aromatic hydrocarbons (BTEX)	Purge and trap GC method SW8020	Handbook method; analysis may be extended to higher molecular weight alkylbenzenes.	BTEX is the primary target analyte for monitoring natural attenuation; BTEX concentrations must also be measured for regulatory compliance.	Initially in year 1 and annually in years 5-18 of the LTM program.	Collect water samples in a 40 mL VOA vial with zero headspace; cool to 4°C; add hydrochloric acid to pH $\leq$2.	Fixed-base

[a] Protocol methods are presented by Wiedemeier *et al.* (1995).

SECTION 8

CONCLUSIONS AND RECOMMENDATIONS

This report presents the results of a treatability study conducted to evaluate the use of intrinsic remediation for remediation of fuel-hydrocarbon-contaminated groundwater in the vicinity of Pumphouse 75 at MacDill AFB, Florida. Specifically, the finite-difference groundwater model Bioplume II was used in conjunction with site-specific geologic, hydrologic, and laboratory analytical data to simulate the migration and biodegradation of fuel hydrocarbon compounds dissolved in groundwater. To collect the data necessary for the intrinsic remediation demonstration, Parsons ES researchers collected soil and groundwater samples from the site. Physical and chemical data collected under this program were supplemented (where necessary) with data collected during previous site characterization events and with reasonable literature values.

Comparison of BTEX, electron acceptor, and biodegradation byproduct isopleth maps for Pumphouse 75 provides strong qualitative evidence of biodegradation of BTEX compounds (Section 4). Geochemical data strongly suggest that biodegradation of fuel hydrocarbons is occurring at the site primarily via the anaerobic processes of sulfate reduction and methanogenesis.

Site-specific geologic, hydrologic, and laboratory analytical data were used in the Bioplume II numerical groundwater model to simulate the effects of advection, dispersion, sorption, and biodegradation on the fate and transport of the dissolved BTEX plume. Extensive site-specific data were used for model calibration and implementation. Model parameters that could not be obtained from existing site data were estimated using common literature values for aquifer materials similar to those found at the site. Conservative input parameters were used to construct the Bioplume II model for this study, and therefore, the model results presented herein are conservative (i.e., the plume should not migrate further than predicted by the models).

For one simulation (model PH75A), it was assumed that BTEX dissolution from source area soils into groundwater would naturally decrease at a rate of 15 percent per year (each concentration was decreased by a factor equal to 15 percent of the previous year's concentration). The results of this model suggest that the plume would reach the downgradient boundary of the model grid after 14 years of simulation time, with BTEX concentrations at this boundary peaking at 8 ug/L in year 17 and decreasing to 2 ug/L in year 20. The model also predicts that maximum BTEX concentrations in the plume would decrease to below 50 µg/L by simulation year 14, and to 3 µg/L by simulation year 20.

Model PH75B assumes that complete source removal via application of an engineered remedial technology such as bioventing would significantly reduce BTEX dissolution from residual LNAPL after 3 years. This assumption is consistent with bioventing results at similar sites (Patrick AFB, Florida). Results of this model suggest that the plume will migrate no further than approximately 550 feet beyond the estimated March 1995 plume front, and after simulation year 12 the plume will recede toward the source area due to the effects of dilution and biodegradation. This model also predicts that maximum dissolved BTEX concentrations in the plume will decrease to below 50 µg/L by simulation year 8, and the plume will completely disappear by simulation year 16.

Model PH75C assumes that limited bioventing is performed in the vicinity of seven model grid cells, where the most significant soil contamination appears to be located. The results of this model are very similar to those of model PH75B, suggesting that, if bioventing is performed, it should be limited to the area near and between monitoring wells MD75-MW04 and MD75-MW08.

The results of this study suggest that natural attenuation of BTEX compounds is occurring at Pumphouse 75 to the extent that the dissolved concentrations of these compounds in groundwater should be reduced to levels below current regulatory guidelines before potential downgradient receptors could be adversely affected (i.e., the potential contaminant migration pathway should not be completed for any of the potential receptors described in Section 6.2). Model results suggest that LTM and institutional controls may be required for as long as 18 years if an engineered remedial action is not implemented to supplement the effects of intrinsic remediation. If an engineered remedial action is implemented in the source area, then the model results suggest that LTM and institutional controls may be required for approximately 12 years.

The Air Force recommends intrinsic remediation, institutional controls, and LTM as the remedial option for BTEX-impacted groundwater at the site. The projected additional cost of source removal via bioventing is not justified by the estimated 6-year reduction in remediation time resulting from the implementation of source removal activities. Groundwater use in and downgradient from the plume area should be restricted for a period of at least 18 years. In addition, proper health and safety precautions should be followed in the event that excavation is performed in the contaminated area. However, engineered source reduction via a combination of bioventing and biosparging should be considered as a contingency in the event that land use in this area changes to commercial or residential, or if measured BTEX reductions in the groundwater are substantially slower than predicted by the Bioplume model. In addition, if a substantial length of the fuel pipelines is exposed in the near future to detect and repair leakage, then consideration should be given to installing a bioventing/biosparging system in the resulting excavation.

To verify the results of the Bioplume II modeling effort, and to ensure that natural attenuation is occurring at rates sufficient to protect potential downgradient receptors, groundwater from six existing monitoring wells and five additional proposed LTM wells should be sampled annually for 18 years and analyzed for the parameters listed in Table 7.1. In addition, four POC groundwater monitoring wells should be installed downgradient from the predicted maximum travel distance of the BTEX plume. These

wells should be sampled once immediately following their installation to ensure that they are not being impacted by a second contaminant source, and then sampled annually for 14 years beginning in year 5 of the LTM program. Target analytes for POC samples are listed in Table 7.2. Figure 7.1 shows suggested locations of the existing and proposed LTM and POC wells. If dissolved BTEX concentrations in groundwater in the POC wells exceed state guidelines for no further action of 50 µg/L for benzene and total BTEX, then additional evaluation or corrective action may be necessary at this site. Once it is decided that the groundwater monitoring points installed for this study will not be used for future resampling, they should be abandoned according to state requirements.

A site-specific remedial action plan, including a detailed SAP, should be submitted to the Florida DEP for approval prior to implementation of the recommended remedial alternative for Pumphouse 75.

The vertical migration of dissolved BTEX within the shallow surficial aquifer at Pumphouse 75 should be investigated further prior to full implementation of the LTM plan described in Section 7. As described in Section 4.3.1, BTEX concentrations in groundwater samples from two wells screened in sand, clay, and limestone layers at or beneath the base of the surficial aquifer increased substantially from November 1994 to March 1995. These deep detections may be at caused in part by cross contamination from shallow intervals during well purging. To test this hypothesis, wells MD75-MW14 and MD75-MW16 could be sampled using the micropurge method described by Kearl *et al.* (1994). This approach, which is based on the premise that stagnant water in the well casing does not completely mix with groundwater flowing through the screen, would require the installation of a low-flow sampling pump in the screened intervals of these wells. Ambient groundwater inflow should be sufficient to supply water to the pump, preventing mixing with stagnant water from the well casing, and only the sample tubing and pump would be purged. The extremely low purge volume and rate would minimize drawdown in the well casing and assure that cross contamination is not occurring. If this sampling indicates that significant contaminant concentrations are present in these deeper zones, then monitoring of these zones should be included in the LTM plan. The cost of performing this sampling is not included in the groundwater monitoring costs provided in Section 6.

SECTION 9

REFERENCES

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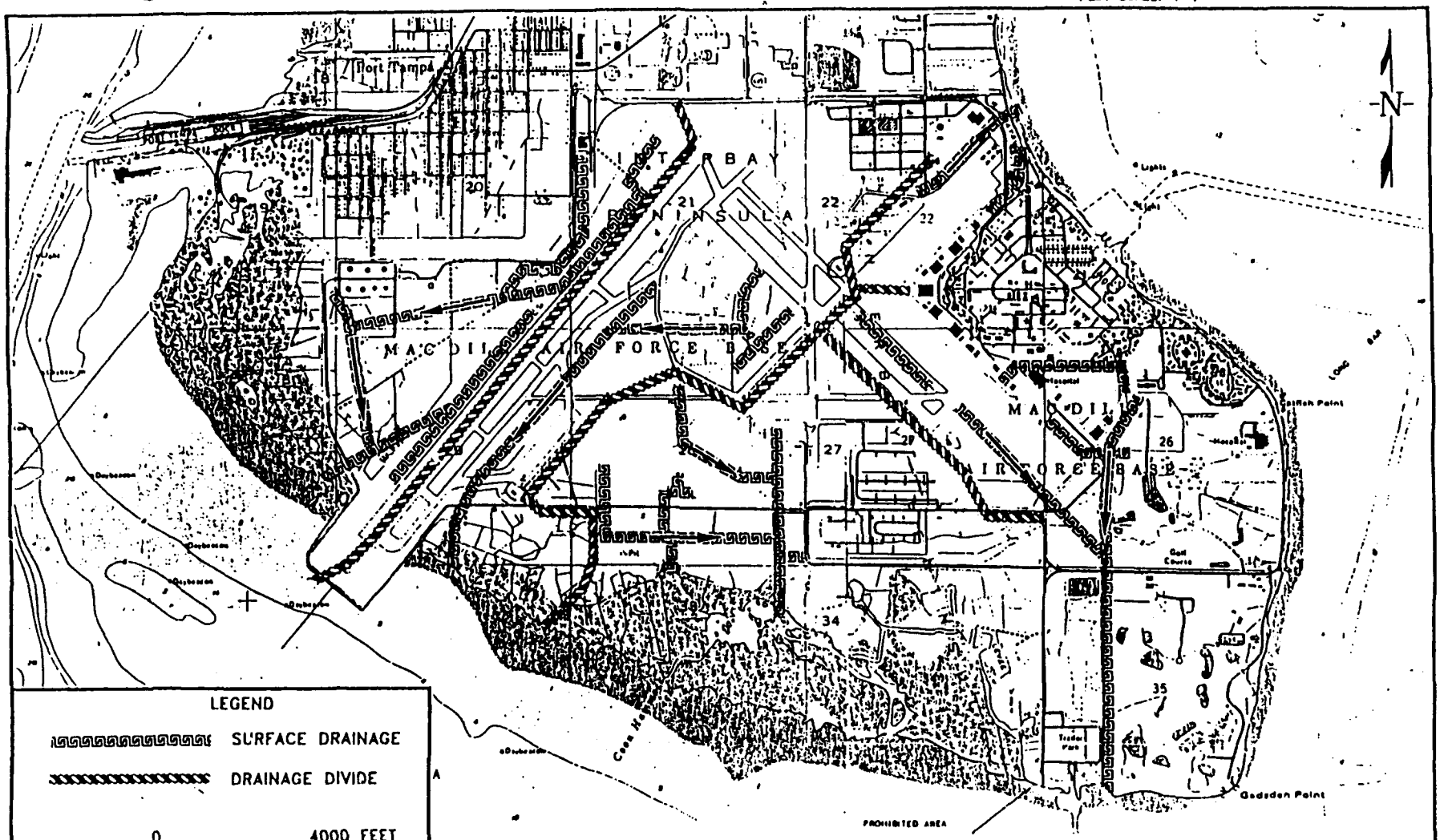
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APPENDIX A

INFORMATION FROM THE *DRAFT CONTAMINATION ASSESSMENT REPORT* (BVWS, 1995)

CAD DWG NO: MACDILL ORIG SIZE
DATE: 11/30/94 GB 11 5
PLOT SCALE: 1=1



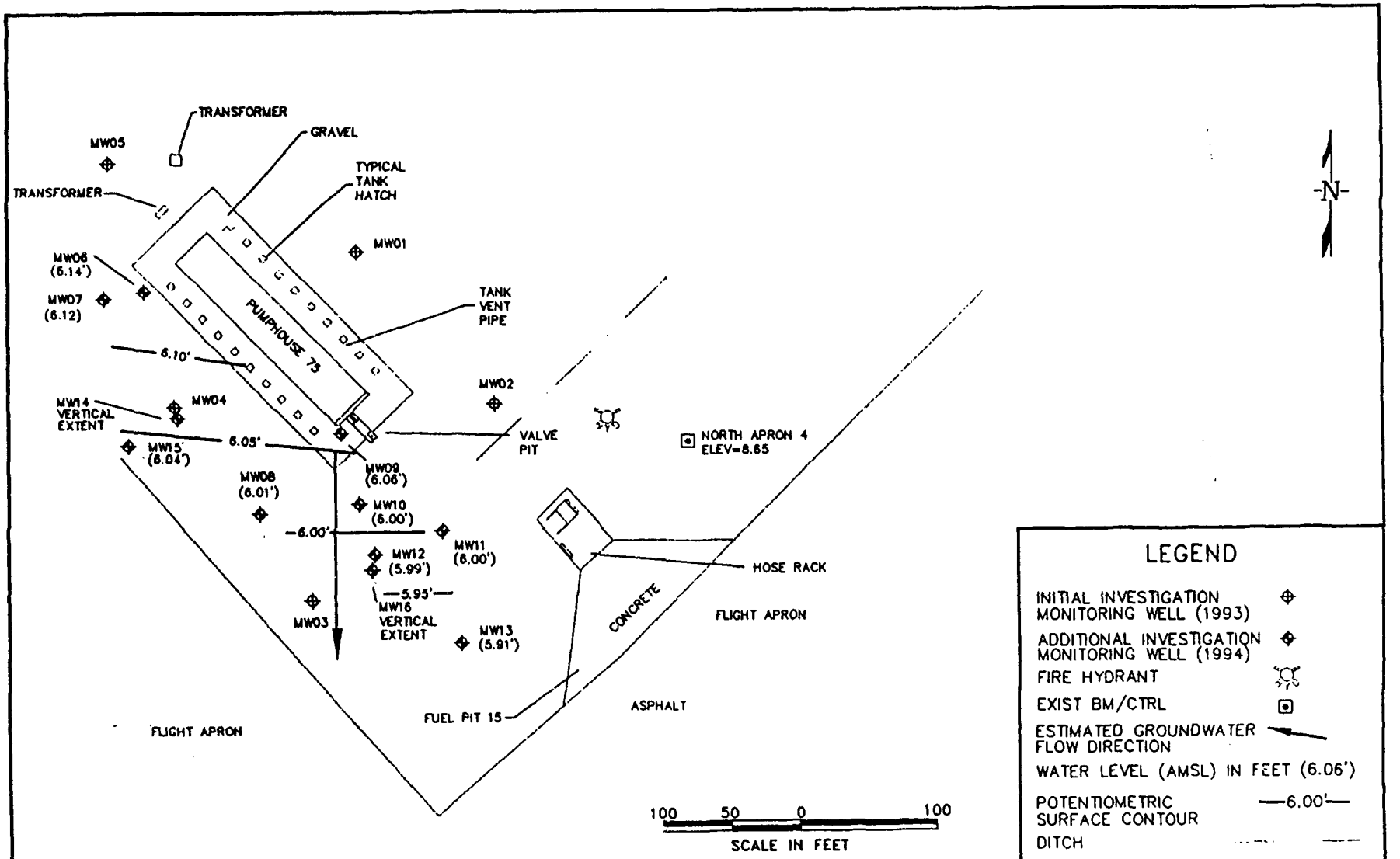
SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC MAPS: PORT TAMPA, FLA., 1981, GIBSONTON, FLA., 1987 & EBS 1993. CONTOUR INTERVAL 5 FEET.

SURFACE DRAINAGE MAP
MacDILL AIR FORCE BASE
TAMPA, FLORIDA

FIGURE
1-3

CAD DWG NO: 5775WF-A
DATE: 1-16-95
PLOT SCALE: 1"=100'

ORIGINAL DWG SIZE
8.5 x 11

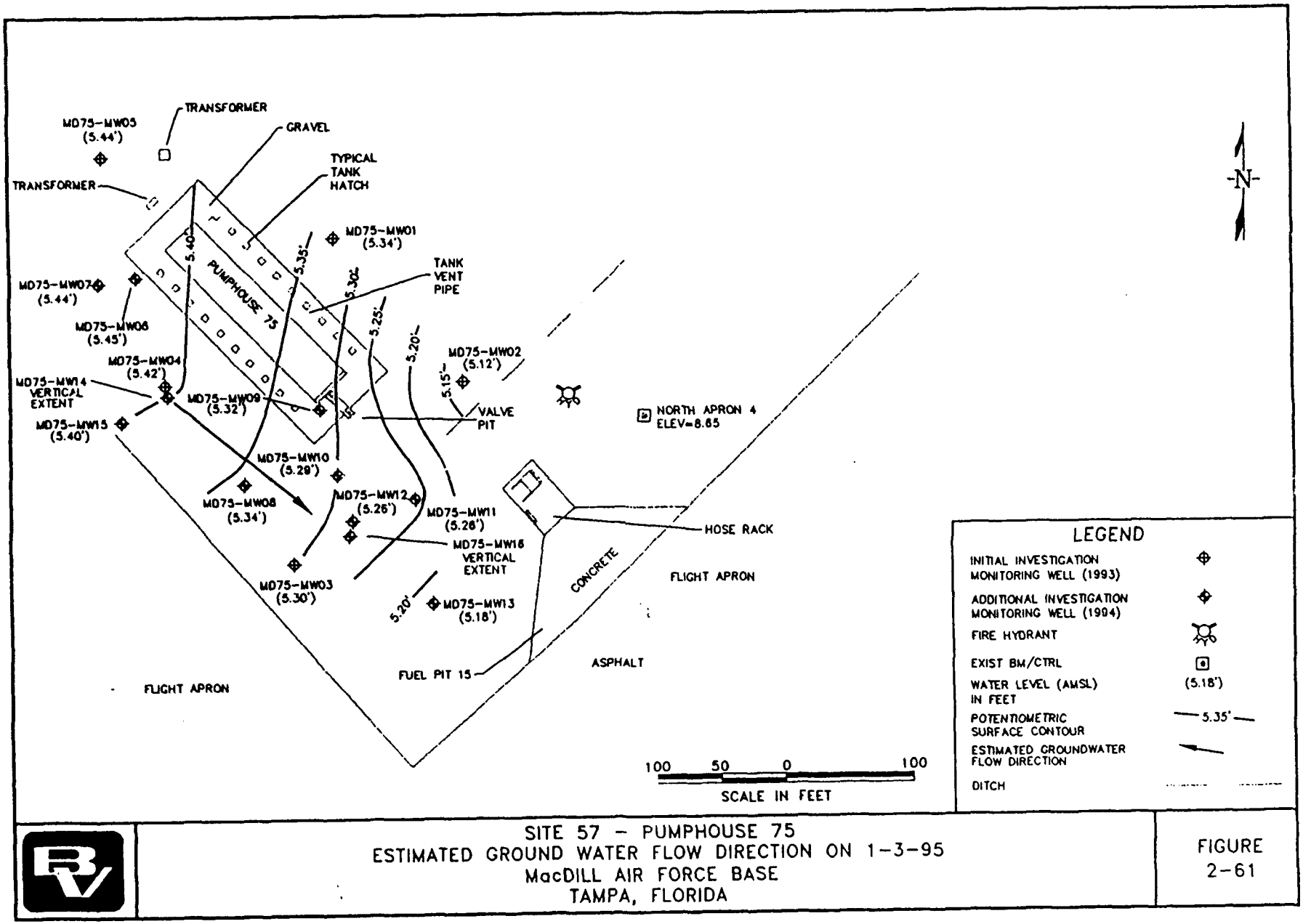


SITE 57 - PUMPHOUSE 75 & FUEL PIT 15
ESTIMATED GROUND WATER FLOW DIRECTION ON 10-22-94
MacDILL AIR FORCE BASE
TAMPA, FLORIDA

FIGURE 2-60

CAD DWG NO: 5775WFD
DATE: 1-16-95 DW
PLOT SCALE: 1"=100'

ORIGINAL DWG SIZE
8.5 x 11



SITE 57 - PUMPHOUSE 75
ESTIMATED GROUND WATER FLOW DIRECTION ON 1-3-95
MacDILL AIR FORCE BASE
TAMPA, FLORIDA

FIGURE
2-61

Table 2-81
Subsurface Soil Analytical Results
Initial Investigation
Site 57 -- Pumphouse 75, MacDill Air Force Base

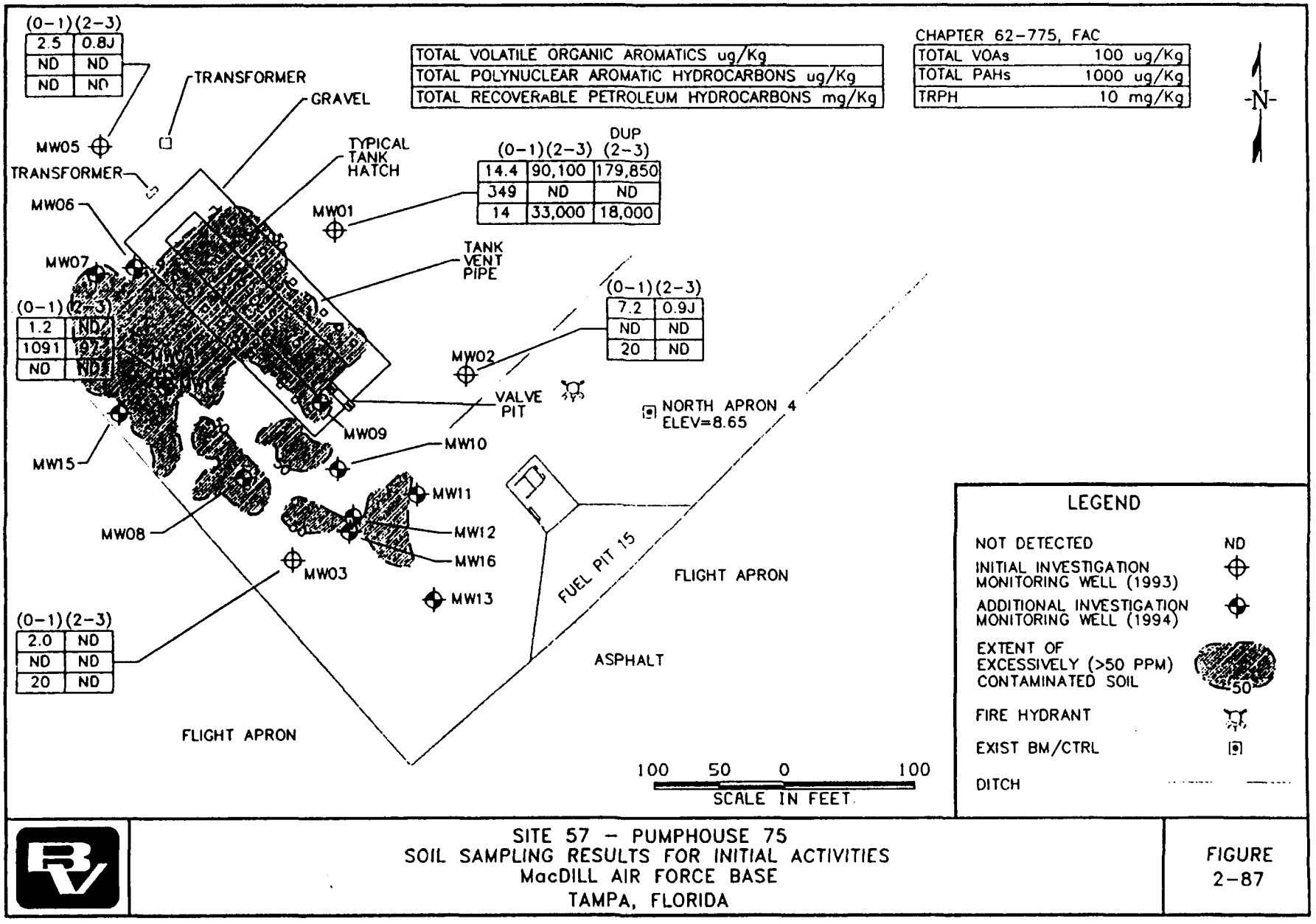
Parameters	FDEP Clean-up Goals	MD75-MW01 (2-3)[1]	MD75-MW01 (DUP)	MD75-MW02 (2-3)[1]	MD75-MW03 (2-3)[1]	MD75-MW04 (2-3)[1]	MD75-MW05 (2-3)[1]
Halogenated Volatiles (µg/kg)(method 8010)							
Methylene Chloride	1.13	--	--	6.0B	10.8B	6.6B	5.3B
1,1-Dichloroethene	NE	--	--	--	--	--	1.3
Total VOHs[2]	NE	--	--	--	--	--	1.3
Aromatic Volatiles (µg/kg)(method 8020)							
Chlorobenzene	NE	54,800JH,M	75,800JH,M	--	--	--	--
1,2-Dichlorobenzene	NE	48,200JH,M	84,300JH,M	--	--	--	--
1,3-Dichlorobenzene	NE	31,400JH,M	--	--	--	--	--
1,4-Dichlorobenzene	NE	35,700JH,M	59,400JH,M	--	--	--	--
Benzene	0.386	1,800JH	2,850JH	--	--	--	--
Ethylbenzene	72.7	25,900JH	72,200JH	--	--	--	--
Toluene	NE	11,300JH	19,600JH	0.9 J	--	--	0.8 J
Xylenes (Total)	NE	51,100JH	85,200JH	--	--	--	--
Total VOAs[2,3]	NE	90,100JH	179,850JH	0.9J	--	--	0.8J
PAH (µg/kg)(method 8100)							
Acenaphthylene	NE	--	--	--	--	97	--
Total PAHs[2,4]	NE	--	--	--	--	97	--
TRPH (mg/kg)(method 418.1)							
TRPH[2]	NE	33,000	18,000	--	--	--	--
RCRA Metals (mg/kg)							
Barium (method 6010)[2]	NE	9.2	9.2	2.8	5.5	5.0	3.2
Chromium (method 6010)[2]	382	5.3B	5.4B	2.7B	6.8B	3.1B	3.8B
Lead	NE	2.7	2.8	1.9	1.8	1.4	0.8
Mercury (method 7421)[2]	NE	0.381	--	--	0.129	--	--

NOTES:

FDEP Clean-up Goals	Florida Department of Environmental Protection clean-up goal for soils at the DOD Sites in Florida. Values for leachability and general worker (carcinogenic and non carcinogenic) were compared and the lowest selected.
MW	Monitoring Well.
NE	Not Established.
--	Below detection limits.
B	Possible false positive based on blank contamination. Blank contaminants are not included in totals.
J	Estimated quantitation based on QC data.
M	Method results conflict; not quantifiable due to coelution of peaks.
JH	Possibly biased high based on surrogate recovery.
1	Soil sampling interval in feet below land surface.
2	Chapter 62-775, F.A.C. , Soil Thermal Treatment criteria: total VOHs (50 ppb), total VOAs (100 ppb), total PAHs (1000 ppb), TRPH (50 ppm),s lead (108 ppm), barium (4,940 ppm), chromium (50 ppm), and mercury (23 ppm).
3	Total VOAs include BTEX constituents only.
4	Total PAHs include naphthalenes.

CAD DWG NO: 571013
DATE: 2-7-95 BM/GB
PLOT SCALE: 1"=100'

ORIGINAL DWG SIZE
8.5 x 11



SITE 57 – PUMPHOUSE 75
SOIL SAMPLING RESULTS FOR INITIAL ACTIVITIES
MacDILL AIR FORCE BASE
TAMPA, FLORIDA

FIGURE
2-87

Table 2-55
Groundwater Analytical Results
Initial Investigation
Site 57 -- Pumphouse 75, MacDill Air Force Base

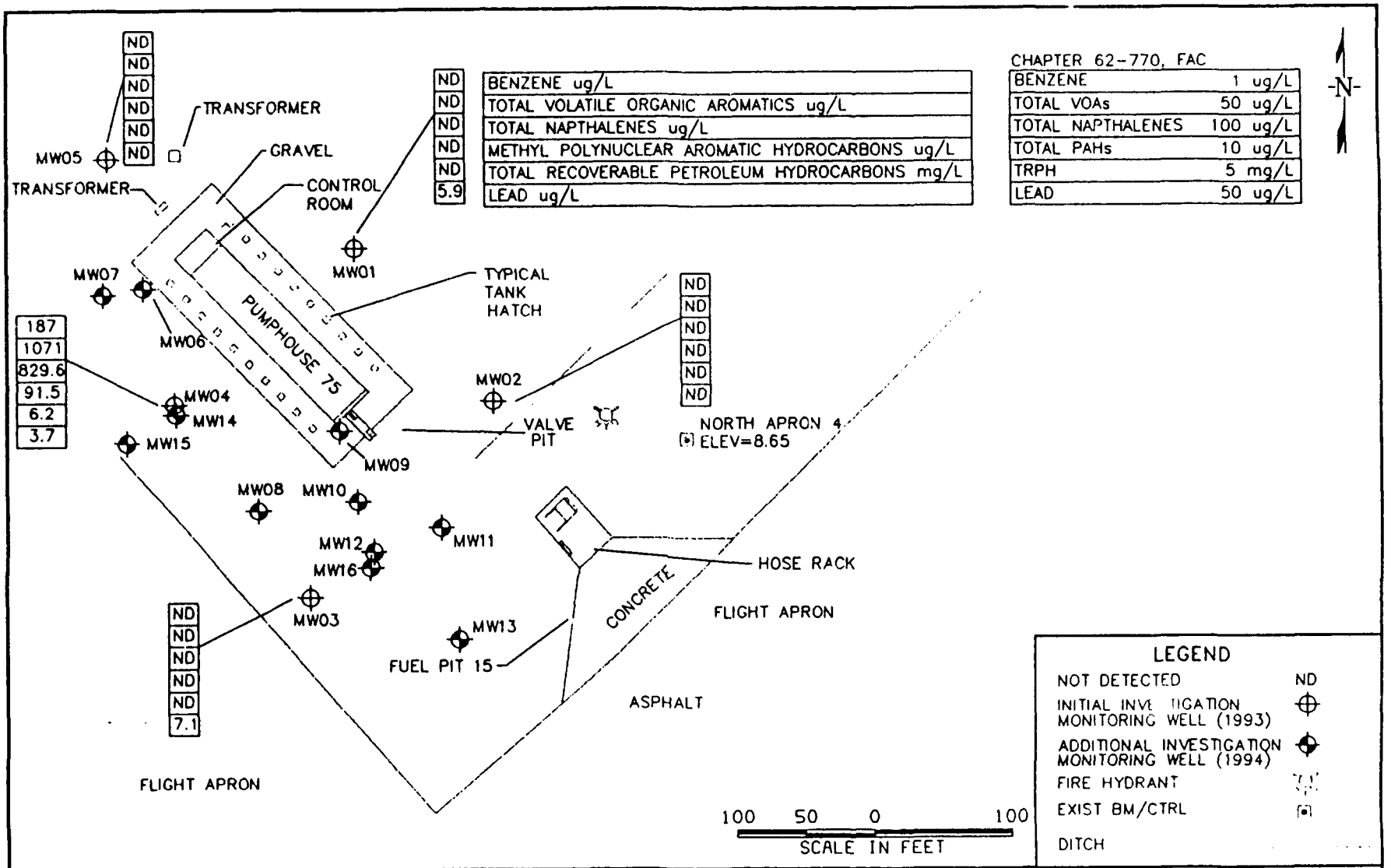
Parameters	Chapter 62-770 F.A.C.	MD75-MW01 (2.5-11.48)[1]	MD75-MW02 (2.41-11.38)[1]	MD75-MW03 (2.5-11.48)[1]	MD75-MW04 (2.5-11.48)[1]	MD75-MW05 (2.5-11.48)[1]
Halogenated Volatiles (method 8010) (µg/L)						
Methylene Chloride	NE	0.8JB	0.8JB	1.1	--	0.7BJ
Aromatic Volatiles (method 8020) (µg/L)						
1,2-Dichlorobenzene	NE	--	--	--	11.2JM	--
Benzene	1	--	--	--	187	--
Ethyl benzene	NE	--	--	--	884	--
Total VOA[2]	50	--	--	--	1071	--
PAH (method 8100) (µg/L)						
Acenaphthyene	NE	--	--	--	91.5	--
Total PAHs[3]	10	--	--	--	91.5	--
Naphthalene	NE	--	--	--	615.2	--
1-methylnaphthalene	NE	--	--	--	105.8	--
2-methylnaphthalene	NE	--	--	--	108.6	--
Total Naphthalenes[4]	100	--	--	--	829.6	--
TRPH (method 418.1) (mg/L)						
Pet. Hydrocarbons	5	--	--	--	6.2	--
RCRA Metals (method 6010) (µg/L)						
Barium	NE	26.2	11.9	44.5	36.7	21.2
Chromium	NE	19.1	10.4	5.6	7.5	18.1
Lead	50	5.9	--	7.1	3.7	--

NOTES:

Chapter 62-770,	Chapter 62-770, Florida Administrative Code petroleum contamination cleanup criteria.
MW	Monitoring Well.
NE	Not Established.
B	Possible false positive based on blank contamination.
J	Estimated quantitation based on QC data.
M	Method results conflict; not quantifiable due to coelution of peaks.
--	Below detection limits.
1	Monitoring well screened interval in feet below land surface.
2	Total VOA includes BTEX constituents only.
3	Total PAHs excluding naphthalenes.
4	Total naphthalenes includes 1-methylnaphthalene and 2-methylnaphthalene.

CAD DWG NO: 571015
DATE: 1-21-95 BM
PLOT SCALE: 1"=100'

ORIGINAL DWG SIZE
8.5 x 11



CHAPTER 62-770, FAC

BENZENE	1 ug/L
TOTAL VOAs	50 ug/L
TOTAL NAPTHALENES	100 ug/L
TOTAL PAHs	10 ug/L
TRPH	5 mg/L
LEAD	50 ug/L

LEGEND

NOT DETECTED	ND
INITIAL INVESTIGATION MONITORING WELL (1993)	⊕
ADDITIONAL INVESTIGATION MONITORING WELL (1994)	⊕
FIRE HYDRANT	
EXIST BM/CTRL	
DITCH	

SITE 57 – PUMPHOUSE 75
GROUNDWATER SAMPLING RESULTS FOR INITIAL INVESTIGATION
MacDILL AIR FORCE BASE
TAMPA, FLORIDA

FIGURE 2-76

Table 2-122
Groundwater Results - Additional Activities
Site 57, Pumphouse 75, MacDill Air Force Base

Parameters	Chapter 62-770 FAC	MD75-MW01 (2.5-11.48)[1]	MD75-MW02 (2.41-11.38)[1]	MD75-MW03 (2.5-11.48)[1]	MD75-MW04 (2.5-11.48)[1]	MD75-MW04 (DUP)	MD75-MW05 (2.5-11.48)[1]	MD75-MW06 (2.48-11.48)[1]	MD75-MW07 (2.43-11.48)[1]	MD75-MW08 (2.43-11.4)[1]
Aromatic Volatiles (method 8020)										
1,2-Dichlorobenzene	NE	--	--	--	--	--	--	--	--	11.3M
1,3-Dichlorobenzene	NE	--	--	--	--	--	--	--	--	6.6M
1,4-Dichlorobenzene	NE	--	--	--	--	--	--	--	--	39.5M
Benzene	1	--	--	--	135	14	--	--	0.6J	174
Ethylbenzene	NE	--	--	--	841	877	--	--	1.7	160
Toluene	NE	--	--	--	--	--	--	--	--	35.9
MTBE	50	--	--	--	--	--	--	--	--	29J
Xylenes (Total)	NE	--	--	--	--	--	--	--		171
Total VOAs[2]	50	--	--	--	976	1071	--	--	2.3J	540.9J
PAH (method 8100) (µg/L)										
Acenaphthylene	NE	--	--	--	15.5J	24.1	--	--	--	90.4
Acenaphthene	NE	--	--	--	7.4	6.7J	--	--	--	17.3
Fluorene	NE	--	--	--	20.8	45.3	--	--	--	19.7
Phenanthrene	NE	--	--	--	18.8	21.4	--	--	--	13.9
Total PAHs[3]	10	--	--	--	62.5	97.5J	--	--	--	141.3
Naphthalene	NE	--	--	--	572	723	--	--	5.2B	175
1-Methylnapthalene	NE	--	--	--	110	150	--	--	0.5J	59.5
2-Methylnapthalene	NE	--	--	--	147	173	--	--	1.2	39.4
Total Naphthalene[4]	100	--	--	--	829	1046	--	--	6.9JB	273.9
TRPH (method EPA 418.1) (mg/L)										
TRPH	5.0	--	0.9	0.5	1.3	1.2	--	--	--	2.1

Table 2-122 (Continued)
Groundwater Results - Additional Activities
Site 57, Pumphouse 75, MacDill Air Force Base

Parameter	Chapter 62-770 FAC	MD75-MW01 (2.5-11.48)[1]	MD75-MW02 (2.41-11.38)[1]	MD75-MW03 (2.5-11.48)[1]	MD75-MW04 (2.5-11.48)[1]	MD75-MW04 (DUP)	MD75-MW05 (2.5-11.48)[1]	MD75-MW06 (2.48-11.48)[1]	MD75-MW07 (2.43-11.48)[1]	MD75-MW08 (2.43-11.4)[1]
RCRA Metals (method 6010) (µg/L)										
Barium	NE	8.5	7.4	7.4	25.4	25.8	6.0	10.1	10.6	7.9
Chromium	NE	--	--	--	--	--	--	1.0	--	--
Arsenic	NE	--	--	--	--	2.0	--	--	2.6	--
Lead	50	2.5	3.8	--	--	2.1	--	--	--	--
Mercury	--	--	--	--	--	2.1	--	--	--	--

NOTES:

FAC 62-770	Chapter 62-770, Florida Administrative Code groundwater standard.
MW	Monitoring Well.
NE	Not Established.
B	Possible false positive based on blank contamination.
J	Estimated quantitation based on QC data.
M	Method results conflict; not quantifiable due to coelution of peaks.
--	Below detection limits.
1	Monitoring Well Screened Interval in feet below land surface.
2	Total VOA includes BTEX constituents only.
3	Total PAHs excluding naphthalenes.
4	Total naphthalenes including naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.

Table 2-122 (Continued)
Groundwater Results - Additional Activities
Site 57, Pumphouse 75, MacDill Air Force Base

Parameters	Chapter 62-770 FAC	MD75-MW09 (2-10.48)[1]	MD75-MW10 (2-10.48)[1]	MD75-MW11 (1.8-10.77)[1]	MD75-MW12 (2.43-11.40)[1]	MD75-MW13 (2-10.98)[1]	MD75-MW14 (22.86-27.18)[1]	MD75-MW15 (2.5-11.49)[1]	MD75-MW16 (20.84-25.15)[1]
Aromatic Volatiles (method 8020)									
1,2-Dichlorobenzene	NE	12.4M	2.7M	0.8M	5.3M	--	--	--	4.1M
1,3-Dichlorobenzene	NE	--	--	--	5.9M	--	--	--	0.6M
1,4-Dichlorobenzene	NE	--	--	--	22.3M	--	--	--	0.9M
Benzene	1	--	3.1	--	31.1	1.6	30.5	--	13.3
Ethylbenzene	NE	81.2	44.3	--	73.3	6.8	64.9	--	32.8
Toluene	NE	--	--	--	--	--	--	--	0.5J
MTBE	50	--	--	--	--	--	--	--	8.8J
Xylenes (Total)	NE	8	--	1.1	34.3	2.2	--	--	6.8
Total VOAs[2]	50	89.2	47.4	1.9M	138.7	10.6	95.4	--	53.4J
PAH (method 8100) (µg/L)									
Acenaphthylene	NE	14.8	1.7	--	1.9J	0.8J	1.8	--	3.6
Acenaphthene	NE	--	1.4	--	--	2.2	5.3	--	11.5
Anthracene	NE	--	--	--	--	0.8J	--	--	0.8J
Fluorene	NE	--	3.6	--	3.7	0.7J	1.7	--	5.2
Phenanthrene	10	--	1.6	--	3.2	--	--	--	2.2
Total PAHs	NE	14.8	8.3	--	8.8J	4.5J	8.8	--	23.3J
Naphthalene	NE	640	61.5	--	108	2.7B	68.8	--	34
1-Methylnapthalene	NE	204	26.2	--	52.5	9.1	10.7	--	9.9
2-Methylnapthalene	100	227	21	--	0.9J	0.8J	12.5	--	5.1
Total Naphthalene		1071	108.7	--	107.6	12.6J	92	--	49
TRPH (method EPA 418.1) (mg/L)									
TRPH	5.0	0.7	--	--	0.6	--	1.0	--	--

Table 2-122 (Continued)
Groundwater Results - Additional Activities
Site 57, Pumphouse 75, MacDill Air Force Base

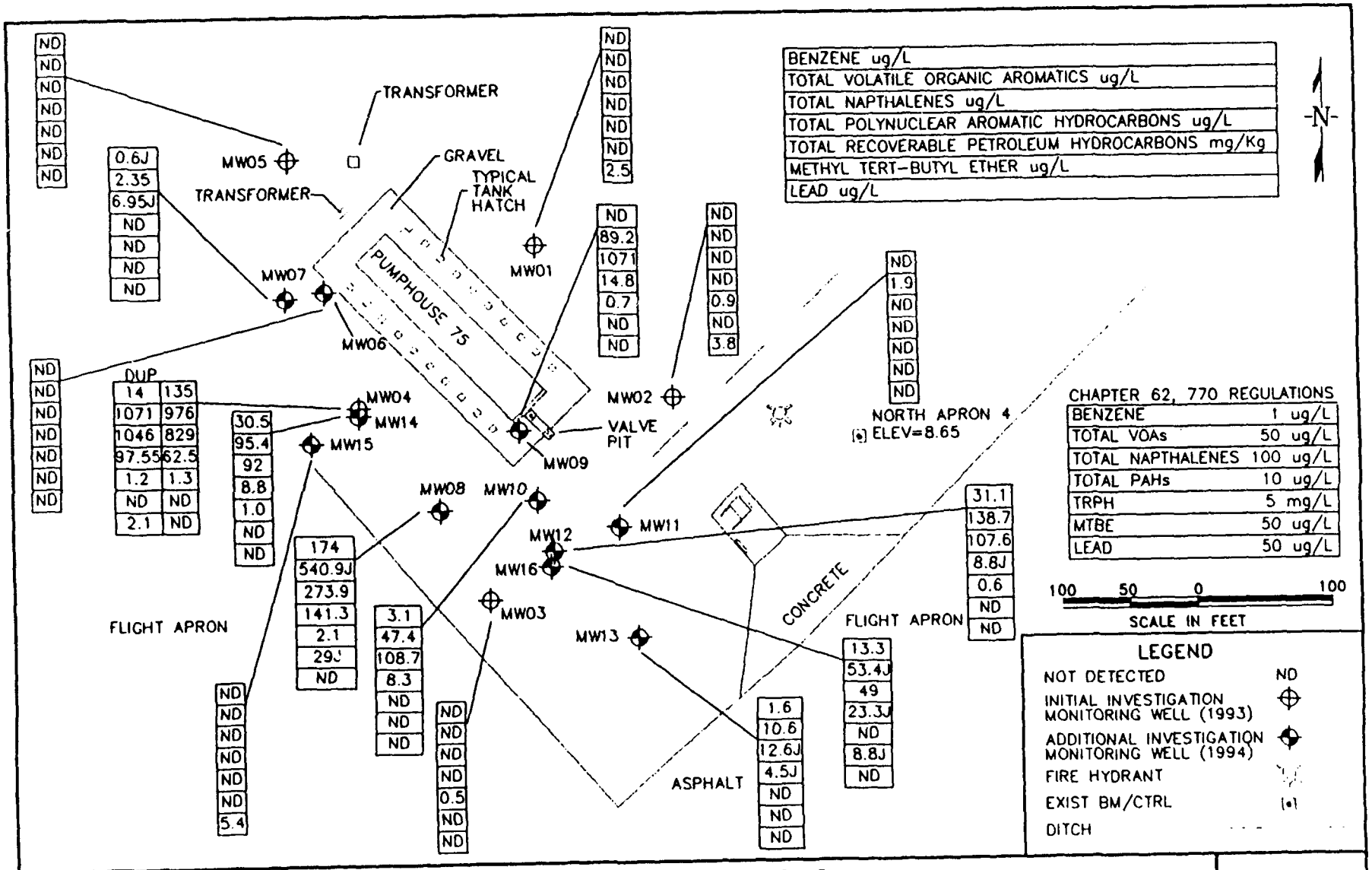
Parameters	Chapter 62-770 FAC	MD75-MW09 (2-10.48)[1]	MD75-MW10 (2-10.48)[1]	MD75-MW11 (1.8-10.77)[1]	MD75-MW12 (2.43-11.40)[1]	MD75-MW13 (2-10.98)[1]	MD75-MW14 (22.86-27.18)[1]	MD75-MW15 (2.5-11.49)[1]	MD75-MW16 (20.84-25.15)[1]
RCRA Metals (method 6010) (µg/L)									
Barium	NE	9.0	15.5	23.0	8.8	2.5	30.7	5.8	10.3
Chromium	NE	--	2.9	--	7.3	1.1	--	--	--
Arsenic	NE	2.2	--	--	--	--	4.9		3.2
Lead	50	--	--	--	--	--	--	5.4	--
Mercury	--	--	0.383	--	--	--	--	5.4	--

NOTES:

FAC 62-770	Chapter 62-770, Florida Administrative Code groundwater standard.
MW	Monitoring Well.
NE	Not Established.
B	Possible false positive based on blank contamination.
J	Estimated quantitation based on QC data.
M	Method results conflict; not quantifiable due to coelution of peaks.
--	Below detection limits.
1	Monitoring Well Screened Interval in feet below land surface.
2	Total VOA includes BTEX constituents only.
3	Total PAHs excluding naphthalenes.
4	Total naphthalenes including naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.

CAD DWG NO: 571017
DATE: 1-21-95 BM
PLOT SCALE: 1"=100'

ORIGINAL DWG SIZE
8.5 x 11

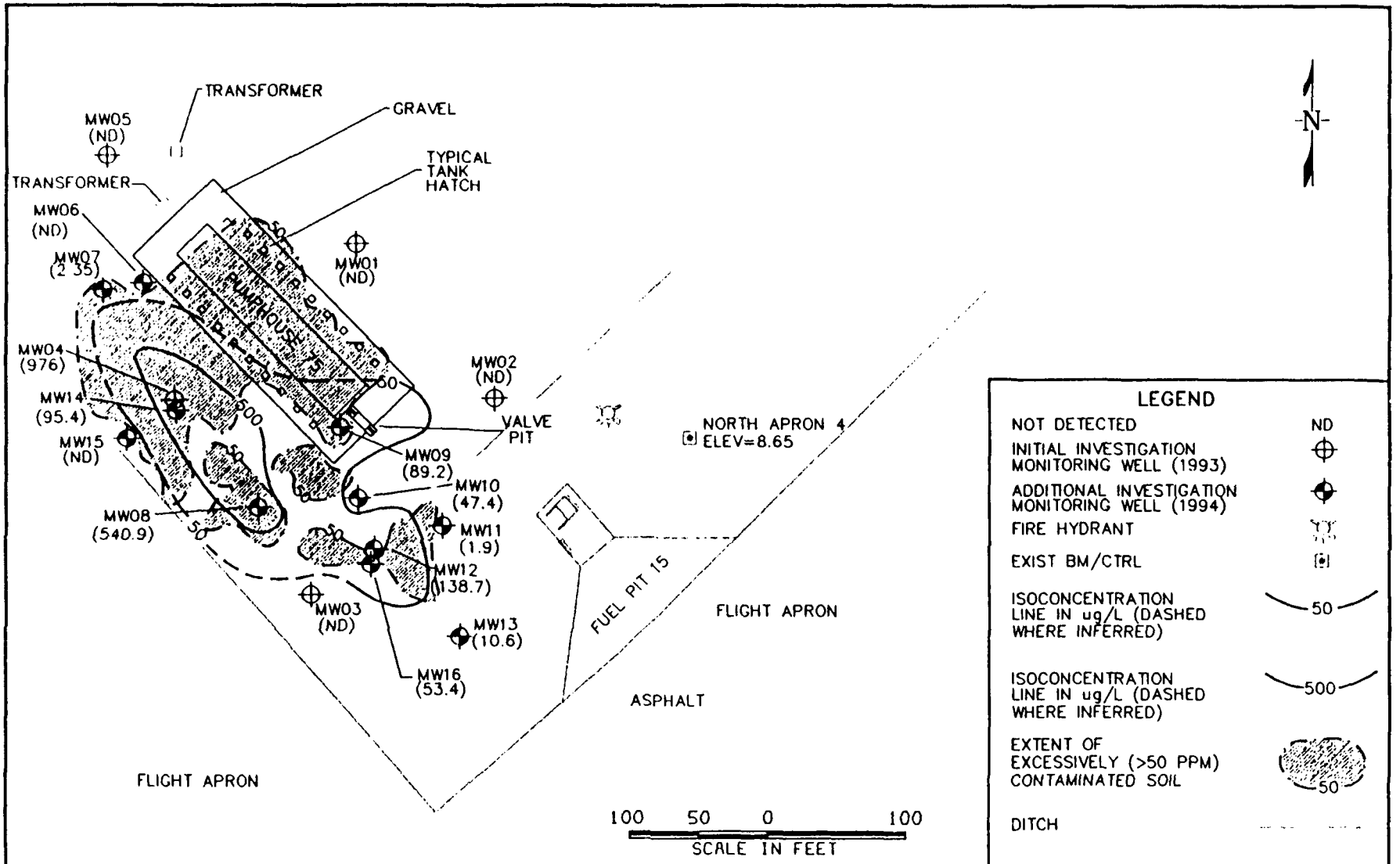


SITE 57 – PUMPHOUSE 75
GROUNDWATER SAMPLING RESULTS FOR ADDITIONAL INVESTIGATION
MacDILL A' 'ORCE BASE
TAMP, LORIDA

FIGURE
2-111

CAD DWG NO: 571019
DATE: 1-22-95 BM/GB
PLOT SCALE: 1"=100'

ORIGINAL DWG SIZE
8.5 x 11



SITE 57 - PUMPHOUSE 75
GROUNDWATER TOTAL VOAs CONCENTRATION MAP FOR ADDITIONAL INVESTIGATION
MacDILL AIR FORCE BASE
TAMPA, FLORIDA

FIGURE 2-113

GEOLOGIC BORING LOG

Sheet 1 of 1

BORING NO.:	75MP-1A	CONTRACTOR:	PARSONS ES	DATE SPUD:	3/11/95
CLIENT:	AFCEE	RIG TYPE:	GEOPROBE	DATE CMPL.:	3/11/95
JOB NO.:	722450 21	DRLG METHOD:	GEOPROBE	ELEVATION:	
LOCATION:	MACDILL AFB	BORING DIA.:	2 INCHES	TEMP:	COOL
GEOLOGIST:	KC	DRLG FLUID:	NONE	WEATHER:	WINDY
COMMENTS:	BACKGROUND PID = 7.1 ppmv				

Elev (ft)	Depth (ft)	Pro-file	US CS	Geologic Description	Sample No.	Sample Depth (ft)	Sample Type	Penet Res	PID(ppm)	WKSPC PID(ppm)	TOTAL BTEX(ppm)	TPH (ppm)
	1		SP	1 foot of brown TOPSOIL Light brown, fine-grained SAND with silt			CONTINUOUS CORE					
▼			SW	White to tan, fine- to medium-grained, well-sorted SAND with silt. Subangular grains Saturated at 3.0 feet bgs	1	3-5			7.1	7.1		
	5		SP	Brown, silty SAND to SAND with silt					7.4			
			SW	White, fine-grained, well-sorted SAND					7.1			
	10								7.1			
				Bottom of hole at 13 feet bgs					7.1			
	15											
	20											
	25											
	30											
	35											

NOTES

SAMPLE TYPE

▼

GEOLOGIC BORING LOG

PARSONS ENGINEERING SCIENCE, INC.

GEOLOGIC BORING LOG

BORING NO.:	75MP-1B	CONTRACTOR:	PARSONS ES	DATE SPUD:	3/11/95
CLIENT:	AFCEE	RIG TYPE:	GEOPROBE	DATE CMPL:	3/11/95
JOB NO.:	722450.21	DRLG METHOD:	GEOPROBE	ELEVATION:	
LOCATION:	MACDILL AFB	BORING DIA.:	2 INCHES	TEMP:	COOL
GEOLOGIST:	KC	DRLG FLUID:	NONE	WEATHER:	OVERCAST
COMMENTS:	BACKGROUND PID = 7.1 ppmv				

Elev (ft)	Depth (ft)	Profile	USCS	Geologic Description	Sample No.	Sample Depth (ft)	Sample Type	Penet Res	PID(ppm)	WKSPC PID(ppm)	TOTAL BTEX(ppm)	TPH (ppm)
▼	1			No sample			CONTINUOUS CORE					
	5											
	10											
	15		SW	White, fine- to medium-grained, well-sorted SAND with silt. Saturated. Slight odor. Saturated at 3.0 feet bgs					21.4			
									7.4			
	20		CH	Light brown, stiff, sandy CLAY. Moderate plasticity					7.1			
			SP	Greyish-green, clayey SAND. Saturated					21.4			
				Bottom of hole at 22 feet bgs								
	25											
	30											
	35											

NOTES

bgs - Below Ground Surface
gs - Ground Surface
toc - Top of Casing
NS - Not Sampled
SAA - Same As Above

SAMPLE TYPE

D - DRIVE
C - CORE
G - GRAB

▼ Water level drilled

GEOLOGIC BORING LOG

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

M:\APPT\DRAWING\BORING\75MP1A 4/18/95 at 1130

GEOLOGIC BORING LOG

Sheet 1 of 1

BORING NO.:	75MP-2	CONTRACTOR:	PARSONS ES	DATE SPUD:	3/13/95
CLIENT:	AFCEE	RIG TYPE:	GEOPROBE	DATE CMPL:	3/13/95
JOB NO.:	722450.21	DRLG METHOD:	GEOPROBE	ELEVATION:	
LOCATION:	MACDILL AFB	BORING DIA.:	2 INCHES	TEMP:	
GEOLOGIST:	KC	DRLG FLUID:	NONE	WEATHER:	
COMMENTS:	BACKGROUND PID = 4.3 ppmv				

Elev (ft)	Depth (ft)	Profile	USCS	Geologic Description	Sample No	Sample Depth (ft)	Sample Type	Penet Res	PID(ppm)	WKSPC PID(ppm)	TOTAL BTEX(ppm)	TPH (ppm)
	1		SW	3 to 5 inches of topsoil and FILL with roots White to tan, fine- to medium-grained, well-sorted SAND with silt. Strong hydrocarbon odor Saturated at 3.0 feet bgs			CONTINUOUS CORE		30.4			
▼					1	2-4			326			
	5								4.3			
									130			
	10			Bottom of hole at 10 feet bgs					130			
	15											
	20											
	25											
	30											
	35											

NOTES

bgs - Below Ground Surface
GS - Ground Surface
TOC - Top of Casing
NS - Not sampled
SAA - Same As Above

SAMPLE TYPE

D - DRIVE
C - CORE
G - GRAB

▼ Water level drilled

GEOLOGIC BORING LOG

Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.

Denver, Colorado

GEOLOGIC BORING LOG

Sheet 1 of 1

BORING NO.:	75MP-3	CONTRACTOR:	PARSONS ES	DATE SPUD:	3/14/95
CLIENT:	AFCEE	RIG TYPE:	GEOPROBE	DATE CMPL:	3/14/95
JOB NO.:	722450.21	DRLG METHOD:	GEOPROBE	ELEVATION:	
LOCATION:	MACDILL AFB	BORING DIA.:	2 INCHES	TEMP:	WARM
GEOLOGIST:	KC	DRLG FLUID:	NONE	WEATHER:	SUNNY
COMMENTS:	BACKGROUND PID = 0.3 ppmv				

Elev (ft)	Depth (ft)	Pro-file	USCS	Geologic Description	Sample No	Sample Depth (ft)	Sample Type	Perct Rec	PID(ppm)	WKSPC PID(ppm)	TOTAL BTEX(ppm)	TPH (ppm)
▼	1		SP	4 to 8 inches of topsoil Dark brown, fine grained silty SAND with clay Saturated at 3.0 feet bgs			CONTINUOUS CORE		0.3	0.5		
	5				1	3.5			0.3			
				Bottom of hole at 6 feet bgs					0.3			
	10											
	15											
	20											
	25											
	30											

SAMPLE TYPE

E - DRIVE

T - SCOPE

G - GRAB

▼ Water level

GEOLOGIC BORING LOG

Intrinsic Remediation IT
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.

GEOLOGIC BORING LOG

Sheet 1 of 1

BORING NO:	75MP-4	CONTRACTOR	PARSONS ES	DATE SPUD:	3/14/95
CLIENT:	AFCEE	RIG TYPE:	GEOPROBE	DATE CMPL	3/14/95
JOB NO:	722450.21	DRLG METHOD:	GEOPROBE	ELEVATION:	
LOCATION:	MACDILL AFB	BORING DIA:	2 INCHES	TEMP:	HOT
GEOLOGIST:	KC	DRLG FLUID:	NONE	WEATHER:	SUNNY
COMMENTS:	BACKGROUND PID = 0.3 ppmv				

Elev (ft)	Depth (ft)	Profile	USCS	Geologic Description	Sample No	Sample Depth (ft)	Sample Type	Penet Res	PID(ppm)	WKSPC PID(ppm)	TOTAL BTEX(ppm)	TPH (ppm)
	1		SP	6 inches of brown sandy TOPSOIL Dark brown, fine-grained silty SAND with hydrocarbon odor			CONTINUOUS CORE		88.7			
▼			SW	Tan, fine- to medium-grained, well-sorted SAND with some silt. Moderate hydrocarbon odor					599			
	5			Saturated at 4.0 feet bgs								
			SW	SAA with slight hydrocarbon odor. Saturated	1	8-10			1.6			
	10											
			SW	SAA. Saturated	2	13-15			1.6			
	15			Bottom of hole at 15 feet bgs								
	20											
	25											
	30											
	35											

SAMPLE TYPE

D = DRIVE

C = CORE

G = GRAB

▼ Water level

GEOLOGIC BORING LOG

PARSONS ENGINEERING SCIENCE, INC.

GEOLOGIC BORING LOG

Sheet 1 of 1

BORING NO:	ZSMP-7	CONTRACTOR	PARSONS ES	DATE STARTED	5/15/96
CLIENT	AFCEE	RIG TYPE	GEOPROBE	DATE FINISHED	5/15/96
JOB NO:	735450.01	DRLG METHOD	GEOPROBE	ELEVATION	
LOCATION:	MACDILL AFB	BORING DIA:	2" INCHES	TEMP:	
GEOLOGIST	KC	DRLG FLUIDS:	NONE	WEATHER:	OVERCAST
COMMENTS:	BACKGROUND PID = 6.0 ppmv				

Elev (ft)	Depth (ft)	Pro file	USCS	Geologic Description	Sample No	Sample Depth (ft)	Sample Type	Penet Res	PID(ppm)	WKSPC PID(ppm)	TOTAL BTEX(ppm)	TPH (ppm)
	1			No sample								
			SW	5 inches of dark brown silty SAND Tan fine- to medium-grained, well-sorted, SAND								
▼				Saturated at 4.5 feet bgs								
	5				1	4-6						
				AA turning grey at 5.5 feet bgs					55.3			
			SP	Dark brown, fine grained, silty SAND. Organic/sulfur odor present	2	6-8						
				Bottom of hole at 8 feet bgs								
	10											

CONTINUOUS CORE

GEOLOGIC BORING LOG

PARSONS ENGINEERING SCIENCE, INC.

GEOLOGIC BORING LOG

BORING NO.: 7555 1 CONTRACTOR: PARSONS ES DATE STARTED: 5/13/95
CLIENT: AFCEE RIG TYPE: GEOPROBE DATE COMPL.: 5/13/95
JOB NO.: 722450.21 DRLG METHOD: GEOPROBE ELEVATION:
LOCATION: MATHER AFB BORING DIA.: 1 INCHES TEMP.:
GEOLOGIST: KS DRLG FLUID: NONE WEATHER: OVERCAST
COMMENTS: BACKGROUND PID = 4.3 ppm. Sample 2 to 9 feet bgs in seperate hole.

Elev (ft)	Depth (ft)	Graphic Log	USCS	Geologic Description	Sample No.	Sample Depth (ft)	Sample Type	Penet Res.	PID (ppm)	Water PID (ppm)	TOTAL BTEX (ppm)	TPH (ppm)
	1		SP	Dark brown, sandy FILL and TOPSOIL to 6 inches Light brown, fine- to medium-grained SAND with silt Moderate hydrocarbon odor								
▼				Saturated at 3.5 feet bgs					160.8			
	5		SW	Tan, fine-grained, well-sorted SAND. Odor present very small recovery	1	3-5	CONTINUOUS CORE			4.3		
					2	7-9			4.3			
									4.3			
				No sample from 10 to 13 feet bgs								
				SAA								
	15			No sample from 17 to 19 feet bgs								
				SAA								
				Light brown fine grained [illegible] SAND [illegible] grey clay [illegible] present								
				Green compact plastic CLAY with some grey [illegible] SAND. Moderate								
				[illegible]								

GEOLOGIC BORING LOG

PARSONS
ENGINEERING SCIENCE, INC.

GEOLOGIC BORING LOG

Sheet 1 of 1

CONTRACTOR: PARSONS ES
DRILL TYPE: GEOPROBE
DRILL METHOD: GEOPROBE
BORING DIA.: 2 INCHES
DRILL FLUID: NONE
DATE DRILLED: 3/13/95
DATE COMPL.: 3/13/95
ELEVATION:
TEMP: WARM
WEATHER: CLEAR

BACKGROUND PID = 4.3 ppmv

Elev (ft)	Depth (ft)	Graphic Log	USCS	Geologic Description	Sample No.	Sample Depth (ft)	Sample Type	Penet Res	PID(ppm)	WKSPC PID(ppm)	TOTAL BTEX(ppm)	TPH (ppm)
			SP	4 1/2 inches of brown sandy FILL Dark brown fine grained SAND with tan sand stringers								
			SW	Tan, fine- to medium-grained, subangular SAND Strong hydrocarbon odor saturated at 7.0 feet bgs	1	5-5	CONTINUOUS CORE		734			
				SAA moderate hydrocarbon odor and roots present					239.1			
									13.0			
			SP	Dark brown, fine-grained silty SAND. Moderate hydrocarbon odor present					47.9			
			SW	Tan, fine- to medium-grained, well sorted SAND Moderate hydrocarbon odor and woody roots present					15.0			
					2	9-11			15.0			
				Groundwater level at 12 feet bgs								

GEOLOGIC BORING LOG

PARSONS
ENGINEERING SCIENCE, INC.

GEOLOGIC BORING LOG

Sheet 1 of 1

BORING NO.:	7555-3	CONTRACTOR:	PARSONS ES	DATE STD:	3/13/95
CLIENT:	AFCEE	RIG TYPE:	GEOPROBE	DATE COMPL:	3/13/95
JOB NO.:	722450.21	DRLG METHOD:	GEOPROBE	ELEVATION:	
LOCATION:	MACDILL AFB	BORING DIA.:	2 INCHES	TEMP:	WARM
GEOLOGIST:	KC	DRLG FLUID:	NONE	WEATHER:	CLEAR
COMMENTS:	BACKGROUND PID = 4.3 ppmv				

Elev (ft)	Depth (ft)	Pro-file	USCS	Geologic Description	Sample No	Sample Depth (ft)	Sample Type	Penet Res	PID(ppm)	WKSPC PID(ppm)	TOTAL BTEX(ppm)	TPH (ppm)
	1		SP	Tan, fine- to medium-grained SAND with some silt								
▼			SW	Tan, fine- to medium-grained, subangular SAND More well sorted Saturated at 3.0 feet bgs	1	3-4	CONTINUOUS CORE		0.0			
	5				2	6-8			0.0			
									0.0			
				Bottom of hole at 8 feet bgs								
	10											
	15											
	20											
	25											

GEOLOGIC BORING LOG

▼

PARSONS ENGINEERING SCIENCE, INC.

GEOLOGIC BORING LOG

BORING NO.:	75SS-4	CONTRACTOR	PARSONS ES	DATE SPUD	5/14/95
CLIENT	AFCEE	RIG TYPE:	GEOPROBE	DATE CMPL	5/14/95
JOB NO.:	722459.21	DRLG METHOD:	GEOPROBE	ELEVATION:	
LOCATION:	MACDILL AFB	BORING DIA.:	2 INCHES	TEMP:	
GEOLOGIST:	KC	DRLG FLUID:	NONE	WEATHER:	SUNNY

COMMENTS: BACKGROUND PID = 0.6 ppmv

Elev (ft)	Depth (ft)	Pro-file	USCS	Geologic Description	Sample No	Sample Depth (ft)	Sample Type	Penet Res	PID(ppm)	WKSPC PID(ppm)	TOTAL BTEX(ppm)	TPH (ppm)
	1		SP	Dark brown, sandy FILL and TOPSOIL to 6 inches Brown, fine- to medium-grained SAND with silt Roots present			CONTINUOUS CORE					
▼			SW	Tan, fine- to medium-grained, well-sorted SAND Saturated at 3.0 feet bgs	1	3-4			0.6			
	5											
			SP	Brown silty SAND as above								
			SW	Tan, fine- to medium-grained, well-sorted SAND								
	10											
				No sample from 12 to 15 feet bgs								
	15			SAA								
				No sample from 17 to 20 feet bgs								
	20		SP/CH	Grey, clayey SAND to sandy CLAY. Moderately plastic								
			SP	Tan, fine- to medium-grained SAND with silt								
	25			Bottom of hole at 24 feet bgs								
	30											

SAMPLE TYPE

▼ [illegible]

GEOLOGIC BORING LOG

[illegible]

PARSONS ENGINEERING SCIENCE, INC.

GEOLOGIC BORING LOG

Sheet 1 of 1

BORING NO: 7SS-5 (7SNP-50) CONTRACTOR: PARSONS ES DATE SPUD: 3/14/95
CLIENT: AFCEE RIG TYPE: GEOPROBE DATE CMPL: 3/14/95
JOB NO: 722450.21 DRLG METHOD: GEOPROBE ELEVATION:
LOCATION: MACDILL AFB BORING DIA.: 2 INCHES TEMP:
GEOLOGIST: KC DRLG FLUID: NONE WEATHER: SUNNY
COMMENTS: BACKGROUND PID = 0.3 ppmv

Elev (ft)	Depth (ft)	Profile	USCS	Geologic Description	Sample No	Sample Depth (ft)	Sample Type	Penet Res	PID (ppm)	WKSPC PID (ppm)	TOTAL BTEX (ppm)	TPH (ppm)
	1			No sample			CONTINUOUS CORE					
▼			SW	Tan, fine- to medium-grained, well-sorted, SAND Some silt present Saturated at 4.0 feet bgs					0.9			
	5				1	4-5			0.9			
					2	6-8						
				Bottom of hole at 8 feet bgs								
	10											
	15											
	20											
	25											
	30											
	35											

NOTES

bgs = Below Ground Surface
GS = Ground Surface
TOC = Top of Casing
N/S = Not Sampled
ppmv = Parts Per Million by Volume

SAMPLE TYPE

D = Drive
G = Grab
S = Split Spoon

▼ Water Level Measurement

GEOLOGIC BORING LOG

PARSONS ENGINEERING SCIENCE, INC.

GEOLOGIC BORING LOG

BORING NO:	7SS-6	CONTRACTOR	PARSONS ES	DATE SPUD	3/15/95
CLIENT	AFCEE	RIG TYPE:	GEOPROBE	DATE CMPL	3/15/95
JOB NO:	722450.21	DRLG METHOD:	GEOPROBE	ELEVATION:	
LOCATION:	MACDILL AFB	BORING DIA:	2 INCHES	TEMP.	
GEOLOGIST:	KC	DRLG FLUID:	NONE	WEATHER:	OVERCAST
COMMENTS:	BACKGROUND PID = 6.0 ppmv				

Elev (ft)	Depth (ft)	Pro-file	USCS	Geologic Description	Sample No	Sample Depth (ft)	Sample Type	Penet Res	PID(ppm)	WKSPC PID(ppm)	TOTAL BTEX(ppm)	TPH (ppm)
	1		SP	Dark brown, sandy FILL and TOPSOIL to 6 inches Brown, fine- to medium-grained SAND with silt Roots present			CONTINUOUS CORE		6.0	6.0		
▼			SW	Tan, fine- to medium-grained, well-sorted SAND Organic odor present Saturated at 3.0 feet bgs								
	5		SP	Brown silty SAND as above	1	3-5			6.0			
									6.0			
			SW	White, fine- to medium-grained, well-sorted SAND Organic odor present								
					2	7-9			6.0			
	10			No sample from 10 to 15 feet bgs						6.0		
									6.0			
	15		SP	Brown, silty SAND as above Odor present					201.1			
				No sample from 17 to 18 feet bgs								
			SP	Brown silty SAND as above								
	20		SW	White well-sorted SAND as above Strong odor present					>1000	6.0		
									187.1			
					3	22-24			>1000	6.0		
	25								80.6			
			SP	Light brown, fine-grained silty, clayey SAND Moderately plastic					6.0			
				Bottom of hole at 28 feet bgs								
	30											
	35											

NOTES

BGS = Below Ground Surface

GS = Ground Surface

TOC = Top of Casing

NA = Not Applicable

MSL = Mean Sea Level

▼ Water level

SAMPLE TYPE

D = DRIVE

C = CORE

G = GRAB

GEOLOGIC BORING LOG

Intrinsic Remediation TS

MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.

MONITORING POINT INSTALLATION RECORD

JOB NAME MACDILL AIR FORCE BASE MONITORING POINT NUMBER 75MP-1S

JOB NUMBER 722450.21 INSTALLATION DATE 3/11/95 LOCATION SITE 57

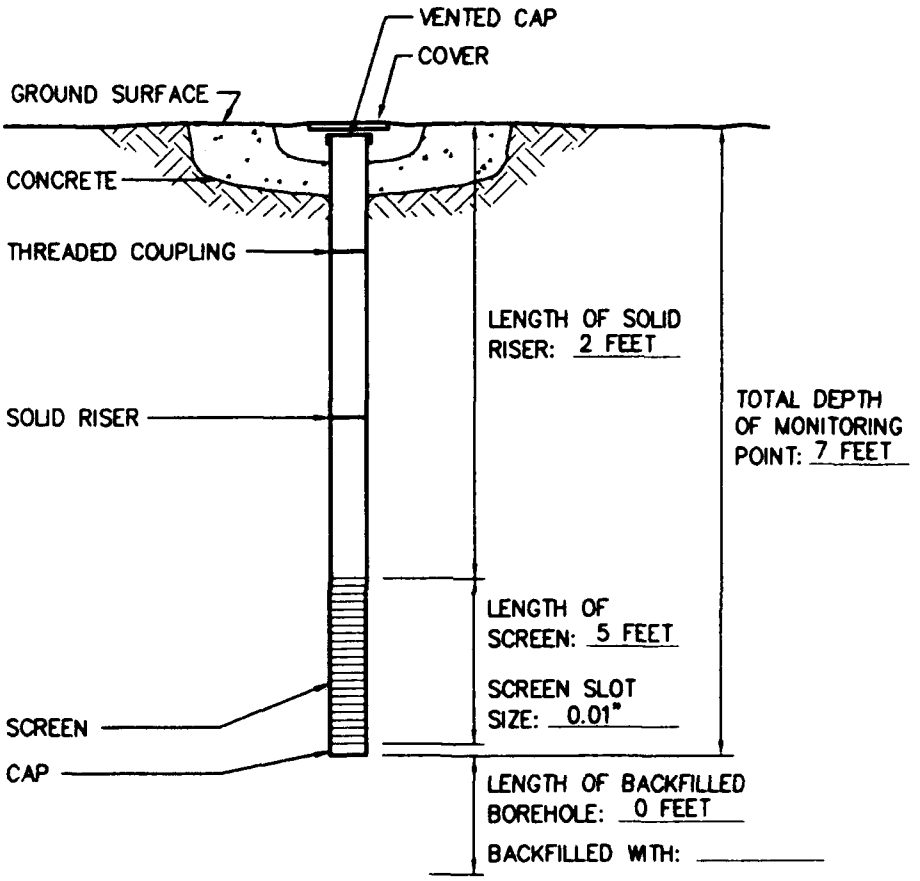
DATUM ELEVATION 9.165 FEET ABOVE MSL WELL CASING ELEVATION 9.011 FT AMSL

DATUM FOR WATER LEVEL MEASUREMENT GROUND SURFACE

SCREEN DIAMETER & MATERIAL 1.0 INCH PVC SLOT SIZE 0.01 INCH

RISER DIAMETER & MATERIAL 1.0 INCH PVC BOREHOLE DIAMETER 2 INCHES

GEOPROBE CONTRACTOR PARSONS ENGINEERING SCIENCE ES REPRESENTATIVE KC



(NOT TO SCALE)

STABILIZED WATER LEVEL 3.45 FEET BELOW DATUM.

TOTAL MONITORING POINT DEPTH 6.95 FEET BELOW DATUM.

MONITORING POINT INSTALLATION RECORD

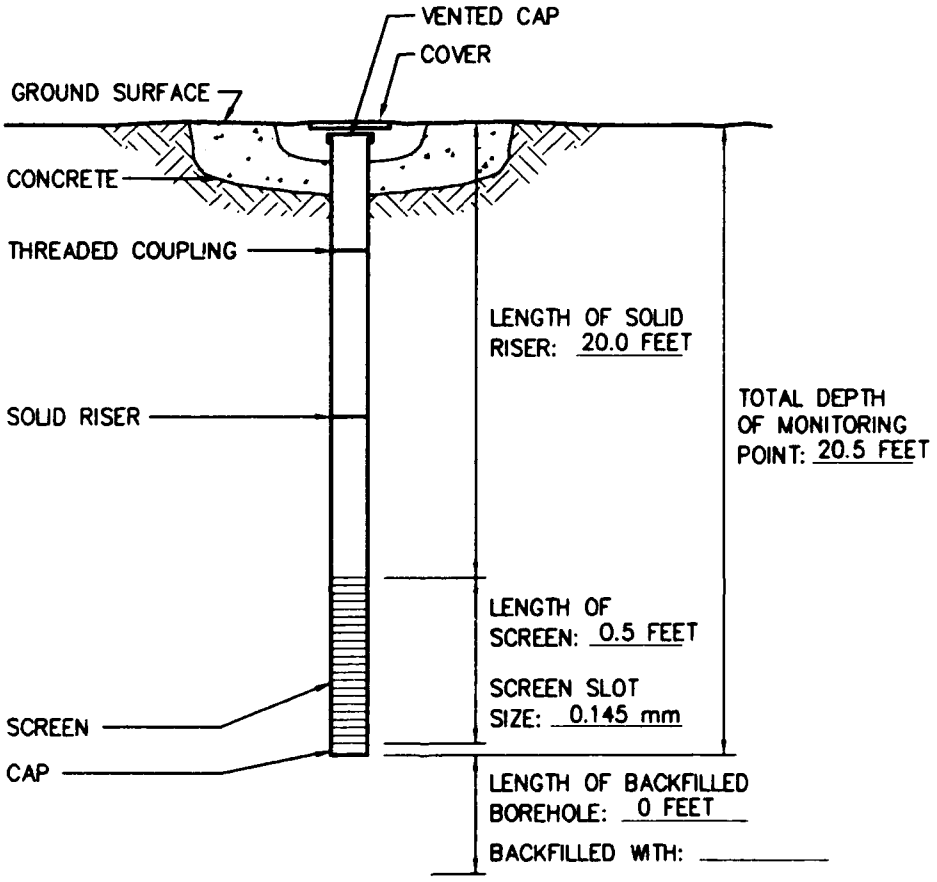
Site 57
Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

N 4502 DRAWINGS WELLINST SITE57\75MP1S ON 4/24/95 AT 1400

MONITORING POINT INSTALLATION RECORD

JOB NAME MACDILL AIR FORCE BASE MONITORING POINT NUMBER 75MP-1D
JOB NUMBER 722450.21 INSTALLATION DATE 3/11/95 LOCATION SITE 57
DATUM ELEVATION 9.165 FEET ABOVE MSL WELL CASING ELEVATION TUBE WELL POINT
DATUM FOR WATER LEVEL MEASUREMENT GROUND SURFACE
SCREEN DIAMETER & MATERIAL 0.375 STAINLESS STEEL SLOT SIZE 0.145 mm
RISER DIAMETER & MATERIAL 0.375 INCH TEFLON TUBING BOREHOLE DIAMETER 1 INCH
GEOPROBE CONTRACTOR PARSONS ENGINEERING SCIENCE ES REPRESENTATIVE KC



(NOT TO SCALE)

NO WATER LEVEL MEASUREMENTS TAKEN.

MONITORING POINT INSTALLATION RECORD

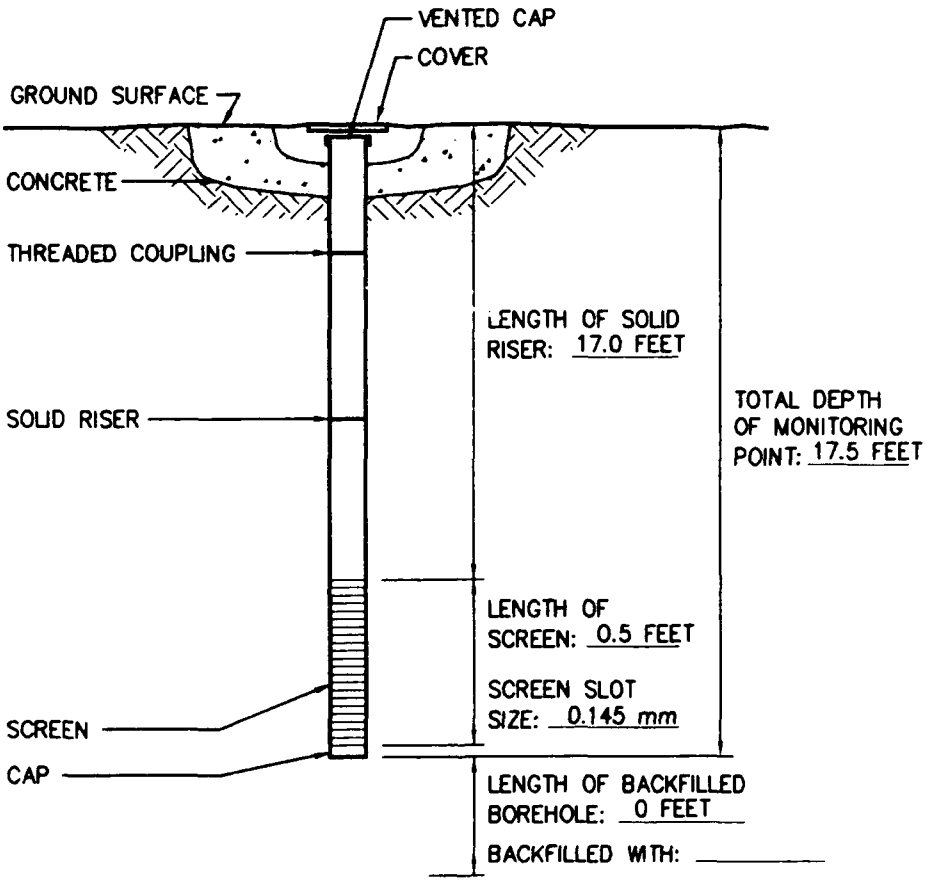
Site 57
Intrinsic Remediation TS
MacDill Air Force Base, Florid.

PARSONS ENGINEERING SCIENCE, INC
Denver, Colorado

M:\45021\DRAWINGS\WELLINST\SITE57\75MP1D ON 4/24/95 AT 1500

MONITORING POINT INSTALLATION RECORD

JOB NAME MACDILL AIR FORCE BASE MONITORING POINT NUMBER 75MP-3D
JOB NUMBER 722450.21 INSTALLATION DATE 3/14/95 LOCATION SITE 57
DATUM ELEVATION 9.278 FEET ABOVE MSL WELL CASING ELEVATION TUBE WELL POINT
DATUM FOR WATER LEVEL MEASUREMENT GROUND SURFACE
SCREEN DIAMETER & MATERIAL 0.375 STAINLESS STEEL SLOT SIZE 0.145 mm
RISER DIAMETER & MATERIAL 0.375 INCH TEFLON TUBING BOREHOLE DIAMETER 1 INCH
GEOPROBE CONTRACTOR PARSONS ENGINEERING SCIENCE ES REPRESENTATIVE KC



(NOT TO SCALE)

NO WATER LEVEL MEASUREMENTS TAKEN.

MONITORING POINT INSTALLATION RECORD

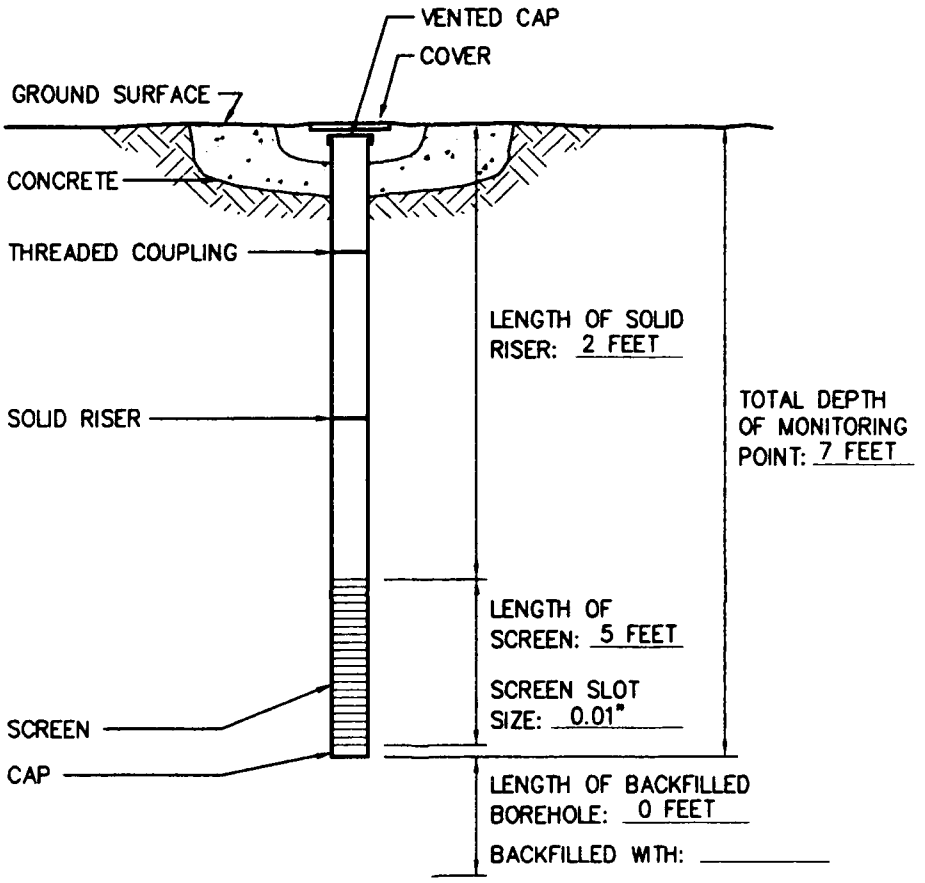
Site 57
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Denver, Colorado

M:\45021\DRAWINGS\WELLINST\SITE57\75MP3D.ON 4/24/95 AT 1500

MONITORING POINT INSTALLATION RECORD

JOB NAME MACDILL AIR FORCE BASE MONITORING POINT NUMBER 75MP-4S
JOB NUMBER 722450.21 INSTALLATION DATE 3/14/95 LOCATION SITE 57
DATUM ELEVATION 9.095 FEET ABOVE MSL WELL CASING ELEVATION 8.968 FT AMS
DATUM FOR WATER LEVEL MEASUREMENT GROUND SURFACE
SCREEN DIAMETER & MATERIAL 1.0 INCH PVC SLOT SIZE 0.01 INCH
RISER DIAMETER & MATERIAL 1.0 INCH PVC BOREHOLE DIAMETER 2 INCHES
GEOPROBE CONTRACTOR PARSONS ENGINEERING SCIENCE ES REPRESENTATIVE KC



(NOT TO SCALE)

STABILIZED WATER LEVEL 3.32 FEET BELOW DATUM.

TOTAL MONITORING POINT DEPTH _____ FEET BELOW DATUM.

MONITORING POINT INSTALLATION RECORD

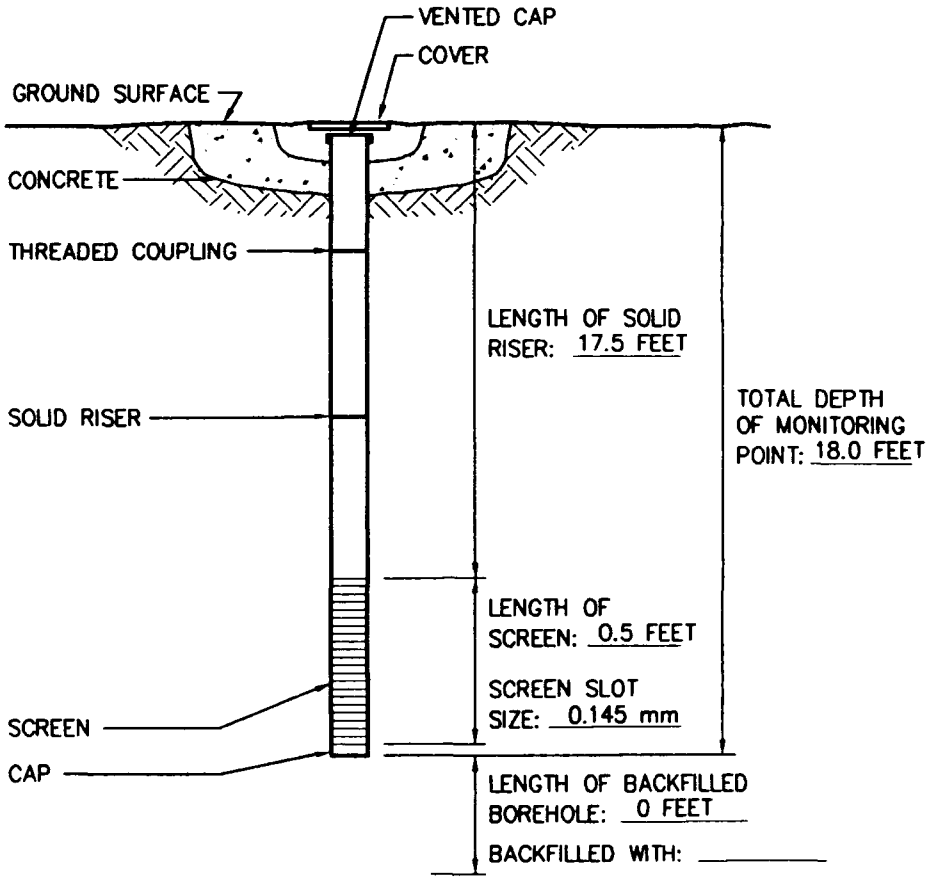
Site 57
Intrinsic Remediation TS
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Denver, Colorado

M:\45021\DRAWINGS\WELLINST\SITE57\75MP2S ON 4/24/95 AT 1400

MONITORING POINT INSTALLATION RECORD

JOB NAME MACDILL AIR FORCE BASE MONITORING POINT NUMBER 75MP-5D
JOB NUMBER 722450.21 INSTALLATION DATE 3/14/95 LOCATION SITE 57
DATUM ELEVATION 9.085 FEET ABOVE MSL WELL CASING ELEVATION TUBE WELL POINT
DATUM FOR WATER LEVEL MEASUREMENT GROUND SURFACE
SCREEN DIAMETER & MATERIAL 0.375 STAINLESS STEEL SLOT SIZE 0.145 mm
RISER DIAMETER & MATERIAL 0.375 INCH TEFLON TUBING BOREHOLE DIAMETER 1 INCH
GEOPROBE CONTRACTOR PARSONS ENGINEERING SCIENCE ES REPRESENTATIVE KC



(NOT TO SCALE)

NO WATER LEVEL MEASUREMENTS TAKEN.

MONITORING POINT INSTALLATION RECORD

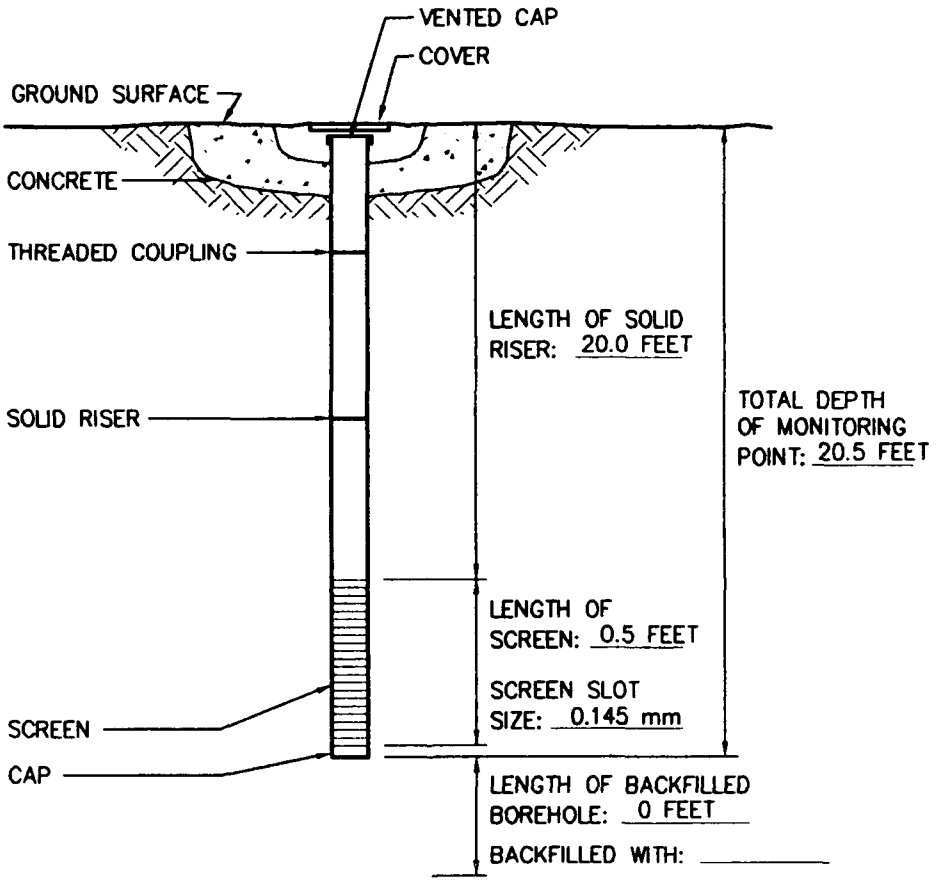
Site 57
Intrinsic Remediation TS
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Denver, Colorado

M:\45021\DRAWINGS\WELLINST\SITE57\75MP5D ON 4/24/95 AT 1500

MONITORING POINT INSTALLATION RECORD

JOB NAME MACDILL AIR FORCE BASE MONITORING POINT NUMBER 75MP-6D
JOB NUMBER 722450.21 INSTALLATION DATE 3/14/95 LOCATION SITE 57
DATUM ELEVATION 8.375 FEET ABOVE MSL WELL CASING ELEVATION TUBE WELL POINT
DATUM FOR WATER LEVEL MEASUREMENT GROUND SURFACE
SCREEN DIAMETER & MATERIAL 0.375 STAINLESS STEEL SLOT SIZE 0.145 mm
RISER DIAMETER & MATERIAL 0.375 INCH TEFLON TUBING BOREHOLE DIAMETER 1 INCH
GEOPROBE CONTRACTOR PARSONS ENGINEERING SCIENCE ES REPRESENTATIVE KC



(NOT TO SCALE)

NO WATER LEVEL MEASUREMENTS TAKEN.

MONITORING POINT INSTALLATION RECORD

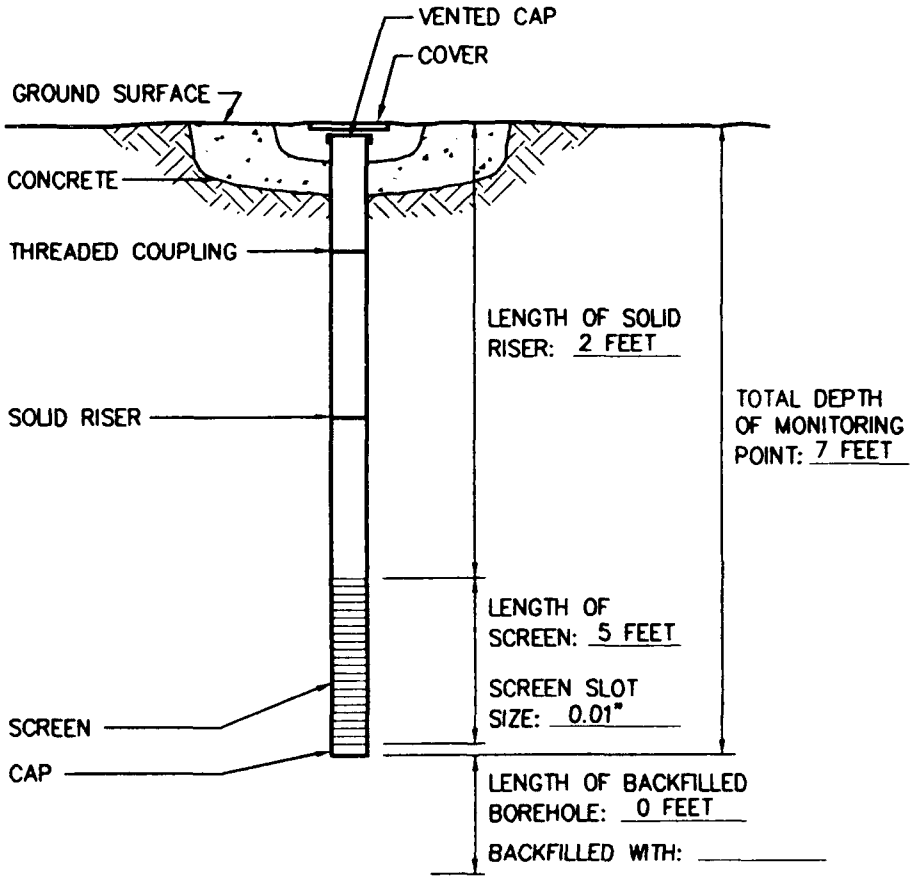
Site 57
Intrinsic Remediation TS
MacDill Air Force Base, Floric

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Denver, Colorado

M:\45021\DRAWINGS\WELLINST\SITE57\75MP6D ON 4/24/95 AT 1500

MONITORING POINT INSTALLATION RECORD

JOB NAME MACDILL AIR FORCE BASE MONITORING POINT NUMBER 75MP-7S
JOB NUMBER 722450.21 INSTALLATION DATE 3/15/95 LOCATION SITE 57
DATUM ELEVATION 9.845 FEET ABOVE MSL WELL CASING ELEVATION 9.501 FT AMSL
DATUM FOR WATER LEVEL MEASUREMENT GROUND SURFACE
SCREEN DIAMETER & MATERIAL 0.5 INCH PVC SLOT SIZE 0.01 INCH
RISER DIAMETER & MATERIAL 0.5 INCH PVC BOREHOLE DIAMETER 2 INCHES
GEOPROBE CONTRACTOR PARSONS ENGINEERING SCIENCE ES REPRESENTATIVE KC



(NOT TO SCALE)

STABILIZED WATER LEVEL 4.55 FEET BELOW DATUM.

TOTAL MONITORING POINT DEPTH 6.98 FEET BELOW DATUM.

MONITORING POINT INSTALLATION RECORD

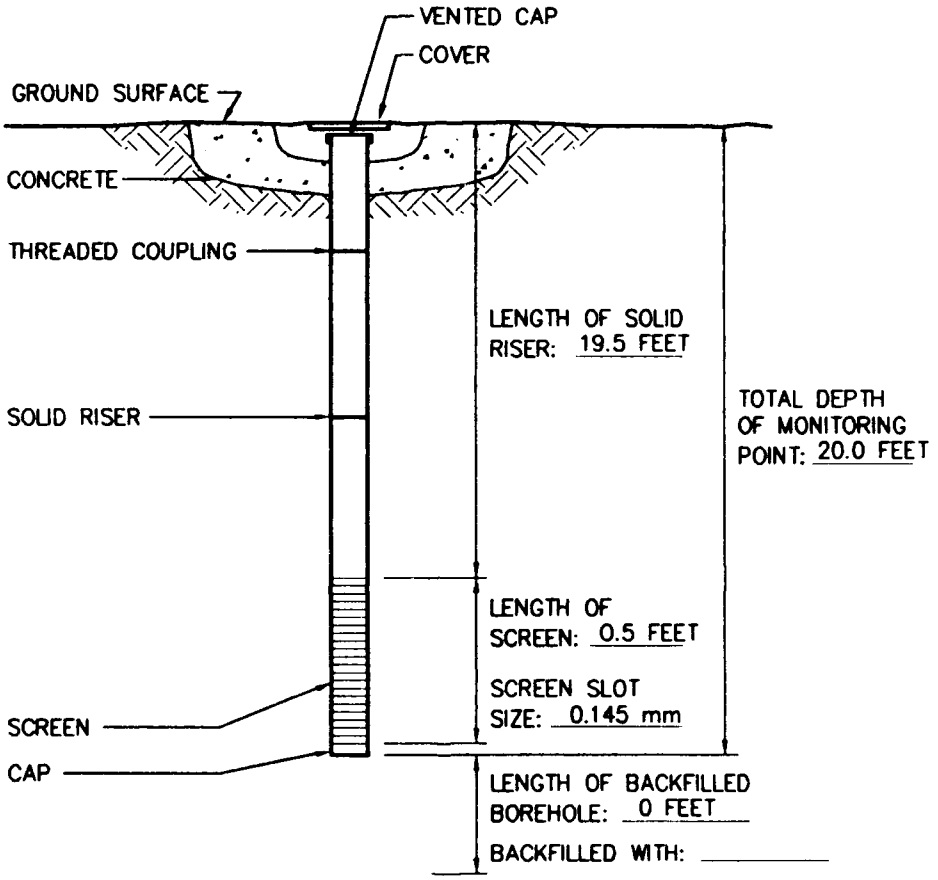
Site 57
Intrinsic Remediation TS
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Denver, Colorado

M:\45021\DRAWINGS\WELLINST\SITE57\75MP7S ON 4/24/95 AT 1400

MONITORING POINT INSTALLATION RECORD

JOB NAME MACDILL AIR FORCE BASE MONITORING POINT NUMBER 75MP-7D
JOB NUMBER 722450.21 INSTALLATION DATE 3/14/95 LOCATION SITE 57
DATUM ELEVATION 9.845 FEET ABOVE MSL WELL CASING ELEVATION TUBE WELL POINT
DATUM FOR WATER LEVEL MEASUREMENT GROUND SURFACE
SCREEN DIAMETER & MATERIAL 0.375 STAINLESS STEEL SLOT SIZE 0.145 mm
RISER DIAMETER & MATERIAL 0.375 INCH TEFLON TUBING BOREHOLE DIAMETER 1 INCH
GEOPROBE CONTRACTOR PARSONS ENGINEERING SCIENCE ES REPRESENTATIVE KC



(NOT TO SCALE)

NO WATER LEVEL MEASUREMENTS TAKEN.

MONITORING POINT INSTALLATION RECORD

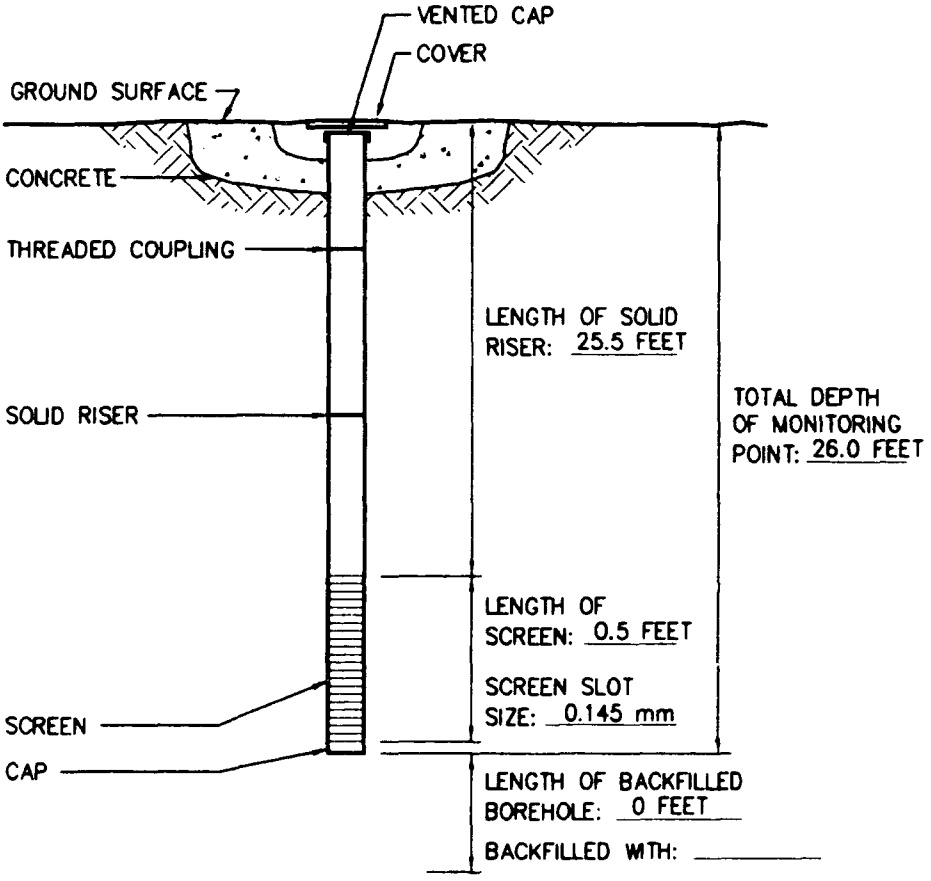
Site 57
Intrinsic Remediation TS
MacDill Air Force Base, Floric

PARSONS ENGINEERING SCIENCE, INC
Denver, Colorado

M 4502 DRAWINGS WELLINST SITE57 75MP7D ON 4/24/95 AT 1500

MONITORING POINT INSTALLATION RECORD

JOB NAME MACDILL AIR FORCE BASE MONITORING POINT NUMBER 75MP-8D
JOB NUMBER 722450.21 INSTALLATION DATE 3/15/95 LOCATION SITE 57
DATUM ELEVATION 9.418 FEET ABOVE MSL WELL CASING ELEVATION TUBE WELL POINT
DATUM FOR WATER LEVEL MEASUREMENT GROUND SURFACE
SCREEN DIAMETER & MATERIAL 0.375 STAINLESS STEEL SLOT SIZE 0.145 mm
RISER DIAMETER & MATERIAL 0.375 INCH TEFLON TUBING BOREHOLE DIAMETER 1 INCH
GEOPROBE CONTRACTOR PARSONS ENGINEERING SCIENCE ES REPRESENTATIVE KC



(NOT TO SCALE)

NO WATER LEVEL MEASUREMENTS TAKEN.

MONITORING POINT INSTALLATION RECORD

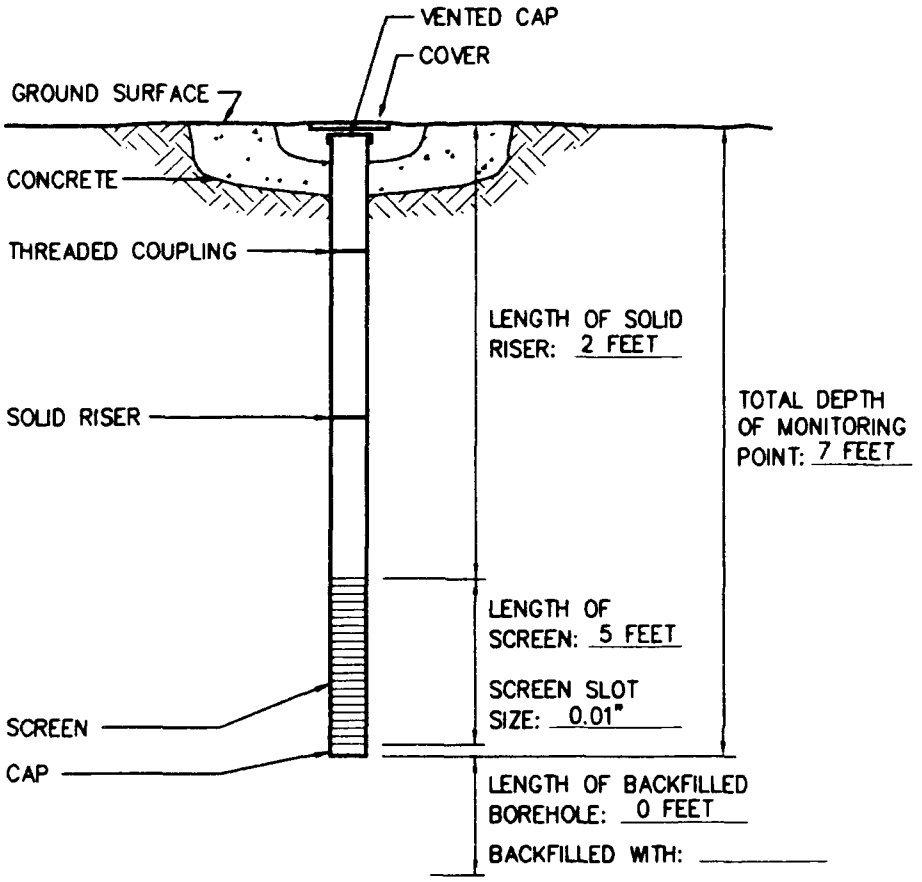
Site 57
Intrinsic Remediation TS
MacDill Air Force Base, Florida

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Denver, Colorado

Y:\4502\DRAWINGS\WELLINST\SITE57\75MP8D.ON 4/24/95 AT 1500

MONITORING POINT INSTALLATION RECORD

JOB NAME MACDILL AIR FORCE BASE MONITORING POINT NUMBER 75MP-9S
JOB NUMBER 722450.21 INSTALLATION DATE 3/15/95 LOCATION SITE 57
DATUM ELEVATION 9.651 FEET ABOVE MSL WELL CASING ELEVATION 9.355 FT AM
DATUM FOR WATER LEVEL MEASUREMENT GROUND SURFACE
SCREEN DIAMETER & MATERIAL 0.5 INCH PVC SLOT SIZE 0.01 INCH
RISER DIAMETER & MATERIAL 0.5 INCH PVC BOREHOLE DIAMETER 2 INCHES
GEOPROBE CONTRACTOR PARSONS ENGINEERING SCIENCE ES REPRESENTATIVE KC



(NOT TO SCALE)

STABILIZED WATER LEVEL 4.20 FEET BELOW DATUM.

TOTAL MONITORING POINT DEPTH 6.52 FEET BELOW DATUM.

MONITORING POINT INSTALLATION RECORD

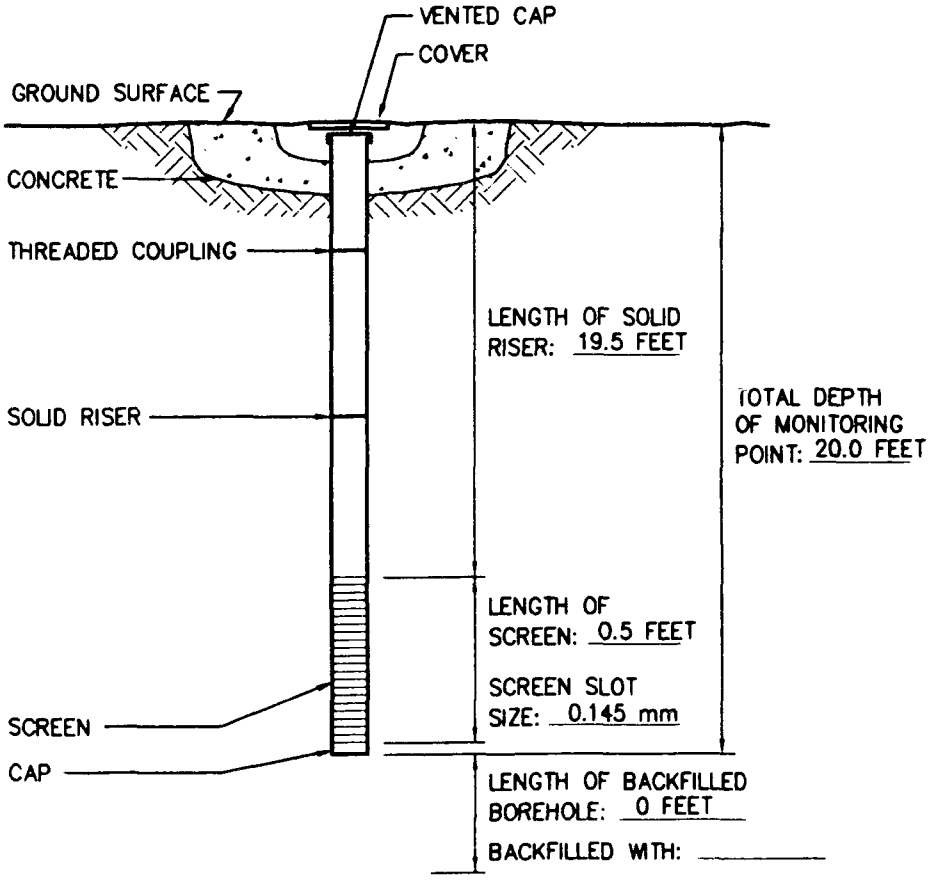
Site 57
Intrinsic Remediation TS
MacDill Air Force Base, Floric

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Denver, Colorado

M 45021 DRAWINGS WELL INST SITE57 75MP9S ON 4/24/95 AT 1400

MONITORING POINT INSTALLATION RECORD

JOB NAME MACDILL AIR FORCE BASE MONITORING POINT NUMBER 75MP-9D
JOB NUMBER 722450.21 INSTALLATION DATE 3/15/95 LOCATION SITE 57
DATUM ELEVATION 9.651 FEET ABOVE MSL WELL CASING ELEVATION TUBE WELL POINT
DATUM FOR WATER LEVEL MEASUREMENT GROUND SURFACE
SCREEN DIAMETER & MATERIAL 0.375 STAINLESS STEEL SLOT SIZE 0.145 mm
RISER DIAMETER & MATERIAL 0.375 INCH TEFLON TUBING BOREHOLE DIAMETER 1 INCH
GEOPROBE CONTRACTOR PARSONS ENGINEERING SCIENCE ES REPRESENTATIVE KC



(NOT TO SCALE)

NO WATER LEVEL MEASUREMENTS TAKEN.

MONITORING POINT INSTALLATION RECORD

Site 57
Intrinsic Remediation TS
MacDill Air Force Base, Florida

PARSONS ENGINEERING SCIENCE, INC.
Denver Colorado

N:\45021\DRAWINGS\WELLIST\SITE57\75MP9D ON 4/24/95 AT 1500

MONITORING POINT DEVELOPMENT RECORD

Job Number: 722450.21 Job Name: MacDill AFB
Location Pumphouse 75 By KC/MV/JF Date 3/15/95
Well Number 75MP-15 Measurement Datum TOC

Pre-Development Information Time (Start): 17:15

Water Level: 3.97 Total Depth of Well:

Water Characteristics

Color white / Clear Cloudy
Odor: None Weak Moderate Strong
Any Films or Immiscible Material
pH Temperature(°F °C)
Specific Conductance(µS/cm)

Interim Water Characteristics

Gallons Removed

pH

Temperature (°F °C)

Specific Conductance(µS/cm)

Post-Development Information Time (Finish): 17:40

Water Level: 3.95 Total Depth of Well:

Approximate Volume Removed: 2 gallons

Water Characteristics

Color Clear Clear Cloudy
Odor: None Weak Moderate Strong
Any Films or Immiscible Material
pH Temperature(°F °C)
Specific Conductance(µS/cm)

Comments:

Monitoring Point Type Shallow / Deep

MONITORING POINT DEVELOPMENT RECORD

Job Number: 722450.21 Job Name: MacDill AFB
Location Pumphouse 75 By KC/MV/TF Date 3/15/95
Well Number 75 MP-1D Measurement Datum TOC

Pre-Development Information Time (Start): 16:00

Water Level: Total Depth of Well:

Water Characteristics

Color milky white Clear (Cloudy)
Odor: None Weak (Moderate) Strong
Any Films or Immiscible Material
pH 4.57 Temperature(°F °C) 24.5
Specific Conductance(µS/cm)

Interim Water Characteristics

Gallons Removed

pH

Temperature (°F °C)

Specific Conductance(µS/cm)

Post-Development Information Time (Finish):

Water Level: Total Depth of Well:

Approximate Volume Removed:

Water Characteristics

Color clear ~~Clear~~ Cloudy
Odor: None (Weak) Moderate Strong
Any Films or Immiscible Material
pH Temperature(°F °C)
Specific Conductance(µS/cm)

Comments: Odor is sulferous

Monitoring Point Type Shallow / (Deep)

MONITORING POINT DEVELOPMENT RECORD

Page 1 of 1

Job Number: 722450.21 Job Name: MacDill AFB
Location Pumphouse 75 By KC/MV/JF Date 3/17/95
Well Number 75MP-25 Measurement Datum TOC

Pre-Development Information Time (Start): 1155

Water Level: 3.06' Total Depth of Well:

Water Characteristics

Color muddy, sandy Clear Cloudy
Odor: None Weak Moderate (Strong)
Any Films or Immiscible Material sheen
pH 6.33 Temperature(°F (°C) 23.5
Specific Conductance(µS/cm) 27X10

Interim Water Characteristics

Gallons Removed ≈ 3 gal

pH

Temperature (°F °C)

Specific Conductance(µS/cm)

Post-Development Information Time (Finish): 1230

Water Level: 3.06' Total Depth of Well:

Approximate Volume Removed:

Water Characteristics

Color (Clear) Cloudy
Odor: None Weak Moderate (Strong)
Any Films or Immiscible Material
pH 6.33 Temperature(°F (°C) 23.0
Specific Conductance(µS/cm) 17X10

Comments:

Monitoring Point Type (Shallow) / Deep

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init. PID hit 72.5 ppm
final PID hit 10.0 ppm

MONITORING POINT DEVELOPMENT RECORD

Job Number: 722450.21 Job Name: MacDill AFB
Location Pumphouse 75 By KC/MV Date 3/16/95
Well Number 75MP-3D Measurement Datum TOC

Pre-Development Information Time (Start): 10:00

Water Level: Total Depth of Well:

Water Characteristics

Color sandy, muddy Clear (Cloudy)
Odor: None Weak (Moderate) Strong (sulfurous)
Any Films or Immiscible Material
pH 4.64 Temperature(°F (°C) 24.4
Specific Conductance(µS/cm) 6X10

Interim Water Characteristics

Gallons Removed ≈ 1.5 gal

pH

Temperature (°F °C)

Specific Conductance(µS/cm)

Post-Development Information Time (Finish): 1020

Water Level: Total Depth of Well:

Approximate Volume Removed:

Water Characteristics

Color (Clear) Cloudy
Odor: None Weak (Moderate) Strong (sulfurous)
Any Films or Immiscible Material
pH 4.74 Temperature(°F (°C) 25.1
Specific Conductance(µS/cm) ~~4X10~~ 6X10

Comments:

Monitoring Point Type Shallow / (Deep)

MONITORING POINT DEVELOPMENT RECORD

Page 1 of 1

Job Number: 722450.21 Job Name: MacDill AFB
Location Pumphouse 75 By KC/MV/[illegible] Date 3/16/95
Well Number 75MP-45 Measurement Datum TOC

Pre-Development Information Time (Start): 0916:05

Water Level: 5.0' Total Depth of Well:

Water Characteristics

Color Brown, Muddy Clear (Cloudy)
Odor: None Weak (Moderate) Strong Sulfuric
Any Films or Immiscible Material ~~no~~ Slight film present
pH 6.42 Temperature(°F (°C) 21.7
Specific Conductance(µS/cm) 91 x 10

Interim Water Characteristics

Gallons Removed ~2 gallons

pH

Temperature (°F °C)

Specific Conductance(µS/cm)

Post-Development Information Time (Finish):

Water Level: Total Depth of Well:

Approximate Volume Removed:

Water Characteristics

Color Clear (Clear) Cloudy
Odor: None Weak (Moderate) Strong Sulfuric
Any Films or Immiscible Material ~~no~~
pH 6.14 Temperature(°F (°C) 21.9
Specific Conductance(µS/cm) 70 x 10 µS/cm

Comments:

Monitoring Point Type (Shallow) / Deep

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MONITORING POINT DEVELOPMENT RECORD

Page 1 of 1

Job Number: 722450.21 Job Name: MacDill AFB
Location Pumphouse 75 By KC/MV/(TF) Date 3/7/95
Well Number 75MP-5D Measurement Datum TOC

Pre-Development Information Time (Start): 10:30

Water Level: Total Depth of Well:

Water Characteristics

Color tan-Brown Clear (Cloudy)
Odor: (None) Weak Moderate Strong
Any (Films) or Immiscible Material sheen on water
pH 6.06 Temperature(°F (°C) 23.3
Specific Conductance(µS/cm) 19 x 10

Interim Water Characteristics

Gallons Removed 2 ~ gallons

pH

Temperature (°F °C)

Specific Conductance(µS/cm)

Post-Development Information Time (Finish): 10:50

Water Level: N.M. (not meas.) Total Depth of Well: NM

Approximate Volume Removed: 2 gall

Water Characteristics

Color Clear (Clear) Cloudy
Odor: None (Weak) Moderate Strong
Any Films or Immiscible Material none noticeable
pH 6.15 Temperature(°F (°C) 23.0
Specific Conductance(µS/cm) 19 x 10

Comments:

Monitoring Point Type Shallow / (Deep)

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MONITORING POINT DEVELOPMENT RECORD

Page 1 of 1

Job Number: 722450.21 Job Name: MacDill AFB
Location Pumphouse 75 By KC/MV/DB Date 3/17/95
Well Number 75MP-60 Measurement Datum TOC

Pre-Development Information Time (Start): 11:00

Water Level: nm. Total Depth of Well:

Water Characteristics

Color tan/Brown Clear (Cloudy)
Odor: None Weak (Moderate) Strong
Any Films or Immiscible Material not not. seable
pH 5.34 Temperature(°F (°C) 23.3
Specific Conductance(µS/cm) 11 X 10

Interim Water Characteristics

Gallons Removed

pH

Temperature (°F °C)

Specific Conductance(µS/cm)

Post-Development Information Time (Finish):

Water Level: approx 2 gallons Total Depth of Well:

Approximate Volume Removed:

Water Characteristics

Color clear (Clear) Cloudy
Odor: (None) Weak Moderate Strong
Any Films or Immiscible Material no
pH 5.21 Temperature(°F (°C) 24.8
Specific Conductance(µS/cm) 9 X 10

Comments:

Monitoring Point Type Shallow / (Deep)

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MONITORING POINT DEVELOPMENT RECORD

Page__ of__

Job Number: 722450.21 Job Name: MacDill AFB
Location Pumphouse 75 By KC /MV Date
Well Number 75 mp - 7S Measurement Datum TOC

Pre-Development Information Time (Start):

Water Level: Total Depth of Well:

Water Characteristics

Color DARK muddy Brown Clear (Cloudy)
Odor: None Weak Moderate (Strong)
Any Films or Immiscible Material
pH 6.99 Temperature(°F (°C) 24.2
Specific Conductance(µS/cm) 47 x 10

Interim Water Characteristics

Gallons Removed ~ 2 gals

pH

Temperature (°F °C)

Specific Conductance(µS/cm)

Post-Development Information Time (Finish):

Water Level: Total Depth of Well:

Approximate Volume Removed:

Water Characteristics

Color Clear (Clear) Cloudy
Odor: None Weak (Moderate) Strong
Any Films or Immiscible Material cant tell
pH 6.74 Temperature(°F (°C) 22.4
Specific Conductance(µS/cm) 46 x 10 E

Comments:

Monitoring Point Type (Shallow) / Deep

initial PID hit 5 ppm

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MONITORING POINT DEVELOPMENT RECORD

Page 1 of 1

Job Number: 722450.21 Job Name: MacDill AFB
Location Pumphouse 75 By KC/MV/JF Date 3/17/95
Well Number 75MP-7D Measurement Datum TOC

Pre-Development Information Time (Start): 1250

Water Level: Total Depth of Well:

Water Characteristics

Color _____ Clear Cloudy
Odor: None Weak Moderate Strong
Any Films or Immiscible Material _____
pH _____ Temperature(^{o}F ^{o}C) _____
Specific Conductance(µS/cm) _____

Interim Water Characteristics

Gallons Removed

pH

Temperature (^{o}F ^{o}C)

Specific Conductance(µS/cm)

Post-Development Information Time (Finish):

Water Level: Total Depth of Well:

Approximate Volume Removed:

Water Characteristics

Color _____ Clear Cloudy
Odor: None Weak Moderate Strong
Any Films or Immiscible Material _____
pH _____ Temperature(^{o}F ^{o}C) _____
Specific Conductance(µS/cm) _____

Comments:

Monitoring Point Type Shallow / Deep

Drew extremely slow

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MONITORING POINT DEVELOPMENT RECORD

Job Number: 722450.21 Job Name: MacDill AFB
Location Pumphouse 75 By KC/MV JF Date 3/18/96
Well Number 75MD-8S Measurement Datum TOC

Pre-Development Information Time (Start): 14:30

Water Level: ~~4.89~~ 3.94 Total Depth of Well:

Water Characteristics

Color ~~Black~~ Dark Brown Clear (Muddy) Cloudy
Odor: None Weak (Moderate) Strong
Any Films or Immiscible Material no
pH 7.04 Temperature (°F) (°C) 23.3
Specific Conductance(µS/cm) 41 x 10

Interim Water Characteristics

Gallons Removed

pH

Temperature (°F °C)

Specific Conductance(µS/cm)

Post-Development Information Time (Finish): @ 14:50

Water Level: Total Depth of Well:

Approximate Volume Removed:

Water Characteristics

Color (Clear) Cloudy
Odor: None (Weak) Moderate Strong
Any Films or Immiscible Material no
pH 6.75 Temperature (°F) (°C) 22.1
Specific Conductance(µS/cm) 6.75

Comments:

Monitoring Point Type Shallow / Deep

MONITORING POINT DEVELOPMENT RECORD

Job Number: 722450.21 Job Name: MacDill AFB
Location Pumphouse 75 By KC/MV Date 3/16/95
Well Number 75MP-8D Measurement Datum TOC

Pre-Development Information Time (Start): 1125

Water Level: Total Depth of Well:

Water Characteristics

Color Sandy Clear (Cloudy)
Odor: (None) Weak Moderate Strong
Any Films or Immiscible Material
pH 6.89 Temperature (°F (°C)) 34.4
Specific Conductance(µS/cm) 28x10

Interim Water Characteristics

Gallons Removed

pH

Temperature (°F °C)

Specific Conductance(µS/cm)

Post-Development Information Time (Finish): 1307

Water Level: Total Depth of Well:

Approximate Volume Removed:

Water Characteristics

Color (Clear) Cloudy
Odor: (None) Weak Moderate Strong
Any Films or Immiscible Material
pH 7.48 Temperature (°F (°C)) 32.1
Specific Conductance(µS/cm) 28x10

Comments:

Monitoring Point Type Shallow / (Deep)

Extremely slow draw

MONITORING POINT DEVELOPMENT RECORD

Job Number: 722450.21 Job Name: MacDill AFB
Location Pumphouse 75 By KC/MV/JF Date 3/16/95
Well Number 75MP-9S Measurement Datum TOC

Pre-Development Information Time (Start): 1058

Water Level: 4.49' Total Depth of Well:

Water Characteristics

Color muddy, sandy Clear Cloudy
Odor: None (Weak) Moderate Strong
Any (Films) or Immiscible Material sheen (slight)
pH 7.43 Temperature(°F (°C) 23.8
Specific Conductance(µS/cm) 35X10

Interim Water Characteristics

Gallons Removed ≈ 1 gal

pH 8.35

Temperature (°F °C) 23.4

Specific Conductance(µS/cm) 36X10

Post-Development Information Time (Finish): 1120

Water Level: 4.49' Total Depth of Well:

Approximate Volume Removed:

Water Characteristics

Color Clear Cloudy
Odor: None (Weak) Moderate Strong
Any Films or Immiscible Material
pH 7.75 Temperature(°F (°C) 23.5
Specific Conductance(µS/cm) 36X10

Comments:

Monitoring Point Type (Shallow) / Deep

MONITORING POINT DEVELOPMENT RECORD

Job Number: 722450.21 Job Name: MacDill AFB
Location Pumphouse 75 By KC/MV JF Date 3/16/95
Well Number 95MP-9D Measurement Datum TOC

Pre-Development Information Time (Start): 1030

Water Level: Total Depth of Well:

Water Characteristics

Color muddy, sandy Clear Cloudy
Odor: None Weak (Moderate) Strong (sulfurous)
Any (Films) or Immiscible Material sheen
pH 6.88 Temperature(°F (°C) 25.5
Specific Conductance(µS/cm) 4X10

Interim Water Characteristics

Gallons Removed ≈ 1 gal

pH

Temperature (°F °C)

Specific Conductance(µS/cm)

Post-Development information Time (Finish): 1055

Water Level: Total Depth of Well:

Approximate Volume Removed:

Water Characteristics

Color (Clear) Cloudy
Odor: None (Weak) Moderate Strong
Any Films or Immiscible Material
pH ~~6.38~~ 5.39 Temperature(°F (°C) ~~24.8~~ 25.1
Specific Conductance(µS/cm) 6X10

Comments:

Monitoring Point Type Shallow / (Deep)

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SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75 MP-15
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/16/95, 1995 15:30 a.m. p.m.
SAMPLE COLLECTED BY (MV) KC (FF) of ES Denver
WEATHER: Partly Cloudy ~ 75°F
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: New
INNER PVC CASING CONDITION IS: New
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH _____ FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 3.39 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance:
Odor:
Other Comments:

4 [x] WELL EVACUATION:
Method:
Volume Removed:
Observations: Water (slightly - very) cloudy Brown, muddy
Water level (rose - fell - no change)
Water odors: Moderate Sulfuric odor
Other comments:

Ground Water Sampling Record - Monitoring Well No. 75MP-15 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 22.5 ° C	Measured with:	Orion Instrument
pH: 7.69	Measured with:	
Conductivity: 28x10 µS/cm	Measured with:	
Dissolved Oxygen: 0.15 mg/l	Measured with:	Orion Instrument
Redox Potential:	Measured with:	
Salinity:	Measured with:	
Nitrate:	Measured with:	
Sulfate:	Measured with:	
Ferrous Iron:	Measured with:	
Other:		

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-250 unpreserved Alkalinity
1-125ml unpreserved Anion
2-40 ml BTEX } preserved
2-40 ml TVH }

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[x] Container Sides Labeled
[ ] Container Lids Taped
[x] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: Dissolved Oxygen ~~measured after~~ not calibrat
Samples taken after D.O., redox, and PH stabilized

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75 MP-15
(number)

REASON FOR SAMPLING: [M] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/4/2, 1995 9:50 a.m./p.m.
SAMPLE COLLECTED BY: MV/KC of ES Denver
WEATHER: Sunny - 70°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [M] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: ~~Good~~ New
INNER PVC CASING CONDITION IS: New
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 3.54 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: milky white
Odor: none
Other Comments:

4 [x] WELL EVACUATION:
Method: Peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: none
Other comments:

Ground Water Sampling Record - Monitoring Well No. 1 S (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp:	22.8 ° C	Measured with:	Orion Instrument
pH:	Broke	Measured with:	
Conductivity:	2741 µS/cm	Measured with:	
Dissolved Oxygen:	0.18	Measured with:	Orion Instrument
Redox Potential:	+21.4	Measured with:	
Salinity:		Measured with:	
Nitrate:		Measured with:	
Sulfate:		Measured with:	
Ferrous Iron:		Measured with:	
Other:			

7 [ ] SAMPLE CONTAINERS (material, number, size): 1- HACH GRAB

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[ ] Container Sides Labeled
[ ] Container Lids Taped
[ ] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75MP-1D
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/16, 1995 14:40 a.m./pm
SAMPLE COLLECTED BY: MW / KC / JE of ES Barnes
WEATHER: Cloudy, Breezy
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: New
INNER PVC CASING CONDITION IS: NEW
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH _____ FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH not measured FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance:
Odor:
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic Pump
Volume Removed: 2000 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: Strong Sulfuric odor
Other comments: milky white Color

Ground Water Sampling Record - Monitoring Well No. 75 MP-1D (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp:	24.8 ° C	Measured with:	Orion Instrument
pH:	5.86	Measured with:	
Conductivity:	10x10 µS/cm	Measured with:	
Dissolved Oxygen:	0.35 mg/L	Measured with:	Orion Instrument
Redox Potential:		Measured with:	
Salinity:		Measured with:	
Nitrate:		Measured with:	
Sulfate:		Measured with:	
Ferrous Iron:		Measured with:	
Other:			

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-250 ml unpreserved Alkalinity
1-125 ml unpreserved Anion
2-40 ml BTEX } preserved
2-40 ml TVH }

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration:
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[x] Container Sides Labeled
[ ] Container Lids Taped
[x] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: * Do not Calibrated
Samples taken after pH, DO, and Conductivity Stabilized.

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75MP-1D
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/2, 1995 10:30 a.m./p.m.
SAMPLE COLLECTED BY: MD/KC of ES Denver
WEATHER: Sunny 70°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: New
INNER PVC CASING CONDITION IS: New
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH NM FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: milky white
Odor: moderate sulfuric
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: moderate
Other comments:

Ground Water Sampling Record - Monitoring Well No. MW-1D (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 23.1 ° C	Measured with:	Orion Instrument
pH: Broke	Measured with:	
Conductivity: 4 x 10 µS/cm	Measured with:	
Dissolved Oxygen: 0.25 mg/l	Measured with:	Orion Instrument
Redox Potential: -29.2 mV	Measured with:	
Salinity:	Measured with:	
Nitrate:	Measured with:	
Sulfate:	Measured with:	
Ferrous Iron:	Measured with:	

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1 - Hach

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[ ] Container Sides Labeled
[ ] Container Lids Taped
[ ] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: _____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75MP-25
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/3/, 1995 8:50 a.m./p.m.
SAMPLE COLLECTED BY: MW / KC of ES Denver
WEATHER: Sunny 70°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: New
INNER PVC CASING CONDITION IS: New
WATER DEPTH MEASUREMENT DATUM (IS IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 3.06 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear / yellow
Odor: Strong H.C
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: Strong
Other comments:

Ground Water Sampling Record - Monitoring Well No. _____ 25 _____ (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: _____	° C	Measured with:	Orion Instrument
pH: _____		Measured with:	
Conductivity: _____	µS/cm	Measured with:	
Dissolved Oxygen: _____	mg/l	Measured with:	Orion Instrument
Redox Potential: _____	mV	Measured with:	
Salinity: _____		Measured with:	
Nitrate: _____		Measured with:	
Sulfate: _____		Measured with:	
Ferrous Iron: _____		Measured with:	

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-Anion, Hach, Methane
2-BTEX, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75MP-3D HACH Dup
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 9/2, 1995 12:00 a.m./p.m.
SAMPLE COLLECTED BY: MV / KC of ES Denver
WEATHER:
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: New
INNER PVC CASING CONDITION IS: New
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH NM FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: milky white
Odor: none
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: none
Other comments:

Ground Water Sampling Record - Monitoring Well No. 75MP-30 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 24.6 ° C		Measured with: Orion Instrument
pH: Brake		Measured with:
Conductivity: 5 x	us/cm	Measured with:
Dissolved Oxygen: 0.15	mg/l	Measured with: Orion Instrument
Redox Potential: -7.5	mV	Measured with:
Salinity:		Measured with:
Nitrate:		Measured with:
Sulfate:		Measured with:
Ferrous Iron:		Measured with:
Other:		

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-Anion, Methane
2-BTEX, VOC, TVH, HACH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[ ] Container Sides Labeled
[ ] Container Lids Taped
[ ] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL # 75MP-4S
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/31, 1995, 13:00 (a.m./p.m.)
SAMPLE COLLECTED BY: MV/KC of ES Denver
WEATHER: cloudy 75°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: good new
INNER PVC CASING CONDITION IS: New
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH ~~NA~~ 3.66 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: milky white / clear
Odor: moderate Sulfuric
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: moderate
Other comments: Film present

Ground Water Sampling Record - Monitoring Well No. 4D (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 23.4 ° C		Measured with: Orion Instrument
pH: 5.15		Measured with:
Conductivity: 55 x 10	µS/cm	Measured with:
Dissolved Oxygen: 0.08	mg/l	Measured with: Orion Instrument
Redox Potential: ~202.1	mV	Measured with:
Salinity:		Measured with:
Nitrate:		Measured with:
Sulfate:		Measured with:
Ferrous Iron:		Measured with:

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-METH, HACH, Anions
2-BTEX, VOC HH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75MP-5D
(number)

REASON FOR SAMPLING: [✓] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/29, 1995 12:15 ~~a.m./p.m.~~
SAMPLE COLLECTED BY: MV / KC of ES Denver
WEATHER: Sunny, 75°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [✓] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: New
INNER PVC CASING CONDITION IS: New
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH NM FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: milky white
Odor: moderate Sulfuric
Other Comments:

4 [x] WELL EVACUATION:
Method: Peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: moderate
Other comments:

Ground Water Sampling Record - Monitoring Well No. 5D (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp:	24.3° C	Measured with:	Orion Instrument
pH:	6.41	Measured with:	
Conductivity:	20x10 µS/cm	Measured with:	
Dissolved Oxygen:	0.04 mg/l	Measured with:	Orion Instrument
Redox Potential:	-103.2 mV	Measured with:	
Salinity:		Measured with:	
Nitrate:		Measured with:	
Sulfate:		Measured with:	
Ferrous Iron:		Measured with:	

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1- Meth, Anions, HACH
2- BTEX, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration:
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75 MP-6D
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/29, 1995 13:30 a.m./p.m.
SAMPLE COLLECTED BY: MV / KC of ES Denver
WEATHER: Sunny - 80°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: new
INNER PVC CASING CONDITION IS: new
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH NM FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: milky white
Odor: Strong Sulfuric
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: Strong
Other comments:

Ground Water Sampling Record - Monitoring Well No. GD (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 25.1 ° C	Measured with:	Orion Instrument
pH: 5.60	Measured with:	
Conductivity: 9x10 µS/cm	Measured with:	
Dissolved Oxygen: 0.14 mg/l	Measured with:	Orion Instrument
Redox Potential: -56.0 mV	Measured with:	
Salinity:	Measured with:	
Nitrate:	Measured with:	
Sulfate:	Measured with:	
Ferrous Iron:	Measured with:	

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1- Meth, Hard, Anions
7-BTEX, VOC TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration:
Method ____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[ ] Container Sides Labeled
[ ] Container Lids Taped
[ ] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: _____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75MP-75 Hach Dup
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 4/2, 1995 14:50 a.m./p.m.
SAMPLE COLLECTED BY: MV / KC of ES Denver
WEATHER: Sunny 75°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: New
INNER PVC CASING CONDITION IS: New
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH Nm FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Cloudy Brown
Odor: moderate H.C.
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: moderate
Other comments:

Ground Water Sampling Record - Monitoring Well No. 75MP-75 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp:	° C	Measured with:	Orion Instrument
pH:	Brake	Measured with:	
Conductivity:	µs/cm	Measured with:	
Dissolved Oxygen:	mg/l	Measured with:	Orion Instrument
Redox Potential:	mV	Measured with:	
Salinity:		Measured with:	
Nitrate:		Measured with:	
Sulfate:		Measured with:	
Ferrous Iron:		Measured with:	

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-Methane, Acons
2-BTEX, VOC, TVH, HACH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] *Filtration:* Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75 MP - 7D
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 4/2, 1995 1410 a.m./p.m.
SAMPLE COLLECTED BY: MV / KC of ES Denver
WEATHER: Sunny 75°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: New
INNER PVC CASING CONDITION IS: New
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH NM FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Milky white
Odor: moderate Sulfuric
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: moderate
Other comments:

Ground Water Sampling Record - Monitoring Well No. MP-7D (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 24.8 ° C		Measured with: Orion Instrument
pH: Broke		Measured with:_____
Conductivity: 22410	µS/cm	Measured with:_____
Dissolved Oxygen: 0.23	mg/l	Measured with: Orion Instrument
Redox Potential: -43.3	mV	Measured with:_____
Salinity: _____		Measured with:_____
Nitrate: _____		Measured with:_____
Sulfate: _____		Measured with:_____
Ferrous Iron: _____		Measured with:_____

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-HACH, Anion, METHANE
2-BTEX, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration:
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[Y] Container Sides Labeled
[ ] Container Lids Taped
[Y] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75MP-8S LAB, EPA, MS/MSD's Samples
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/30, 1995 11:15 a.m./p.m.
SAMPLE COLLECTED BY: MW/KC of ES Denver
WEATHER: Sunny 75°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: new
INNER PVC CASING CONDITION IS: new
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 4.21 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: murky white
Odor: moderate Sulfur
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: ≈4000 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: moderate
Other comments:

Ground Water Sampling Record - Monitoring Well No. 8S (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 24.3 ° C		Measured with: Orion Instrument
pH: 7.20		Measured with:
Conductivity: 36x10	µS/cm	Measured with:
Dissolved Oxygen: 0.18	mg/l	Measured with: Orion Instrument
Redox Potential: -3.2	mV	Measured with:
Salinity:		Measured with:
Nitrate:		Measured with:
Sulfate:		Measured with:
Ferrous Iron:		Measured with:

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 4-Anions, TOC, ALK,
4- VOC
2- METHs
8- BTEX, TVH,

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75MP-8D
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/30, 1995 10:45 (a.m./p.m.)
SAMPLE COLLECTED BY: MW / KC of ES Denver
WEATHER: Sunny 75°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: New
INNER PVC CASING CONDITION IS: New
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH NM FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear
Odor: weak, Sulfuric
Other Comments:

4 [x] WELL EVACUATION:
Method: Peristaltic
Volume Removed: 2500
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: weak to none
Other comments:

Ground Water Sampling Record - Monitoring Well No. 8D (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 50.5 ° C	Measured with:	Orion Instrument
pH: 7.09	Measured with:	
Conductivity: 2910 µS/cm	Measured with:	
Dissolved Oxygen: 2.12 mg/l	Measured with:	Orion Instrument
Redox Potential: -83.2 mV	Measured with:	
Salinity:	Measured with:	
Nitrate:	Measured with:	
Sulfate:	Measured with:	
Ferrous Iron:	Measured with:	
Other:		

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-METH, HACH, Anions
2 - BTEX, VOC TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: Slow pump rate
PID, may not be Accurate

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75MP-95 HACH OUP
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/30, 1995 12:30 a.m./p.m.
SAMPLE COLLECTED BY: MW / KC of ES Denver
WEATHER: Sunny 80°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: NEW
INNER PVC CASING CONDITION IS: NEW
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 4.13 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Brown
Odor: moderate - strong Sulfuric
Other Comments:

4 [x] WELL EVACUATION:
Method: Peristaltic
Volume Removed: 2.00
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: moderate
Other comments: Clear

Ground Water Sampling Record - Monitoring Well No. 95 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp:	24.9 ° C	Measured with:	Orion Instrument
pH:	7.68	Measured with:	
Conductivity:	37x10	Measured with:	
Dissolved Oxygen:	8.48 mg/l	Measured with:	Orion Instrument
Redox Potential:	-6.8 mV	Measured with:	
Salinity:		Measured with:	
Nitrate:		Measured with:	
Sulfate:		Measured with:	
Ferrous Iron:		Measured with:	

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-meth, Anion, Hach, TOC
2-BTEX, VOC, TVH & Hach Dup

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration:
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[ ] Container Sides Labeled
[ ] Container Lids Taped
[ ] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: Hach Dup

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL 75MP-9D
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/30, 1995 ____ a.m./p.m.
SAMPLE COLLECTED BY: (MV) KC of ES Denver
WEATHER: ____
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[ ] LOCKED: [X] UNLOCKED
WELL NUMBER (IS / IS NOT) APPARENT
STEEL CASING CONDITION IS: new
INNER PVC CASING CONDITION IS: new
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe): ____

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH NM FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: light Brown
Odor: moderate Sulfuric
Other Comments: ____

4 [x] WELL EVACUATION:
Method: Peristaltic
Volume Removed: ≈500 ml
Observations: Water (slightly / very) cloudy
Water level (rose - fell - no change)
Water odors: moderate
Other comments: ____

Ground Water Sampling Record - Monitoring Well No. 9D (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp:	26.7 ° C	Measured with:	Orion Instrument
pH:	5.60	Measured with:	
Conductivity:	57X10 µs/cm	Measured with:	
Dissolved Oxygen:	0.35 mg/l	Measured with:	Orion Instrument
Redox Potential:	-13 mV	Measured with:	
Salinity:		Measured with:	
Nitrate:		Measured with:	
Sulfate:		Measured with:	
Ferrous Iron:		Measured with:	

Other:_____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-meth, Anion, Hach
2-Btex, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[x] Container Sides Labeled
[ ] Container Lids Taped
[x] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MP75-MW 1
(number)

REASON FOR SAMPLING: [✓] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/29/, 1995 11:30 a.m./p.m.
SAMPLE COLLECTED BY: MP/KC of ES Denver
WEATHER: Sunny ~75°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[✓] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH i 3.73 f. 3.79 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear/yellow
Odor: Slight Sulfuric
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: Slight
Other comments:

Ground Water Sampling Record - Monitoring Well No. MW-1 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 23.4 ° C	Measured with:	Orion Instrument
pH: 7.02	Measured with:	
Conductivity: 18410 µS/cm	Measured with:	
Dissolved Oxygen: 0.19 mg/l	Measured with:	Orion Instrument
Redox Potential: +35 mV	Measured with:	
Salinity:	Measured with:	
Nitrate:	Measured with:	
Sulfate:	Measured with:	
Ferrous Iron:	Measured with:	

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-methane, Nitrate, Hach
2-BTEX, TVH, VOC

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: _____

HACH Dup Sample

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MW 75-2
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/29, 1995 14:15 a.m./p.m.
SAMPLE COLLECTED BY: (MW) KC of ES Denver
WEATHER: Sunny 80°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS) IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH ND FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH c - 3.11 f - 3.13 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear
Odor: no
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 7500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell) - no change)
Water odors: no
Other comments:

Ground Water Sampling Record - Monitoring Well No. MW 2 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp:	23.8 ° C	Measured with:	Orion Instrument
pH:	6.63	Measured with:	
Conductivity:	22 x10 µS/cm	Measured with:	
Dissolved Oxygen:	0.10 mg/l	Measured with:	Orion Instrument
Redox Potential:	-6.0 mV	Measured with:	
Salinity:		Measured with:	
Nitrate:		Measured with:	
Sulfate:		Measured with:	
Ferrous Iron:		Measured with:	

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1- METHANE, (2) (Dup) Hach, Anion
2 - BTEX, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: Hach Dup

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MP75-MW3 (Accu Dup)
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/31, 1995 10:20 a.m./p.m.
SAMPLE COLLECTED BY: MP/ KC of ES Denver
WEATHER: P.Cloudy 75°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 4.13 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear/yellow
Odor: moderate H.C
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2,500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: moderate
Other comments:

Ground Water Sampling Record - Monitoring Well No. MW-3 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 23.9 ° C		Measured with: Orion Instrument
pH: 4.97		Measured with:
Conductivity: 2210	µS/cm	Measured with:
Dissolved Oxygen: 0.17	mg/l	Measured with: Orion Instrument
Redox Potential: -18.4	mV	Measured with:
Salinity:		Measured with:
Nitrate:		Measured with:
Sulfate:		Measured with:
Ferrous Iron:		Measured with:
Other:		

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-Anion, Methane, AIK
2-Btex, VOC, TVH, HACH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration:
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[ ] Container Sides Labeled
[ ] Container Lids Taped
[ ] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: _____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MD 75 - MW 4 (HACH OUD)
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/31, 1995 13:45 a.m./p.m.
SAMPLE COLLECTED BY: MD/KC of ES Denny
WEATHER: Cloudy, 75°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 4.79 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: clear/yellow
Odor: moderate H.C.
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: moderate
Other comments: film present

Ground Water Sampling Record - Monitoring Well No. MW-4 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 23.7 ° C	Measured with:	Orion Instrument
pH: 5.60	Measured with:	
Conductivity: 69 x 10 mS/cm	Measured with:	
Dissolved Oxygen: 0.08 mg/l	Measured with:	Orion Instrument
Redox Potential: -71.2 mV	Measured with:	
Salinity:	Measured with:	
Nitrate:	Measured with:	
Sulfate:	Measured with:	
Ferrous Iron:	Measured with:	
Other:		

7 [ ] SAMPLE CONTAINERS (material, number, size): 1- methane, TEH
2- VOC, HACH (DUP), ANIONS (DUP)
4- BTEX, TVH,

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: HACH DUP
LAB DUP - MD75 - MW 24

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL ~~EW~~ MO 75-MW 5
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/29, 1995 10:45 a.m./p.m.
SAMPLE COLLECTED BY: MV/KC of ES Denver
WEATHER: Windy, partly cloudy ~ 70°F
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH i 4.19 f - 4.24 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear yellow
Odor: none
Other Comments:

4 [x] WELL EVACUATION:
Method: Peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: no
Other comments:

Ground Water Sampling Record - Monitoring Well No. MW 5 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp:	23.7° C	Measured with:	Orion Instrument
pH:	6.10	Measured with:	
Conductivity:	3410 µS/cm	Measured with:	
Dissolved Oxygen:	0.08 mg/l	Measured with:	Orion Instrument
Redox Potential:	-15.4 mV	Measured with:	
Salinity:		Measured with:	
Nitrate:		Measured with:	
Sulfate		Measured with:	
Ferrous Iron:		Measured with:	
Other:			

7 [ ] SAMPLE CONTAINERS (material, number, size): 1 - Metals, HACH, Anions, TOC, Alk
2 - BTEX, VOC, TVH
1 - MS/MSD - (BTEX, TVH, ~~Metals~~ Anions)

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: _____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MD 75-MW6
(number)

REASON FOR SAMPLING: (X) Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/31, 1995 14:20 a.m./p.m.
SAMPLE COLLECTED BY: (MY / KC) of ES Denver
WEATHER: Cloudy 75°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 3.84 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear | yellow
Odor: moderate Sulfuric
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: moderate
Other comments:

Ground Water Sampling Record - Monitoring Well No. MW6 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 23.4 ° C		Measured with: Orion Instrument
pH: 6.57		Measured with:
Conductivity: 31x10	µs/cm	Measured with:
Dissolved Oxygen: 0.18	mg/l	Measured with: Orion Instrument
Redox Potential: +8.2	mV	Measured with:
Salinity:		Measured with:
Nitrate:		Measured with:
Sulfate:		Measured with:
Ferrous Iron:		Measured with:
Other:		

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-METHANE, HACH, Amber 2-BTEX, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration:
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MD75 - MW7
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/2, 1995 ____ a.m./p.m.
SAMPLE COLLECTED BY: MD / KC of ES Denver
WEATHER: Sunny 70°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 3.68 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: clear / yellow
Odor: moderate HC. — Used to tell between H.C. & Sulfurec
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: moderate
Other comments:

Ground Water Sampling Record - Monitoring Well No. MW-7 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 23.0° C	Measured with: Orion Instrument	
pH: Brake	Measured with:	
Conductivity: 52 X10 µs/cm	Measured with:	
Dissolved Oxygen: 0.10 mg/l	Measured with: Orion Instrument	
Redox Potential: -88.4 mV	Measured with:	
Salinity:	Measured with:	
Nitrate:	Measured with:	
Sulfate:	Measured with:	
Ferrous Iron:	Measured with:	

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-HACH, ALK, ANION, METHANE
2-BTEX, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: _____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MD 75- MW-8
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/31, 1995 11:15 a.m./p.m.
SAMPLE COLLECTED BY: (MV) / KC of ES Denver
WEATHER: P. Cloudy
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 4.79 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear/yellow
Odor: Strong H.C.
Other Comments: film present

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: Strong
Other comments:

Ground Water Sampling Record - Monitoring Well No. MW-8 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp:	23.8 ° C	Measured with:	Orion Instrument
pH:	4.83	Measured with:	
Conductivity:	38x10 µs/cm	Measured with:	
Dissolved Oxygen:	0.08 mg/l	Measured with:	Orion Instrument
Redox Potential:	-95.7 mV	Measured with:	
Salinity:		Measured with:	
Nitrate:		Measured with:	
Sulfate:		Measured with:	
Ferrous Iron:		Measured with:	

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-Hach, Anion, Alk, TEH, Methane
2-BTEX, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MD 75 - MW9
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/30, 1995 16:00 a.m./p.m.
SAMPLE COLLECTED BY: MV / KC of ES Denver
WEATHER: Sunny 85°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH i 4.26 f - 4.48 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear / yellow
Odor: Strong Sulfuric
Other Comments:

4 [x] WELL EVACUATION:
Method: Peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: Strong
Other comments:

Ground Water Sampling Record - Monitoring Well No. MW 9 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 22.8 ° C		Measured with: Orion Instrument
pH: 7.14		Measured with: _____
Conductivity: 29X10	µS/cm	Measured with: _____
Dissolved Oxygen: 0.12	mg/l	Measured with: Orion Instrument
Redox Potential: -120.8	mV	Measured with: _____
Salinity: _____		Measured with: _____
Nitrate: _____		Measured with: _____
Sulfate: _____		Measured with: _____
Ferrous Iron: _____		Measured with: _____

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-Methane, ~~1~~ Hach, Anions
2- BTEX, TUH, VOC

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration:
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: _____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MD75 - mw10
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/30/95, 19__ _____ a.m./p.m.
SAMPLE COLLECTED BY: MW / KC of ES Denver
WEATHER: Sunny 85°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH ~~3.75~~ f. 3.77 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: clear / yellow
Odor: moderate sulfuric
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: moderate
Other comments:

Ground Water Sampling Record - Monitoring Well No. MW-10 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 24.0 ° C	Measured with:	Orion Instrument
pH: 6.95	Measured with:	
Conductivity: 24x10 µS/cm	Measured with:	
Dissolved Oxygen: 0.12 mg/l	Measured with:	Orion Instrument
Redox Potential: -88.4 mV	Measured with:	
Salinity: _____	Measured with:	
Nitrate: _____	Measured with:	
Sulfate: _____	Measured with:	
Ferrous Iron: _____	Measured with:	
Other: _____		

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-METHANE, ANION, HACH
2-BTEX, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: _____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MD75 -MW 11
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/30, 1995 _____ a.m./p.m.
SAMPLE COLLECTED BY: MP / KC of ES Denver
WEATHER: Sunny 65
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: good
INNER PVC CASING CONDITION IS: good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH i 3.99 f-4.05 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear / Yellow
Odor: Strong Sulfuric
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: ~500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: Strong
Other comments:

Ground Water Sampling Record - Monitoring Well No. MW-11 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp:	23.7 ° C	Measured with:	Orion Instrument
pH:	6.76	Measured with:	
Conductivity:	31X10 µS/cm	Measured with:	
Dissolved Oxygen:	0.01 mg/l	Measured with:	Orion Instrument
Redox Potential:	-73.9 mV	Measured with:	
Salinity:		Measured with:	
Nitrate:		Measured with:	
Sulfate:		Measured with:	
Ferrous Iron:		Measured with:	

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-Anion, Alk, [redacted], Hach, Methane
2-BTEX, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration:
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: _____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MO75- mw 12
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/31, 1995 9:30 a.m./p.m.
SAMPLE COLLECTED BY: MP/KC of ES Denver
WEATHER: P. Cloudy 75°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS) IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS) IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 3.11 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear yellow
Odor: Strong H.C
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: Strong H.C.
Other comments: film present

Ground Water Sampling Record - Monitoring Well No. MW2 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 22.8 ° C	Measured with:	Orion Instrument
pH: 4.61	Measured with:	
Conductivity: 13 x 10 µs/cm	Measured with:	
Dissolved Oxygen: 0.09 mg/l	Measured with:	Orion Instrument
Redox Potential: -98.2 mV	Measured with:	
Salinity:	Measured with:	
Nitrate:	Measured with:	
Sulfate:	Measured with:	
Ferrous Iron:	Measured with:	
Other:		

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-Anion, Hach, Meth., Tell, Alk
2-BTEX, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: _____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL ~~25MW2~~ MD75-MW13
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/30, 1995 _____ a.m./p.m.
SAMPLE COLLECTED BY: ~~MD~~ / KC of ES Denver
WEATHER: Sunny 85°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS) IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS) IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH i 4.05 f - 4.09 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear / yellow
Odor: moderate sulfur
Other Comments:

4 [x] WELL EVACUATION:
Method: Peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: no water
Other comments:

Ground Water Sampling Record - Monitoring Well No. MW 13 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 24.4 ° C	Measured with: Orion Instrument	
pH: 7.29	Measured with:	
Conductivity: 411 x 10 µS/cm	Measured with:	
Dissolved Oxygen: 0.11 mg/l	Measured with: Orion Instrument	
Redox Potential: -228 mV	Measured with:	
Salinity:	Measured with:	
Nitrate:	Measured with:	
Sulfate:	Measured with:	
Ferrous Iron:	Measured with:	

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-METH, HACH, ANIONS
2 - BTEX, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[x] Container Sides Labeled
[ ] Container Lids Taped
[x] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MO 75 - mw 14
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/31, 1995 12:15 a.m./p.m.
SAMPLE COLLECTED BY: MV KC of ES Denver
WEATHER: Cloudy, 75°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH ND FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 4.01 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear / yellow
Odor: Strong H,C, ? (HARD to tell)
Other Comments:

4 [x] WELL EVACUATION:
Method: Peristaltic
Volume Removed: 2500
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: strong
Other comments: Fish present

Ground Water Sampling Record - Monitoring Well No. MW 14 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp:	° C	Measured with:	Orion Instrument
pH:		Measured with:	
Conductivity:	µS/cm	Measured with:	
Dissolved Oxygen:	mg/L	Measured with:	Orion Instrument
Redox Potential:	mV	Measured with:	
Salinity:		Measured with:	
Nitrate:		Measured with:	
Sulfate:		Measured with:	
Ferrous Iron:		Measured with:	
Other:			

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-metals, HACH, Anions
2 - BTEX, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MO75-MW 15
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/2, 1995 11:14 a.m./p.m.
SAMPLE COLLECTED BY: MV / KC of ES Denver
WEATHER: Sunny 70°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [N] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 36.3 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe).
Appearance: clear yellow
Odor: weak sulfuric
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 25 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: weak
Other comments:

Ground Water Sampling Record - Monitoring Well No. MW 15 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of:_____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe:_____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp:	22.9 ° C	Measured with:	Orion Instrument
pH:	Brake	Measured with:	
Conductivity:	33 x10 µS/cm	Measured with:	
Dissolved Oxygen:	0.16 mg/l	Measured with:	Orion Instrument
Redox Potential:	-20.6 mV	Measured with:	
Salinity:		Measured with:	
Nitrate:		Measured with:	
Sulfate:		Measured with:	
Ferrous Iron:		Measured with:	

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1- HACH, METHANE, ALK, Anion
2- BTEX, TVH, VOC.

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration: Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

[ ] Preservatives added:

Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____
Method_____ Containers:_____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS:_____

SAMPLING LOCATION MacDill AFB Pumphouse 75
SAMPLING DATE(S) March 1995

GROUND WATER SAMPLING RECORD - MONITORING WELL MO 75 - MW 16
(number)

REASON FOR SAMPLING: [X] Regular Sampling; [ ] Special Sampling;
DATE AND TIME OF SAMPLING: 3/31, 1995 8:15 a.m./p.m.
SAMPLE COLLECTED BY: MV / KC of ES Denver
WEATHER: Sunny 70°
DATUM FOR WATER DEPTH MEASUREMENT (Describe): Top of Well Casing

MONITORING WELL CONDITION:
[X] LOCKED: [ ] UNLOCKED
WELL NUMBER (IS - IS NOT) APPARENT
STEEL CASING CONDITION IS: Good
INNER PVC CASING CONDITION IS: Good
WATER DEPTH MEASUREMENT DATUM (IS - IS NOT) APPARENT
[ ] DEFICIENCIES CORRECTED BY SAMPLE COLLECTOR
[ ] MONITORING WELL REQUIRED REPAIR (describe):

Check-off

1 [x] EQUIPMENT CLEANED BEFORE USE WITH Alconox, Distilled H2O, and Acetone
Items Cleaned (List): All Equipment used in sampling

2 [x] PRODUCT DEPTH NP FT. BELOW DATUM
Measured with: Oil/ Water Interface Probe

WATER DEPTH 3.34 FT. BELOW DATUM
Measured with: Water Level Probe

3 [x] WATER-CONDITION BEFORE WELL EVACUATION (Describe):
Appearance: Clear | yellow
Odor: Strong H2S
Other Comments:

4 [x] WELL EVACUATION:
Method: peristaltic
Volume Removed: 2500 ml
Observations: Water (slightly - very) cloudy
Water level (rose - fell - no change)
Water odors: Strong H2S
Other comments: ~~often~~ film present

Ground Water Sampling Record - Monitoring Well No. MW 16 (Cont'd)

5 [x] SAMPLE EXTRACTION METHOD:

[ ] Bailer made of: _____
[x] Pump, type: Peristaltic Pump
[ ] Other, describe: _____

Sample obtained is [x] GRAB; [ ] COMPOSITE SAMPLE

6 [x] ON-SITE MEASUREMENTS:

Temp: 23.4 ° C		Measured with: Orion Instrument
pH: 5.91		Measured with: _____
Conductivity: 41X10	µs/cm	Measured with: _____
Dissolved Oxygen: 0.16	mg/l	Measured with: Orion Instrument
Redox Potential: -9.9	mV	Measured with: _____
Salinity: _____		Measured with: _____
Nitrate: _____		Measured with: _____
Sulfate: _____		Measured with: _____
Ferrous Iron: _____		Measured with: _____

Other: _____

7 [ ] SAMPLE CONTAINERS (material, number, size): 1-METHANE, Amin Hach
2 - BTEX, VOC, TVH

8 [ ] ON-SITE SAMPLE TREATMENT:

[ ] Filtration:
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

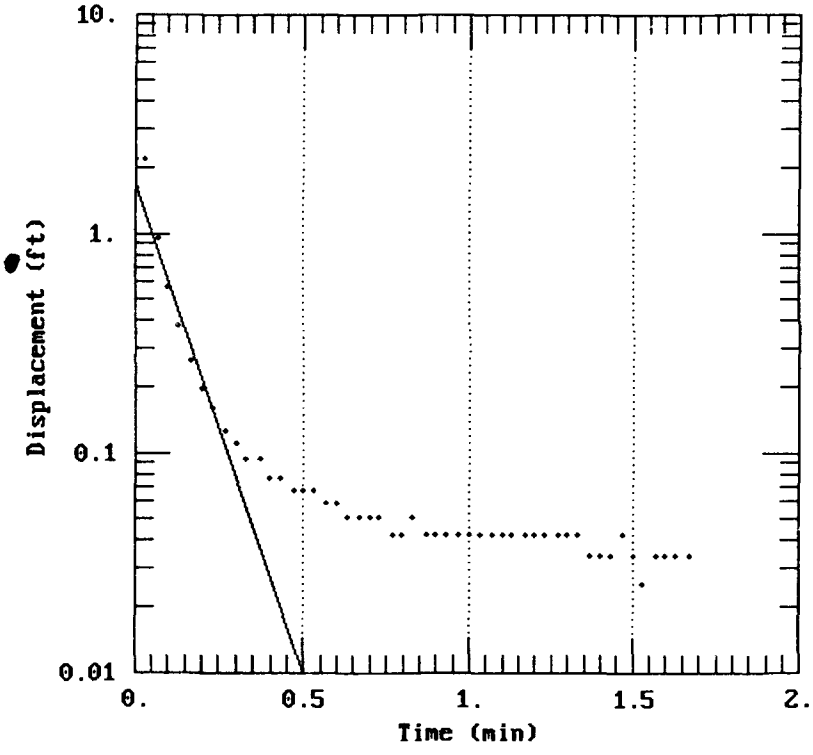
[ ] Preservatives added:

Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____
Method _____ Containers: _____

9 [ ] CONTAINER HANDLING:

[✓] Container Sides Labeled
[ ] Container Lids Taped
[✓] Containers Placed in Ice Chest

10 [ ] OTHER COMMENTS: _____



DATA SET:
PH7513R3.AQT
07/06/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0= 2.19 ft
r_c= 0.0833 ft
r_w= 0.333 ft
L = 9. ft
b = 19. ft
H = 9.3 ft

PARAMETER ESTIMATES:
K = 0.04702 ft/min
y0 = 1.7 ft

MacDill Air Force Base
Site 57 Coordinate Data

April 4, 1995

Point	Identification	North	East	Elevation
1	N APRON 4	1279802.6000	494886.4990	8.65
2	N APRON 3	1279045.4380	495595.4450	7.40
100	0 SET	1279045.4144	495595.4671	7.45
200	Ground Shot	1279830.9928	494740.4344	8.06
201	MD 75 MW 02	1279831.2717	494745.2614	8.21
202	Ground Shot	1279831.0504	494742.2670	8.37
203	75 SD-3 Ground Shot	1279816.1621	494756.3473	8.09
204	MD75-MW01	1279943.1085	494645.1378	8.91
205	Ground Shot	1279940.2685	494647.4511	9.08
206	75MP-5D-75SS-5	1279938.4585	494648.9858	8.82
207	75SS-3 Ground Shot	1279844.7123	494687.8364	9.15
208	Ground Shot 75SD-2	1279766.9146	494710.7244	7.95
209	75 SW-1 75 SD-4	1279759.0616	494730.2227	9.31
210	75MP-7S-7D	1279692.4979	494785.1800	9.50
211	Ground Shot	1279693.4093	494784.5572	9.84
212	MD75MW13	1279658.5772	494720.3632	9.14
213	Ground Shot 75SS-6	1279661.8265	494722.7368	9.29
214	75MP 8S-8D	1279614.8092	494764.2600	9.27
215	Ground Shot	1279615.3790	494763.2564	9.42
216	75MP-9S-9D	1279611.2265	494670.6001	9.35
217	Ground Shot	1279610.2532	494671.6309	9.65
218	75SD-2 Ground Shot	1279766.9586	494710.7228	7.95
219	MD75MW11	1279739.0859	494707.2511	9.14
220	Ground Shot	1279740.8310	494706.2405	9.21
221	Ground Shot 75SD-1	1279726.0788	494674.3213	8.04
222	75MP-2S	1279717.0078	494661.5998	8.22
223	MD75MW16	1279711.0766	494655.9220	8.34
224	MD75MW12	1279722.2266	494658.3194	8.21
225	Ground Shot	1279716.5613	494657.2221	8.31
226	MD75MW03	1279689.0058	494612.5550	9.30
227	Ground Shot	1279686.7207	494613.5007	9.42
228	75MP-1S-1D	1279726.7594	494551.0218	9.01
229	Ground Shot	1279728.0701	494549.9999	9.16
230	MD75MW08	1279751.7337	494574.2064	9.01
231	75SS-2 Ground Shot	1279756.0583	494571.8365	9.31
232	MD75MW10	1279758.4534	494646.7751	8.92
233	Ground Shot	1279759.5281	494648.0773	9.13
234	MD75MW09	1279809.9930	494633.7265	9.50
235	75SS-1 Ground Shot	1279808.5005	494630.9104	9.48
236	MD75MW04	1279829.3036	494513.9899	9.06

Prepared by: **Landmark Engineering & Surveying Corporation**

For: **PARSONS ENGINEERING SCIENCE, INC.**

MacDill Air Force Base
Site 57 Coordinate Data

April 4, 1995

Point	Identification	North	East	Elevation
237	MD75MW14	1279821.1985	494513.1259	9.07
238	75MP-4S	1279823.6120	494517.7612	8.97
239	Ground Shot	1279824.3951	494514.1894	9.09
240	75MP-3D	1279805.3346	494476.5841	8.87
241	MD75MW15	1279801.3977	494479.2818	9.08
242	Ground Shot	1279803.6709	494478.2044	9.28
243	MD75MW05	1280007.5597	494465.0305	9.48
244	Ground Shot	1280009.2374	494466.9928	9.62
245	75SS-4 Ground Shot	1280029.2598	494442.1656	9.61
246	MD75MW07	1279909.6516	494461.9729	9.07
247	Ground Shot	1279908.5968	494462.8221	9.30
248	MD75MW06	1279914.4972	494490.5571	9.12
249	Ground Shot	1279914.1418	494492.6904	9.18
250	Building Corner.N.W.	1279934.1590	494513.9606	9.48
251	Building Corner.N.E.	1279957.6492	494537.6885	9.70
252	Building Corner	1279839.1522	494655.7609	9.72
253	Building Corner	1279814.4685	494631.0392	9.64

Prepared by: **Landmark Engineering & Surveying Corporation**

For: PARSONS ENGINEERING SCIENCE, INC.

APPENDIX C

LABORATORY ANALYTICAL DATA

MANTECH

Ref: 95/JAD21

April 20, 1995

Dr. Don Kampbell
R.S. Kerr Environmental Research Lab
U.S. Environmental Protection Agency
P.O. Box 1198
Ada, OK 74820

THRU: S.A. Vandegrift SV

+ MacDill AFB

Dear Don:

MacDill data also included

As requested in Service Request # SF-1-123, headspace GC/MS analysis of 90 Patrick AFB water samples for chlorinated VOAs (TCE, PCE, DCE's, and vinyl chloride) was completed. The samples were received on March 28 & April 6, 1995 and analyzed on April 6-11, 1995. RSKSOP-148 (Determination of Volatile Organic Compounds in Water by Automated Headspace Gas Chromatography/Mass Spectrometry (Saturn II Ion Trap Detector) was used for this analysis.

An internal standard calibration method was established for 6 chlorinated compounds. The standard curves were prepared from 1.0 to 5000 ppb. The lower calibration limits were 1.0 ppb.

A dilution corrected quantitation report for the samples, lab duplicates, field duplicates, QC standards and lab blanks is presented in tables 1-4.

If you should have any questions, please feel free to contact me.

Sincerely,

John Allen Daniel

xc: R.L. Cosby
G.B. Smith
D.D. Fine
J.L. Seeley

ManTech Environmental Research Services Corporation

R S Kerr Environmental Research Laboratory, P.O. Box 1198, 919 Kerr Research Drive
Ada, Oklahoma 74821-1198 405-436-8660 FAX 405-436-8501

Table 1. Quantitation Report for S.R. # SF-1-123 from Patrick AFB.

Concentration = ppb

Compound	24MP-1D	24MP-1S	24MP-1S Lab Dup	24MP-1S Field Rep	24MP-2D	24MP-2S	24MP-3D	24MP-3S	24MP-4S	24MP-5D
VINYL CHLORIDE	ND	20.7	20.2	20.8	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C-1,2-DICHLOROETHENE	1.1	6.8	6.5	6.2	---	ND	---	ND	ND	ND
TRICHLOROETHENE	ND	---	ND	ND	ND	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	1.1	1.0	1.0	ND	ND	ND	ND	ND	ND

	24MP-5S	24MP-6S	24MP-7D	24MP-7D Lab Dup	24MP-7S	24MP-8D	24MP-8S	24MP-9D	24MP-9S	24MP-10D
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	1.8	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

	24MP-10D Lab Dup	24MP-10S	24PZ-1D	24PZ-1S	24PZ-1S Field Rep	MD24-1	MD24-2	MD24-3	MD24-4	MD24-5
VINYL CHLORIDE	ND	ND	1.0	2.8	2.6	---	3.4	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C-1,2-DICHLOROETHENE	ND	ND	---	1.0	---	---	1.4	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND	ND	2.6	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

	MD24-6A	MD24-6	MD24-7	MD24-7 Field Rep	MD24-7 Field Dup	MD24-8	MD24-9	MD24-9 Lab Dup	MD24-10	MD24-10A
VINYL CHLORIDE	16.4	---	1.2	1.5	1.6	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C-1,2-DICHLOROETHENE	ND	---	ND	ND	ND	ND	ND	ND	---	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = None Detected --- = Below Calibration Limit(1.0 ppb) Dup = Duplicate Rep = Replicate

Table 2. Quantitation Report for S.R. # SF-1-123 from Patrick AFB.

Concentration = ppb

Compound	MD24-41	MW32-1	MW32-3	MD32-MW7	56MP-1S	56MP-2S	56MP-3D	56MP-3S	56MP-4S 1/5 Dil	56MP-4S Field Rep
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C-1,2-DICHLOROETHENE	---	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Compound	56MP-5D	56MP-5S	56MP-6D	56MP-6D Lab Dup	56MP-6S	56MP-7D	56MP-7S	56MP-8S	56MP-10S	56MP-15D
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

MD32-MW10 JAH 6/12/95

Compound	MD56-MW1	MD56-MW4	~~56MD-MW10~~	~~56MD-MW10 Lab Dup~~	56-MW1	MW56-2	MW56-5	MW56-5 Lab Dup	MW56-6	MW56-6 Field Rep
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Compound	MW56-7	MW56-8	MW56-9	MW56-10	MW56-11	MW56-12	75MP-2S	75MP-3D	75MP-4S	75MP-5D
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = None Detected --- = Below Calibration Limit(1.0 ppb) Rep = Replicate Dup = Duplicate Dil = Dilution

Table 3. Quantitation Report for S.R. # SF-1-123 from Patrick AFB.

Concentration = ppb

Compound	75MP-5D Field Rep	75MP-6D	75MP-7D	75MP-7D Lab Dup	75MP-7S	75MP-8D	75MP-8S	75MP-8S Field Dup	75MP-9D	75MP-9S
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

	MD75-MW2 ND	MD75-MW3	MD75-MW4	MD75-MW4 Lab Dup	MD75-MW4 Field Rep	MD75-MW5	MD75-MW6	MD75-MW7	MD75-MW8	MD75-MW9
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TETRACHLOROETHENE		ND	ND	ND	ND	ND	ND	ND	ND	ND

	MD75-MW10	MD75-MW11	MD75-MW12	MD75-MW13	MD75-MW14	MD75-MW14 Lab Dup	MD75-MW14 Field Rep	MD75-MW15	MD75-MW16	Trip Blank
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C-1,2-DICHLOROETHENE	ND	ND	ND	ND	1.0	1.1	1.0	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

	QC0406A 20 ppb	QC0406B 200 ppb	QC0406C 20 ppb	QC0406D 200 ppb	QC0406E 20 ppb	QC0406F 200 ppb	QC0406G 20 ppb	QC0406H 200 ppb	QC0408A 20 ppb	QC0408B 200 ppb
VINYL CHLORIDE	20.8	196	20.7	198	18.9	197	19.6	189	19.9	195
1,1-DICHLOROETHENE	20.3	199	19.9	197	18.4	198	18.7	196	19.1	196
T-1,2-DICHLOROETHENE	19.4	185	19.5	180	18.2	186	19.0	187	18.7	192
C-1,2-DICHLOROETHENE	19.2	196	20.2	196	19.5	187	20.4	198	20.8	201
TRICHLOROETHENE	21.2	210	22.1	210	19.9	214	21.1	208	21.3	213
TETRACHLOROETHENE	19.9	195	19.0	197	18.8	193	18.8	194	18.2	190

ND = None Detected --- = Below Calibation Limit(1.0 ppb) QC = Quality Control Std Dup = Duplicate Rep = Replicate

Table 4. Quantitation Report for S.R. # SF-1-123 from Patrick AFB.

Concentration = ppb

Compound	QC0408C 20 ppb	QC0408D 200 ppb	QC0408E 20 ppb	QC0408F 200 ppb	QC0410A 20 ppb	QC0410B 200 ppb	QC0410C 20 ppb	QC0410D 200 ppb	QC0410E 20 ppb	BL0406A
VINYL CHLORIDE	20.9	198	21.0	188	21	191	19.2	194	20.9	ND
1,1-DICHLOROETHENE	18.7	200	19.7	196	19.8	189	19.1	200	20.0	ND
T-1,2-DICHLOROETHENE	19.0	189	19.2	181	18.6	181	19.6	192	19.1	ND
C-1,2-DICHLOROETHENE	19.8	203	19.0	193	19.2	194	19.9	199	19.3	ND
TRICHLOROETHENE	20.4	214	20.8	206	21.3	203	20.6	212	21.8	ND
TETRACHLOROETHENE	19.0	196	18.7	186	19.3	187	19.5	198	19.9	ND

	BL0406B	BL0408A	BL0410A
VINYL CHLORIDE	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND
T-1,2-DICHLOROETHENE	ND	ND	ND
C-1,2-DICHLOROETHENE	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND

QC = Quality Control Std BL = Blank ND = None Detected

MANTECH

Ref: 95-JH29/vg

May 9, 1995

Dr. Don Kampbell
R.S. Kerr Environmental Research Lab
U.S. Environmental Protection Agency
P.O. Box 1198
Ada, OK 74820

THRU: S.A. Vandegrift

Dear Don:

Find attached results for methane and ethylene on ~~Patrick~~ MacDill AFB samples as per Service Request #SF-1-123. Samples were received on 3/27, 3/28, and 4/6 and analyzed on 3/27, 3/28, 3/30, 4/3, 4/4, 4/7, 4/10, and 4/11/95. Samples were prepared and calculations were done as per RSKSOP-175. Analysis was performed as per RSKSOP-147.

If you have any questions, please feel free to see me.

Sincerely,

Jeff Hickerson

Jeff Hickerson

xc: R.L. Cosby
J.L. Seeley
G.B. Smith

ManTech Environmental Research Services Corporation
R.S. Kerr Environmental Research Laboratory; P.O. Box 1198, 919 Kerr Research Drive
Ada, Oklahoma 74821-1198 405-436-8660 FAX 405 436 8501

SF-1-123 DATA

ANALYZED 3/27/95

SAMPLE	METHANE	ETHYLENE
LAB BLANK	BLQ	ND
2S	12.846	ND
* FIELD DUP	14.150	ND
3D	2.570	ND
3M	12.437	ND
3S	15.534	ND
86-16DD	0.074	ND
9D	9.839	ND
9S	5.822	ND
12D	0.882	ND
12S	12.339	ND
26D	3.756	ND
26S	9.009	ND
86-18D	6.116	ND

ANALYZED 3/28/95

SAMPLE	METHANE	ETHYLENE
LAB BLANK	BLQ	ND
86-21-MWD	0.749	ND
86MW-10D	1.598	ND
* FIELD DUP	1.560	ND
86MW-18S	3.379	ND
* LAB DUP	3.178	ND
86-18DD	0.068	ND
86-MW4D	5.095	ND
86-MW4S	11.630	ND
* LAB DUP	10.594	ND
86-21-MWS	9.857	ND

ANALYZED 3/30/95

SAMPLE	METHANE	ETHYLENE
LAB BLANK	BLQ	ND
24PZ-1S	4.177	ND
24MP-2S	9.887	ND
24MP-3D	0.182	ND
MD32-3	0.137	ND
MD24-4	0.266	ND
* LAB DUP	0.261	ND
MW56-6	6.324	ND
56-MP-6S	0.245	ND
24MP-7S	0.045	ND
56MP-7D	0.067	ND
MW56-8	2.298	ND
24MP-8D	0.068	ND
MD24-9	0.146	ND
24MP-1S	2.501	BLQ

SF-1-123 DATA

ANALYZED 3/30/95

SAMPLE	METHANE	ETHYLENE
24MP-1D	1.788	ND
24MP-2D	0.145	ND
MP24-4	0.288	ND
" LAB DUP	0.271	ND

ANALYZED 4/3/95

SAMPLE	METHANE	ETHYLENE
LAB BLANK	BLQ	ND
24PZ-1D	0.137	ND
MD56-MW9	0.739	ND
56MP-4S	8.968	ND
56MP-5D	0.568	ND
56MP-5S	13.574	ND
56MP-6D	0.086	ND
56MP-8S	0.032	ND
56MP-10S	2.288	ND
" LAB DUP	2.081	ND
56MP-15D	0.548	ND
MD24-1	0.573	ND
MD24-2	1.311	ND
MD24-3	0.242	ND
MD24-5	0.217	ND
MD24-6	0.610	ND
MD24-6A	2.335	0.001
MD24-7	0.429	ND

ANALYZED 4/4/95

SAMPLE	METHANE	ETHYLENE
LAB BLANK	BLQ	ND
MD24-7 FIELD DUP	0.048	ND
MD24-8	0.578	ND
MD24-10	0.249	ND
MD24-10A	0.749	ND
24MP-3S	0.970	ND
24MP-5D	0.075	ND
24MP-5S	0.065	ND
24MP-6S	1.045	ND
24MP-7D	0.033	ND
" LAB DUP	0.032	ND
24MP-8S	0.125	ND
24MP-9D	0.053	ND
24MP-9S	3.270	ND
24MP-10	0.696	ND
24MP-10D	0.060	ND
MW56-1	0.442	ND
MW56-2	0.492	ND

SF-1-123 DATA

ANALYZED 4/4/95

SAMPLE	METHANE	ETHYLENE
MW56-10	3.711	ND
* LAB DUP	3.513	ND
MW56-12	0.014	ND

ANALYZED 4/7/95

SAMPLE	METHANE	ETHYLENE
LAB BLANK	BLQ	ND
56MW-1	0.087	ND
MW56-5	0.136	ND
MW56-7	7.953	ND
MW56-11	5.279	ND
56MP-1S	0.161	ND
56MP-2S	0.030	ND
56MP-3D	1.069	ND
56MP-3S	0.092	ND
56MP-7D	0.035	ND
MD32-MW7	4.749	ND
* LAB DUP	4.545	ND

ANALYZED 4/10/95

SAMPLE	METHANE	ETHYLENE
LAB BLANK	BLQ	ND
MD56-MW4	0.034	ND
MW32-1	2.634	ND
MD75-MW2	0.271	ND
MD75-MW3	0.038	ND
MD75-MW4	1.890	BLQ
MD75-MW5	0.035	ND
MD75-MW9	2.245	ND
MD75-MW6	2.466	ND
*LAB DUP	2.351	ND
MD75-MW7	0.641	ND
MD75-MW8	8.962	ND
MD75-MW10	5.394	ND
MD75-MW11	0.986	ND
MD75-MW12	7.310	ND
MD75-MW13	1.227	ND
MD75-MW14	15.439	ND
MD75-MW15	0.050	ND
MD75-MW16	6.039	ND
75MP-2S	6.550	0.001
* LAB DUP	6.215	ND

SF-1-123 DATA

ANALYZED 4/11/95

SAMPLE	METHANE	ETHYLENE
LAB BLANK	BLQ	ND
75MP-3D	1.777	ND
" FIELD DUP	0.036	ND
75MP-4S	14.469	0.001
75MP-5D	7.361	ND
75MP-6D	8.613	ND
75MP-7D	0.437	ND
75MP-8D	0.038	ND
75MP-8S	0.042	ND
" LAB DUP	0.041	ND
75MP-9D	0.072	ND
75MP-9S	0.132	ND
75MP-28S	0.043	ND

STANDARDS

SAMPLE	METHANE	ETHYLENE
10 PPM CH4	9.71	ND
100 PPM CH4	100.03	ND
1000 PPM CH4	1044.51	ND
1% CH4	1.01	ND
10% CH4	9.63	ND
20% CH4	20.18	ND
10 PPM C2H4	ND	9.95
100 PPM C2H4	ND	100.00
1000 PPM C2H4	ND	999.62

LOWER LIMIT OF QUANTITATION

METHANE	ETHYLENE
0.001	0.003

UNITS FOR THE SAMPLES ARE mg/L.

UNITS FOR THE STANDARDS CORRESPOND TO THE UNITS IN THE SAMPLE COLUMN.

ND DENOTES NONE DETECTED.
BLQ DENOTES BELOW LIMIT OF QUANTITATION.

Note
I would round off the reported values to two significan digits. Don Campbell

Evergreen Analytical Sample Log Sheet

Project # 95-0871

Date(s) Sampled: 03/13-15/95 COC

Date Due: 03/22/95-UST
03/31/95-OTHERS

Date Received: 03/17/95 1030

Holding Time(s): 03/27-29-BTEX,TVH,TEH

Client Project I.D. 722450.21020/MacDILL AFB

Rush STANDARD

Client: Parsons Engineering Science, Inc.

Address: 1700 Broadway Suite 900
Denver, CO 80290

Contact: TODD WIEDEMEIER

Client P.O. 722450.21020

Phone #831-8150 Fax #831-8208

Shipping Charges N/A

E.A. Cooler # 602

Airbill # FEDEX 9581826192

Custody Seal Intact? Y
Cooler X Bottles ___
COC Present Y
Sample Tags Present? Y
Sample Tags Listed? Y
Sample(s) Sealed? Y

Special Instructions *PLUS CHLOROBENZENE, TEMB & TMB. REPORT ALL SOILS ON A DRY WEIGHT BASIS. ANALYYZE ANMS/MSD AND DUPLICATE ON THIS CLIENT'S SAMPLES.

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
X04339A/B	75MP-2(2-4)	*BTEX	S	2WM	2
X04340A/B	75MP-2(8-10)	*BTEX	S	2WM	2
X04341A/B	75SS-3(3-4)	*BTEX	S	2WM	2
X04342A/B	75SS-3(8-10)	*BTEX	S	2WM	2
X04344A/B	75MP-3(3-5)	*BTEX	S	2WM	2
X04345A/B	75MP-4(8-10)	*BTEX (% MOISTURE)	S	2WM	2
X04346A/B	75MP-4(13-15)	*BTEX (% MOISTURE)	S	2WM	2
X04347A/B	75MP-5(4-6)	*BTEX	S	2WM	2
X04348A/B	75MP-5(6-8)	*BTEX (% MOISTURE)	S	2WM	2
X04349A/B	75SS-15(4-6)	*BTEX (% MOISTURE)	S	2WM	2
X04350A/B	75SS-6(3-5)	*BTEX	S	2WM	2
X04353A/B	75SD-1	*BTEX (% MOISTURE)	S	2WM	2
X04354A/B	75SD-2	*BTEX (% MOISTURE)	S	2WM	2
X04355A/B	75SD-3	*BTEX (% MOISTURE)	S	2WM	2
X04356A/B	75SD-4	*BTEX (% MOISTURE)	S	2WM	2
X04360A/B	75MP-7(6-8)	*BTEX (% MOISTURE)	S	2WM	2
X04357A/B	75SW-1	*BTEX	W	40V	2
X04361A	TRIP BLANK	*BTEX	W	40V	2
X04351A/B	75SS-6(7-9)	*BTEX,TVH	S	2WM	2
X04352A/B	75SS-6(22-24)	*BTEX,TVH (% MOISTURE)	S	TUBE	2

Sample to be returned

Route To GC/MS ___ GC 4 Metals ___ Wet Chem 1 SxPrep 1 Acctg 1
SxRec C QA/QC C Sales C File Orig

Page 1 of 2 Page(s)

Custodian/Date: 3/20/95

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
X04339C	75MP-2(2-4)	TVH	S	2WM	2
X04340C	75MP-2(8-10)	TVH	S	2WM	2
X04341C	75SS-3(3-4)	TVH	S	2WM	2
X04342C	75SS-3(8-10)	TVH	S	2WM	2
X04344C	75MP-3(3-5)	TVH	S	2WM	2
X04345C	75MP-4(8-10)	TVH	S	2WM	2
X04346B	75MP-4(13-15)	TVH	S	2WM	2
X04347C	75MP-5(4-6)	TVH	S	2WM	2
X04348C	75MP-5(6-8)	TVH	S	2WM	2
X04349C	75SS-15(4-6)	TVH	S	2WM	2
X04350C	75SS-6(3-5)	TVH	S	2WM	2
X04353C	75SD-1	TVH	S	2WM	2
X04354C	75SD-2	TVH	S	2WM	2
X04355C	75SD-3	TVH	S	2WM	2
X04360C	75MP-7(6-8)	TVH	S	2WM	2
X04339D	75MP-2(2-4)	TEH	S	2WM	B7
X04340D	75MP-2(8-10)	TEH	S	2WM	B7
X04341D	75SS-3(3-4)	TEH	S	2WM	B7
X04342D	75SS-3(8-10)	TEH	S	2WM	B7
X04344D	75MP-3(3-5)	TEH	S	2WM	B7
X04347D	75MP-5(4-6)	TEH	S	2WM	B7
X04349D	75SS-15(4-6)	TEH	S	2WM	B7
X04350D	75SS-6(3-5)	TEH	S	2WM	B7
X04351B	75SS-6(7-9)	TEH	S	2WM	B7
X04339E	75MP-2(2-4)	% MOISTURE	S	4WM	B7
X04340E	75MP-2(8-10)	% MOISTURE	S	4WM	B7
X04341E	75SS-3(3-4)	% MOISTURE	S	4WM	B7
X04342E	75SS-3(8-10)	% MOISTURE	S	4WM	B7
X04344E	75MP-3(3-5)	% MOISTURE	S	4WM	B7
X04347E	75MP-5(4-6)	% MOISTURE	S	4WM	B7
X04350E	75SS-6(3-5)	% MOISTURE	S	4WM	B7
X04351C	75SS-6(7-9)	% MOISTURE	S	TUBE	B7
X04343A	75SS-4(3-4)	TOC(% MOISTURE)	S	2WM	OUT
X04350F	75SS-6(7-9)	TOC	S	2WM	OUT
X04358A	75MP-7(4-6)	TOC	S	2WM	OUT
X04359A	75MP-17(4-6)	TOC	S	2WM	OUT

R=Sample to be returned

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
X04339C	75MP-2(2-4)	TVH	S	2WM	2
X04340C	75MP-2(8-10)	TVH	S	2WM	2
X04341C	75SS-3(3-4)	TVH	S	2WM	2
X04342C	75SS-3(8-10)	TVH	S	2WM	2
X04344C	75MP-3(3-5)	TVH	S	2WM	2
X04345C	75MP-4(8-10)	TVH	S	2WM	2
X04346B	75MP-4(13-15)	TVH	S	2WM	2
X04347C	75MP-5(4-6)	TVH	S	2WM	2
X04348C	75MP-5(6-8)	TVH	S	2WM	2
X04349C	75SS-15(4-6)	TVH	S	2WM	2
X04350C	75SS-6(3-5)	TVH	S	2WM	2
X04353C	75SD-1	TVH	S	2WM	2
X04354C	75SD-2	TVH	S	2WM	2
X04355C	75SD-3	TVH	S	2WM	2
X04360C	75MP-7(6-8)	TVH	S	2WM	2
X04339D	75MP-2(2-4)	TEH	S	2WM	B7
X04340D	75MP-2(8-10)	TEH	S	2WM	B7
X04341D	75SS-3(3-4)	TEH	S	2WM	B7
X04342D	75SS-3(8-10)	TEH	S	2WM	B7
X04344D	75MP-3(3-5)	TEH	S	2WM	B7
X04347D	75MP-5(4-6)	TEH	S	2WM	B7
X04349D	75SS-15(4-6)	TEH	S	2WM	B7
X04350D	75SS-6(3-5)	TEH	S	2WM	B7
X04351B	75SS-6(7-9)	TEH	S	2WM	B7
X04339E	75MP-2(2-4)	% MOISTURE	S	4WM	B7
X04340E	75MP-2(8-10)	% MOISTURE	S	4WM	B7
X04341E	75SS-3(3-4)	% MOISTURE	S	4WM	B7
X04342E	75SS-3(8-10)	% MOISTURE	S	4WM	B7
X04344E	75MP-3(3-5)	% MOISTURE	S	4WM	B7
X04347E	75MP-5(4-6)	% MOISTURE	S	4WM	B7
X04350E	75SS-6(3-5)	% MOISTURE	S	4WM	B7
X04351C	75SS-6(7-9)	% MOISTURE	S	TUBE	B7
X04343A	75SS-4(3-4)	TOC(% MOISTURE)	S	2WM	OUT
X04350F	75SS-6(7-9)	TOC	S	2WM	OUT
X04358A	75MP-7(4-6)	TOC	S	2WM	OUT
X04358B	75MP-7(4-6) METHOD BLANK	TOC	S	2WM	OUT
X04359A	75MP-17(4-6)	TOC	S	2WM	OUT

Project # 95-0871

R=Sample to be returned

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

Page 1 of 3

COMPANY Parsons E.S.
ADDRESS 1700 Broadway Ste 900
CITY Denver STATE CO ZIP 80701
PHONE # 831-8100 FAX # 831-~~8100~~ 8208 FAX RESULTS (Y) / N

CLIENT CONTACT (print) Todd Weidemier
PROJECT I.D. MacDill AFB
EAL. QUOTE # _____ P.O. # F22450.2102
TURNAROUND REQUIRED* _____
*expedited turnaround subject to additional fee

Sampler Name:
(signature)
(print) Kelly L. Cannon

Evergreen Analytical Cooler No. 622
Cooler Received

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	ANALYSIS REQUESTED: TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle)	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Moisture	TOC	EAL Sample No.
75MP-2(2-4)	3-13-95	1245	5		X									X		X	X			X		X04334
75MP-2(8-10)	3-13-95	1400	5		X									X		X	X			X		40
75~~88~~-3(3-4)	3-13-95	1630	5		X									X		X	X			X		41
7555-3(8-10)	3-13-95	1700	5		X									X		X	X			X		42
7555-4(3-4)	3-14-95	1100	1		X																X A	43
75MP-3(3-5)	3-14-95	1345	5		X									X		X	X			+		44
75MP-4(8-10)	3-14-95	1445	3		X									X		X	*			*		45
75MP-4(13-15)	3-14-95	1515	3		X								A	X	B	X						46
75MP-5(4-6)	3-14-95	1600	5		X									X		X	X			X		47
75MP-5(6-8)	3-14-95	1605	5		X									X		X	*			*		48
HT:														Na		C						Location 2,B7
DD:																						Container Size 40V, 2W Tube

HB C D E

EAL use only
Do not write in shaded area

EAL Project # 95-0871
Custodian MK

Instructions:

Relinquished by (Signature) Date/Time Received by (Signature)

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY: Jones ES
ADDRESS: 1700 Broadway Ste 1100
CITY: Denver STATE: CO ZIP: 80290
PHONE #: 303 831-3100 FAX #: 831-8208 FAX RESULTS: (Y) / N

CLIENT CONTACT (print): T. Weidemeier
PROJECT I.D.: MacDill AFB
EAL QUOTE #: PO #: 722450.7002
TURNAROUND REQUIRED*:
*expedited turnaround subject to additional fee

Sampler Name (signature): Kyle L. Cannon
(print): Kyle L. Cannon

Evergreen Analytical Cooler No: ~~#2~~ 602
Cooler Received:

Please **PRINT** all information:

EAL use only
Do not write in shaded area

EAL Project #: 95-871
Custodian: MZ

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	ANALYSIS REQUESTED: TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle) MTBE (circle)	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Moisture	TOC	EAL Sample No.
~~7555~~														A B	C	D						
7555-15(4-6)	3-14-95	1860	3		X									X		X	X			E	F	104349
7555-6 (3-5)	3-15-95	1315	6		X									X		X	X			X	X	50
7555-6 (7-9)	3-15-95	1325	3		X									X	A-	X	X[B]			TUBE		51
7555-6(12-14)	3-15-95	1430	1		X								A	X		X	A			TUBE		52
7550-1	3-15-95	1445	3		X									X		X						53
7550 2	3-15-95	1455	3		X									X		X						54
7550-3	3-15-95	1505	3		X									X		X						55
7550-4	3-15-95	1515	2		X									X								56
7550-1	3-15-95	1515	2	X										X	40							57
HT:																						Location 2 1B7
DD:																						Container Size 40ml VOA

Instructions:

Analyze 7555-6 (7-9) for TEH (Not on original C.O.C)

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Kyle L. Cannon	3/14/95		3-17-95				

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons ES
ADDRESS 1700 Broadway Ste 700
CITY Denver STATE Co ZIP 80202
PHONE # 831 2160 FAX # 831-8213 FAX RESULTS (Y) N

CLIENT CONTACT (print) John Hicks
PROJECT I.D. 7 McDill
EAL QUOTE # _____ P.O # 722[illegible]2162
TURNAROUND REQUIRED* _____
*expedited turnaround subject to additional fee

Sampler Name:
(signature) [signature]
(print) Kyle L. Cannon

Evergreen Analytical Cooler No. 62
Cooler Received _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	BTEX 8020/602 (circle)/MTBE	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	TCC	Method Blank	EAL Sample No.
7SMP-7(19)	3-15-95	1700	3		X							A	X	X	B	X04358
7SMP-17(16)	3-15-95	1830	1		X		A		B			A	X			59
7SMP-7(6-8)	3-15-95	720	1		X		X	X	X							60
Trip Blank	3-15-95	1130	1	X			X		TVBE							61
							A									~~62~~
																Not used
																9.99
HT:																Location 7,B7
DD:																Container Size 40V, 2WM

EAL use only. Do not write in shaded area

EAL Project # 95-871
Custodian MER

Instructions:

Relinquished by: (Signature) _____ Date/Time _____ Received by: (Signature) _____ Date/Time _____ Relinquished by: (Signature) _____ Date/Time _____ Received by: (Signature) _____ Date/Time _____

Evergreen Analytical Sample Receipt/Check-in Record

Date & Time Rec'd: 3-17-95 1600 Shipped Via: Fedex
(Airbill # if applicable)

Client : Parsons ES

Client Project ID(s): MacDill AFB

EAL Project #(s): 95- 0871 EAL Cooler(s): (Y) N

Cooler#	602								
Ice packs	(Y)	N	Y	N	Y	N	Y	N	Y	N
Temperature °C	4°C								

	Y	N	N/A
1. Custody seal(s) present:	X		
Seals on cooler intact	X		X
Seals on bottle intact			X
2. Chain of Custody present:	X		
3. Containers broken or leaking: (Comment on COC if Y)		X	
4. Containers labeled:	X		
5. COC agrees w/ bottles received: (Comment on COC if N)	X		
6. COC agrees w/ labels: (Comment on COC if N)	X		
7. Headspace in VOA vials-waters only (comment on COC if Y)	X		
8. VOA samples preserved:		X	
9. pH measured on metals, cyanide or phenolics*:			X
List discrepancies			
*Non-EAL provided containers only, water samples only.			
10. Metal samples present:			X
Total _____ , Dissolved _____			
D or PD to be filtered:			
T,TR,D,PD to be Preserved:			
11. Short holding times:		X	
Specify parameters			
12. Multi-phase sample(s) present:		X	
13. COC signed w/ date/time:	X		

Comments:

(Additional comments on back)
Custodian Signature/Date: 3-17-95

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons ES
ADDRESS 1700 Broadway Ste 900
CITY Denver STATE CO ZIP 80701
PHONE# 831-2100 FAX # 831-~~2100~~ 2208 FAX RESULTS (Y) N

CLIENT CONTACT (print) Todd Weidemeier
PROJECT I.D. MacD. 11 AFB
EAL. QUOTE # _____ P.O # 722430.2122
TURNAROUND REQUIRED* _____
*expedited turnaround subject to additional fee

Sampler Name:
(Signature)
(print) Kyle L. Cannon
Evergreen Analytical Cooler No. ~~422~~ 622
Cooler Received

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle)	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Moisture	TOC	EAL Sample No.
75MP-2(2-4)	3-13-95	1245	5		X									X		X	X			X		
75MP-2(8-10)	3-13-95	1400	5		X									X		X	X			X		
75~~88~~-3(3-4)	3-13-95	1630	5		X									X		X	X			X		
7555-3 (8-10)	3-13-95	1700	5		X									X		X	X			X		
7555-4 (3-4)	3-14-95	1100	1		X																X	
75MP-3(3-5)	3-14-95	1345	5		X									X		X	X			+		
75MP-4(8-10)	3-14-95	1445	3		X									X		X	~~X~~			~~X~~		
75MP-4(13-15)	3-14-95	1515	3		X									X		X						
75MP-5(4-6)	3-14-95	1600	5		X									X		X	X			X		
75MP-5(6-8)	3-14-95	1605	3		X									X		X	~~X~~			~~X~~		
HT:																						Location
DD:																						Container Size

EAL use only
Do not write in shaded area

EAL
Project # _____
Custodian _____

Instructions:

Relinquished by (Signature) | Date/Time | Received by: (Signature) | Date/Time | Relinquished by (Signature) | Date/Time | Received by: (Signature)

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons ES
ADDRESS 1700 Broadway Ste 1100
CITY Denver STATE CO ZIP 80290
PHONE # 303 831-8100 FAX # 831-8208 FAX RESULTS (Y) / N

CLIENT CONTACT (print) T. Weidemeier
PROJECT I.D. MacDill AFB
EAL QUOTE # _____ PO # 722450.2002
TURNAROUND REQUIRED* _____
*expedited turnaround subject to additional fee

Sampler Name: (signature) _____
(print) Kyle L. Cannon
Evergreen Analytical Cooler No ~~#3~~ 602
Cooler Received _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle) MTBE	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Moisture	TOC	EAL Sample No.
~~7550~~																						
7555-15(4-6)	3-14-95	1860	3		X									X		X	X					
7555-6 (3-5)	3-15-95	1315	6		X									X		X	X			X	X	
7555-6 (7-9)	3-15-95	1325	3		X									X		X						
7555-6(22-24)	3-15-95	1430	1		X									X		X						
7550-1	3-15-95	1440	3		X									X		X						
7550-2	3-15-95	1455	3		X									X		X						
7550-3	3-15-95	1505	3		X									X		X						
7550-4	3-15-95	1515	2		X									X								
7550-1	3-15-95	1515	2	X										X								
HT:																						Location
DD:																						Container Size

Instructions: Please analyze 7555-6 (7-9) for TEH

Relinquished by (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time
[signature]	3/14/95	[signature]	3-15-95				

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons ES
ADDRESS 1700 Broadway Ste 900
CITY Denver STATE CO ZIP 80202
PHONE # 831-8100 FAX # 831-8208 FAX RESULTS (Y) N

CLIENT CONTACT (print) John Hicks
PROJECT I.D. 7 MacDill
EAL QUOTE # _____ PO # 72246T 2102
TURNAROUND REQUIRED* _____
*expedited turnaround subject to additional fee

Sampler Name:
(signature) K L Cam
(print) Kyle L. Cannon
Evergreen Analytical Cooler No. 62
Cooler Received _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	TOC	Method Blank	EAL Sample No.
75SBMP-7(1-2)	3-15-95	1700	3		X															X	X	
75MP-17(1-2)	3-15-95	1830	1		X															X		
75MP-7(6-7)	3-15-95	1720	1		X									X	X	X						
Trip Blank	3-6-95	1130	1	X										X								
HT:																						Location
DD:																						Container Size

EAL use only
Do not write in shaded area

EAL
Project # _____
Custodian _____

Instructions: _____

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

		Client Project No.	: 722450.21020 MacDill AFB
Client Sample Number	: 75MP-2(2-4)		
Lab Sample Number	: X04339	Lab Project No.	: 95-0871
Date Sampled	: 3/13/95	Dilution Factor	: 5.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/23/95	Matrix	: Soil
Date Analyzed	: 3/24/95	Lab File No.	: BX2032326
Methanol Extract?	: No	Method Blank No.	: MB032395
% Moisture	: 13.80%		

Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	U	23
Toluene	108-88-3	630	23
Ethyl Benzene	100-41-4	680	23
Total Xylenes	1330-20-7	**	**
Chlorobenzene	108-90-7	**	**
1,3,5-trimethylbenzene	108-67-8	**	**
1,2,4-trimethylbenzene	95-63-6	**	**
1,2,3-trimethylbenzene	526-73-8	**	**
1,2,3,4-tetramethylbenzene	488-23-3	**	**

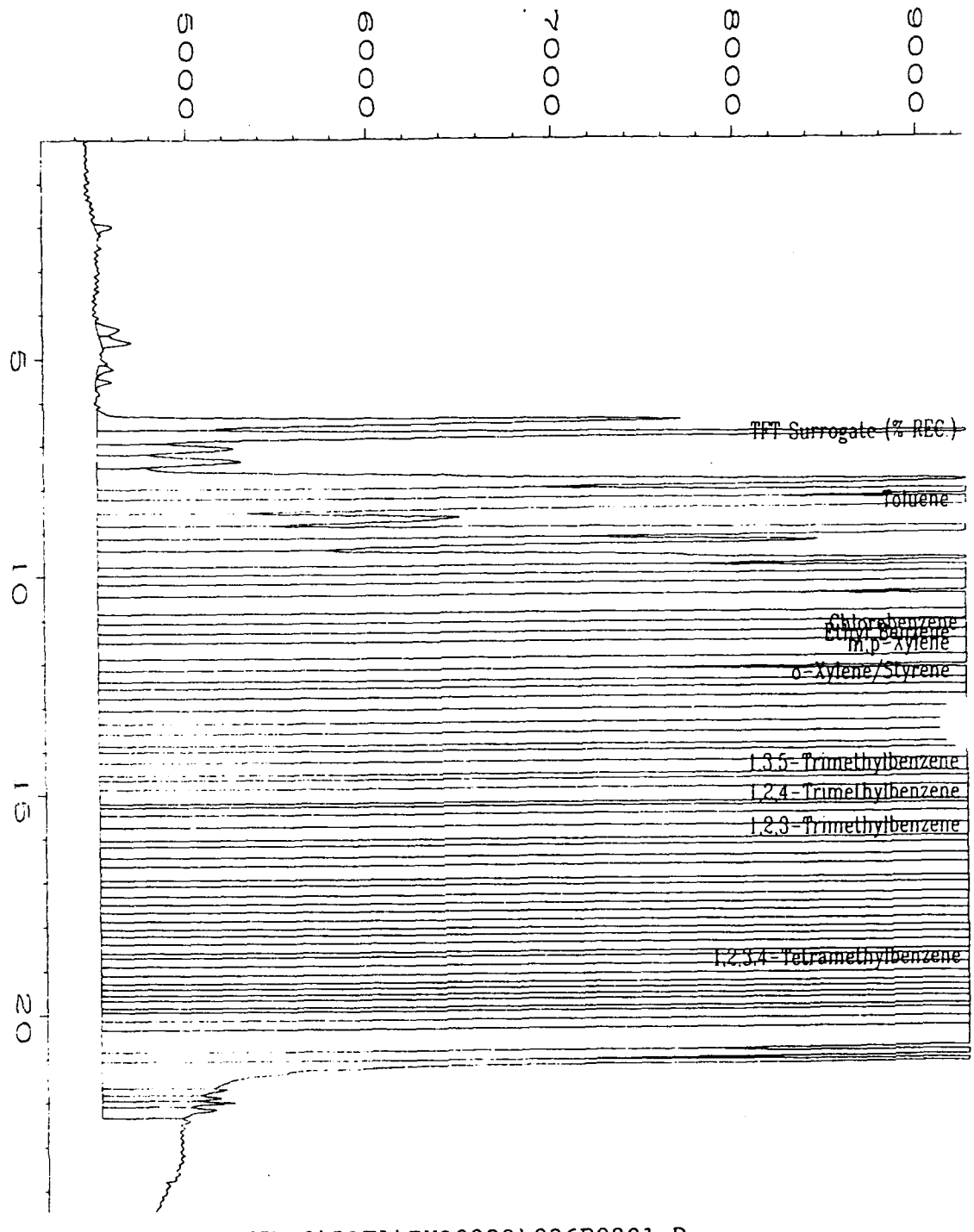
Surrogate Recovery (α,α,α-Trifluorotoluene):	128%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
** = See BX2032229 for noted values, df = 125, 03/23/95.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

K. Cone
Approved



Data File Name : C:\HPCHEM\2\DATA\BX20323\026R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04339 DF=5
Run Time Bar Code:
Acquired on : 24 Mar 95 05:54 AM
Report Created on: 24 Mar 95 06:19 AM
Last Recalib on : 23 Mar 95 03:56 PM
Multiplier : 5
Sample Info : Project#: 95-0871 Client#: 75MP-2(2-4) Soil

Page Number : 1
Vial Number : 26
Injection Number : 1
Sequence Line : 8
Instrument Method: BX20 .M
Analysis Method : BX20 .M
Sample Amount : 0
ISTD Amount :

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BTEX Data Report

Client Sample Number	: 75MP-2(2-4)	Client Project No.	: 722450.21020 MacDill AFB
Lab Sample Number	: X04339	Lab Project No.	: 95-0871
Date Sampled	: 3/13/95	Dilution Factor	: 125.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/22/95	Matrix	: Soil
Date Analyzed	: 3/23/95	Lab File No.	: BX2032229
Methanol Extract?	: Yes	Method Blank No.	: MEB032295
% Moisture	: 13.80%		

Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2		**	**
Toluene	108-88-3		**	**
Ethyl Benzene	100-41-4		**	**
Total Xylenes	1330-20-7	640		580
Chlorobenzene	108-90-7	150	J	580
1,3,5-trimethylbenzene	108-67-8	1800		580
1,2,4-trimethylbenzene	95-63-6	2000		580
1,2,3-trimethylbenzene	526-73-8	1400		580
1,2,3,4-tetramethylbenzene	488-23-3	2300		580

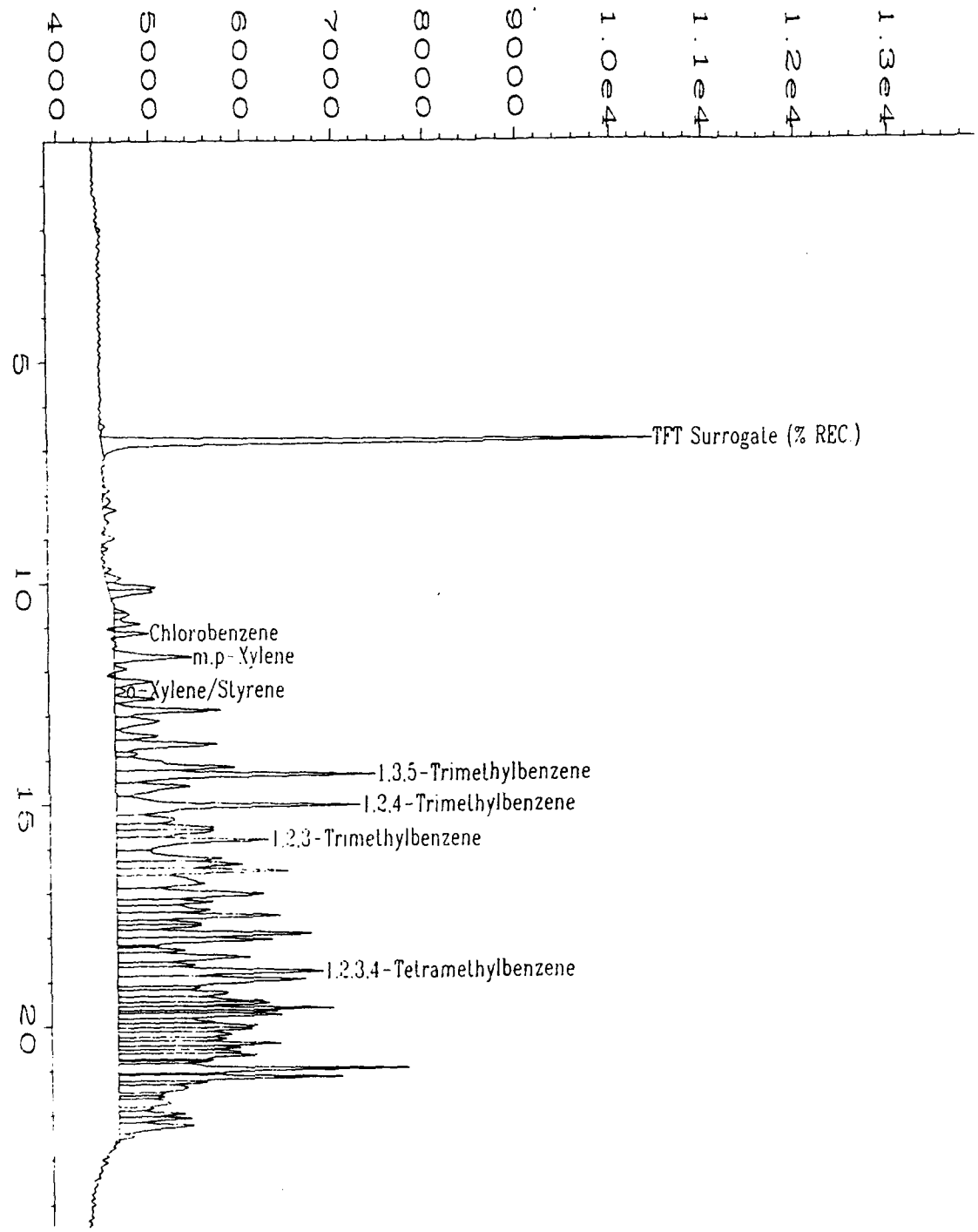
Surrogate Recovery (α,α,α-Trifluorotoluene):	87%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
** = See BX2032326 for noted values, df = 5, 03/24/95.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

K. Cone
Approved



Data File Name : C:\HPCHEM\2\DATA\BX20322\029R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04339 DF=125
Run Time Bar Code:
Acquired on : 23 Mar 95 08:04 AM
Report Created on: 23 Mar 95 08:30 AM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 125
Sample Info : Project#: 95-0871 Client#: 75MP-2(2-4) Soil

Page Number : 1
Vial Number : 29
Injection Number : 1
Sequence Line : 7
Instrument Method: BX2032
Analysis Method : BX2032
Sample Amount : 0
ISTD Amount :

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BTEX Data Report

		Client Project No.	: 722450.21020
Client Sample Number	: 75MP-2(8-10)		MacDill AFB
Lab Sample Number	: X04340	Lab Project No.	: 95-0871
Date Sampled	: 3/13/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/22/95	Matrix	: Soil
Date Analyzed	: 3/22/95	Lab File No.	: BX2032213
Methanol Extract?	: No	Method Blank No.	: MB032295
% Moisture	: 17.39%		

Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2		U	4.8
Toluene	108-88-3		U	4.8
Ethyl Benzene	100-41-4		U	4.8
Total Xylenes	1330-20-7		U	4.8
Chlorobenzene	108-90-7		U	4.8
1,3,5-trimethylbenzene	108-67-8		U	4.8
1,2,4-trimethylbenzene	95-63-6		U	4.8
1,2,3-trimethylbenzene	526-73-8		U	4.8
1,2,3,4-tetramethylbenzene	488-23-3	5.0	J	4.8

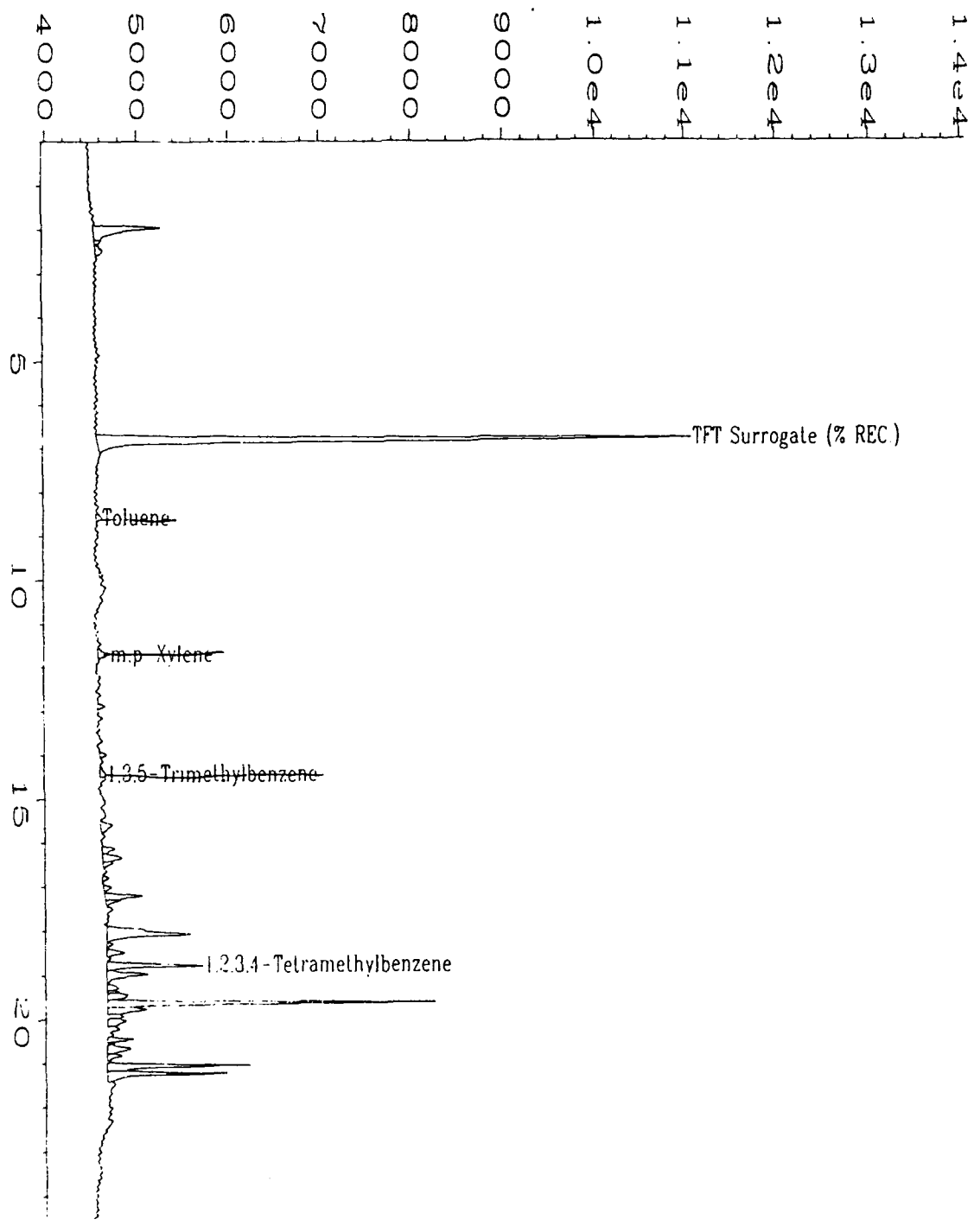
Surrogate Recovery (α,α,α-Trifluorotoluene):	94%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

K. Cone
Approved



Data File Name : C:\HPCHEM\2\DATA\BX20322\013R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04340 DF=1
Run Time Bar Code:
Acquired on : 22 Mar 95 08:11 PM
Report Created on: 22 Mar 95 08:36 PM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75MP-2(8-10) Soil

Page Number : 1
Vial Number : 13
Injection Number : 1
Sequence Line : 7
Instrument Method: BX2032
Analysis Method : BX2032
Sample Amount : 0
ISTD Amount :

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BTEX Data Report

Client Sample Number	: 75MP-2(8-10)	Client Project No.	: 722450.21020 MacDill AFB
Lab Sample Number	: X04340DUP	Lab Project No.	: 95-0871
Date Sampled	: 3/13/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/22/95	Matrix	: Soil
Date Analyzed	: 3/22/95	Lab File No.	: BX2032214
Methanol Extract?	: No	Method Blank No.	: MB032295
% Moisture	: 17.39%		

Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2		U	4.8
Toluene	108-88-3		U	4.8
Ethyl Benzene	100-41-4	1.2	J	4.8
Total Xylenes	1330-20-7	3.5	J	4.8
Chlorobenzene	108-90-7		U	4.8
1,3,5-trimethylbenzene	108-67-8		U	4.8
1,2,4-trimethylbenzene	95-63-6		U	4.8
1,2,3-trimethylbenzene	526-73-8		U	4.8
1,2,3,4-tetramethylbenzene	488-23-3	9.3		4.8

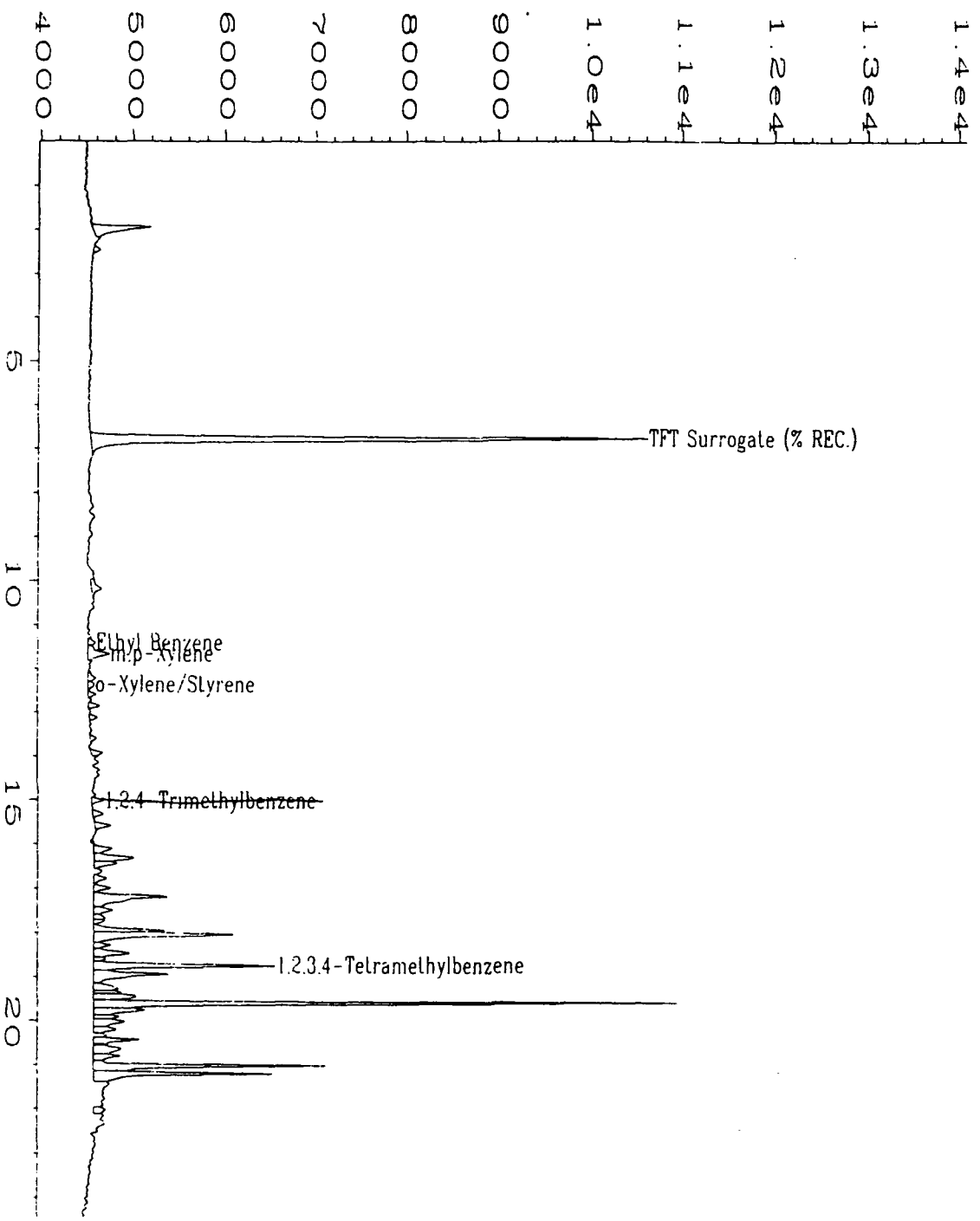
Surrogate Recovery (α,α,α-Trifluorotoluene):	87%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20322\014R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04340DUP DF=1
Run Time Bar Code:
Acquired on : 22 Mar 95 08:55 PM
Report Created on: 22 Mar 95 09:20 PM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75MP-2(8-10) Soil

Page Number : 1
Vial Number : 14
Injection Number : 1
Sequence Line : 7
Instrument Method: BX2032
Analysis Method : BX20322.mT
Sample Amount : 0
ISTD Amount :

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(303) 425-6021

BTEX Data Report

		Client Project No.	: 722450.21020
Client Sample Number	: 75MP-3(3-5)		MacDill AFB
Lab Sample Number	: X04344	Lab Project No.	: 95-0871
Date Sampled	: 3/14/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/22/95	Matrix	: Soil
Date Analyzed	: 3/23/95	Lab File No.	: BX2032222
Methanol Extract?	: No	Method Blank No.	: MB032295
% Moisture	: 15.00%		

Compound Name	Cas Number	Sample Concentration ug/kg	PQL ug/kg
Benzene	71-43-2	U	4.7
Toluene	108-88-3	U	4.7
Ethyl Benzene	100-41-4	U	4.7
Total Xylenes	1330-20-7	U	4.7
Chlorobenzene	108-90-7	U	4.7
1,3,5-trimethylbenzene	108-67-8	U	4.7
1,2,4-trimethylbenzene	95-63-6	U	4.7
1,2,3-trimethylbenzene	526-73-8	U	4.7
1,2,3,4-tetramethylbenzene	488-23-3	U	4.7

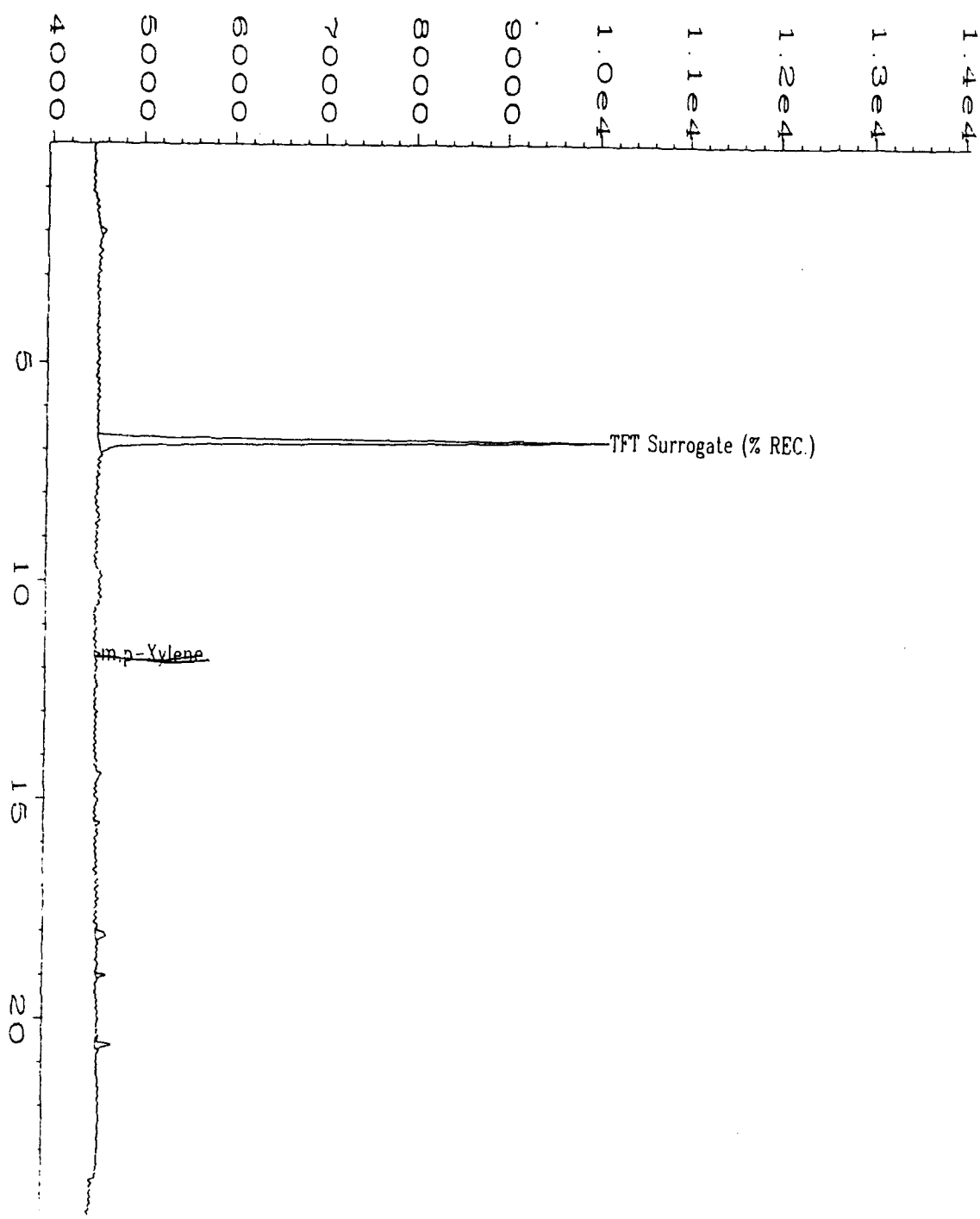
Surrogate Recovery (α,α,α-Trifluorotoluene):	83%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20322\022R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04344DUP DF=1
Run Time Bar Code:
Acquired on : 23 Mar 95 02:52 AM
Report Created on: 23 Mar 95 03:17 AM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75MP-3(3-5) Soil

Page Number : 1
Vial Number : 22
Injection Number : 1
Sequence Line : 7
Instrument Method: BX2032[illegible]
Analysis Method : BX20322.MT
Sample Amount : 0
ISTD Amount :

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BTEX Data Report

		Client Project No.	: 722450.21020 MacDill AFB
Client Sample Number	: 75MP-4(8-10)		
Lab Sample Number	: X04345	Lab Project No.	: 95-0871
Date Sampled	: 3/14/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/22/95	Matrix	: Soil
Date Analyzed	: 3/23/95	Lab File No.	: BX2032223
Methanol Extract?	: No	Method Blank No.	: MB032295
% Moisture	: 16.96%		

Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2		U	4.8
Toluene	108-88-3	0.9	J	4.8
Ethyl Benzene	100-41-4	16		4.8
Total Xylenes	1330-20-7	1.5	J	4.8
Chlorobenzene	108-90-7		U	4.8
1,3,5-trimethylbenzene	108-67-8		U	4.8
1,2,4-trimethylbenzene	95-63-6		U	4.8
1,2,3-trimethylbenzene	526-73-8		U	4.8
1,2,3,4-tetramethylbenzene	488-23-3	14		4.8

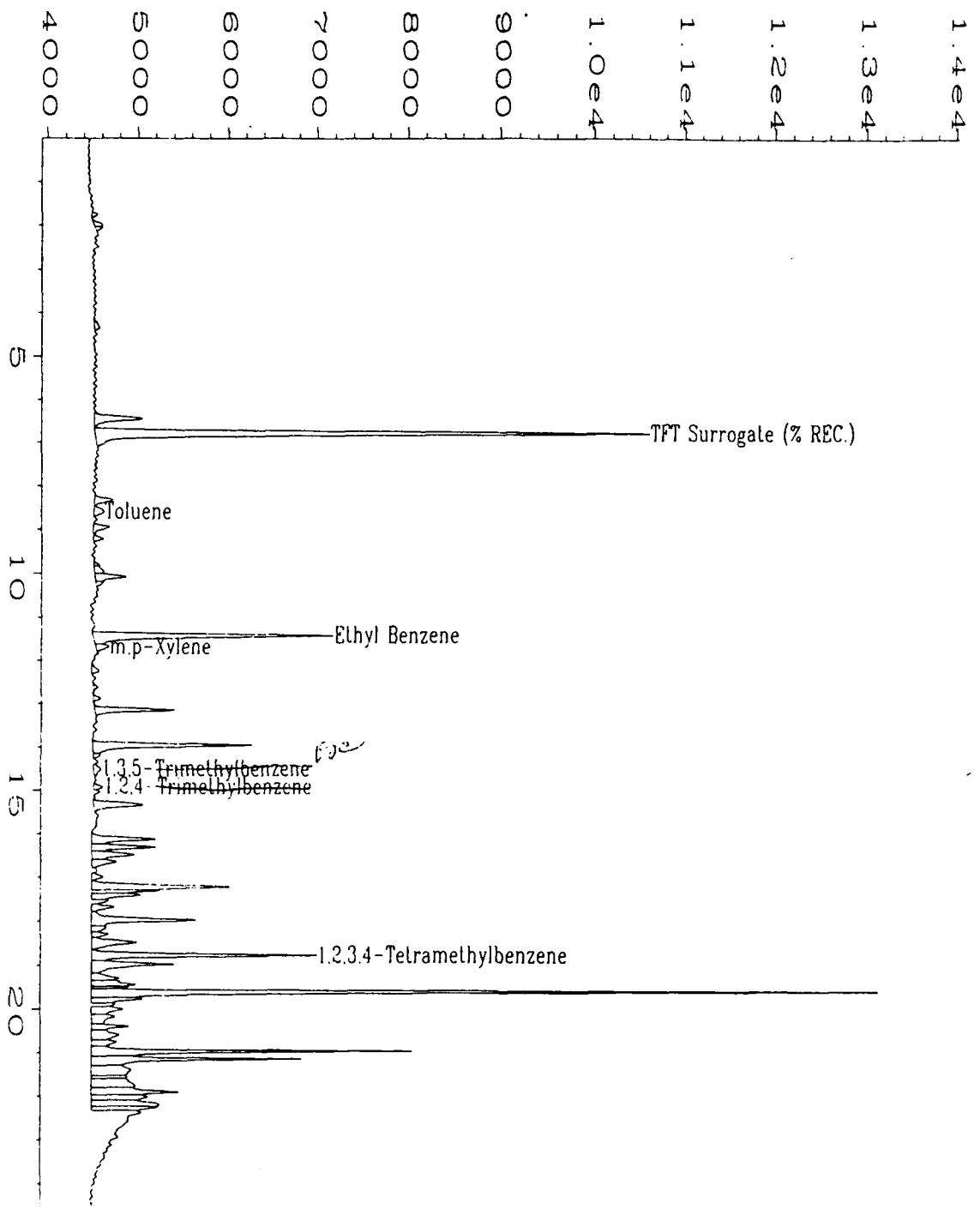
Surrogate Recovery (α,α,α-Trifluorotoluene):	87%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20322\023R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04345 DF=1
Run Time Bar Code:
Acquired on : 23 Mar 95 03:37 AM
Report Created on: 23 Mar 95 04:02 AM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75MP-4(8-10) Soil

Page Number : 1
Vial Number : 23
Injection Number : 1
Sequence Line : 7
Instrument Method: BX2032
Analysis Method : BX20322.M
Sample Amount : 0
ISTD Amount :

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BTEX Data Report

		Client Project No.	: 722450.21020 MacDill AFB
Client Sample Number	: 75MP-4(13-15)		
Lab Sample Number	: X04346	Lab Project No.	: 95-0871
Date Sampled	: 3/14/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/22/95	Matrix	: Soil
Date Analyzed	: 3/23/95	Lab File No.	: BX2032224
Methanol Extract?	: No	Method Blank No.	: MB032295
% Moisture	: 17.77%		

Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2		U	4.9
Toluene	108-88-3		U	4.9
Ethyl Benzene	100-41-4		U	4.9
Total Xylenes	1330-20-7		U	4.9
Chlorobenzene	108-90-7		U	4.9
1,3,5-trimethylbenzene	108-67-8		U	4.9
1,2,4-trimethylbenzene	95-63-6		U	4.9
1,2,3-trimethylbenzene	526-73-8		U	4.9
1,2,3,4-tetramethylbenzene	488-23-3	1.3	J	4.9

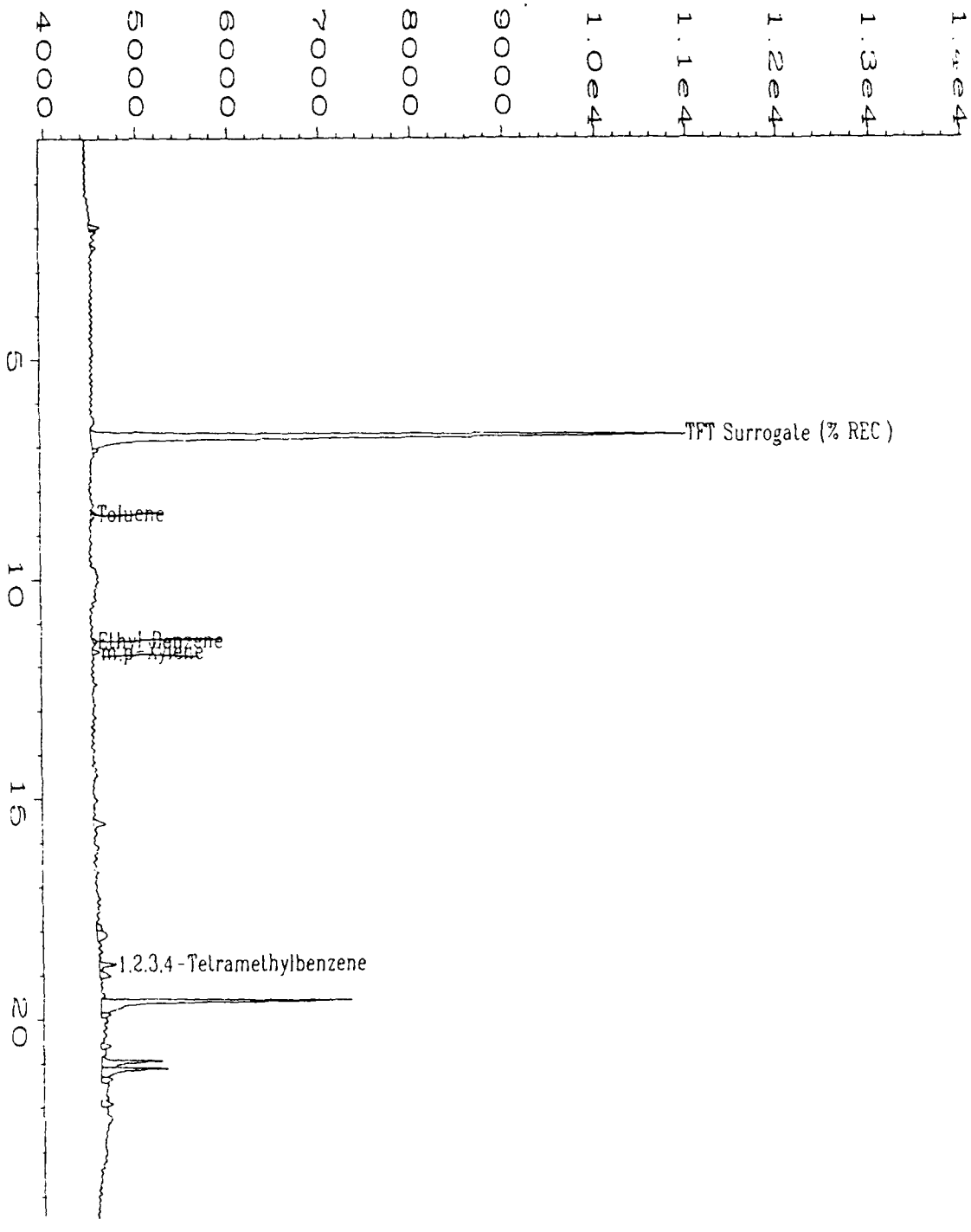
Surrogate Recovery (α,α,α-Trifluorotoluene):	95%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20322\024R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04346 DF=1
Run Time Bar Code:
Acquired on : 23 Mar 95 04:21 AM
Report Created on: 23 Mar 95 04:46 AM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75MP-4(13-15) Soil

Page Number : 1
Vial Number : 24
Injection Number : 1
Sequence Line : 7
Instrument Method: BX2032.
Analysis Method : BX20322.MT
Sample Amount : 0
ISTD Amount :

4/5/95

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BTEX Data Report

		Client Project No.	: 722450.21020 MacDill AFB
Client Sample Number	: 75MP-5(4-6)		
Lab Sample Number	: X04347	Lab Project No.	: 95-0871
Date Sampled	: 3/14/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/22/95	Matrix	: Soil
Date Analyzed	: 3/23/95	Lab File No.	: BX2032225
Methanol Extract?	: No	Method Blank No.	: MB032295
% Moisture	: 15.13%		

Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	U	4.7
Toluene	108-88-3	U	4.7
Ethyl Benzene	100-41-4	U	4.7
Total Xylenes	1330-20-7	U	4.7
Chlorobenzene	108-90-7	U	4.7
1,3,5-trimethylbenzene	108-67-8	U	4.7
1,2,4-trimethylbenzene	95-63-6	U	4.7
1,2,3-trimethylbenzene	526-73-8	U	4.7
1,2,3,4-tetramethylbenzene	488-23-3	U	4.7

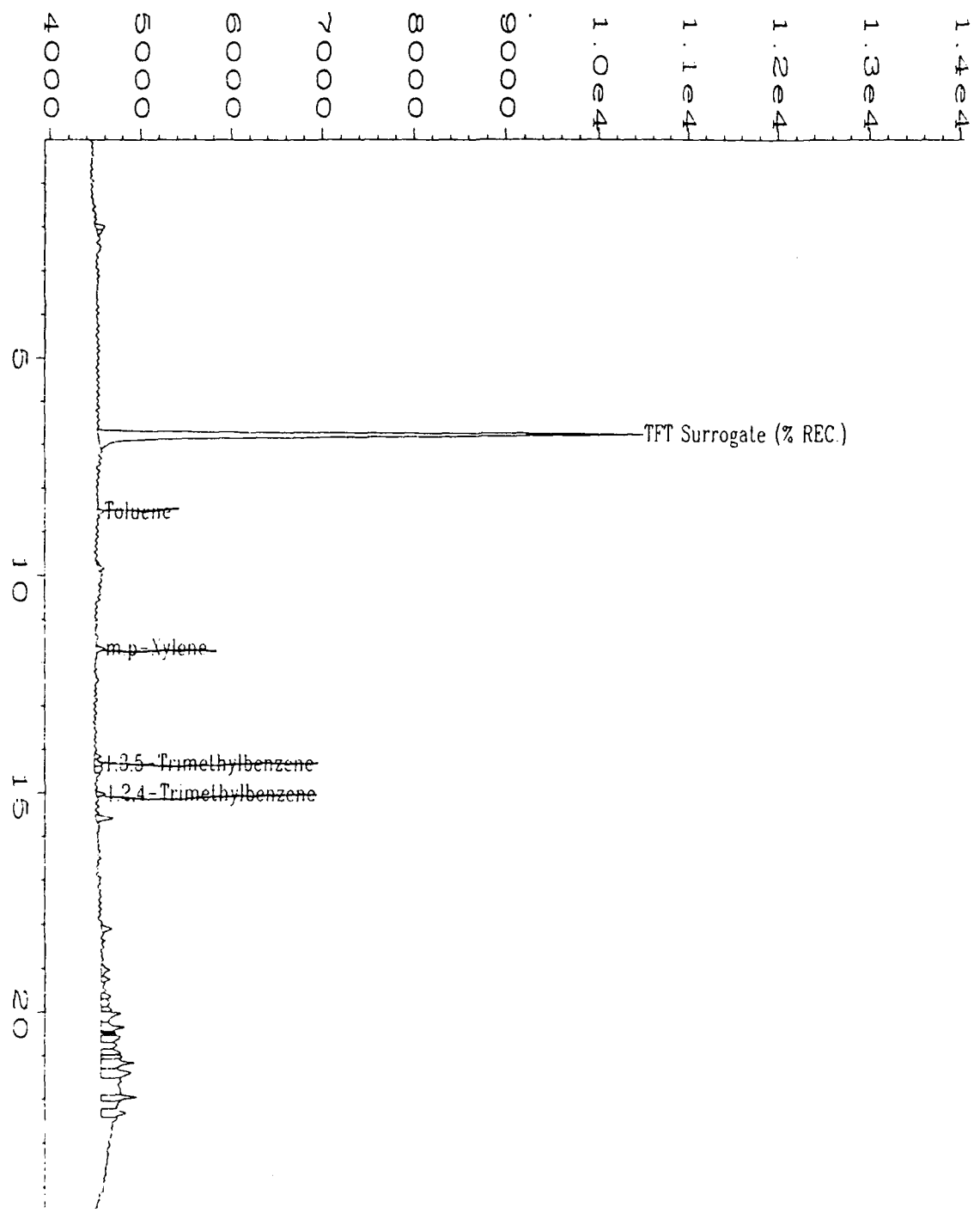
Surrogate Recovery (α,α,α-Trifluorotoluene):	88%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20322\025R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04347 DF=1
Run Time Bar Code:
Acquired on : 23 Mar 95 05:06 AM
Report Created on: 23 Mar 95 05:31 AM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75MP-5(4-6) Soil

Page Number : 1
Vial Number : 25
Injection Number : 1
Sequence Line : 7
Instrument Method: BX20322
Analysis Method : BX20322....
Sample Amount : 0
ISTD Amount :

jm 4/5/95

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(303) 425-6021

BTEX Data Report

Client Sample Number	: 75MP-5(6-8)	Client Project No.	: 722450.21020 MacDill AFB
Lab Sample Number	: X04348	Lab Project No.	: 95-0871
Date Sampled	: 3/14/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/22/95	Matrix	: Soil
Date Analyzed	: 3/23/95	Lab File No.	: BX2032226
Methanol Extract?	: No	Method Blank No.	: MB032295
% Moisture	: 17.55%		

Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	U	4.9
Toluene	108-88-3	U	4.9
Ethyl Benzene	100-41-4	U	4.9
Total Xylenes	1330-20-7	U	4.9
Chlorobenzene	108-90-7	U	4.9
1,3,5-trimethylbenzene	108-67-8	U	4.9
1,2,4-trimethylbenzene	95-63-6	U	4.9
1,2,3-trimethylbenzene	526-73-8	U	4.9
1,2,3,4-tetramethylbenzene	488-23-3	U	4.9

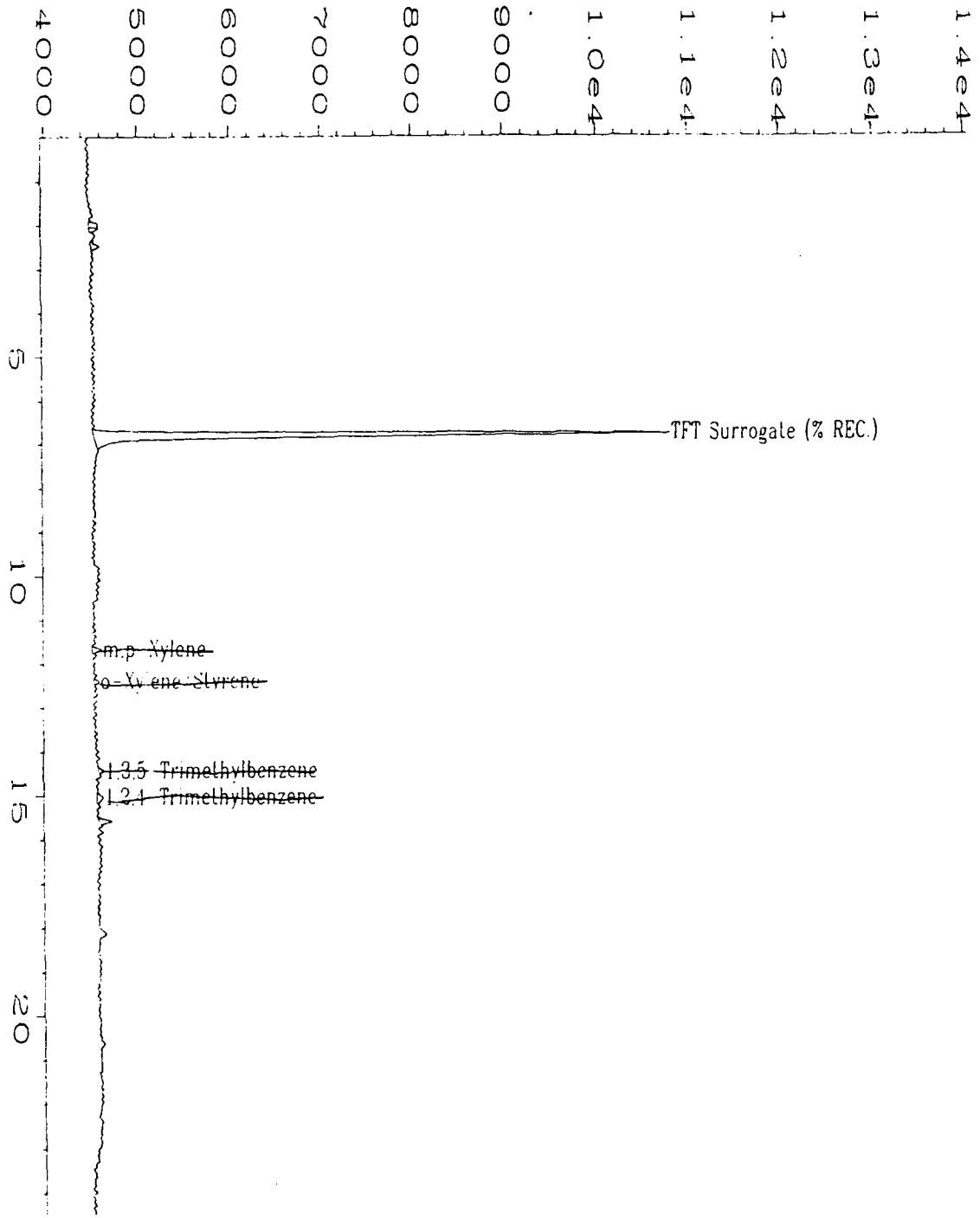
Surrogate Recovery (α,α,α-Trifluorotoluene):	91%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20322\026R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04348 DF=1
Run Time Bar Code:
Acquired on : 23 Mar 95 05:51 AM
Report Created on: 23 Mar 95 06:16 AM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75MP-5(6-8) Soil

Page Number : 1
Vial Number : 26
Injection Number : 1
Sequence Line : 7
Instrument Method: BX20322
Analysis Method : BX20322...
Sample Amount : 0
ISTD Amount :

pm 4/5/95

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BTEX Data Report

Client Sample Number	: 75MP-7(6-8)	Client Project No.	: 722450.21020 MacDill AFB
Lab Sample Number	: X04360	Lab Project No.	: 95-0871
Date Sampled	: 3/15/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/23/95	Matrix	: Soil
Date Analyzed	: 3/24/95	Lab File No.	: BX2032322
Methanol Extract?	: No	Method Blank No.	: MB032395
% Moisture	: 16.80%		

Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2		U	4.8
Toluene	108-88-3		U	4.8
Ethyl Benzene	100-41-4		U	4.8
Total Xylenes	1330-20-7		U	4.8
Chlorobenzene	108-90-7		U	4.8
1,3,5-trimethylbenzene	108-67-8	0.6	J	4.8
1,2,4-trimethylbenzene	95-63-6	0.5	J	4.8
1,2,3-trimethylbenzene	526-73-8		U	4.8
1,2,3,4-tetramethylbenzene	488-23-3	0.7	J	4.8

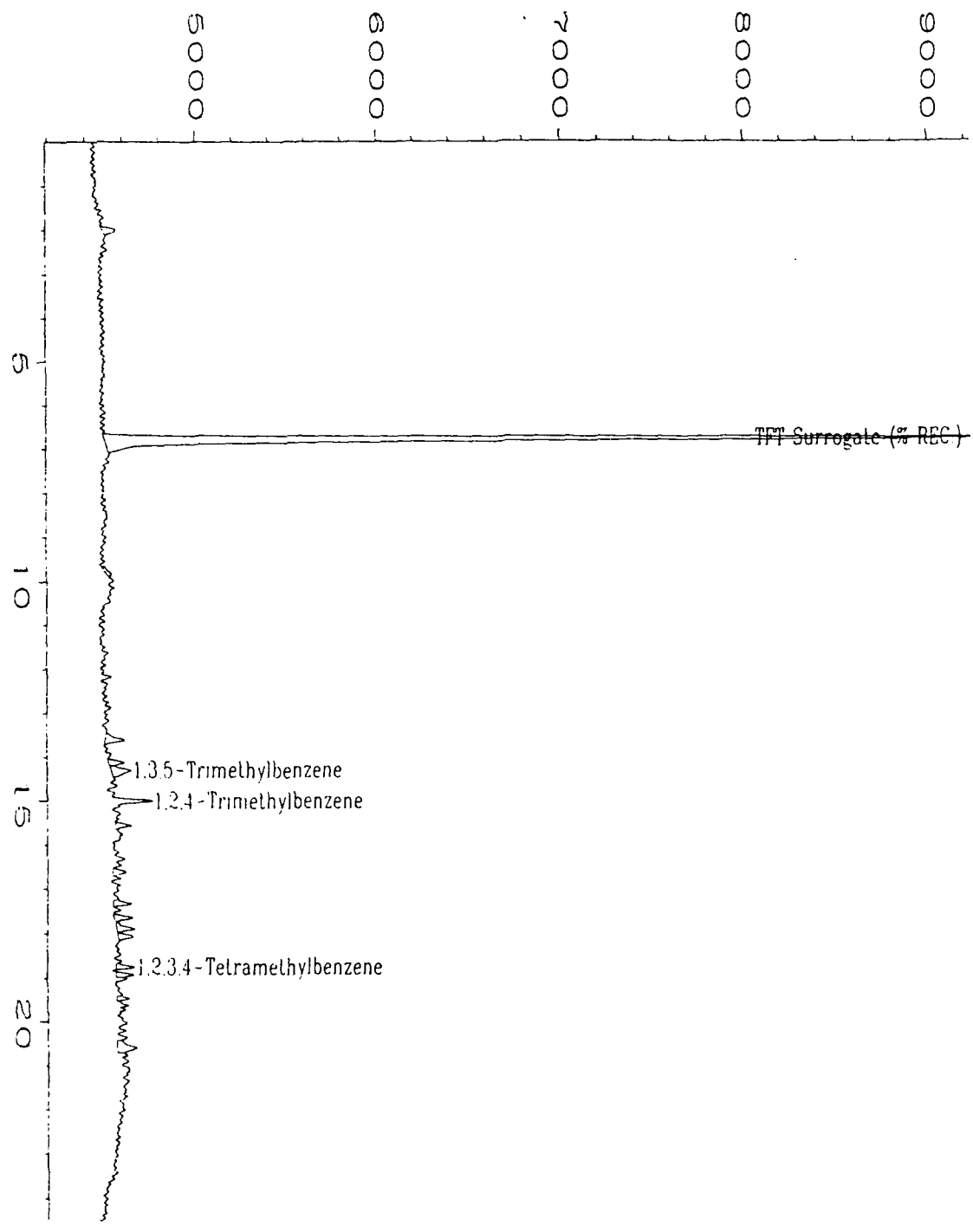
Surrogate Recovery (α,α,α-Trifluorotoluene):	93%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

K. Cone
Approved



Data File Name : C:\HPCHEM\2\DATA\BX20323\022R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04360 DF=1
Run Time Bar Code:
Acquired on : 24 Mar 95 02:52 AM
Report Created on: 24 Mar 95 03:17 AM
Last Recalib on : 23 Mar 95 03:56 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75MP-7(6-8) Soil

Page Number : 1
Vial Number : 22
Injection Number : 1
Sequence Line : 8
Instrument Method: BX20323
Analysis Method : BX20323.m
Sample Amount : 0
ISTD Amount :

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BTEX Data Report

		Client Project No.	: 722450.21020
Client Sample Number	: 75MP-7(6-8)		MacDill AFB
Lab Sample Number	: X04360DUP	Lab Project No.	: 95-0871
Date Sampled	: 3/15/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/23/95	Matrix	: Soil
Date Analyzed	: 3/24/95	Lab File No.	: BX2032323
Methanol Extract?	: No	Method Blank No.	: MB032395
% Moisture	: 16.80%		

Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2		U	4.8
Toluene	108-88-3		U	4.8
Ethyl Benzene	100-41-4		U	4.8
Total Xylenes	1330-20-7		U	4.8
Chlorobenzene	108-90-7		U	4.8
1,3,5-trimethylbenzene	108-67-8	1.2	J	4.8
1,2,4-trimethylbenzene	95-63-6	1.2	J	4.8
1,2,3-trimethylbenzene	526-73-8		U	4.8
1,2,3,4-tetramethylbenzene	488-23-3	1.4	J	4.8

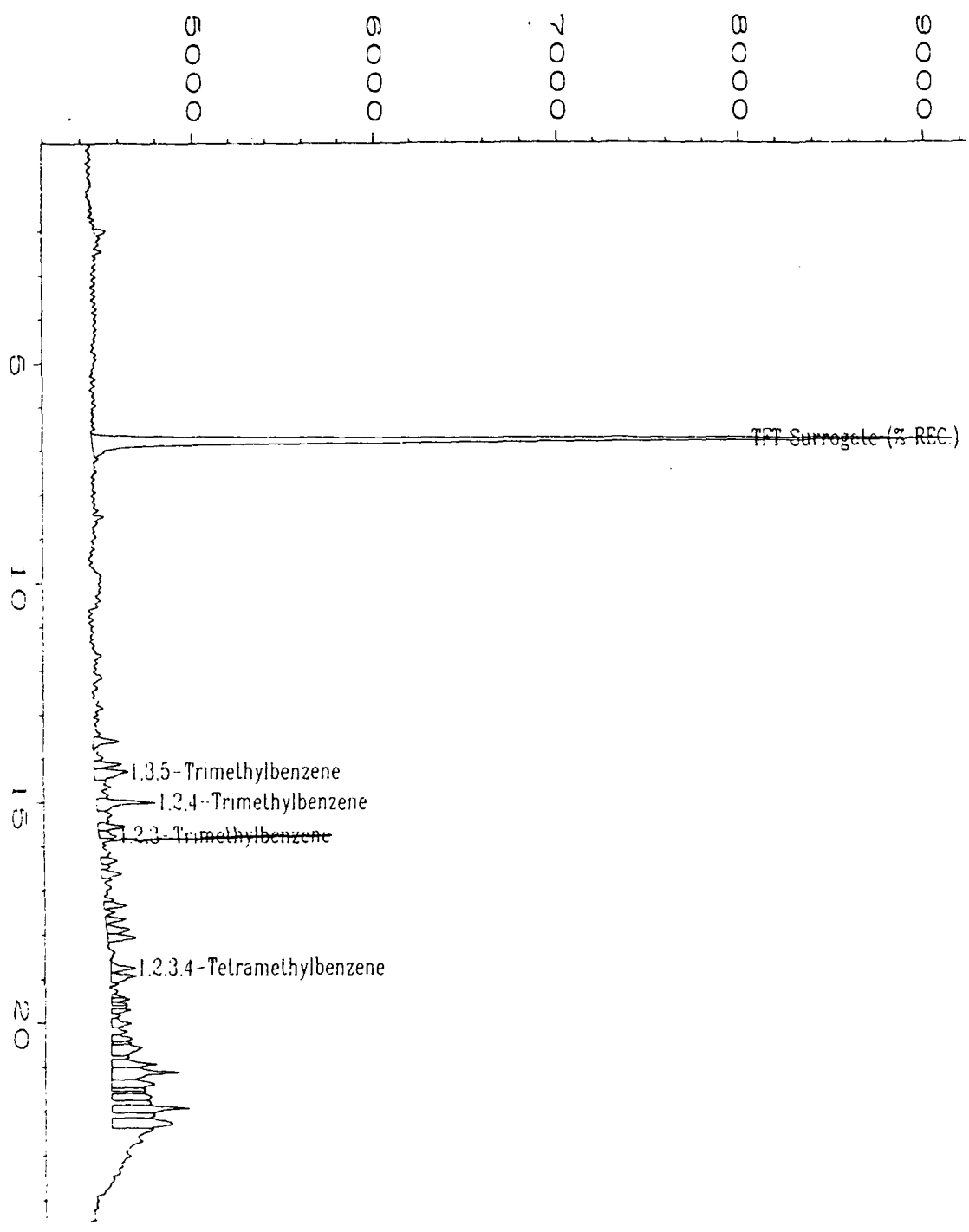
Surrogate Recovery (α,α,α-Trifluorotoluene):	88%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

K. Cone
Approved



Data File Name : C:\HPCHEM\2\DATA\BX20323\023R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04360DUP DF=1
Run Time Bar Code:
Acquired on : 24 Mar 95 03:38 AM
Report Created on: 24 Mar 95 04:03 AM
Last Recalib on : 23 Mar 95 03:56 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75MP-7(6-8) Soil

Page Number : 1
Vial Number : 23
Injection Number : 1
Sequence Line : 8
Instrument Method: BX2032
Analysis Method : BX2032
Sample Amount : 0
ISTD Amount :

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BTEX Data Report

		Client Project No.	: 722450.21020
Client Sample Number	: 75SD-1		MacDill AFB
Lab Sample Number	: X04353	Lab Project No.	: 95-0871
Date Sampled	: 3/15/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/23/95	Matrix	: Soil
Date Analyzed	: 3/23/95	Lab File No.	: BX2032312
Methanol Extract?	: No	Method Blank No.	: MB032395
% Moisture	: 10.69%		

Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	U	4.5
Toluene	108-88-3	U	4.5
Ethyl Benzene	100-41-4	U	4.5
Total Xylenes	1330-20-7	U	4.5
Chlorobenzene	108-90-7	U	4.5
1,3,5-trimethylbenzene	108-67-8	U	4.5
1,2,4-trimethylbenzene	95-63-6	U	4.5
1,2,3-trimethylbenzene	526-73-8	U	4.5
1,2,3,4-tetramethylbenzene	488-23-3	U	4.5

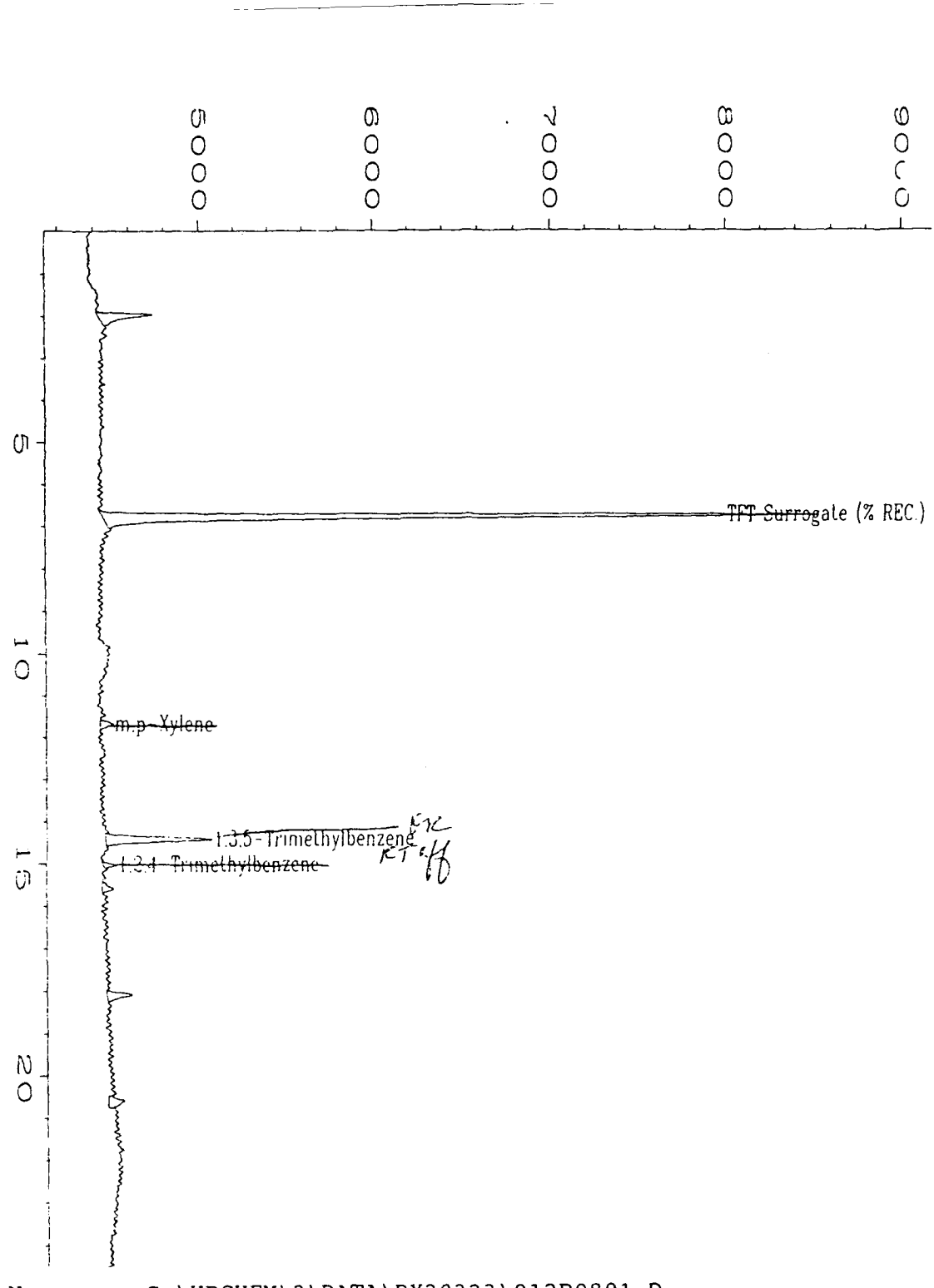
Surrogate Recovery (α,α,α-Trifluorotoluene):	75%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

K Cone
Approved



Data File Name : C:\HPCHEM\2\DATA\BX20323\012R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04353 DF=1
Run Time Bar Code:
Acquired on : 23 Mar 95 07:20 PM
Report Created on: 23 Mar 95 07:45 PM
Last Recalib on : 23 Mar 95 03:56 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75SD-1 Soil

Page Number : 1
Vial Number : 12
Injection Number : 1
Sequence Line : 8
Instrument Method: BX20? MT
Analysis Method : BX203. .MT
Sample Amount : 0
ISTD Amount :

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BTEX Data Report

Client Sample Number	: 75SD-1	Client Project No.	: 722450.21020 MacDill AFB
Lab Sample Number	: X04353DUP	Lab Project No.	: 95-0871
Date Sampled	: 3/15/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/23/95	Matrix	: Soil
Date Analyzed	: 3/23/95	Lab File No.	: BX2032313
Methanol Extract?	: No	Method Blank No.	: MB032395
% Moisture	: 10.69%		

Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	U	4.5
Toluene	108-88-3	U	4.5
Ethyl Benzene	100-41-4	U	4.5
Total Xylenes	1330-20-7	U	4.5
Chlorobenzene	108-90-7	U	4.5
1,3,5-trimethylbenzene	108-67-8	U	4.5
1,2,4-trimethylbenzene	95-63-6	U	4.5
1,2,3-trimethylbenzene	526-73-8	U	4.5
1,2,3,4-tetramethylbenzene	488-23-3	U	4.5

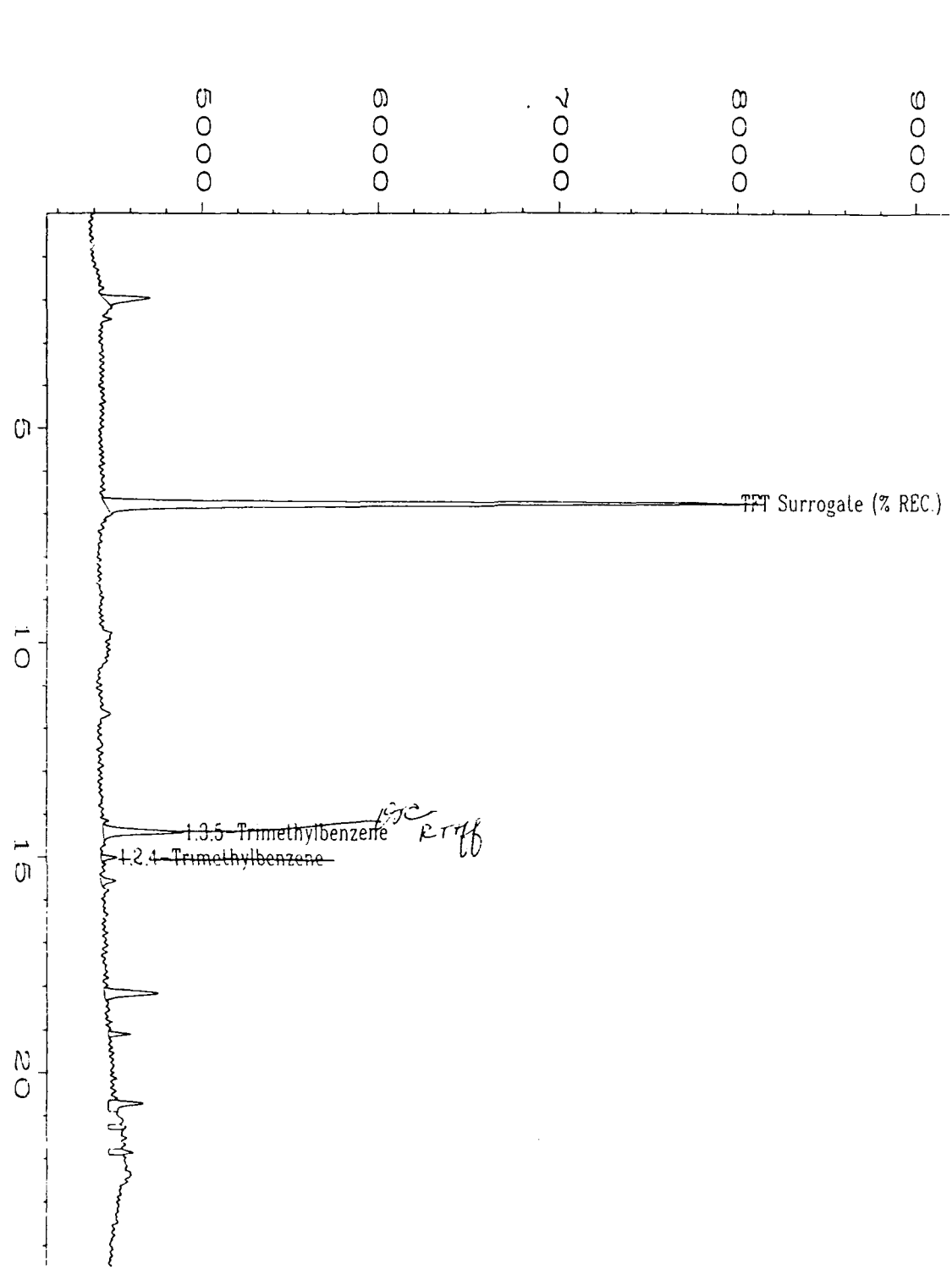
Surrogate Recovery (α,α,α-Trifluorotoluene):	68%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available

Analyst

K. Cone
Approved



Data File Name : C:\HPCHEM\2\DATA\BX20323\013R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04353DUP DF=1
Run Time Bar Code:
Acquired on : 23 Mar 95 08:05 PM
Report Created on: 23 Mar 95 08:30 PM
Last Recalib on : 23 Mar 95 03:56 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75SD-1 Soil

Page Number : 1
Vial Number : 13
Injection Number : 1
Sequence Line : 8
Instrument Method: BX2032[illegible]
Analysis Method : BX203[illegible]
Sample Amount : 0
ISTD Amount :

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BTEX Data Report

Client Sample Number	: 75SD-2	Client Project No.	: 722450.21020 MacDill AFB
Lab Sample Number	: X04354	Lab Project No.	: 95-0871
Date Sampled	: 3/15/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/23/95	Matrix	: Soil
Date Analyzed	: 3/23/95	Lab File No.	: BX2032314
Methanol Extract?	: No	Method Blank No.	: MB032395
% Moisture	: 10.72%		

Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2		U	4.5
Toluene	108-88-3		U	4.5
Ethyl Benzene	100-41-4		U	4.5
Total Xylenes	1330-20-7	1.0	J	4.5
Chlorobenzene	108-90-7		U	4.5
1,3,5-trimethylbenzene	108-67-8		U	4.5
1,2,4-trimethylbenzene	95-63-6	0.4	J	4.5
1,2,3-trimethylbenzene	526-73-8		U	4.5
1,2,3,4-tetramethylbenzene	488-23-3		U	4.5

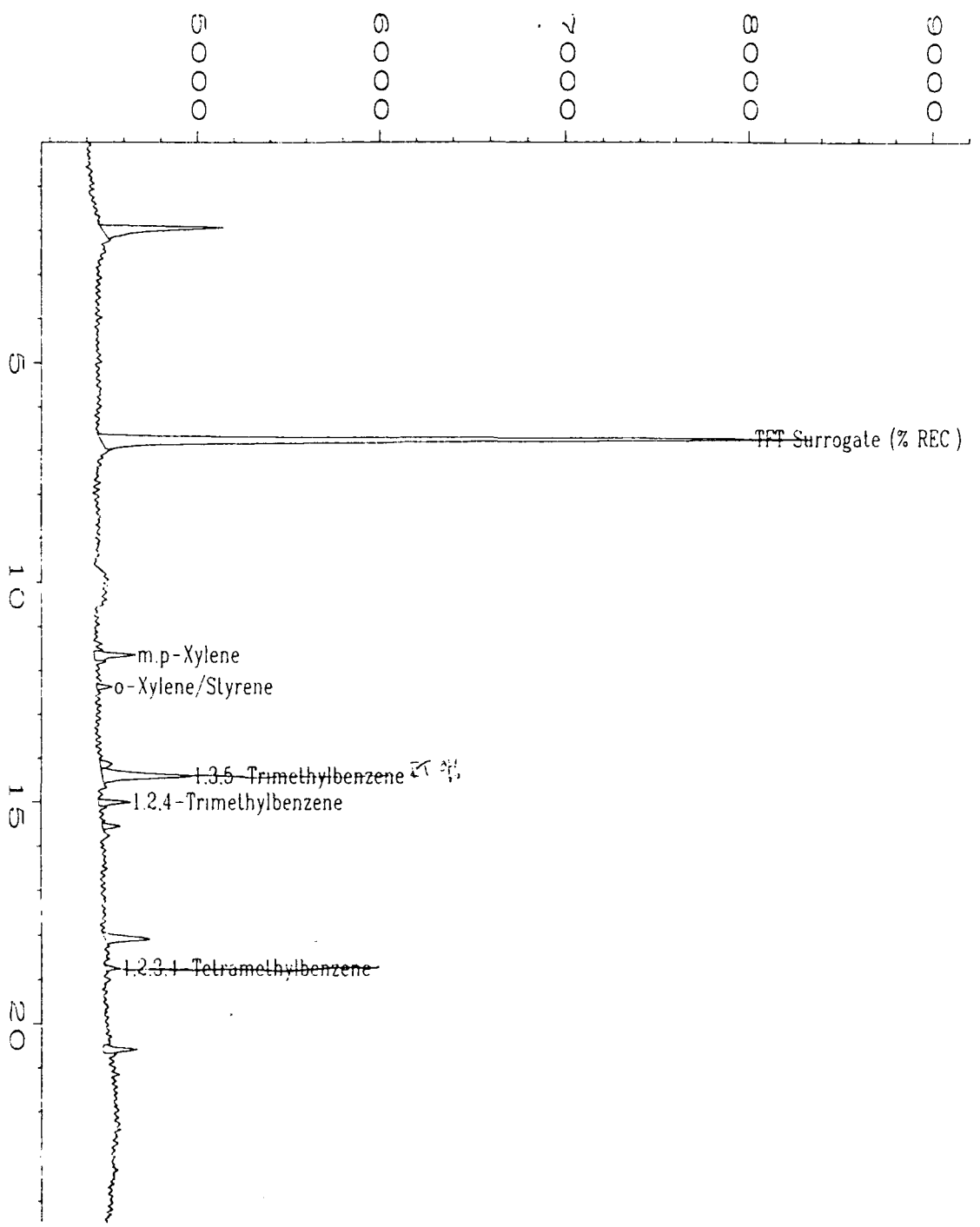
Surrogate Recovery (α,α,α-Trifluorotoluene):	71%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

K. Cone
Approved



Data File Name : C:\HPCHEM\2\DATA\BX20323\014R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04354 DF=1
Run Time Bar Code:
Acquired on : 23 Mar 95 08:49 PM
Report Created on: 23 Mar 95 09:14 PM
Last Recalib on : 23 Mar 95 03:56 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75SD-2 Soil

Page Number : 1
Vial Number : 14
Injection Number : 1
Sequence Line : 8
Instrument Method: BX2032[illegible]
Analysis Method : BX203[illegible]
Sample Amount : 0
ISTD Amount :

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(303) 425-6021

BTEX Data Report

		Client Project No.	: 722450.21020 MacDill AFB
Client Sample Number	: 75SD-3		
Lab Sample Number	: X04355	Lab Project No.	: 95-0871
Date Sampled	: 3/15/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/23/95	Matrix	: Soil
Date Analyzed	: 3/23/95	Lab File No.	: BX2032317
Methanol Extract?	: No	Method Blank No.	: MB032395
% Moisture	: 11.87%		

Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2		U	4.5
Toluene	108-88-3		U	4.5
Ethyl Benzene	100-41-4		U	4.5
Total Xylenes	1330-20-7	0.9	J	4.5
Chlorobenzene	108-90-7		U	4.5
1,3,5-trimethylbenzene	108-67-8		U	4.5
1,2,4-trimethylbenzene	95-63-6		U	4.5
1,2,3-trimethylbenzene	526-73-8		U	4.5
1,2,3,4-tetramethylbenzene	488-23-3		U	4.5

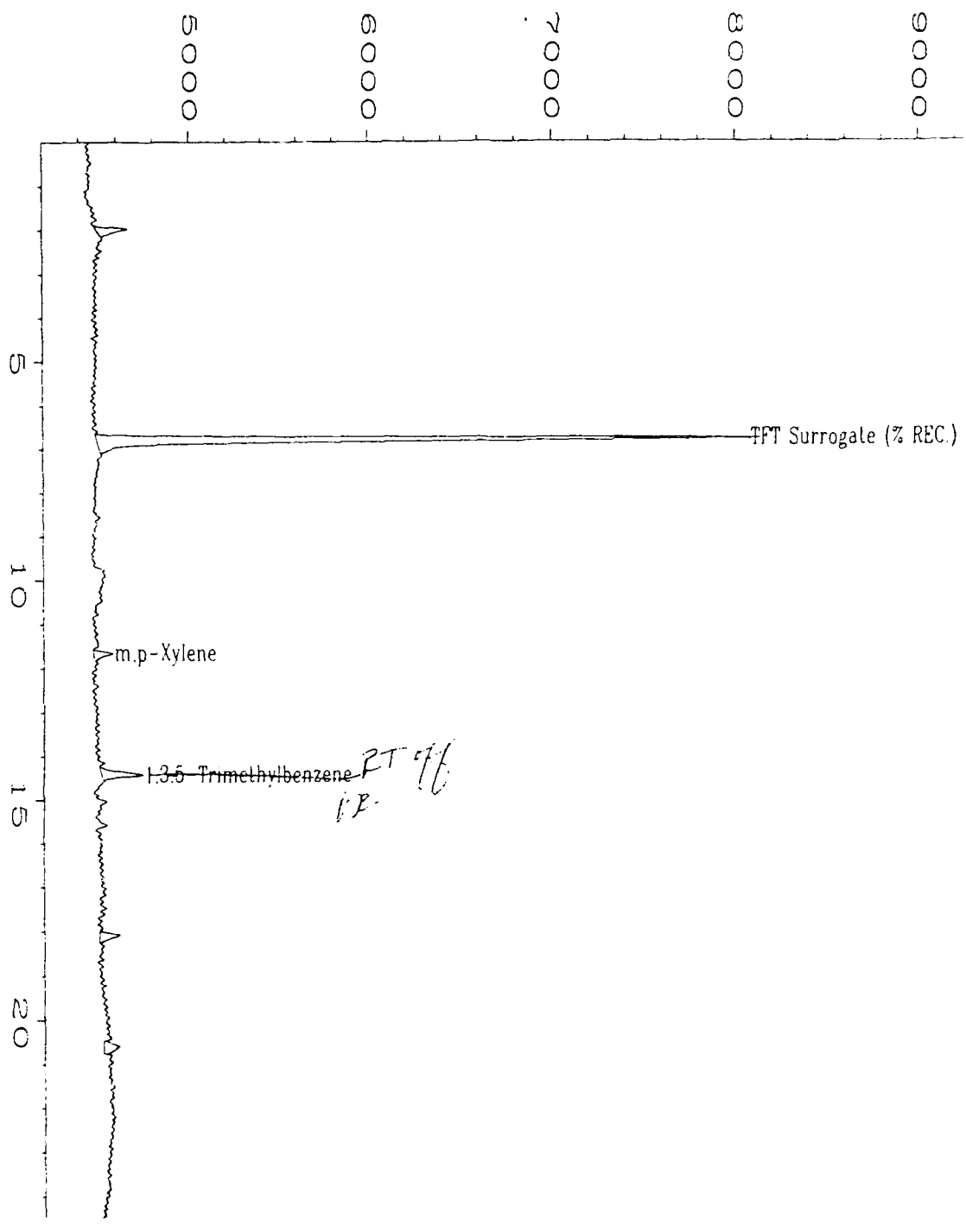
Surrogate Recovery (α,α,α-Trifluorotoluene):	66%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20323\017R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04355 DF=1
Run Time Bar Code:
Acquired on : 23 Mar 95 11:05 PM
Report Created on: 23 Mar 95 11:30 PM
Last Recalib on : 23 Mar 95 03:56 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75SD-3 Soil

Page Number : 1
Vial Number : 17
Injection Number : 1
Sequence Line : 8
Instrument Method: BX2032
Analysis Method : BX2032
Sample Amount : 0
ISTD Amount :

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BTEX Data Report

Client Sample Number	: 75SD-4	Client Project No.	: 722450.21020 MacDill AFB
Lab Sample Number	: X04356	Lab Project No.	: 95-0871
Date Sampled	: 3/15/95	Dilution Factor	: 5.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/23/95	Matrix	: Soil
Date Analyzed	: 3/23/95	Lab File No.	: BX2032318
Methanol Extract?	: No	Method Blank No.	: MB032395
% Moisture	: 37.24%		

Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2		U	32
Toluene	108-88-3		U	32
Ethyl Benzene	100-41-4		U	32
Total Xylenes	1330-20-7		U	32
Chlorobenzene	108-90-7		U	32
1,3,5-trimethylbenzene	108-67-8		U	32
1,2,4-trimethylbenzene	95-63-6		U	32
1,2,3-trimethylbenzene	526-73-8		U	32
1,2,3,4-tetramethylbenzene	488-23-3	9.6	J	32

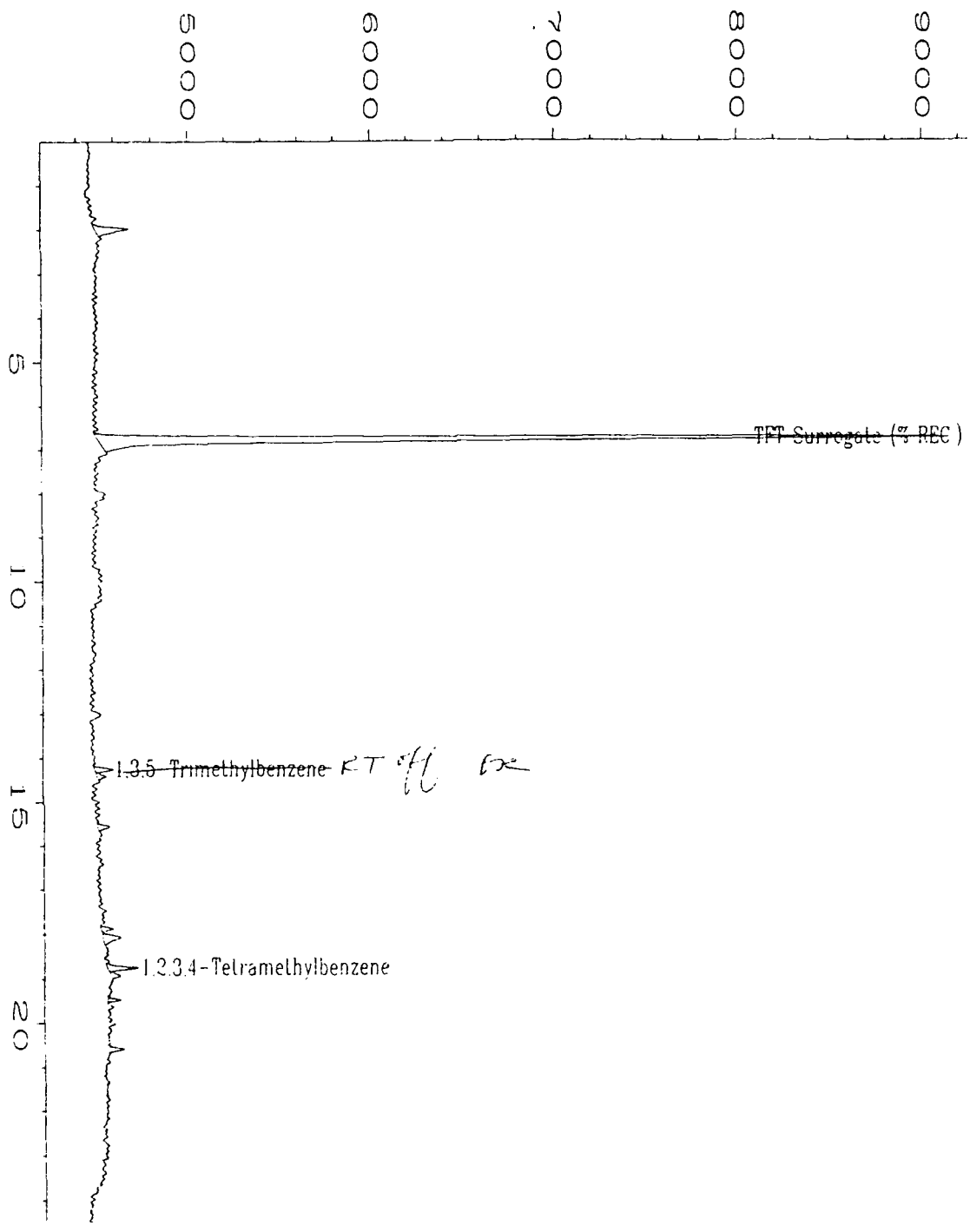
Surrogate Recovery (α,α,α-Trifluorotoluene):	85%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20323\018R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04356 DF=5
Run Time Bar Code:
Acquired on : 23 Mar 95 11:50 PM
Report Created on: 24 Mar 95 00:15 AM
Last Recalib on : 23 Mar 95 03:56 PM
Multiplier : 5
Sample Info : Project#: 95-0871 Client#: 75SD-4 Soil

Page Number : 1
Vial Number : 18
Injection Number : 1
Sequence Line : 8
Instrument Method: BX2(3.1
Analysis Method : BX2(3.1
Sample Amount : 0
ISTD Amount :

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BTEX Data Report

		Client Project No.	: 722450.21020
Client Sample Number	: 75SS-3(3-4)		MacDill AFB
Lab Sample Number	: X04341	Lab Project No.	: 95-0871
Date Sampled	: 3/13/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/22/95	Matrix	: Soil
Date Analyzed	: 3/22/95	Lab File No.	: BX2032215
Methanol Extract?	: No	Method Blank No.	: MB032295
% Moisture	: 14.37%		

Compound Name	Cas Number	Sample Concentration* ug/kg		PQL * ug/kg
Benzene	71-43-2		U	4.7
Toluene	108-88-3		U	4.7
Ethyl Benzene	100-41-4		U	4.7
Total Xylenes	1330-20-7	0.7	J	4.7
Chlorobenzene	108-90-7		U	4.7
1,3,5-trimethylbenzene	108-67-8		U	4.7
1,2,4-trimethylbenzene	95-63-6		U	4.7
1,2,3-trimethylbenzene	526-73-8		U	4.7
1,2,3,4-tetramethylbenzene	488-23-3		U	4.7

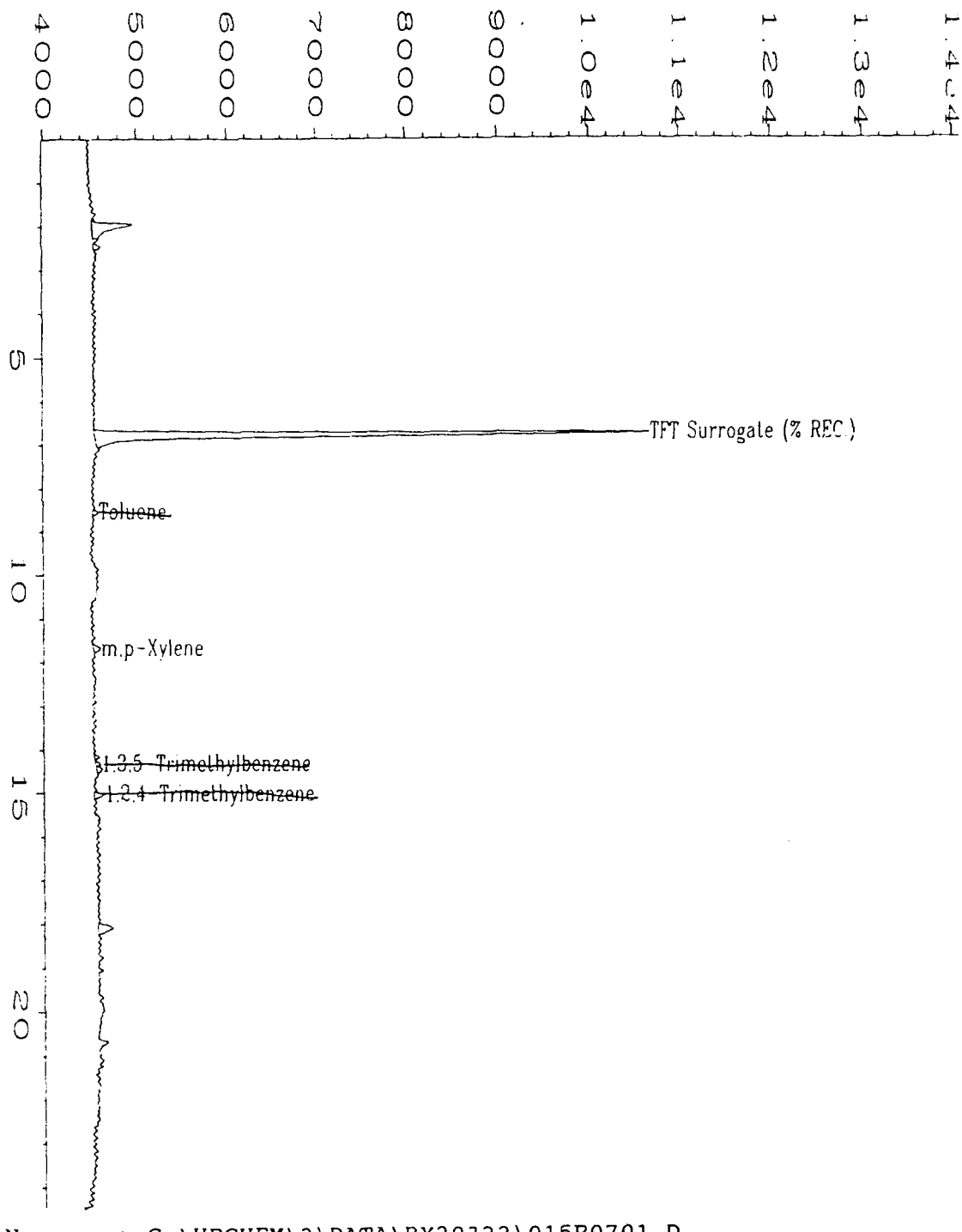
Surrogate Recovery (α,α,α-Trifluorotoluene):	91%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

K. Done
Approved



Data File Name : C:\HPCHEM\2\DATA\BX20322\015R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04341 DF=1
Run Time Bar Code:
Acquired on : 22 Mar 95 09:40 PM
Report Created on: 22 Mar 95 10:05 PM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75SS-3(3-4) Soil

Page Number : 1
Vial Number : 15
Injection Number : 1
Sequence Line : 7
Instrument Method: BX2032
Analysis Method : BX2032
Sample Amount : 0
ISTD Amount :

pm 4/5/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

Client Sample Number	: 75SS-3(8-10)	Client Project No.	: 722450.21020 MacDill AFB
Lab Sample Number	: X04342	Lab Project No.	: 95-0871
Date Sampled	: 3/13/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/22/95	Matrix	: Soil
Date Analyzed	: 3/22/95	Lab File No.	: BX2032218
Methanol Extract?	: No	Method Blank No.	: MB032295
% Moisture	: 17.99%		

Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2		U	4.9
Toluene	108-88-3		U	4.9
Ethyl Benzene	100-41-4		U	4.9
Total Xylenes	1330-20-7		U	4.9
Chlorobenzene	108-90-7		U	4.9
1,3,5-trimethylbenzene	108-67-8		U	4.9
1,2,4-trimethylbenzene	95-63-6		U	4.9
1,2,3-trimethylbenzene	526-73-8		U	4.9
1,2,3,4-tetramethylbenzene	488-23-3	1.9	J	4.9

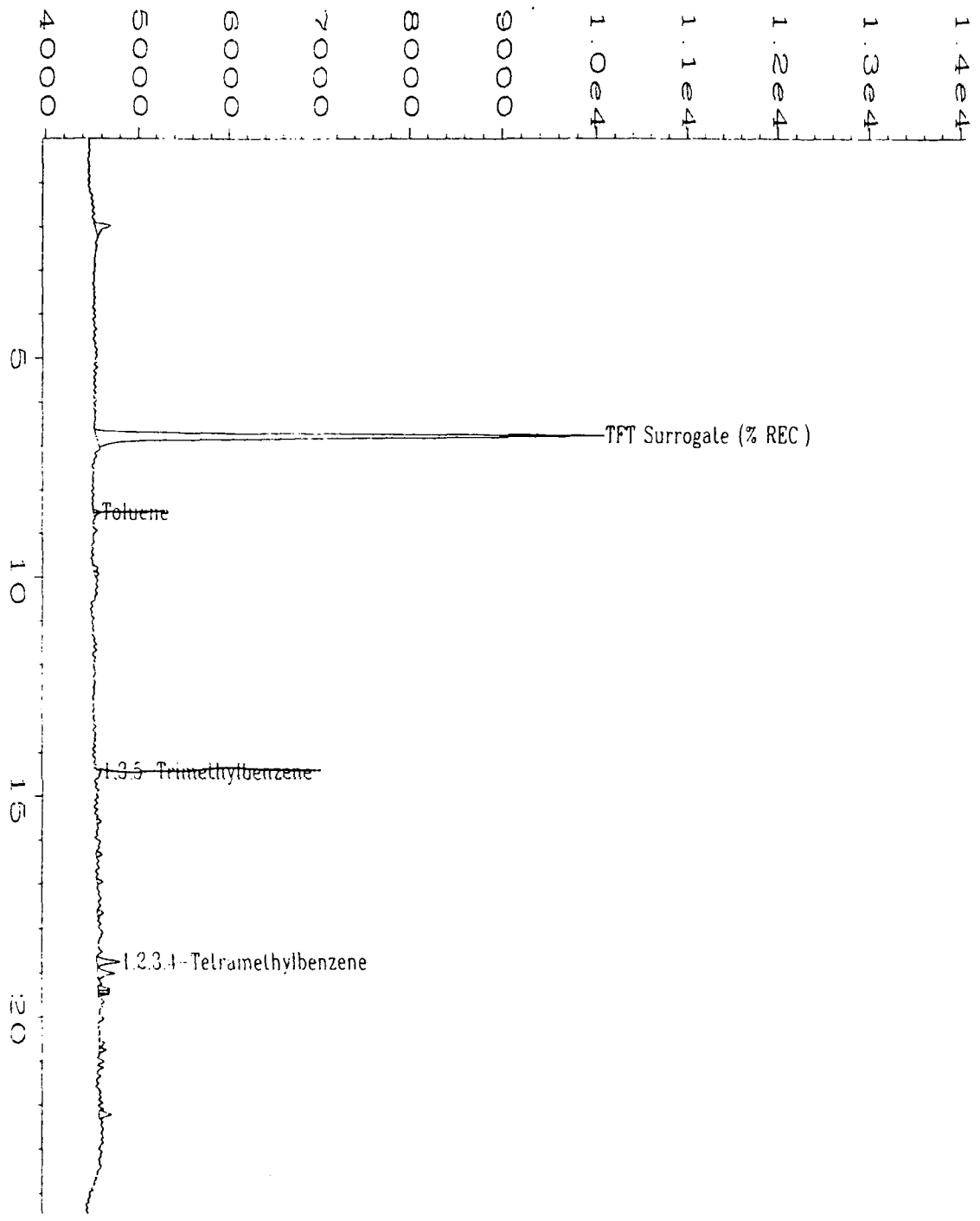
Surrogate Recovery (α,α,α-Trifluorotoluene):	81%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20322\018R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04342 DF=1
Run Time Bar Code:
Acquired on : 22 Mar 95 11:53 PM
Report Created on: 23 Mar 95 00:19 AM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75SS-3(8-10) Soil

Page Number : 1
Vial Number : 18
Injection Number : 1
Sequence Line : 7
Instrument Method: BX2032
Analysis Method : BX20322.MT
Sample Amount : 0
ISTD Amount :

4/11/95

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4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

		Client Project No.	: 722450.21020 MacDill AFB
Client Sample Number	: 75SS-6(3-5)		
Lab Sample Number	: X04350	Lab Project No.	: 95-0871
Date Sampled	: 3/15/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/22/95	Matrix	: Soil
Date Analyzed	: 3/23/95	Lab File No.	: BX2032228
Methanol Extract?	: No	Method Blank No.	: MB032295
% Moisture	: 15.12%		

Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	U	4.7
Toluene	108-88-3	U	4.7
Ethyl Benzene	100-41-4	U	4.7
Total Xylenes	1330-20-7	U	4.7
Chlorobenzene	108-90-7	U	4.7
1,3,5-trimethylbenzene	108-67-8	U	4.7
1,2,4-trimethylbenzene	95-63-6	U	4.7
1,2,3-trimethylbenzene	526-73-8	U	4.7
1,2,3,4-tetramethylbenzene	488-23-3	U	4.7

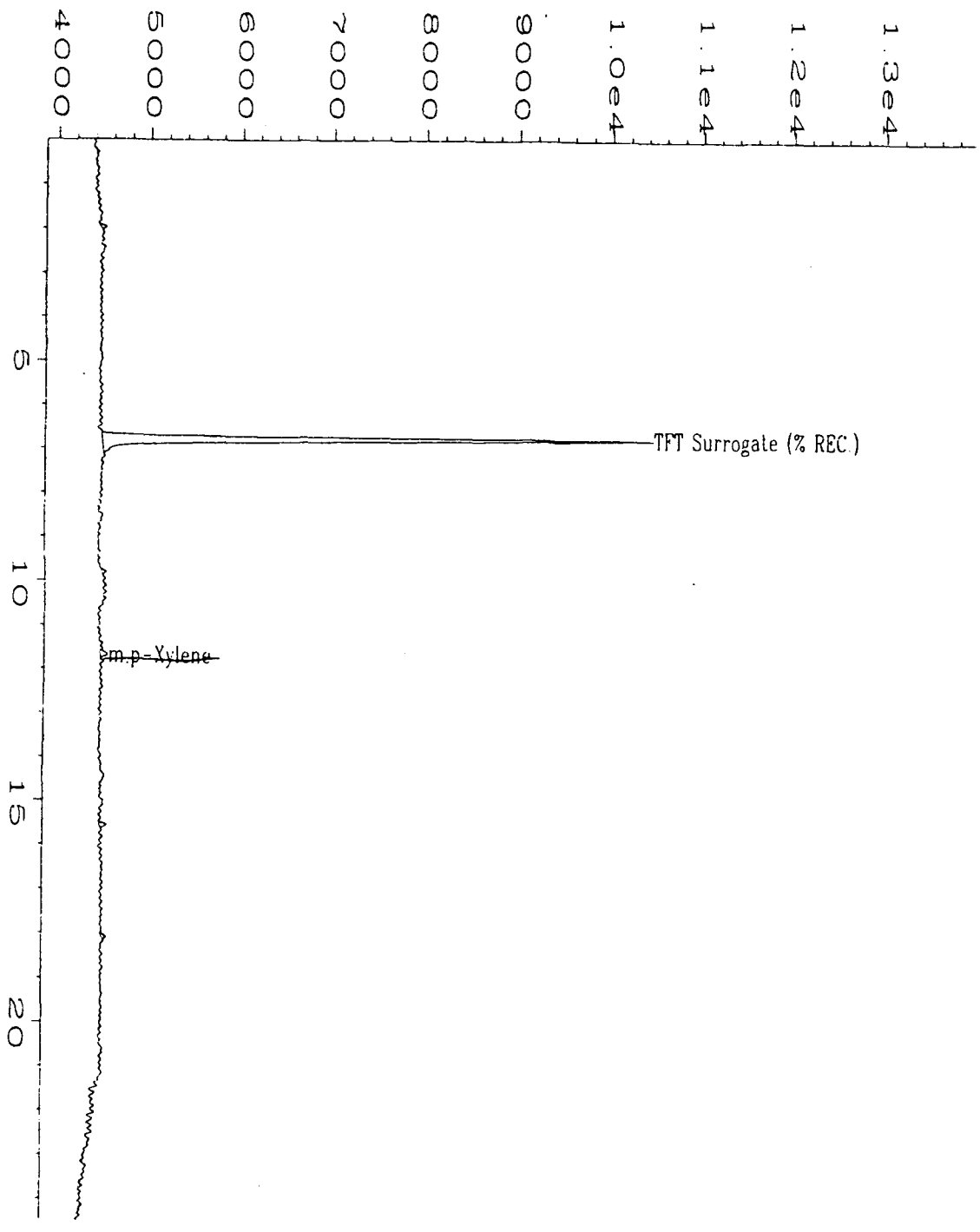
Surrogate Recovery (α,α,α-Trifluorotoluene):	85%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20322\028R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04350 DF=1
Run Time Bar Code:
Acquired on : 23 Mar 95 07:20 AM
Report Created on: 23 Mar 95 07:45 AM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75SS-6(3-5) Soil

Page Number : 1
Vial Number : 28
Injection Number : 1
Sequence Line : 7
Instrument Method: BX2032
Analysis Method : BX2032
Sample Amount : 0
ISTD Amount :

pm 4/5/95

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BTEX Data Report

Client Sample Number	: 75SS-6(7-9)	Client Project No.	: 722450.21020 MacDill AFB
Lab Sample Number	: X04351	Lab Project No.	: 95-0871
Date Sampled	: 3/15/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/23/95	Matrix	: Soil
Date Analyzed	: 3/24/95	Lab File No.	: BX2032324
Methanol Extract?	: No	Method Blank No.	: MB032395
% Moisture	: 19.65%		

Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	U	5.0
Toluene	108-88-3	U	5.0
Ethyl Benzene	100-41-4	U	5.0
Total Xylenes	1330-20-7	U	5.0
Chlorobenzene	108-90-7	U	5.0
1,3,5-trimethylbenzene	108-67-8	U	5.0
1,2,4-trimethylbenzene	95-63-6	U	5.0
1,2,3-trimethylbenzene	526-73-8	U	5.0
1,2,3,4-tetramethylbenzene	488-23-3	U	5.0

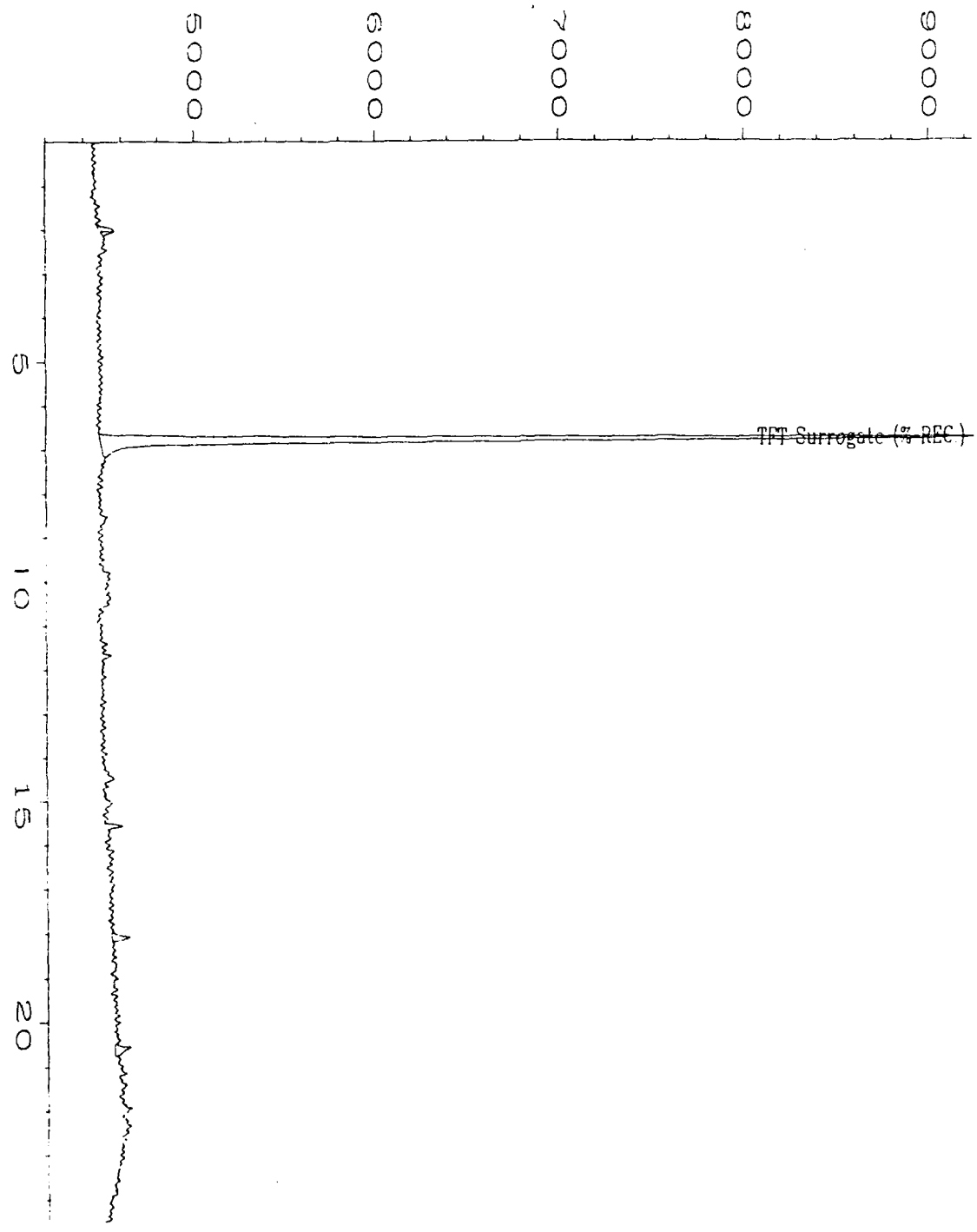
Surrogate Recovery (α,α,α-Trifluorotoluene):	93%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

K. Cone
Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20323\024R0801.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 24
Sample Name	: X04351 DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 24 Mar 95 04:22 AM	Instrument Method	: BX2032.
Report Created on	: 24 Mar 95 04:48 AM	Analysis Method	: BX20323.MT
Last Recalib on	: 23 Mar 95 03:56 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-0871 Client#: 75SS-6(7-9) Soil		

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(303) 425-6021

BTEX Data Report

		Client Project No.	: 722450.21020 MacDill AFB
Client Sample Number	: 75SS-6(22-24)		
Lab Sample Number	: X04352	Lab Project No.	: 95-0871
Date Sampled	: 3/15/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/23/95	Matrix	: Soil
Date Analyzed	: 3/24/95	Lab File No.	: BX2032325
Methanol Extract?	: No	Method Blank No.	: MB032395
% Moisture	: 16.18%		

Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2	3.3	J	4.8
Toluene	108-88-3		U	4.8
Ethyl Benzene	100-41-4		U	4.8
Total Xylenes	1330-20-7		U	4.8
Chlorobenzene	108-90-7		U	4.8
1,3,5-trimethylbenzene	108-67-8		U	4.8
1,2,4-trimethylbenzene	95-63-6		U	4.8
1,2,3-trimethylbenzene	526-73-8		U	4.8
1,2,3,4-tetramethylbenzene	488-23-3		U	4.8

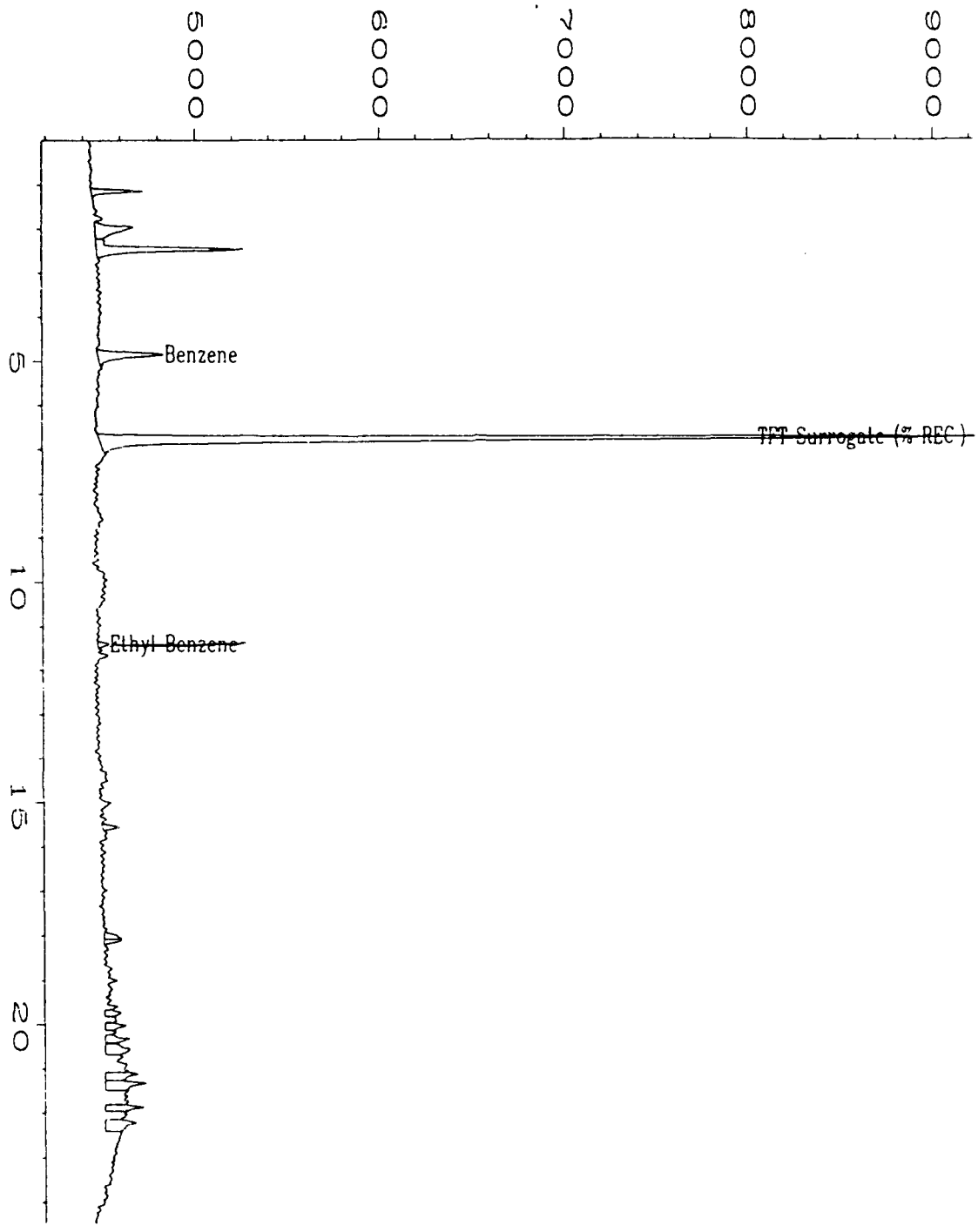
Surrogate Recovery (α,α,α-Trifluorotoluene):	86%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20323\025R0801.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 25
Sample Name	: X04352 DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 24 Mar 95 05:09 AM	Instrument Method	: BX203 M
Report Created on	: 24 Mar 95 05:34 AM	Analysis Method	: BX20323.M
Last Recalib on	: 23 Mar 95 03:56 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-0871 Client#: 75SS-6(22-24) Soil		

Dm 4/5/95

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BTEX Data Report

		Client Project No.	: 722450.21020 MacDill AFB
Client Sample Number	: 75SS-15(4-6)		
Lab Sample Number	: X04349	Lab Project No.	: 95-0871
Date Sampled	: 3/14/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/22/95	Matrix	: Soil
Date Analyzed	: 3/23/95	Lab File No.	: BX2032227
Methanol Extract?	: No	Method Blank No.	: MB032295
% Moisture	: 16.97%		

Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	U	4.8
Toluene	108-88-3	U	4.8
Ethyl Benzene	100-41-4	U	4.8
Total Xylenes	1330-20-7	U	4.8
Chlorobenzene	108-90-7	U	4.8
1,3,5-trimethylbenzene	108-67-8	U	4.8
1,2,4-trimethylbenzene	95-63-6	U	4.8
1,2,3-trimethylbenzene	526-73-8	U	4.8
1,2,3,4-tetramethylbenzene	488-23-3	U	4.8

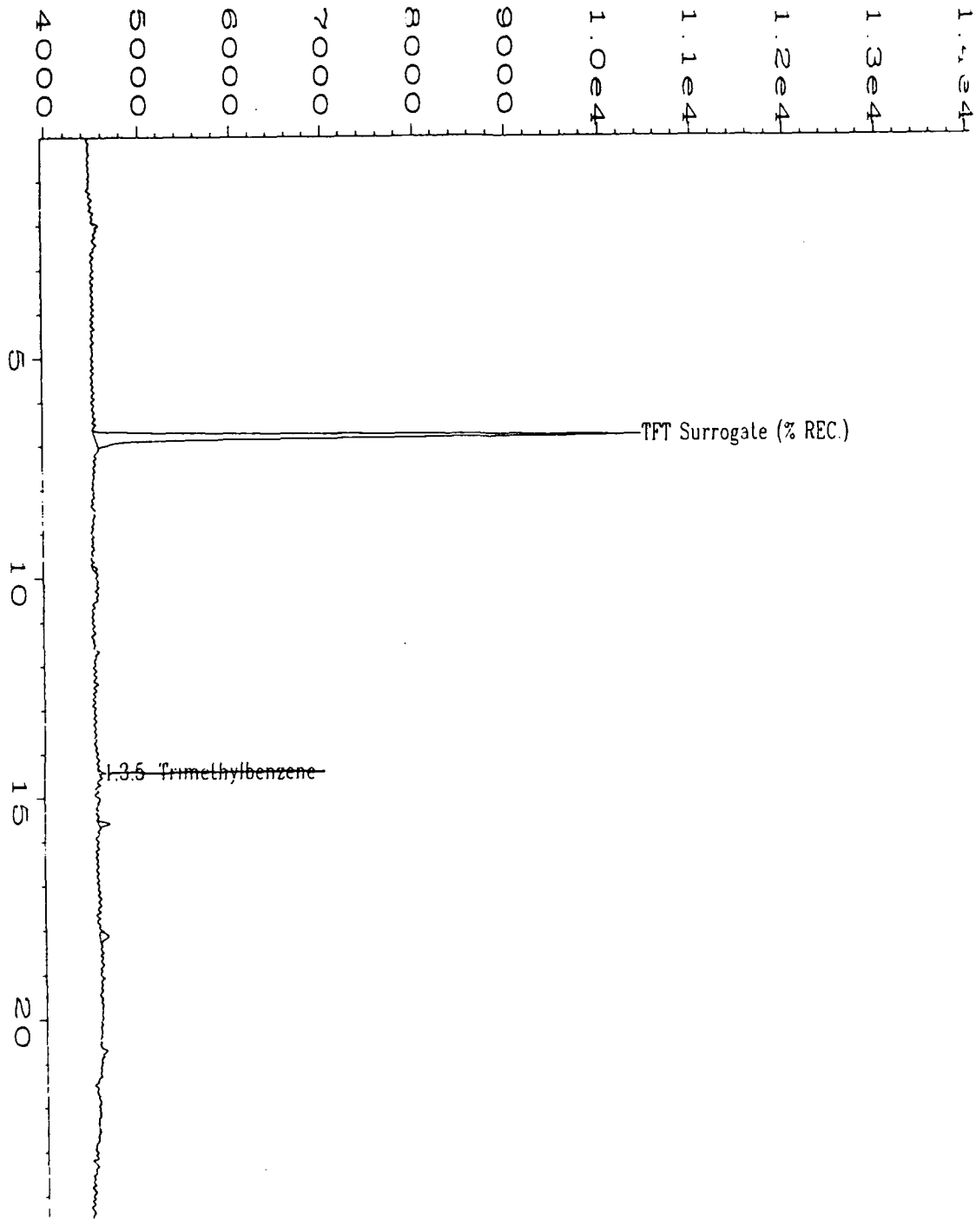
Surrogate Recovery (α,α,α-Trifluorotoluene):	86%	64%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Dry Weight Basis.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20322\027R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04349 DF=1
Run Time Bar Code:
Acquired on : 23 Mar 95 06:36 AM
Report Created on: 23 Mar 95 07:01 AM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75SS-15(4-6) Soil

Page Number : 1
Vial Number : 27
Injection Number : 1
Sequence Line : 7
Instrument Method: BX203 M
Analysis Method : BX20322.M
Sample Amount : 0
ISTD Amount :

Dm 4/5/95

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BTEX Data Report

Client Sample Number	: 75SW-1	Client Project No.	: 722450.21020 MacDill AFB
Lab Sample Number	: X04357	Lab Project No.	: 95-0871
Date Sampled	: 3/15/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 602
Date Extracted/Prepared	: 3/23/95	Matrix	: Water
Date Analyzed	: 3/24/95	Lab File No.	: BX2032320
Methanol Extract?	: No	Method Blank No.	: MB032395
% Moisture	NA		

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4.0
Toluene	108-88-3	U	4.0
Ethyl Benzene	100-41-4	U	4.0
Total Xylenes	1330-20-7	U	4.0
Chlorobenzene	108-90-7	U	4.0
1,3,5-trimethylbenzene	108-67-8	U	4.0
1,2,4-trimethylbenzene	95-63-6	U	4.0
1,2,3-trimethylbenzene	526-73-8	U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	U	4.0

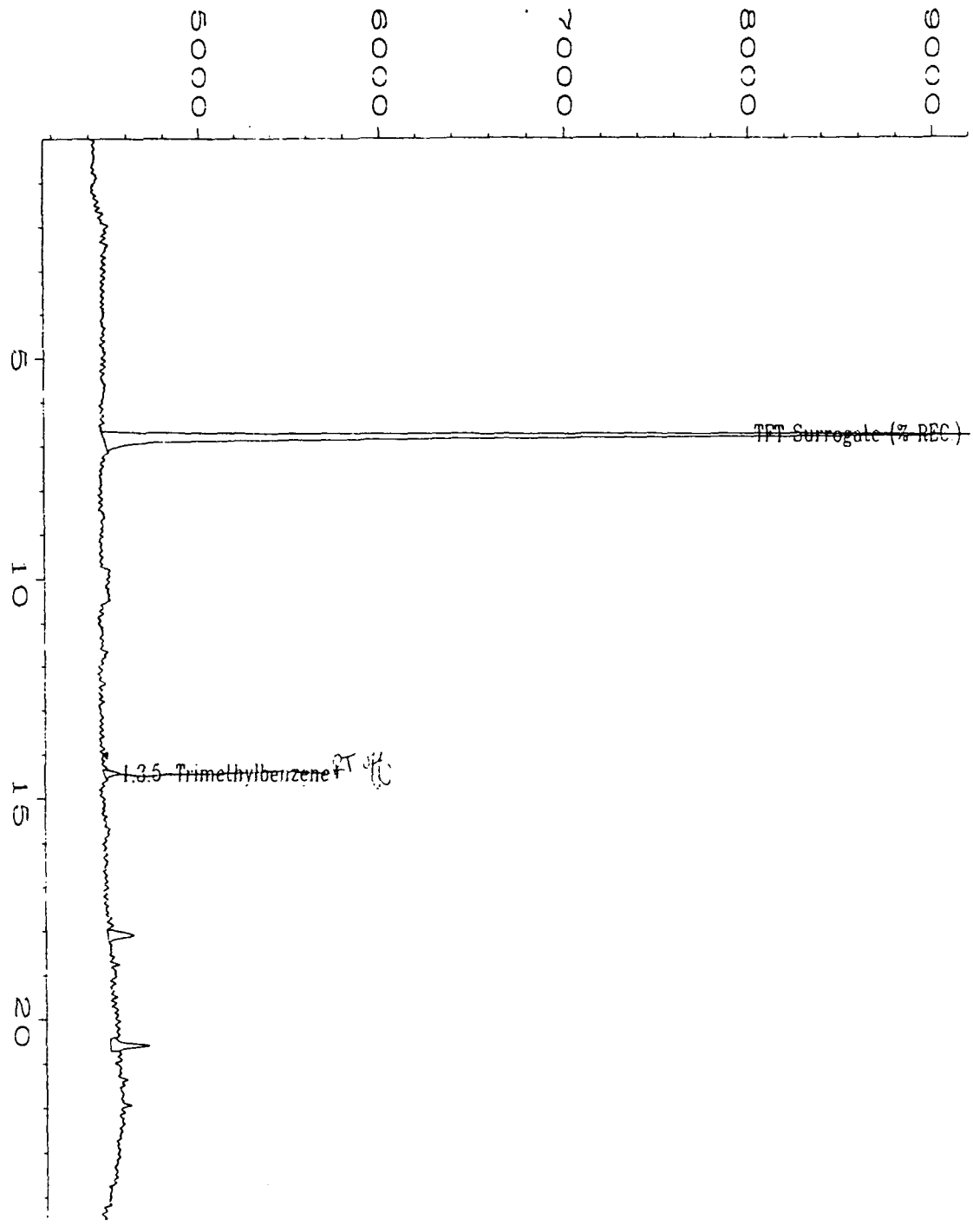
Surrogate Recovery (α,α,α-Trifluorotoluene):	90%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

K. Cone
Approved



Data File Name : C:\HPCHEM\2\DATA\BX20323\020R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04357 DF=1
Run Time Bar Code:
Acquired on : 24 Mar 95 01:21 AM
Report Created on: 24 Mar 95 01:46 AM
Last Recalib on : 23 Mar 95 03:56 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: 75SW-1 Water

Page Number : 1
Vial Number : 20
Injection Number : 1
Sequence Line : 8
Instrument Method: BX2032
Analysis Method : BX20323.M
Sample Amount : 0
ISTD Amount :

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TOTAL EXTRACTABLE HYDROCARBONS
TEH Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: 75MP-2(8-10)	Client Project No.	: 722450.21020/MACDI
Lab Sample No.	: X04340	Lab Project No.	: 95-0871
Date Sampled	: 3/13/95	EPA Method No.	: 3500/MOD. 8015
Date Received	: 3/17/95	Matrix	: SOIL
Date Prepared	: 3/20/95	Method Blank	: SB032095
Date Analyzed	: 3/24/95		

Compound	Spike Added (ug/mL)	Sample Concentration (ug/mL)	MS Concentration (ug/mL)	MS %REC	QC Limits %REC
Jet Fuel A	1000	217	1170	95	60-140

Compound	Spike Added (ug/mL)	MSD Concentration (ug/mL)	MSD %REC	RPD	QC Limits RPD	QC Limits %REC
Jet Fuel A	1000	1090	87	8.8	50	60-140

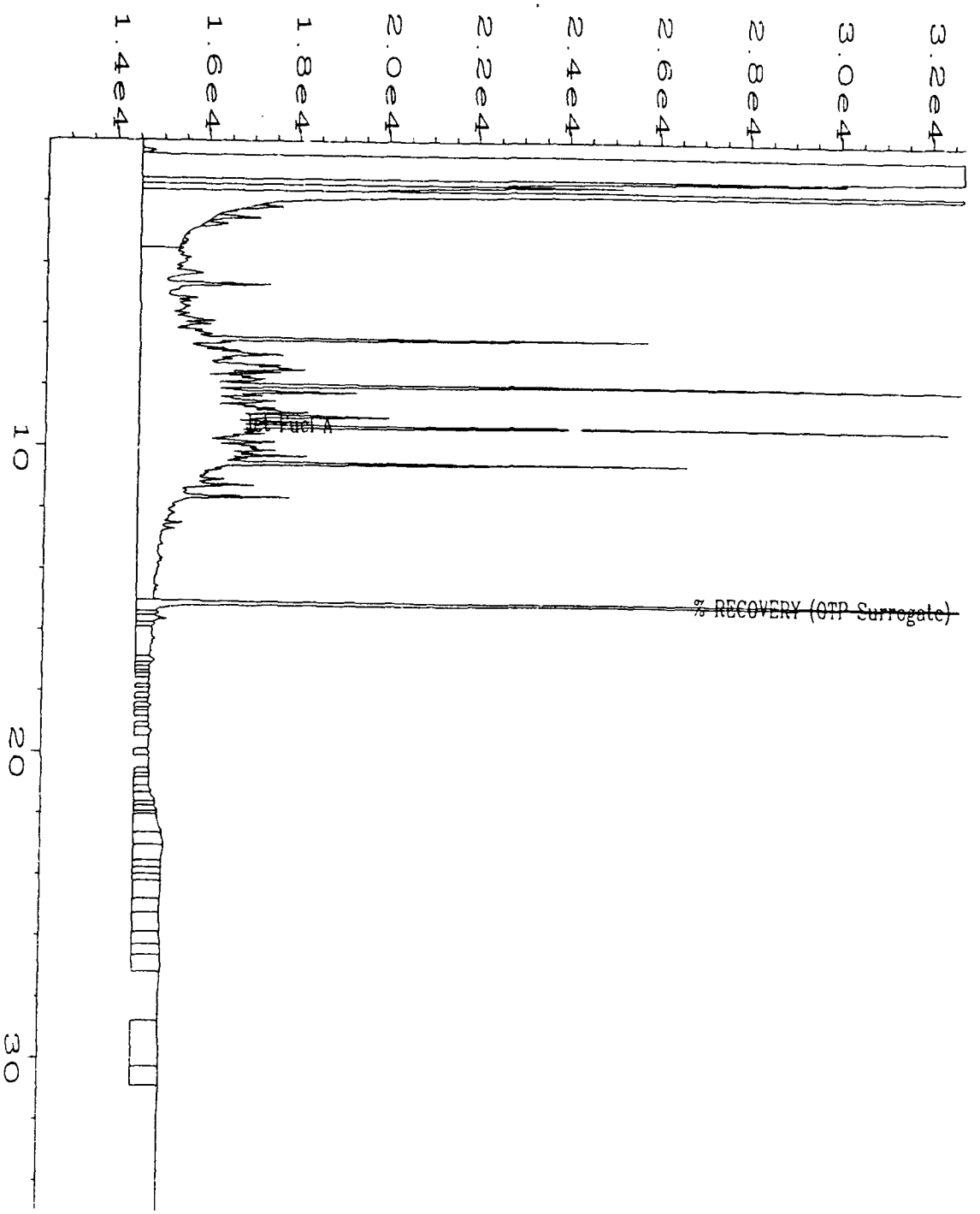
* = Values outside of QC limits.

RPD: 0 out of (1) outside limits.

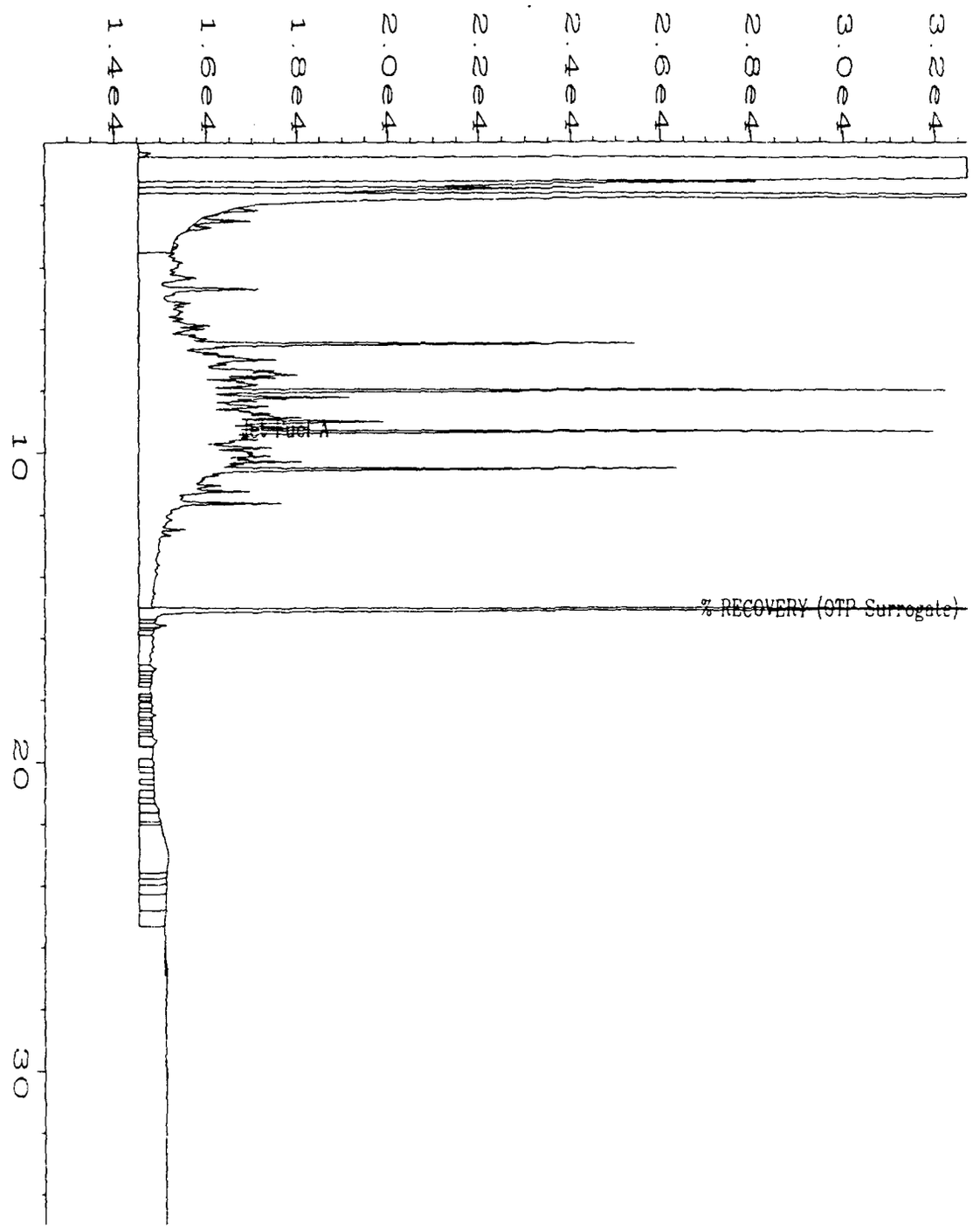
Spike Recovery: 0 out of (1) outside limits.

Comments: NA = Not analyzed/not applicable.

Values reported in ug/mL in the liquid extract.



Data File Name	: C:\HPCHEM\2\DATA\JET0323\016R0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 16
Sample Name	: X04340 MS	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 24 Mar 95 12:05 PM	Instrument Method	: JET0323.MT
Report Created on	: 24 Mar 95 12:40 PM	Analysis Method	: JET0323.MT
Last Recalib on	: 24 MAR 95 08:06 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Soil Matrix Spike	Client #75MP-2 (8-10) MS	



Data File Name : C:\HPCHEM\2\DATA\JET0323\017R0101.D
Operator : Dawn N. Guildner
Instrument : TEH
Sample Name : X04340 MSD
Time Bar Code:
Acquired on : 24 Mar 95 12:55 PM
Report Created on: 24 Mar 95 01:30 PM
Last Recalib on : 24 MAR 95 08:06 AM
Multiplier : 1
Sample Info : Soil Spike Duplicate

Page Number : 1
Vial Number : 17
Injection Number : 1
Sequence Line : 1
Instrument Method: JET0323.MTH
Analysis Method : JET0323.MTH
Sample Amount : 0
ISTD Amount :

Client # 75MP-3(8-10) MSD

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TOTAL VOLATILE HYDROCARBONS
TVH Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: 75SS-6(7-9)	**Client Project No.**	: 722450.21020/MACD
Lab Sample No.	: X04352	**Lab Project No.**	: 95-0871
Date Sampled	: 3/13/95	**EPA Method No.**	: 5030/8015 Mod
Date Received	: 3/17/95	**Matrix**	: SOIL
Date Prepared	: 3/23/95	**Method Blank**	: MB022395
Date Analyzed	: 3/23/95		

Compound	Spike Added (mg/L)	Sample Concentration (mg/L)	MS Concentration (mg/L)	MS %REC	QC Limits %REC
Gasoline	5.00	2.53	8.58	121	60-140

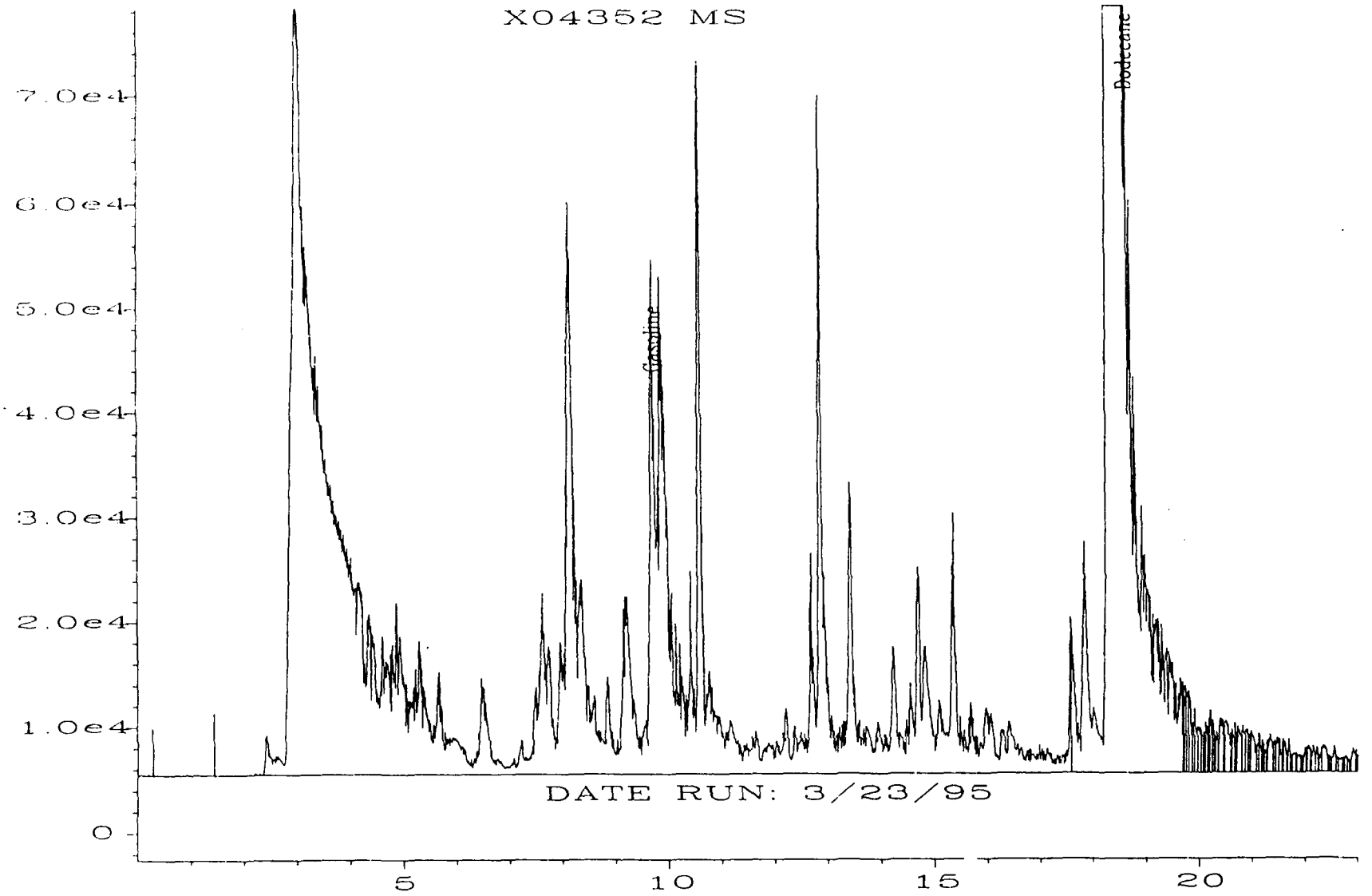
Compound	Spike Added (mg/L)	MSD Concentration (mg/L)	MS %REC	RPD	QC Limits RPD	QC Limits %REC
Gasoline	5.00	9.12	132	8.5	50	60-140

* = Values outside of QC limits.

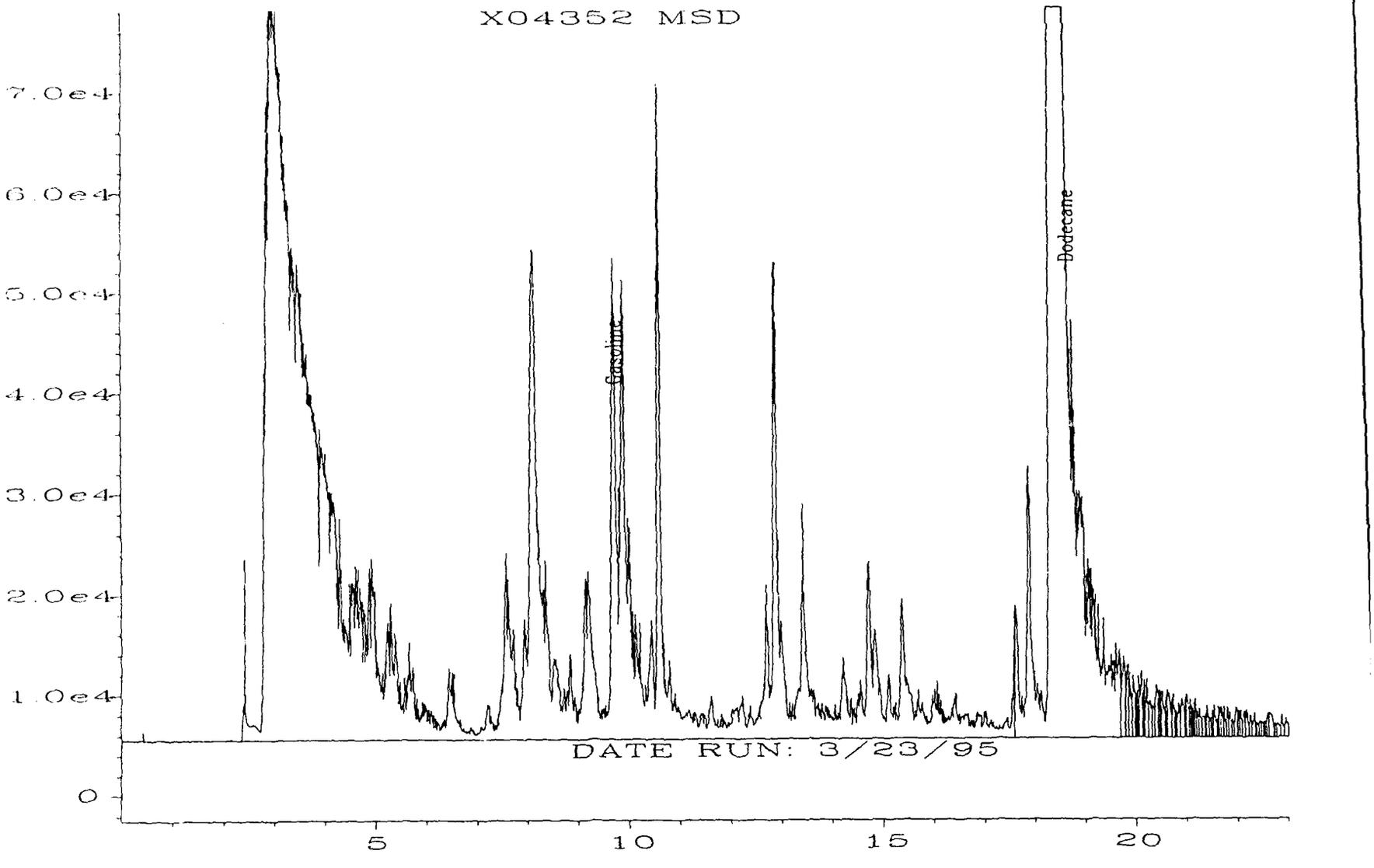
RPD: 0 out of (1) outside limits.

Spike Recovery: 0 out of (2) outside limits.

Comments: NA = Not analyzed/not applicable.



Sig. 1 in C:\HPCHEM\1\DATA\TVH0322\040F0101.D



Sig. 1 in C:\HPCHEM\1\DATA\TVH0322\041F0101.D

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(303) 425-6021

BTEX Soil Matrix Spike/Matrix Spike Duplicate Data Report

		Client Project No.	: 722450.21020 MacDill AFB
Client Sample No.	: 75SS-3(3-4)		
Lab Sample No.	: X04341	Lab Project No.	: 95-0871
Date Sampled	: 3/13/95	EPA Method No.	: 8020
Date Received	: 3/17/95	Matrix	: Soil
Date Prepared	: 3/22/95	Lab File Number(s)	: BX2032216,17
Date Analyzed	: 3/22/95	Method Blank	: MB032295

Compound	Spike Added (ug/L)	Sample Concentration (ug/L)	MS Concentration (ug/L)	MS %REC	QC Limits %REC
Benzene	20.0	0.0	17.5	88	65-121
Toluene	20.0	0.0	18.1	91	69-117
Ethyl Benzene	20.0	0.0	17.1	86	68-118
m,p-Xylene	40.0	0.0	33.6	84	66-116
o-Xylene	20.0	0.0	17.2	86	73-117
Chlorobenzene	20.0	0.0	17.0	85	65-121
1,3,5-TMB	20.0	0.0	16.9	85	65-121
1,2,4-TMB	20.0	0.0	16.4	82	65-121
1,2,3-TMB	20.0	0.0	16.0	80	65-121
1,2,3,4-TeMB	20.0	0.0	15.5	78	65-121

Compound	Spike Added (ug/L)	MSD Concentration (ug/L)	MSD %REC	RPD	QC Limits RPD	QC Limits %REC
Benzene	20.0	17.7	89	1.1	17.4	65-121
Toluene	20.0	17.5	88	3.4	15.8	69-117
Ethyl Benzene	20.0	17.6	88	2.9	11.9	68-118
m,p-Xylene	40.0	34.9	87	3.8	15.4	66-116
o-Xylene	20.0	17.6	88	2.3	13.2	73-117
Chlorobenzene	20.0	17.0	85	0.0	17.4	65-121
1,3,5-TMB	20.0	16.9	85	0.0	17.4	65-121
1,2,4-TMB	20.0	15.4	77	6.3	17.4	65-121
1,2,3-TMB	20.0	16.4	82	2.5	17.4	65-121
1,2,3,4-TeMB	20.0	14.4	72	7.4	17.4	65-121

* = Values outside of QC limits.

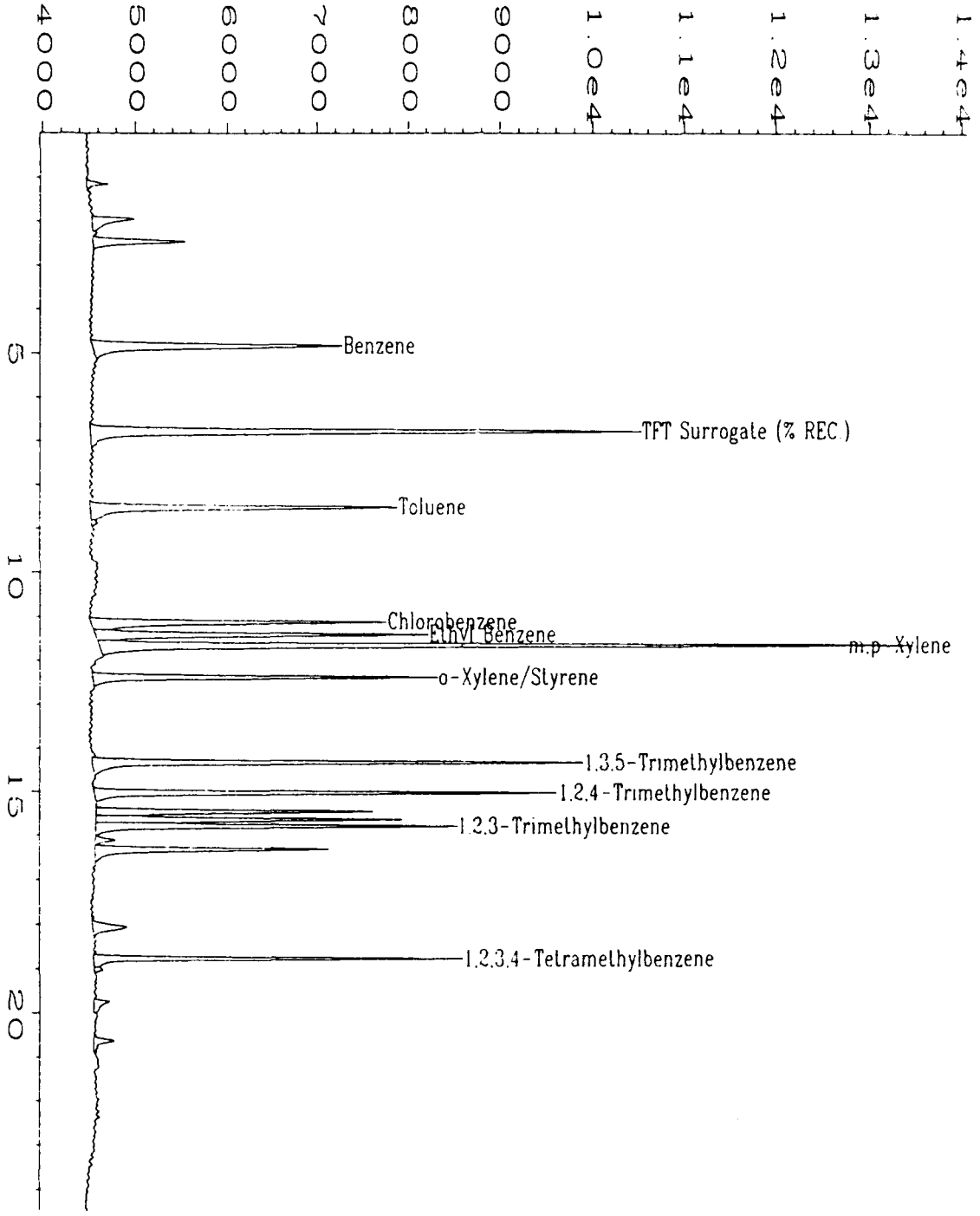
RPD: 0 out of (10) outside limits.

Spike Recovery: 0 out of (20) outside limits.

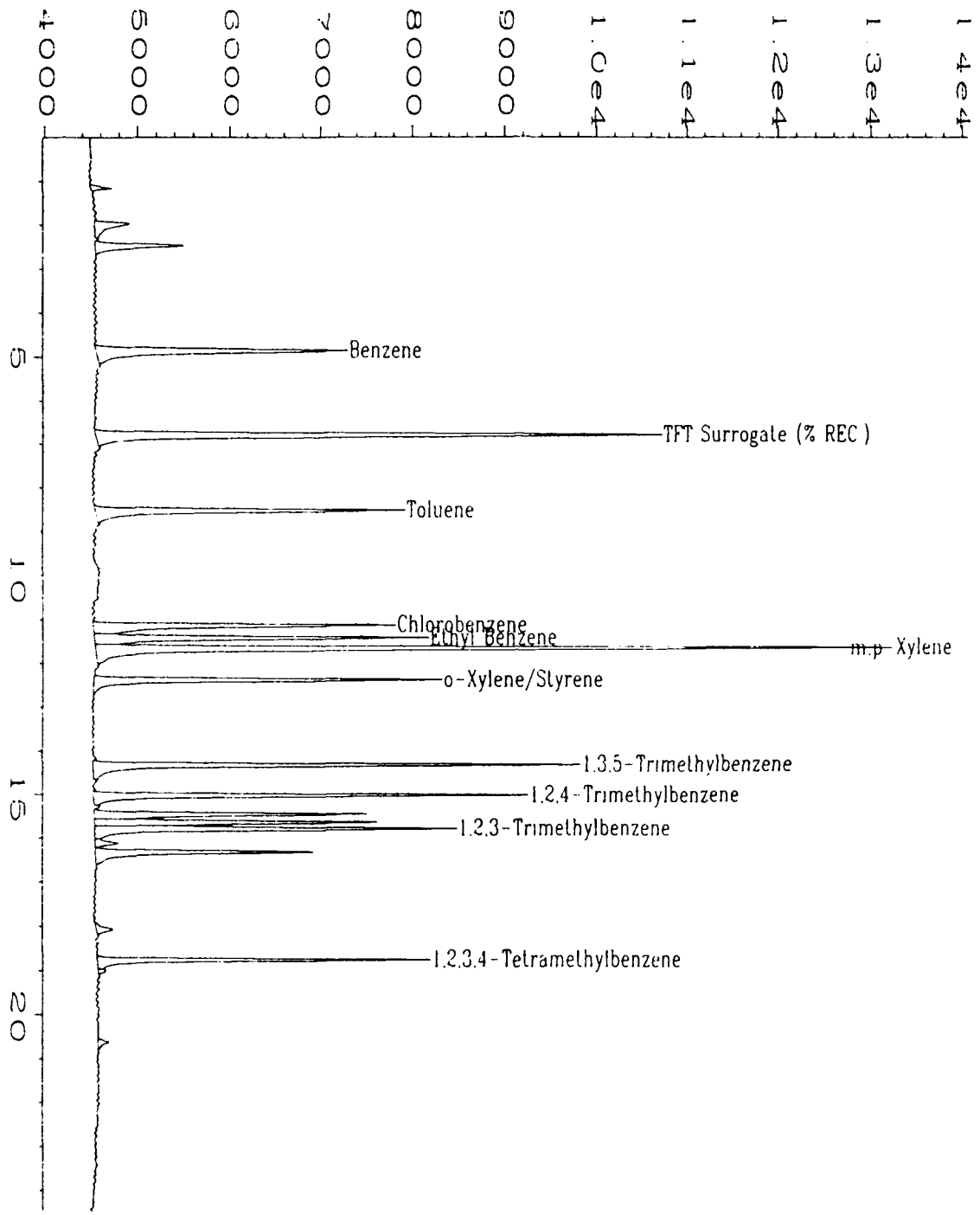
Comments:

Analyst

K. Cline
Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20322\016R0701.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 16
Sample Name	: X04341MS DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
Acquired on	: 22 Mar 95 10:24 PM	Instrument Method	: BX2032
Report Created on	: 22 Mar 95 10:49 PM	Analysis Method	: BX20322.M
Last Recalib on	: 22 Mar 95 04:04 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-0871 Client#: 75MP-3(3-4) Soil		



Data File Name	: C:\HPCHEM\2\DATA\BX20322\017R0701.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 17
Sample Name	: X04341MSD DF=1	Injection Number	: 1
In Time Bar Code:		Sequence Line	: 7
Acquired on	: 22 Mar 95 11:09 PM	Instrument Method	: BX20322.MTH
Report Created on	: 22 Mar 95 11:34 PM	Analysis Method	: BX20322.MTH
Last Recalib on	: 22 Mar 95 04:04 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-0871 Client#: 75MP-3(3-4) Soil		

EVERGREEN ANALYTICAL, INC.
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BTEX Data Report

		Client Project No.	: 722450.21020 MacDill AFB
Client Sample Number	: Trip Blank		
Lab Sample Number	: X04361	Lab Project No.	: 95-0871
Date Sampled	: 3/15/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 8020
Date Extracted/Prepared	: 3/23/95	Matrix	: Water
Date Analyzed	: 3/24/95	Lab File No.	: BX2032321
Methanol Extract?	: No	Method Blank No.	: MB032395
% Moisture	NA		

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4.0
Toluene	108-88-3	U	4.0
Ethyl Benzene	100-41-4	U	4.0
Total Xylenes	1330-20-7	U	4.0
Chlorobenzene	108-90-7	U	4.0
1,3,5-trimethylbenzene	108-67-8	U	4.0
1,2,4-trimethylbenzene	95-63-6	U	4.0
1,2,3-trimethylbenzene	526-73-8	U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	U	4.0

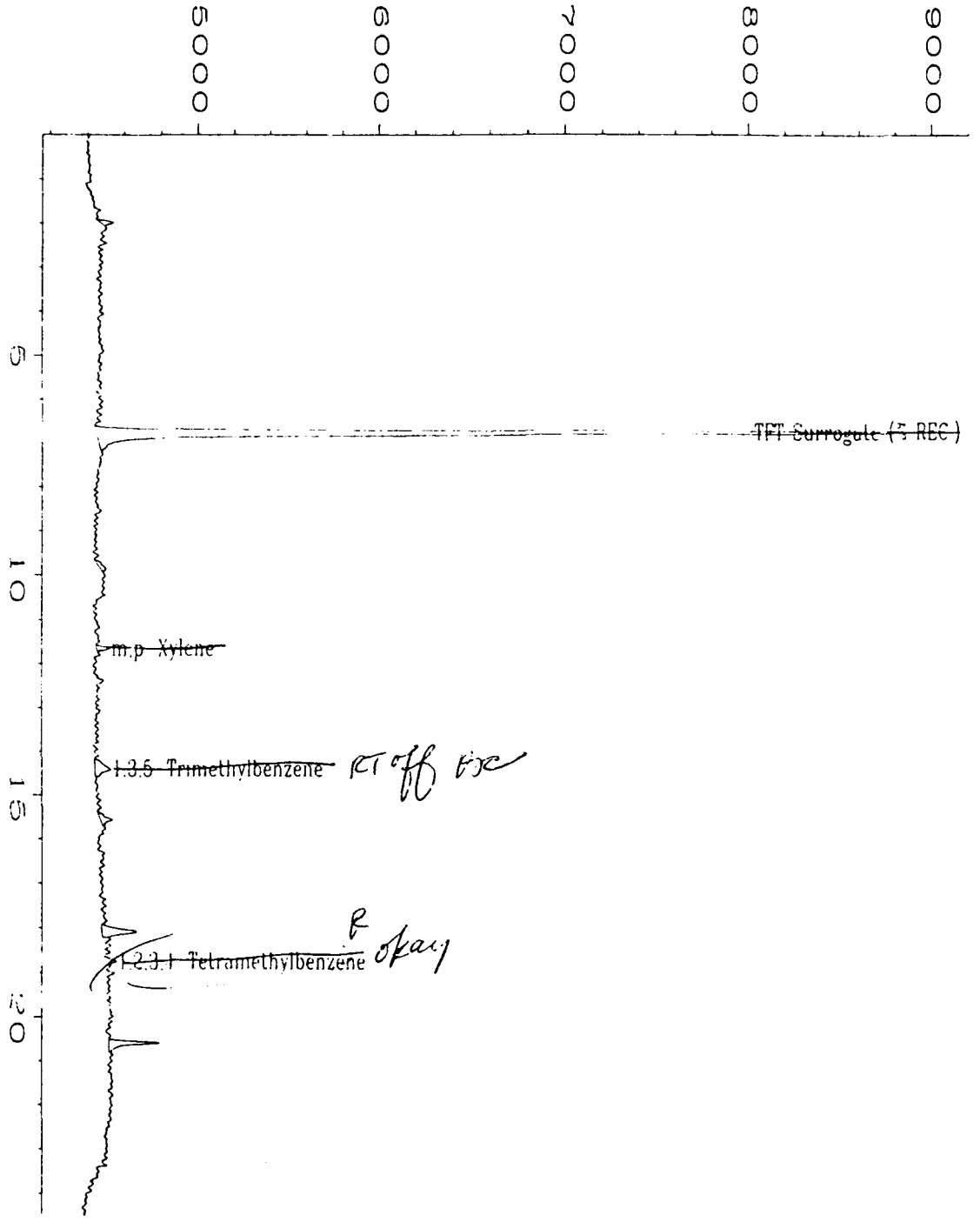
Surrogate Recovery (α,α,α-Trifluorotoluene):	89%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available/Not applicable.

Analyst

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Data File Name : C:\HPCHEM\2\DATA\BX20323\021R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04361 DF=1
Time Bar Code:
Acquired on : 24 Mar 95 02:07 AM
Report Created on: 24 Mar 95 02:32 AM
Last Recalib on : 23 Mar 95 03:56 PM
Multiplier : 1
Sample Info : Project#: 95-0871 Client#: Trip Blank Water

Page Number : 1
Vial Number : 21
Injection Number : 1
Sequence Line : 8
Instrument Method: BX20323.MTH
Analysis Method : BX20323.MTH
Sample Amount : 0
ISTD Amount :

Qm 4/4/95

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4036 Youngfield St. Wheat Ridge, CO 80033
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BTEX Data Report
Method Blank Report

		Client Project No.	: 722450.21020
			MacDill AFB
Method Blank Number	: MB032295		
Date Extracted/Prepared	: 3/22/95	Lab Project No.	: 95-0871
Date Analyzed	: 3/22/95	Dilution Factor	: 1.00
		Method	: 8020
		Matrix	: Water
		Lab File No.	: BX2032210

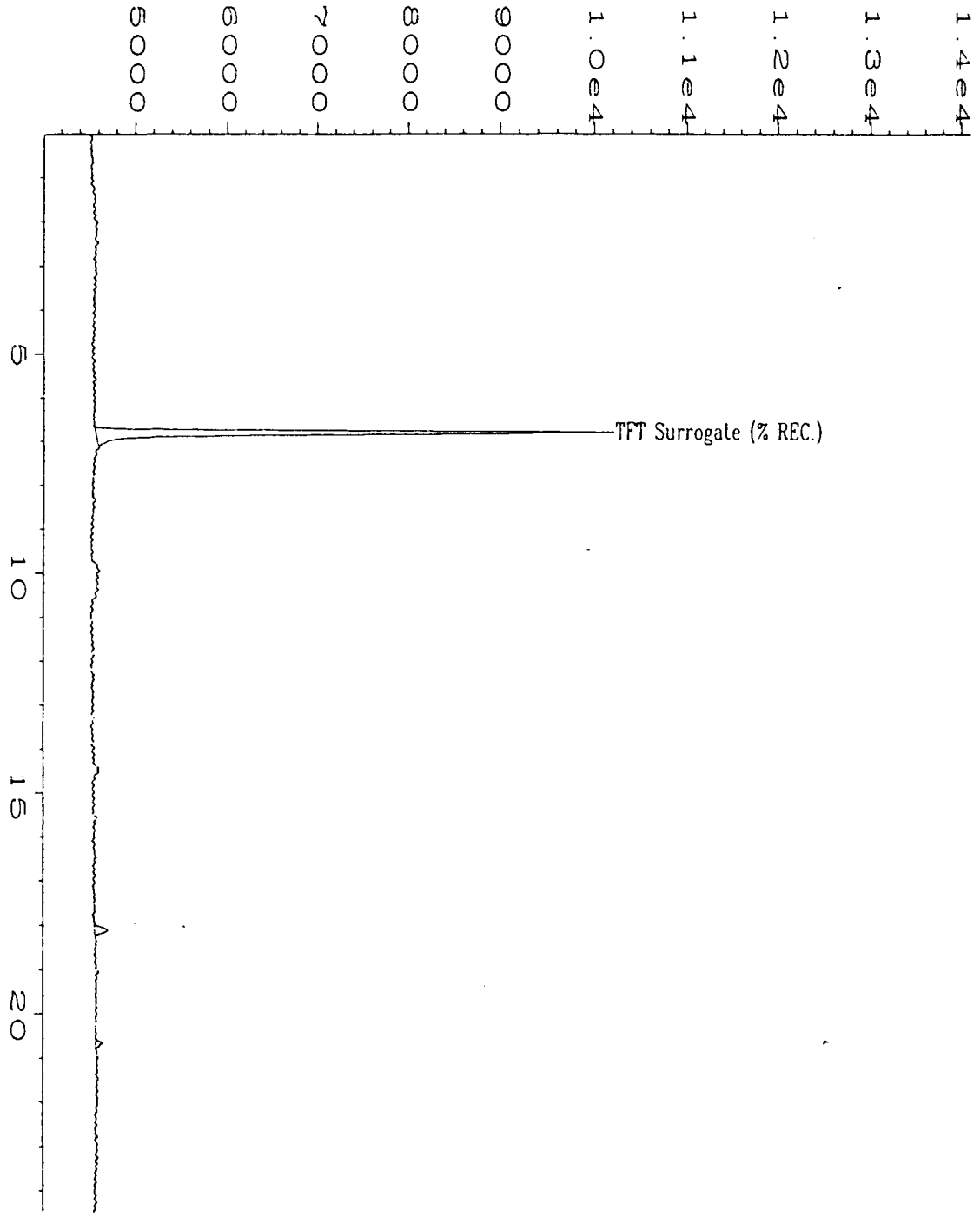
Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4.0
Toluene	108-88-3	U	4.0
Ethyl Benzene	100-41-4	U	4.0
Total Xylenes	1330-20-7	U	4.0
Chlorobenzene	108-90-7	U	4.0
1,3,5-trimethylbenzene	108-67-8	U	4.0
1,2,4-trimethylbenzene	95-63-6	U	4.0
1,2,3-trimethylbenzene	526-73-8	U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	U	4.0
Surrogate Recovery (α,α,α-Trifluorotoluene):		81%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available

Analyst

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Data File Name	: C:\HPCHEM\2\DATA\BX20322\010R0701.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 10
Sample Name	: MB032295-WATER	Injection Number	: 1
Time Bar Code:		Sequence Line	: 7
Acquired on	: 22 Mar 95 05:57 PM	Instrument Method	: BX20322.MTH
Report Created on	: 22 Mar 95 06:22 PM	Analysis Method	: BX20322.MTH
Last Recalib on	: 22 Mar 95 04:04 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

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BTEX Data Report
Method Blank Report

		Client Project No.	: 722450.21020
			MacDill AFB
Method Blank Number	: MEB032295		
Date Extracted/Prepared	: 3/22/95	Lab Project No.	: 95-0871
Date Analyzed	: 3/23/95	Dilution Factor	: 125.00
		Method	: 8020
		Matrix	: MeOH Ext.
		Lab File No.	: BX2032220

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	500
Toluene	108-88-3	U	500
Ethyl Benzene	100-41-4	U	500
Total Xylenes	1330-20-7	U	500
Chlorobenzene	108-90-7	U	500
1,3,5-trimethylbenzene	108-67-8	U	500
1,2,4-trimethylbenzene	95-63-6	U	500
1,2,3-trimethylbenzene	526-73-8	U	500
1,2,3,4-tetramethylbenzene	488-23-3	U	500

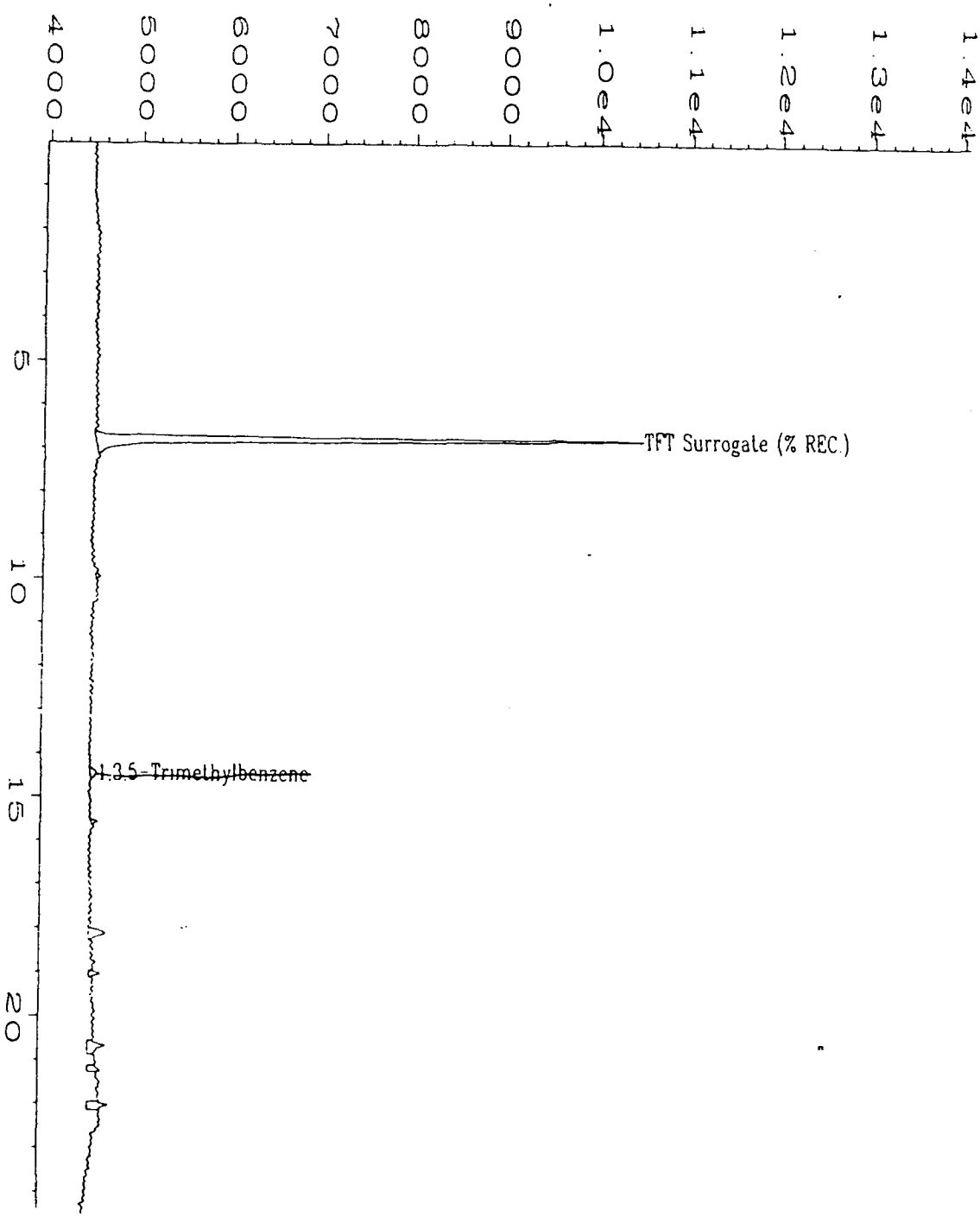
Surrogate Recovery (α,α,α-Trifluorotoluene):	89%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

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Data File Name : C:\HPCHEM\2\DATA\BX20322\020R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : MEB032295
F Time Bar Code:
Acquired on : 23 Mar 95 01:23 AM
Report Created on: 23 Mar 95 01:48 AM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1

Page Number : 1
Vial Number : 20
Injection Number : 1
Sequence Line : 7
Instrument Method: BX20322.MTH
Analysis Method : BX20322.MTH
Sample Amount : 0
ISTD Amount :

DM 4/5/95

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BTEX Data Report
Method Blank Report

		Client Project No.	: 722450.21020
			MacDill AFB
Method Blank Number	: MB032395	Lab Project No.	: 95-0871
Date Extracted/Prepared	: 3/23/95	Dilution Factor	: 1.00
Date Analyzed	: 3/23/95	Method	: 8020
		Matrix	: Water
		Lab File No.	: BX2032310

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4.0
Toluene	108-88-3	U	4.0
Ethyl Benzene	100-41-4	U	4.0
Total Xylenes	1330-20-7	U	4.0
Chlorobenzene	108-90-7	U	4.0
1,3,5-trimethylbenzene	108-67-8	U	4.0
1,2,4-trimethylbenzene	95-63-6	U	4.0
1,2,3-trimethylbenzene	526-73-8	U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	U	4.0

Surrogate Recovery (α,α,α-Trifluorotoluene):	90%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

K. Cone
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BTEX Data Report
Laboratory Control Sample (LCS)

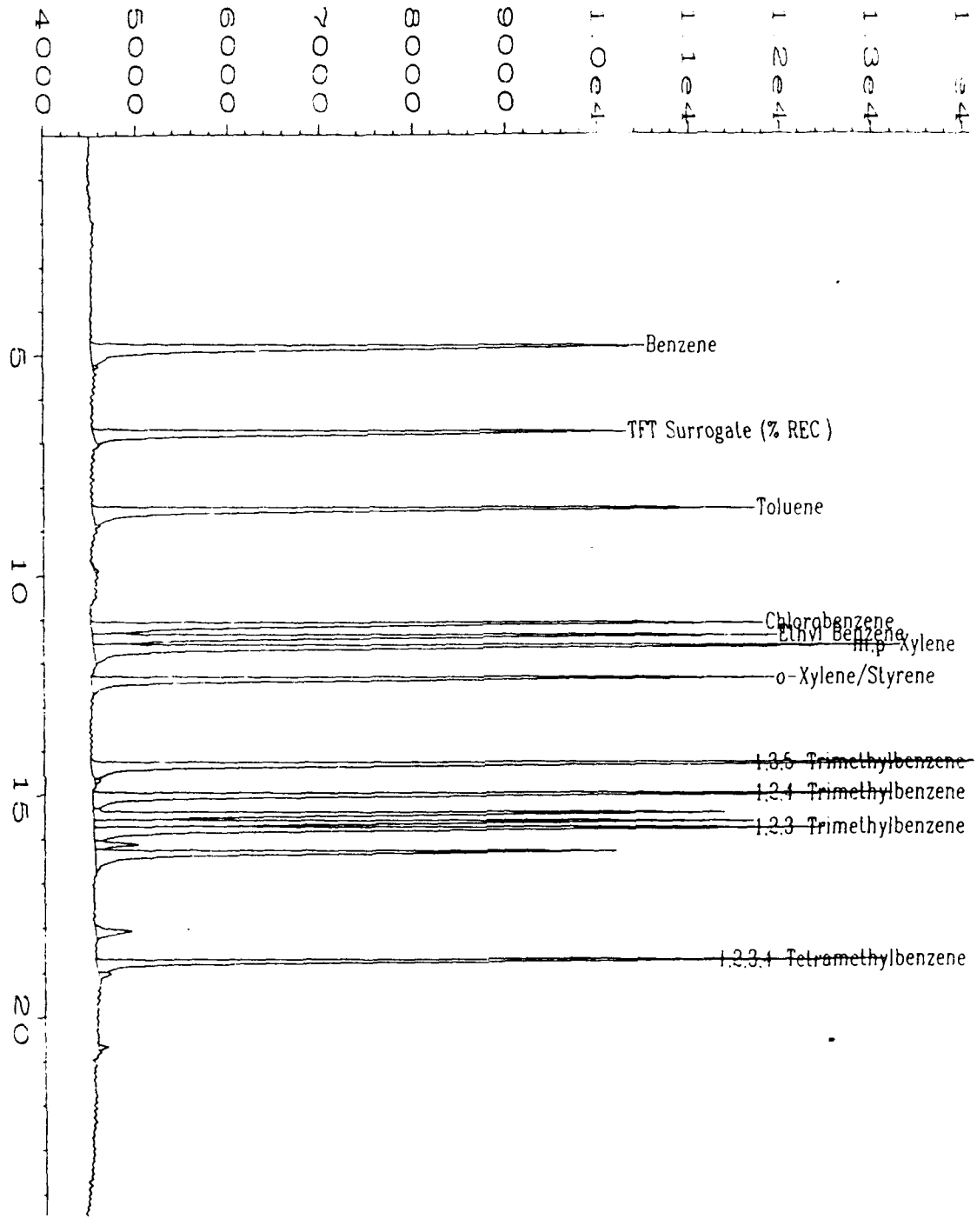
LCS Number	: LCS032295	Dilution Factor	: 1.00
Date Extracted/Prepared	: 3/22/95	Method	: 602
Date Analyzed	: 3/22/95	Matrix	: Water
Spike Amount (ug/L)	: 40.0	Lab File No.	: BX2032211

Compound Name	Cas Number	LCS Concentration ug/L	LCS % Recovery	QC Limit % Recovery
Benzene	71-43-2	36.8	92.0%	57.5%-110.0%
Toluene	108-88-3	34.6	86.5%	65.0%-107.5%
Ethyl Benzene	100-41-4	34.7	86.8%	65.0%-120.0%
m,p-Xylene	NA	34.1	85.3%	62.5%-117.5%
o-Xylene	95-47-6	33.7	84.3%	65.0%-120.0%
Chlorobenzene	108-90-7	34.3	85.8%	70.0%-115.0%
1,3,5-trimethylbenzene	108-67-8	35.5	88.8%	60.0%-117.5%
1,2,4-trimethylbenzene	95-63-6	29.1	72.8%	57.5%-115.0%
1,2,3-trimethylbenzene	526-73-8	34.3	85.8%	72.5%-122.5%
1,2,3,4-tetramethylbenzene	488-23-3	33.5	83.8%	NA
Surrogate Recovery (α,α,α-Trifluorotoluene):		82%	70%-130% (QC limits)	

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
NA = Not available/Not analyzed

Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20322\011R0701.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 11
Sample Name	: LCS032295	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
Acquired on	: 22 Mar 95 06:41 PM	Instrument Method	: BX203 .MT
Report Created on	: 22 Mar 95 07:06 PM	Analysis Method	: BX20322.MT
Last Recalib on	: 22 Mar 95 04:04 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

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(303) 425-6021

BTEX Data Report
Laboratory Control Sample (LCS)

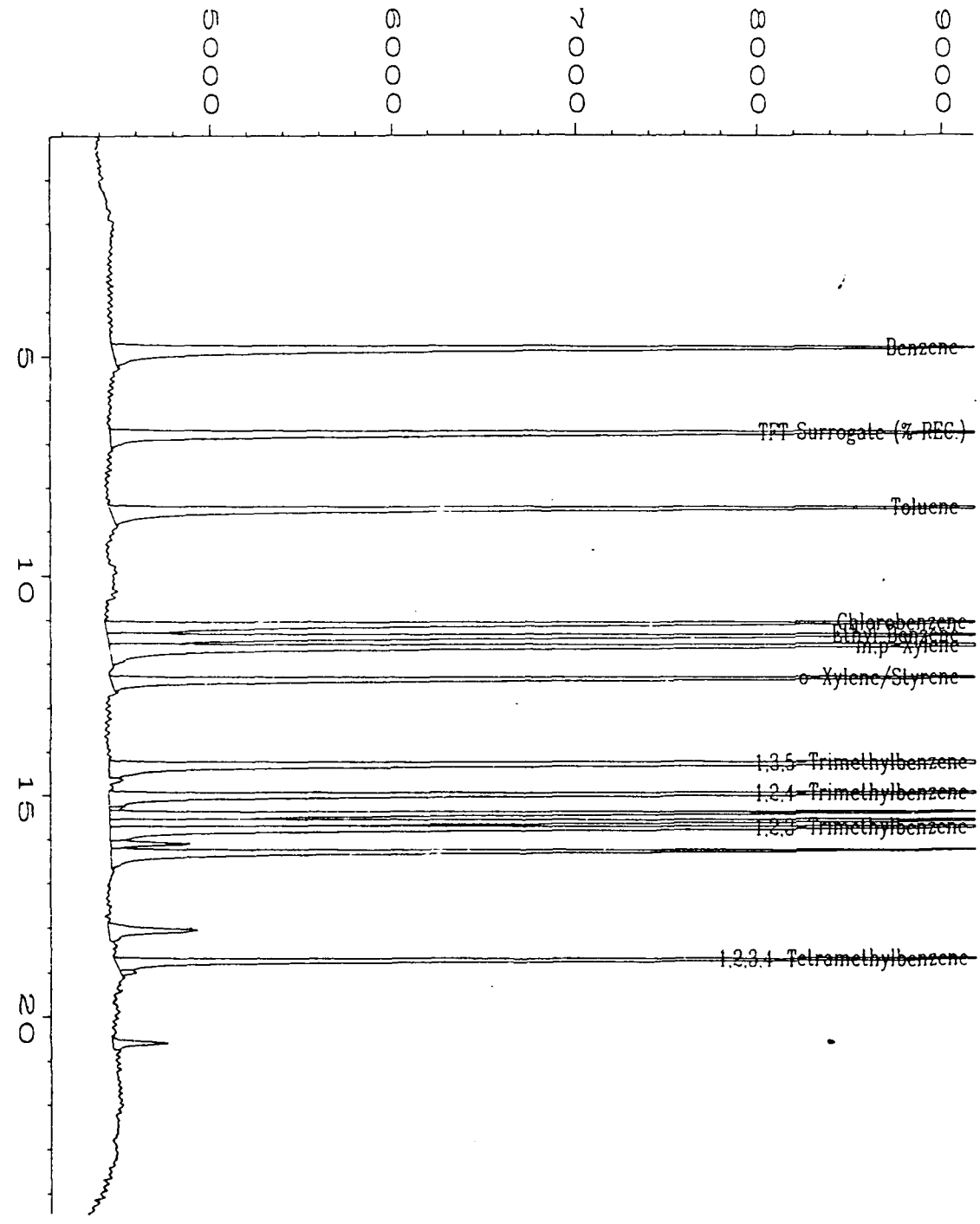
LCS Number	: LCS032395	Dilution Factor	: 1.00
Date Extracted/Prepared	: 3/23/95	Method	: 602
Date Analyzed	: 3/23/95	Matrix	: Water
Spike Amount (ug/L)	: 40.0	Lab File No.	: BX20[illegible]2311

Compound Name	Cas Number	LCS Concentration ug/L	LCS % Recovery	QC Limit % Recovery
Benzene	71-43-2	36.9	92.3%	57.5%-110.0%
Toluene	108-88-3	35.6	89.0%	65.0%-107.5%
Ethyl Benzene	100-41-4	36.0	90.0%	65.0%-120.0%
m,p-Xylene	NA	36.6	91.5%	62.5%-117.5%
o-Xylene	95-47-6	34.2	85.5%	65.0%-120.0%
Chlorobenzene	108-90-7	35.4	88.5%	70.0%-115.0%
1,3,5-trimethylbenzene	108-67-8	37.0	92.5%	60.0%-117.5%
1,2,4-trimethylbenzene	95-63-6	30.1	75.3%	57.5%-115.0%
1,2,3-trimethylbenzene	526-73-8	35.6	89.0%	72.5%-122.5%
1,2,3,4-tetramethylbenzene	488-23-3	35.5	88.8%	NA
Surrogate Recovery (α,α,α-Trifluorotoluene):		98%	70%-130% (QC limits)	

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
NA = Not available/Not analyzed

Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20323\011R0801.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 11
Sample Name	: LCS032395	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 23 Mar 95 06:35 PM	Instrument Method	: BX20323
Report Created on	: 23 Mar 95 07:00 PM	Analysis Method	: BX20323.MT
Last Recalib on	: 23 Mar 95 03:56 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

External Standard Report

Data File Name : C:\HPCHEM\2\DATA\BX20323\008R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : 1.0 ppb BTEX MIX
Run Time Bar Code:
Acquired on : 23 Mar 95 04:17 PM
Report Created on: 23 Mar 95 04:42 PM
Last Recalib on : 23 Mar 95 03:56 PM
Multiplier : 1
Sample Info : STD REF #1644, 3/10/95, 0.5 UG/ML (M & P-XYLENE PRESENT); + 1,2,3 & 1,2,4-Trimethylbenzene

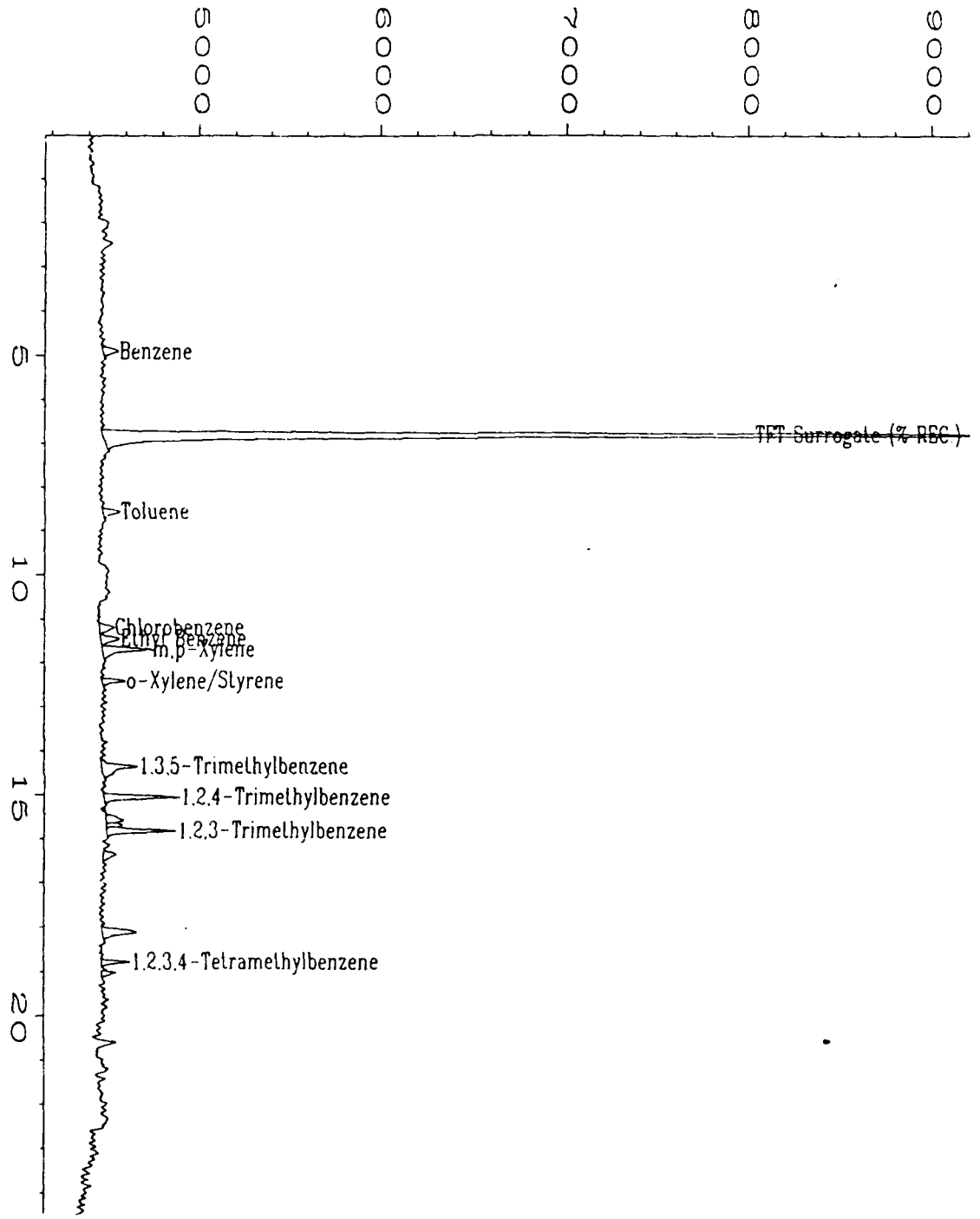
Page Number : 1
Vial Number : 8
Injection Number : 1
Sequence Line : 8
Instrument Method: BX20323.MTH
Analysis Method : BX20323.MTH
Sample Amount : 0
ISTD Amount :

Sig. 2 in C:\HPCHEM\2\DATA\BX20323\008R0801.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
2.452	* not found *			1		
4.902	662	BV	0.095	1	3.204	Benzene
6.798	35775	PV	0.105	1-R	98.651	TFT Surrogate (% REC.)
8.555	667	BV	0.092	1	2.805	Toluene
11.180	645	BV	0.106	1	2.661	Chlorobenzene
11.435	783	PV	0.096	1	1.394	Ethyl Benzene
11.680	1791	VV	0.094	1	-0.189	m,p-Xylene
12.400	665	PV	0.077	1	1.854	o-Xylene/Styrene
14.340	1763	PV	0.113	1	1.380	1,3,5-Trimethylbenzene
15.038	2270	PV	0.080	1	1.950	1,2,4-Trimethylbenzene
15.240	* not found *			1		
15.567	636	BV	0.083	1	2.307	
15.803	2097	VV	0.077	1	0.698	1,2,3-Trimethylbenzene
16.089	* not found *			1		
18.764	689	BV	0.062	1	0.938	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
3	6.750	6.798	0.048

Not all calibrated peaks were found



Data File Name : C:\HPCHEM\2\DATA\BX20323\008R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : 1.0 ppb BTEX MIX
Run Time Bar Code:
Acquired on : 23 Mar 95 04:17 PM
Report Created on: 23 Mar 95 04:42 PM
Last Recalib on : 23 Mar 95 03:56 PM
Multiplier : 1
Sample Info : STD REF #1644, 3/10/95, 0.5 UG/ML (M & P-XYLENE PRESENT); 1,2,3 & 1,2,4-Trimethylbenzene

Page Number : 1
Vial Number : 8
Injection Number : 1
Sequence Line : 8
Instrument Method: BX20323...
Analysis Method : BX20323.MT
Sample Amount : 0
ISTD Amount :

External Standard Report

Data File Name : C:\HPCHEM\2\DATA\BX20322\008R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : 1.0 ppb BTEX MIX
Run Time Bar Code:
Acquired on : 22 Mar 95 04:24 PM
Report Created on: 23 Mar 95 08:56 AM
Last Recalib on : 22 MAR 95 04:04 PM
Multiplier : 1
Sample Info : STD REF #1644, 3/10/95, 0.5 UG/ML (M & P-XYLENE PRESENT); + 1,2,3 & 1,2,4-Trimethylbenzene

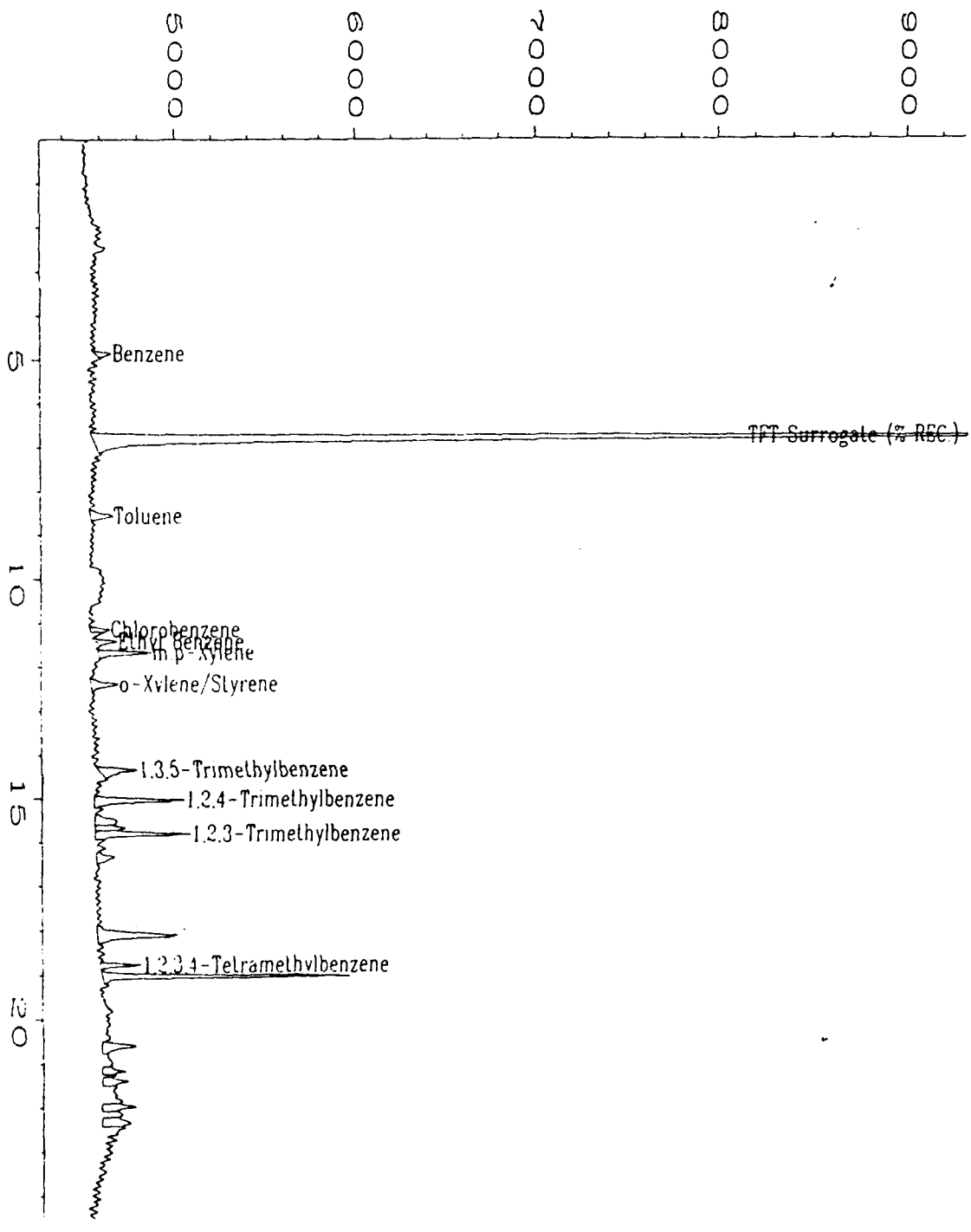
Page Number : 1
Vial Number : 8
Injection Number : 1
Sequence Line : 7
Instrument Method: BX20322.MTH
Analysis Method : BX20322.MTH
Sample Amount : 0
ISTD Amount :

Sig. 2 in C:\HPCHEM\2\DATA\BX20322\008R0701.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
2.452	* not found *			1		
4.860	438	PV	0.067	1	1.864	Benzene
6.789	39381	PV	0.099	1-R	87.650	TFT Surrogate (% REC.)
8.562	933	PV	0.094	1	1.820	Toluene
11.144	534	BV	0.069	1	1.698	Chlorobenzene
11.428	529	PV	0.064	1	0.289	Ethyl Benzene
11.672	1477	BV	0.077	1	-2.219	m,p-Xylene
12.389	1035	BV	0.093	1	1.133	o-Xylene/Styrene
14.332	1481	BV	0.103	1	-0.0133	1,3,5-Trimethylbenzene
15.022	2932	BV	0.083	1	1.035	1,2,4-Trimethylbenzene
15.240	* not found *			1		
15.484	1180	PV	0.154	1	4.187	
15.799	2933	VV	0.079	1	0.0762	1,2,3-Trimethylbenzene
16.330	794	VV	0.105	1	10.218	
18.764	948	VV	0.059	1	0.600	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
3	6.750	6.789	0.039

Not all calibrated peaks were found



Data File Name : C:\HPCHEM\2\DATA\BX20322\008R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : 1.0 ppb BTEX MIX
Run Time Bar Code:
Acquired on : 22 Mar 95 04:24 PM
Report Created on: 22 Mar 95 04:50 PM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1
Sample Info : STD REF #1644, 3/10/95, 0.5 UG/ML (M & P-XYLENE PRESENT); 1,2,3 & 1,2,4-Trimethylbenzene

Page Number : 1
Vial Number : 8
Injection Number : 1
Sequence Line : 7
Instrument Method: BX20322.
Analysis Method : BX20322.MT
Sample Amount : 0
ISTD Amount :

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS (TVH)

Date Sampled	: 3/13-15/95	Client Project Number	: 722450.21020/MACDILL AFB
Date Received	: 3/17/95	Lab Project Number	: 95-0871
Date Prepared	: 3/22,23/95	Matrix	: Soil
Date Analyzed	: 3/22,23/95	Method Number	: 5030/Mod.8015

Evergreen Sample #	Client Sample #	Surrogate Recovery	TVH* mg/Kg	RL* mg/Kg
MB032295	METHOD BLANK	100%	U	0.
MB032395	METHOD BLANK	99%	U	0.1
X04339	75MP-2(2-4)	131%	3000E	6.0
X04340	75MP-2(8-10)	102%	U	0.12
X04341	75SS-3(3-4)	102%	U	0.12
X04342	75SS-3(8-10)	107%	U	0.12
X04344	75MP-3(3-5)	100%	U	0.12
X04345	75MP-4(8-10)	97%	U	0.12
X04346	75MP-4(13-15)	99%	U	0.12
X04347	75MP-5(4-6)	93%	U	0.12
X04348	75MP-5(6-8)	98%	U	0.12
X04348 DUP	75MP-5(6-8)	100%	U	0.12
X04349	75SS-15(4-6)	112%	U	0.12
X04350	75SS-6(3-5)	100%	U	0.12
X04351	75SS-6(7-9)	88%	U	0.12
X04351 DUP	75SS-6(7-9)	89%	U	0.12
X04352	75SS-6(22-24)	89%	3.0	0.12
X04353	75SD-1	102%	U	0.11
X04354	75SD-2	100%	U	0.11
X04355	75SD-3	99%	U	0.11
X04360	75MP-7(6-8)	97%	U	0.12

* = Based on dry weight.

QUALIFIERS

U = TVH analyzed for but not detected.

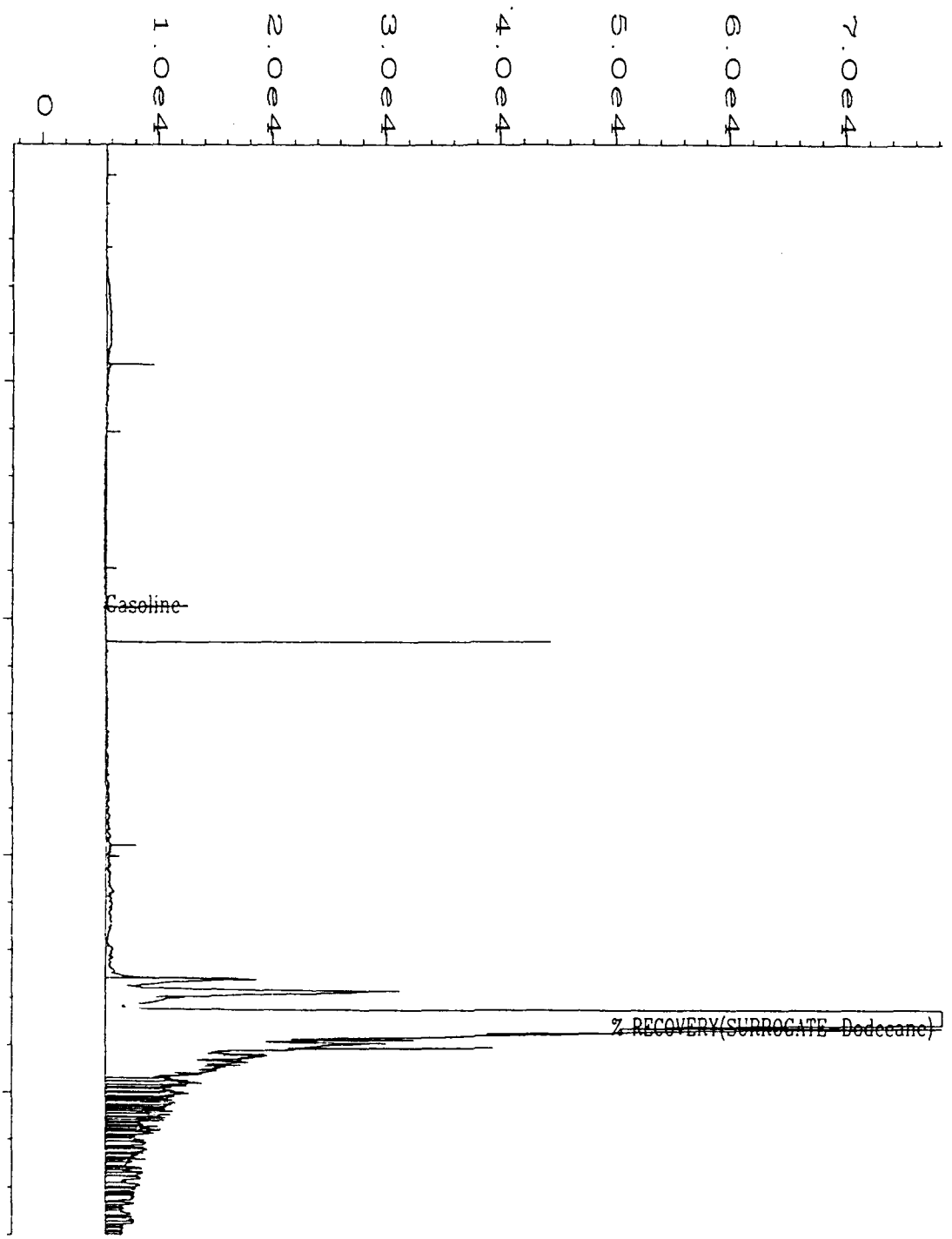
B = TVH found in blank as well as sample (blank data should be compared).

E = Extrapolated value.

RL = Reporting Limit

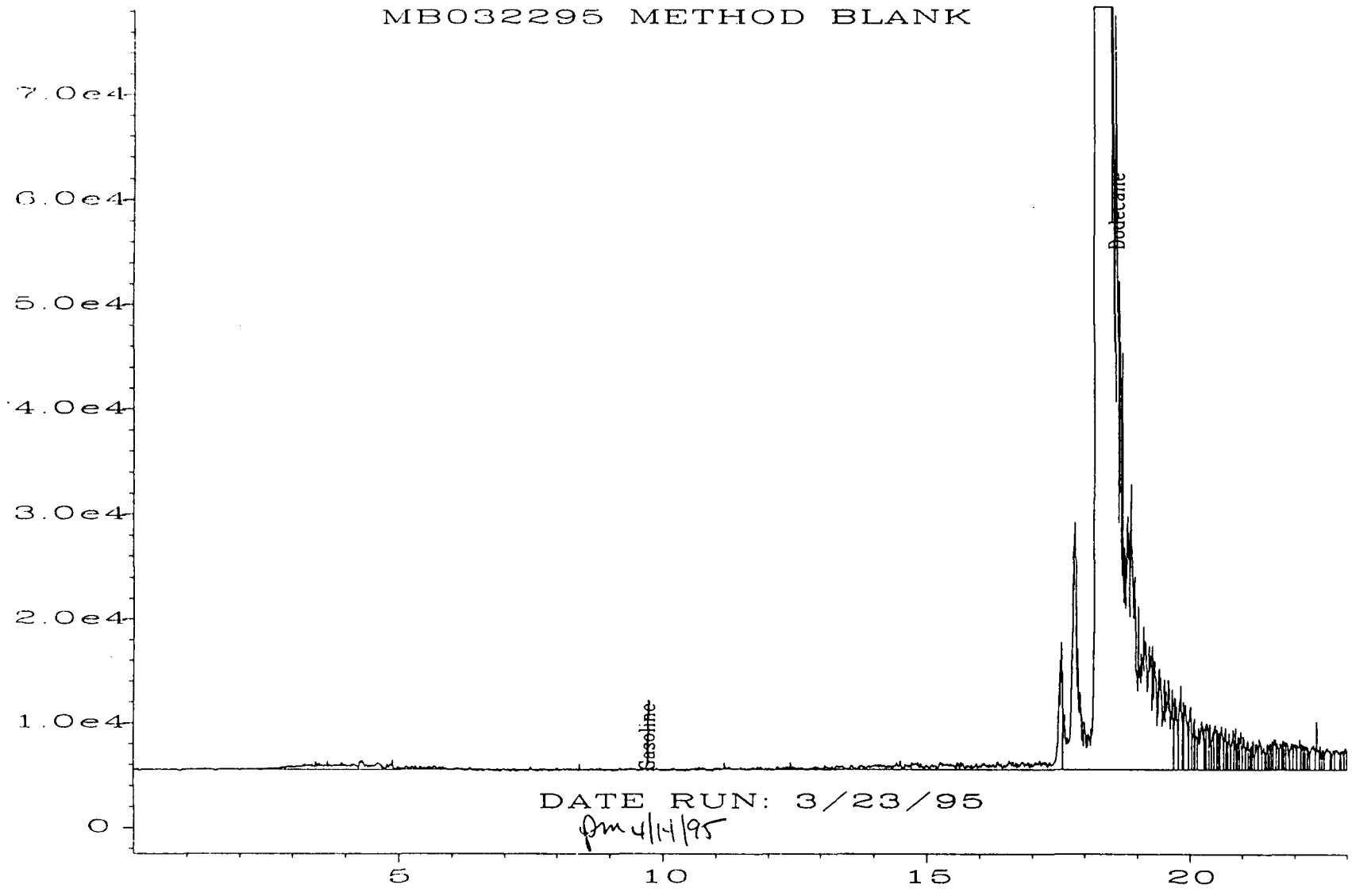
Analyst

Approved

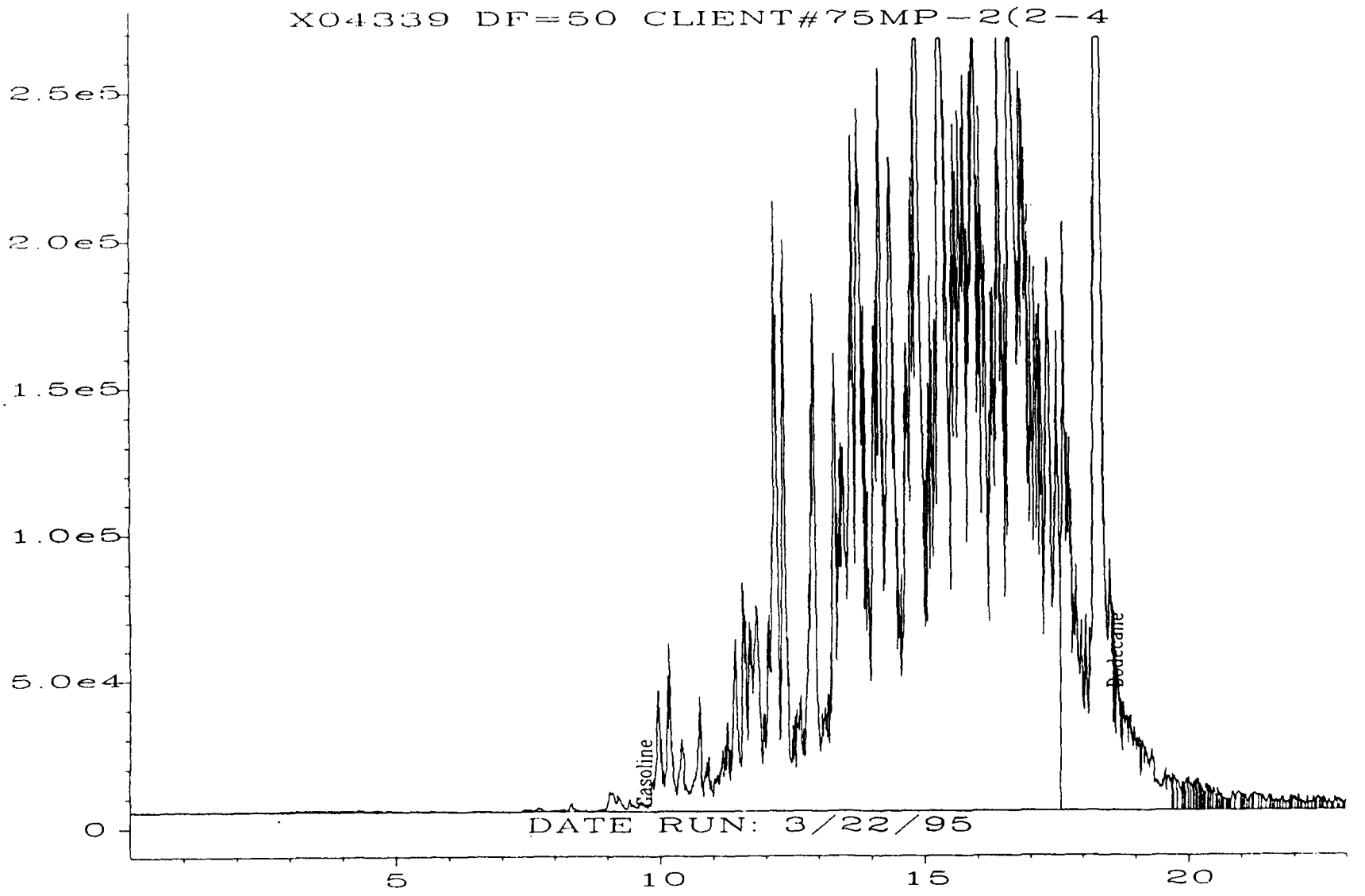


Data File Name	: C:\HPCHEM\1\DATA\tvh0322\046F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH3	Vial Number	: 46
Sample Name	: MB032395	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 23 Mar 95 03:47 PM	Instrument Method	: TVH1BASE...
Report Created on	: 23 Mar 95 09:22 PM	Analysis Method	: TVH0322.MT1
Last Recalib on	: 23 MAR 95 12:18 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

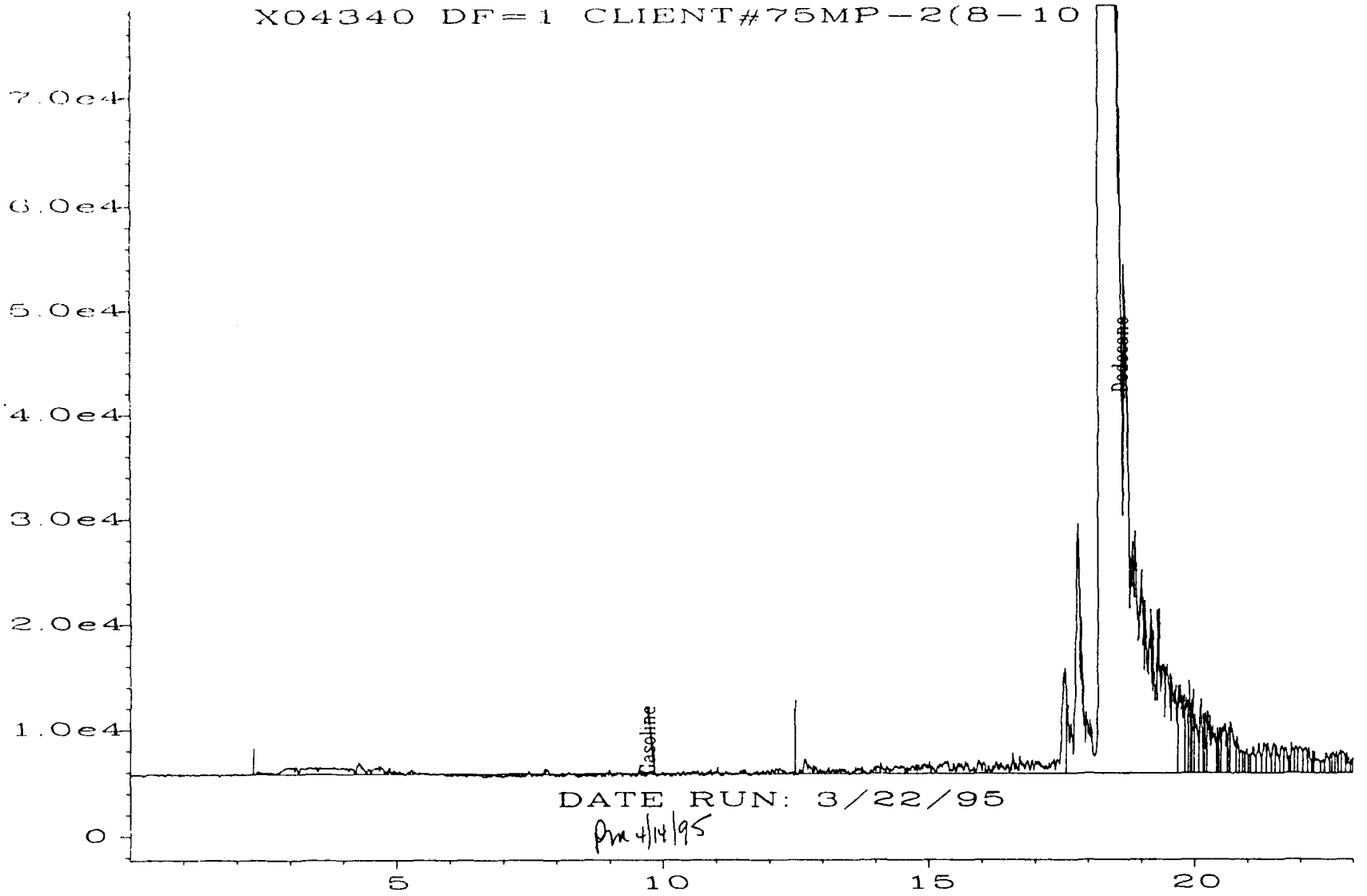
4/14/95



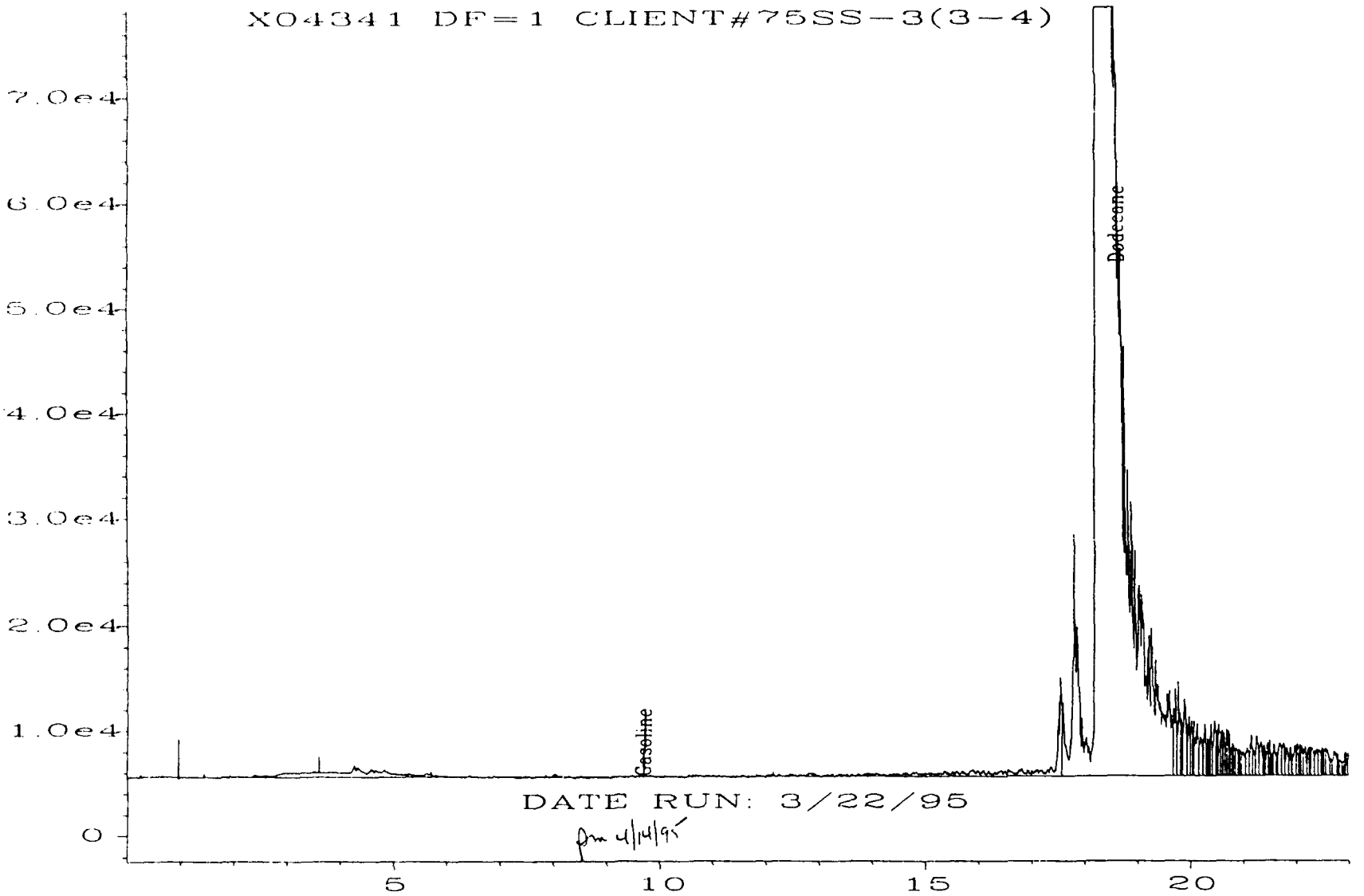
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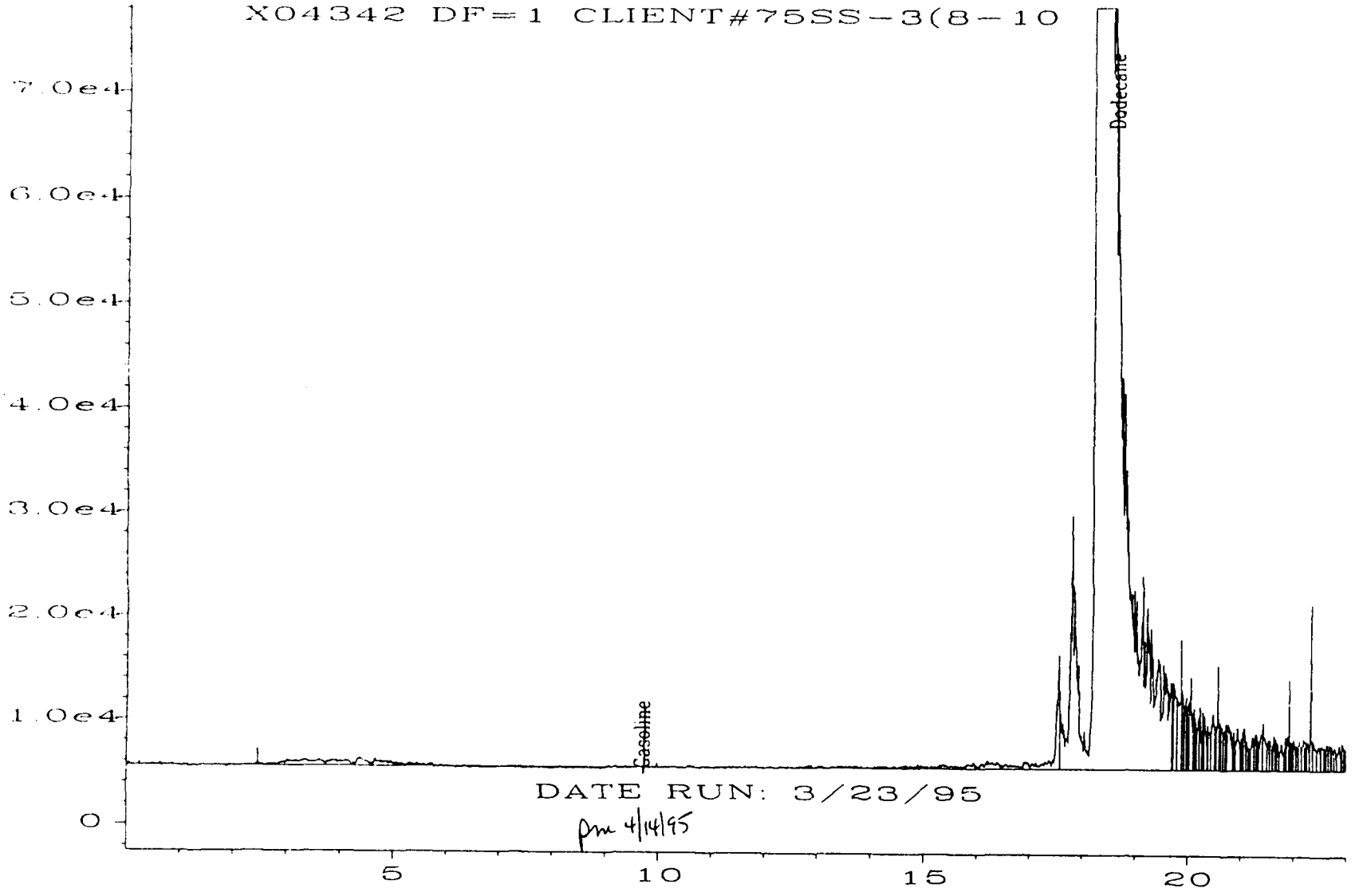
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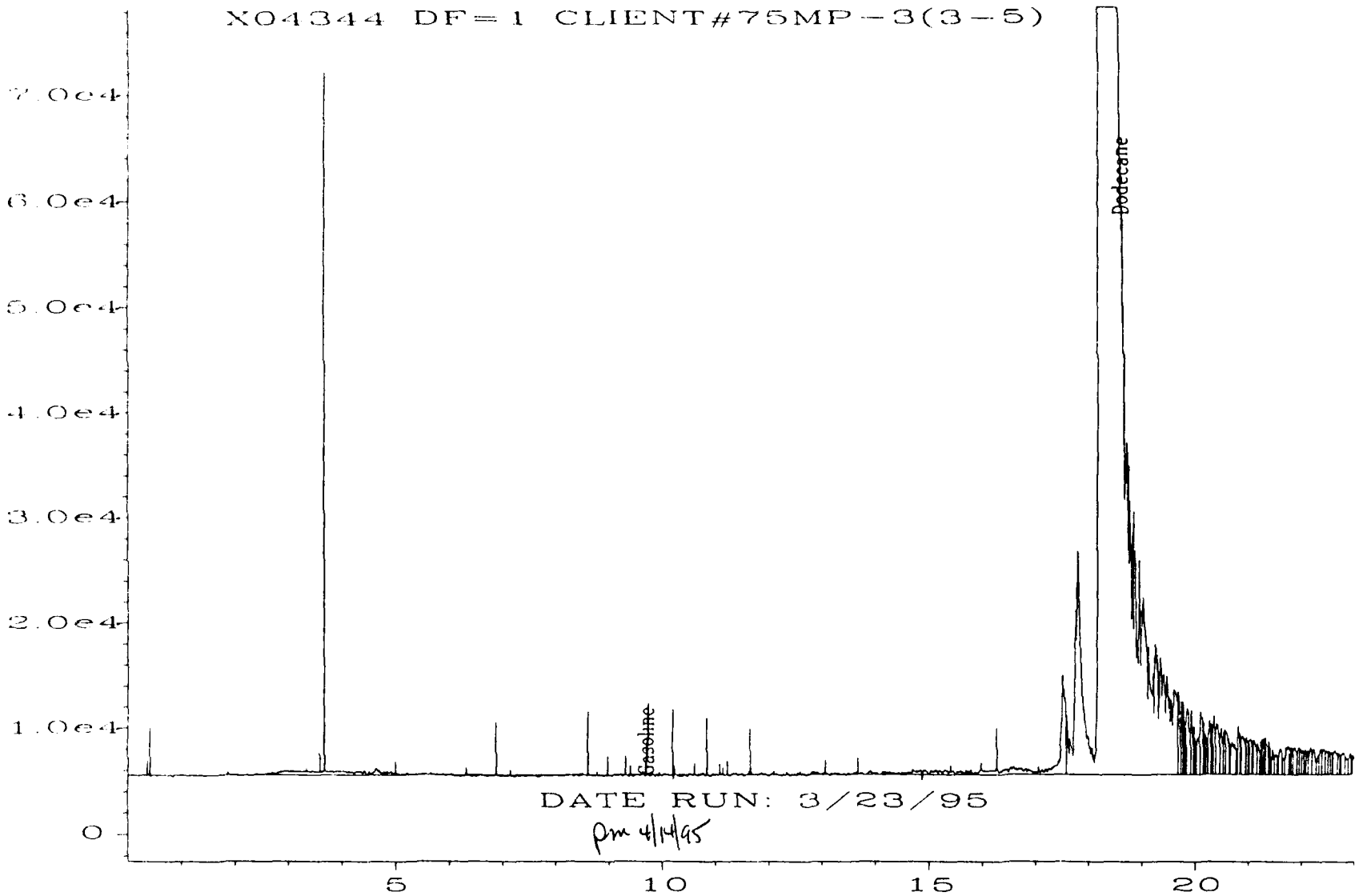
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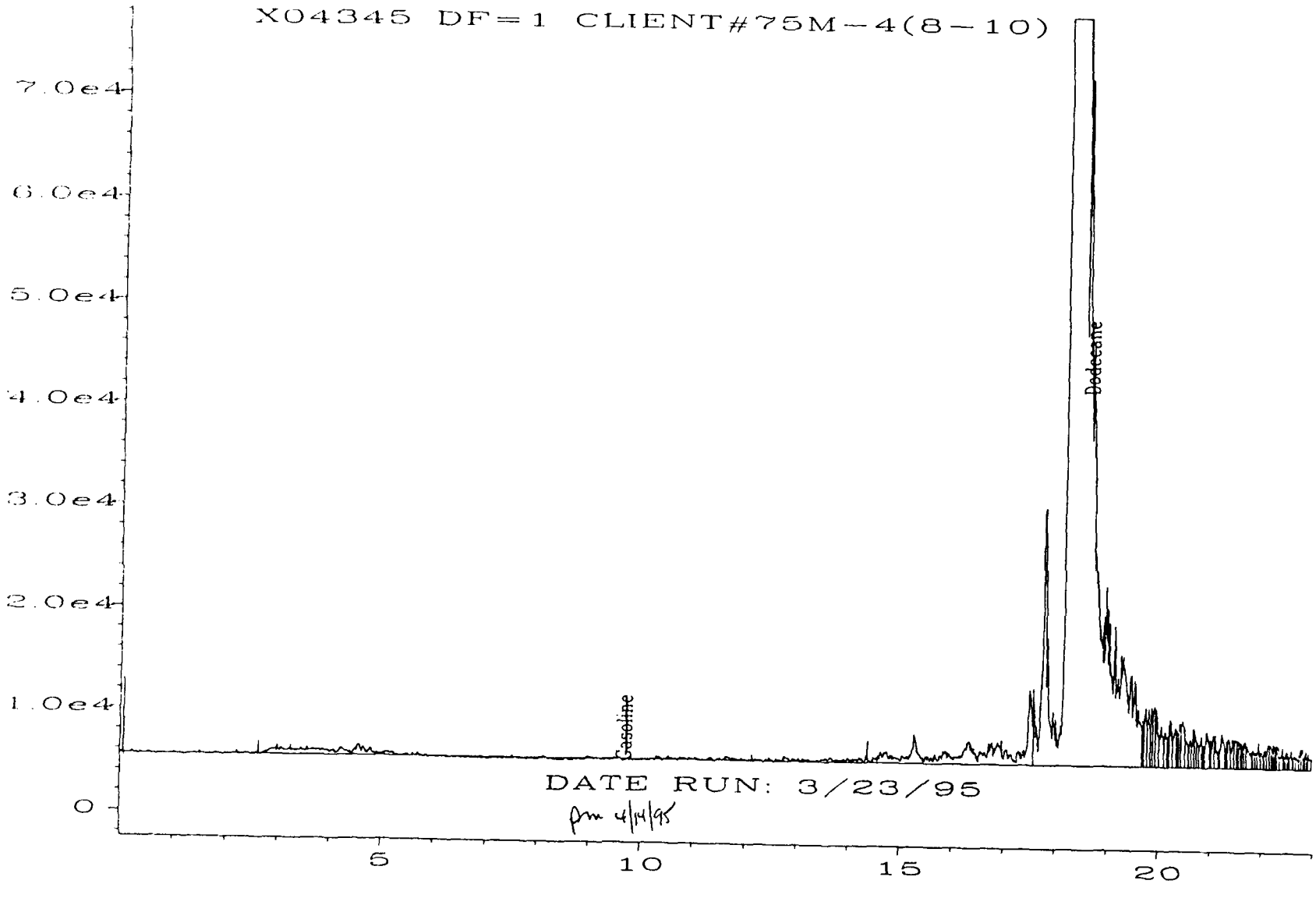
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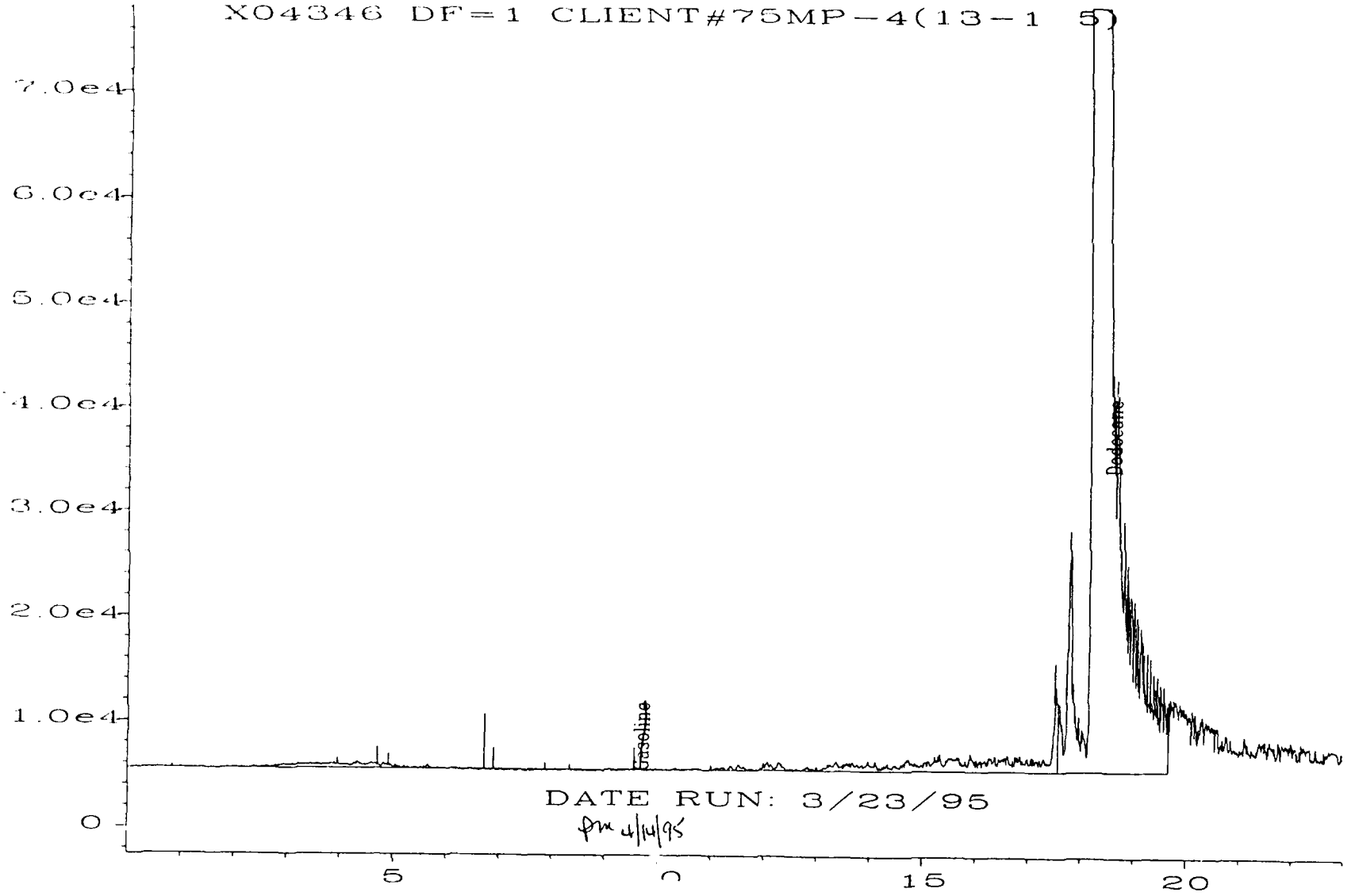
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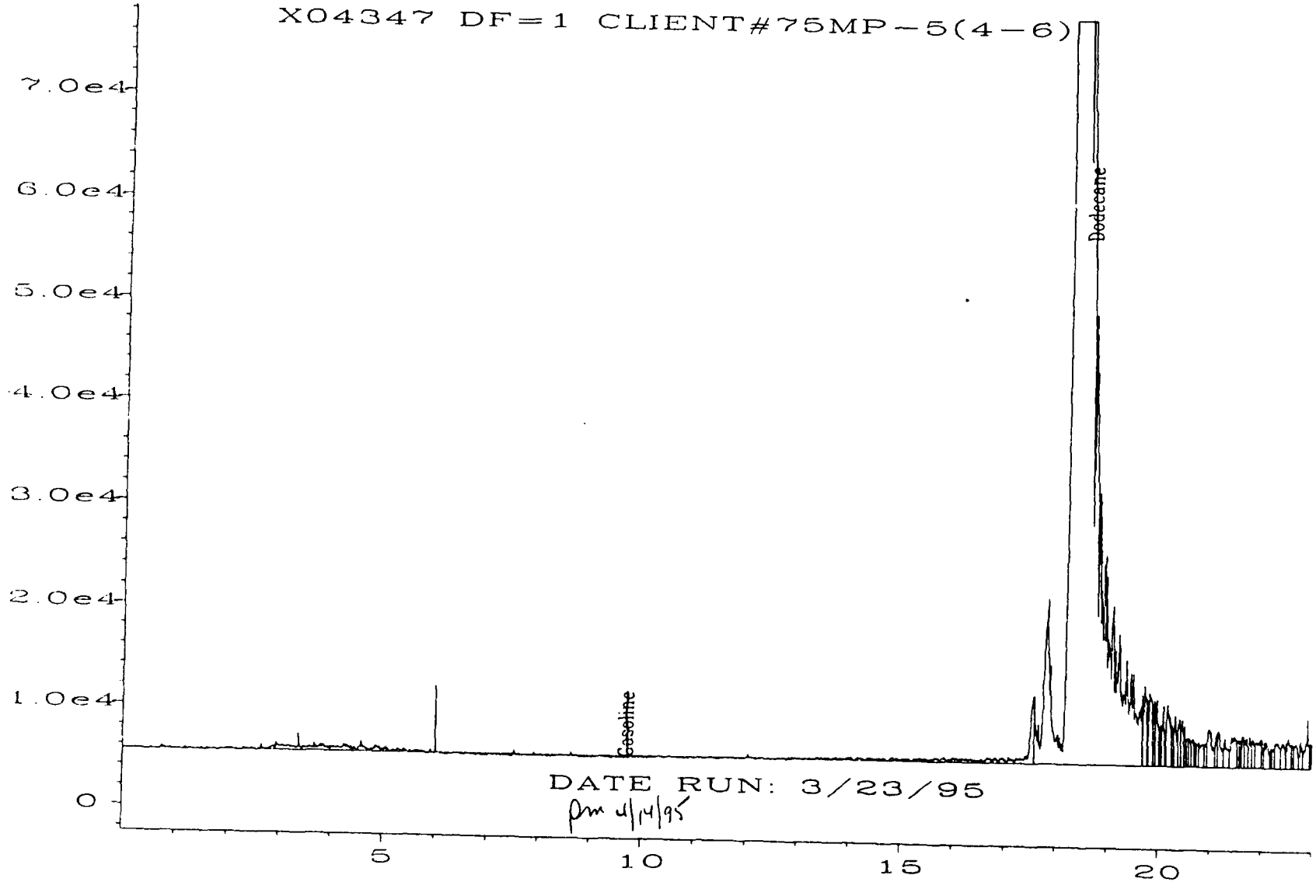
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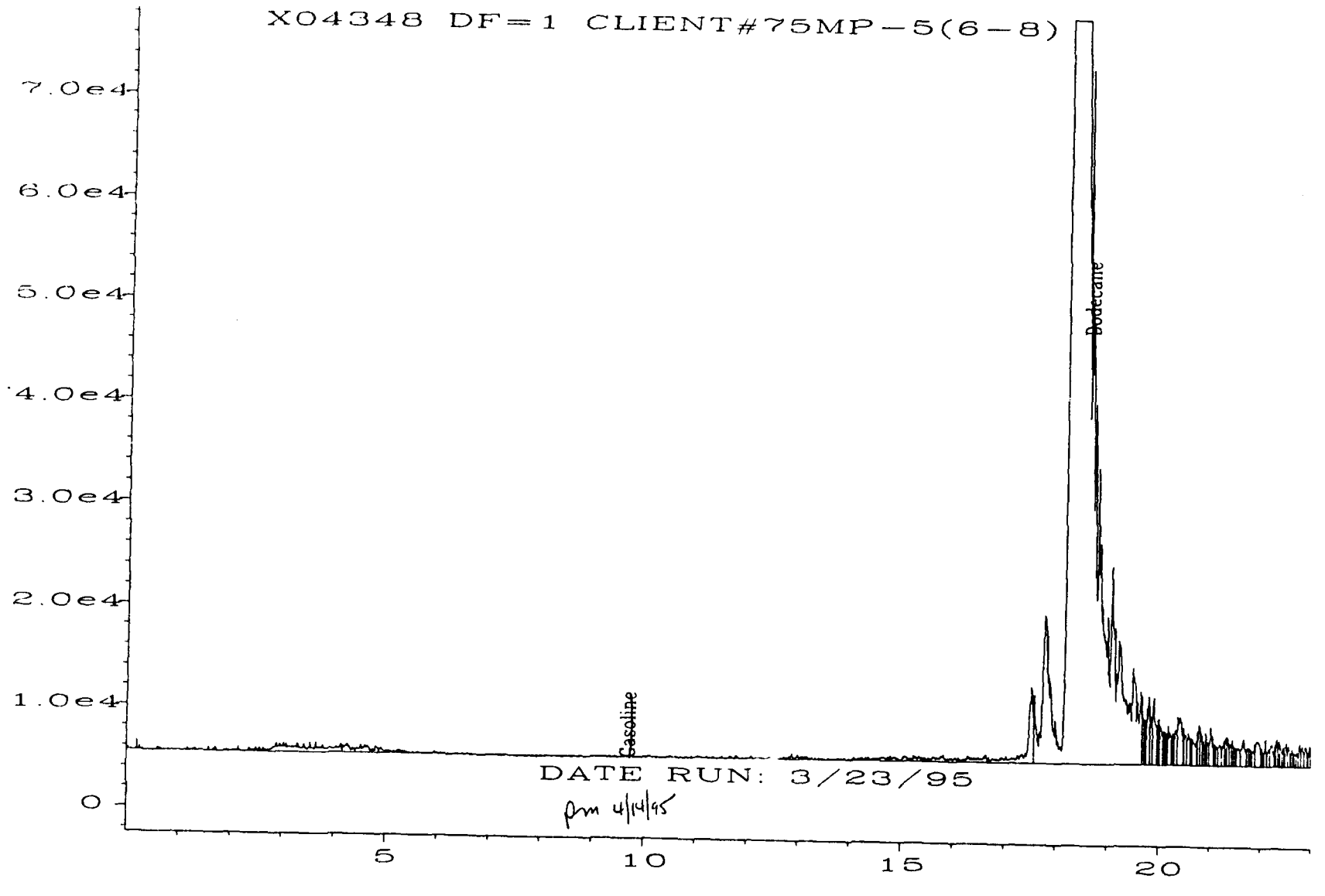
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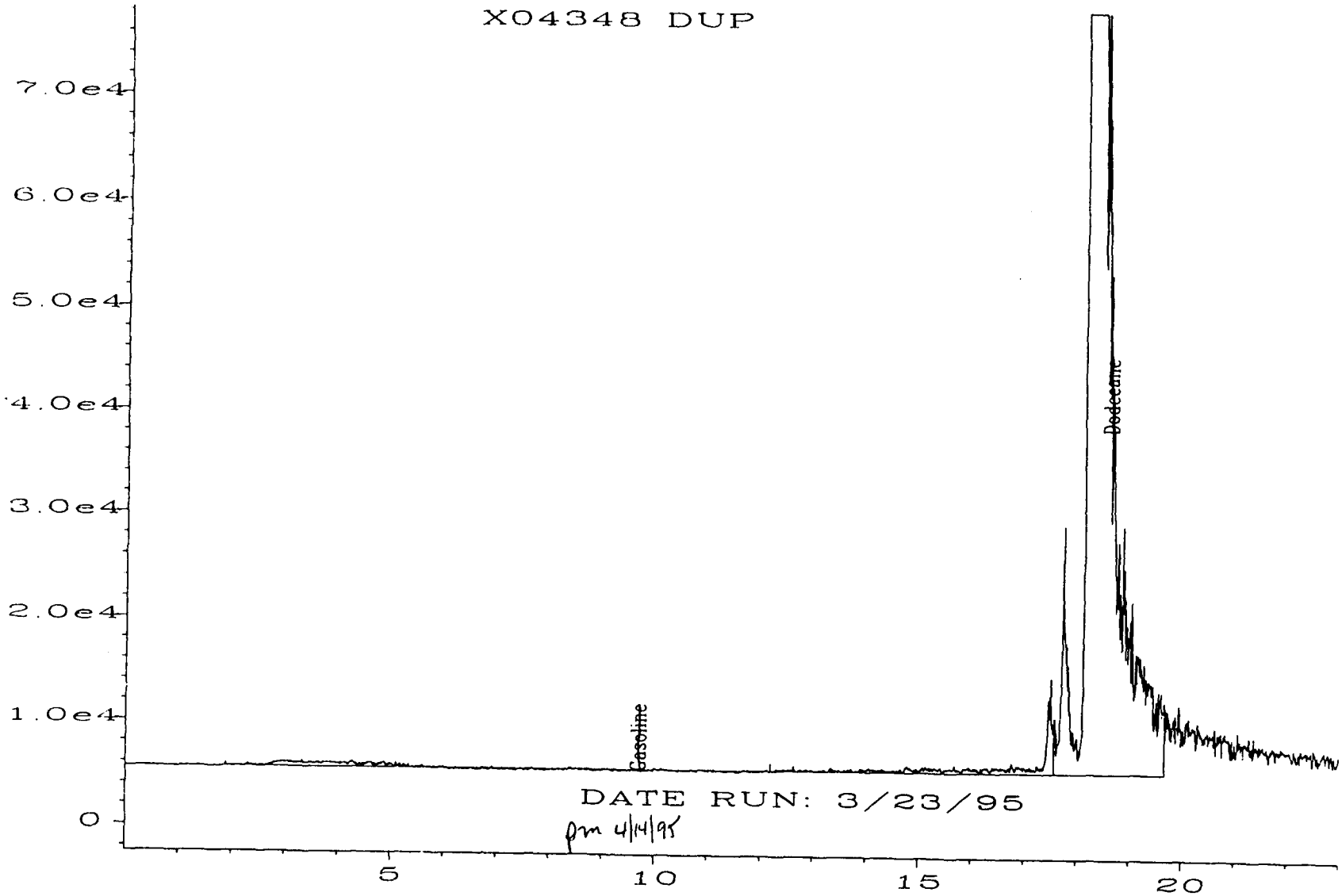
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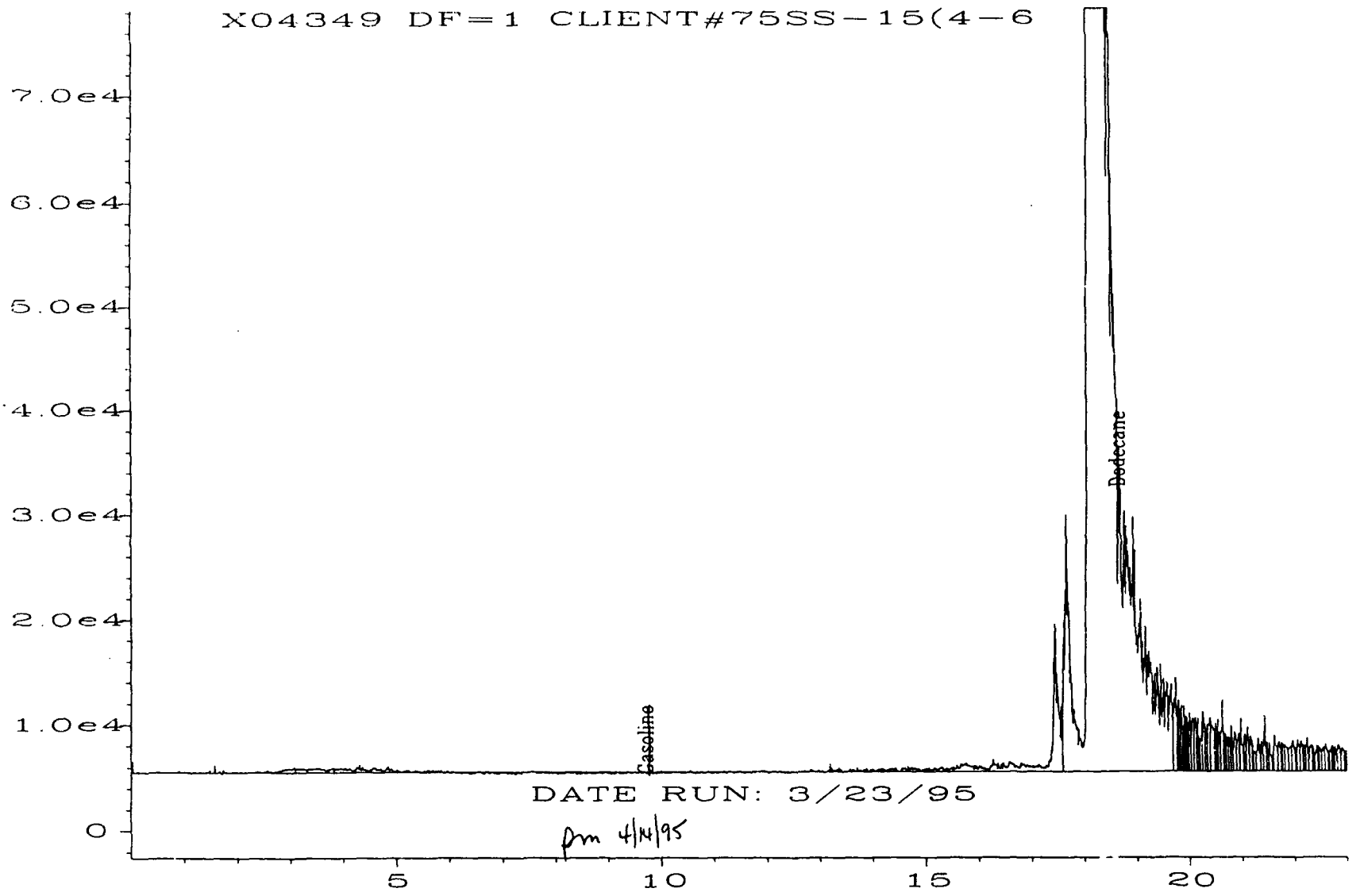
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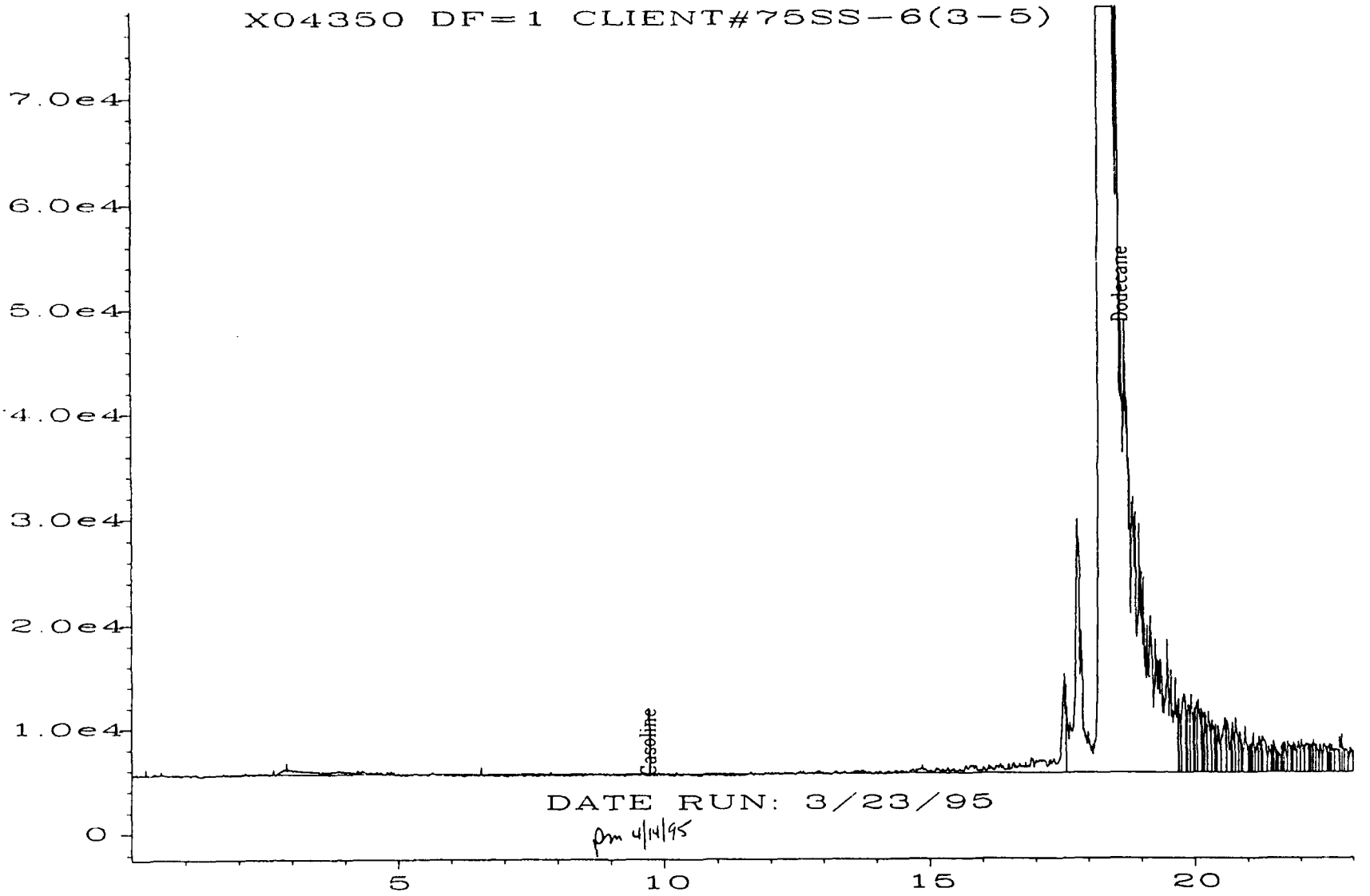
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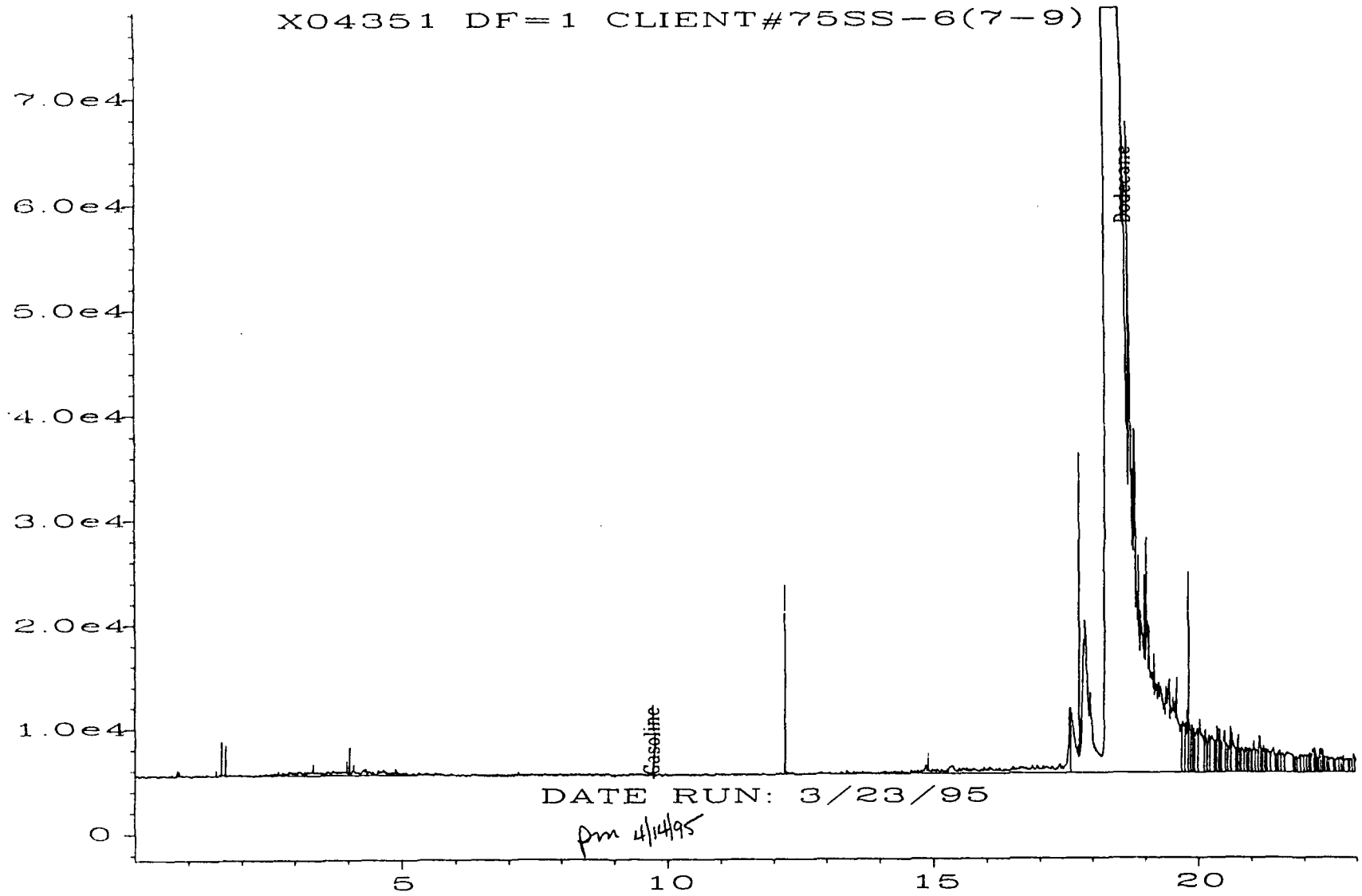
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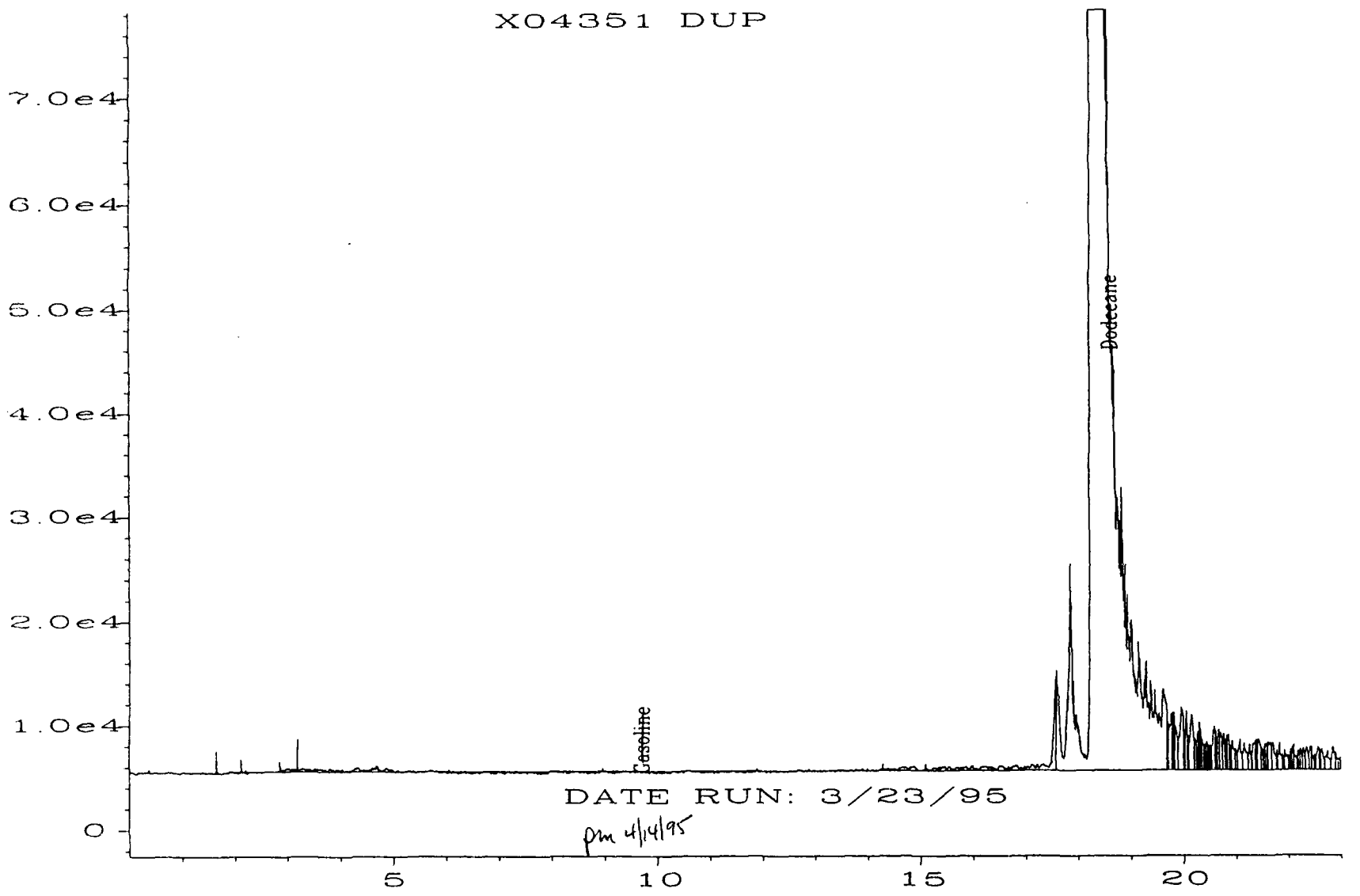
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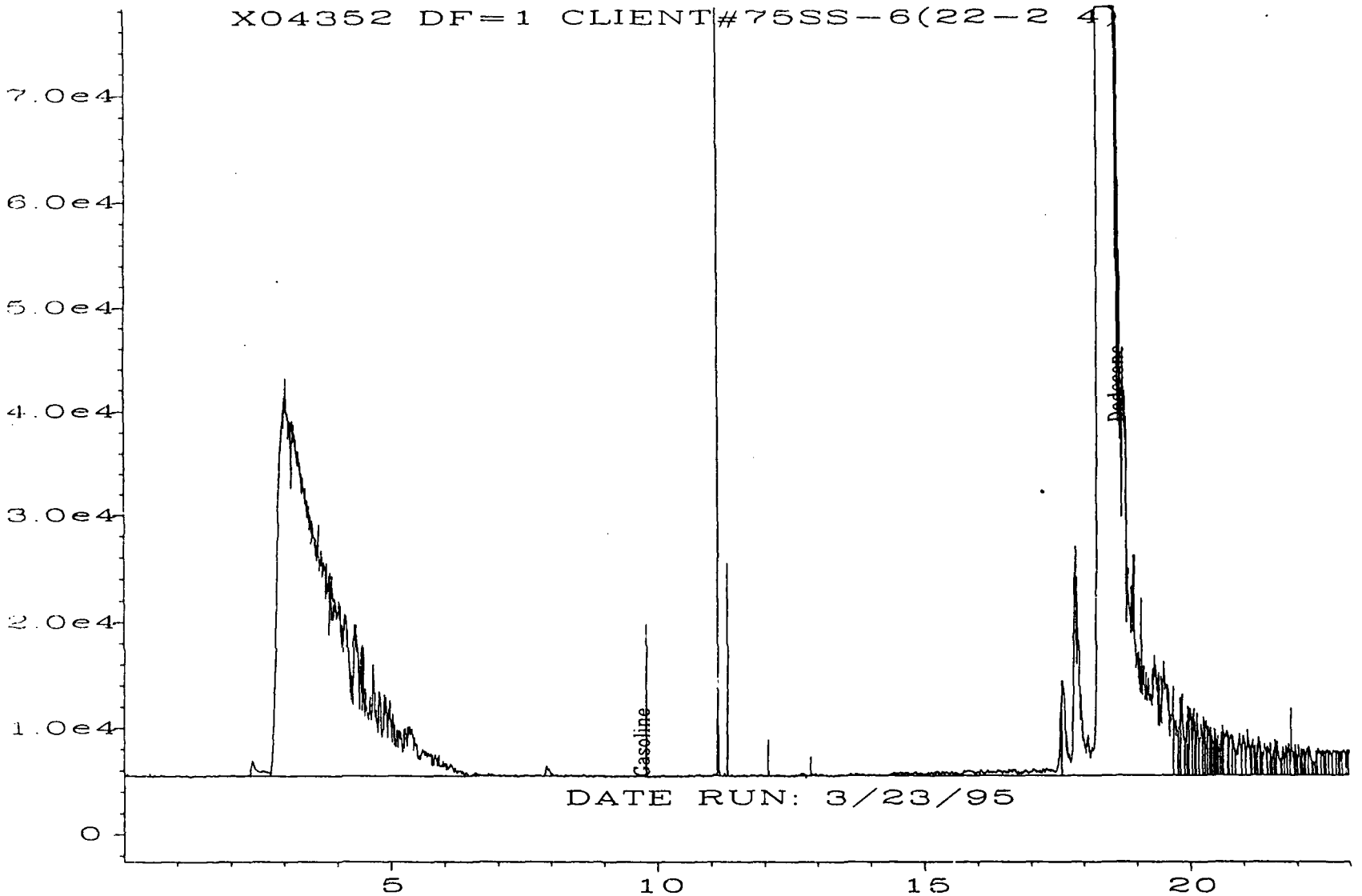
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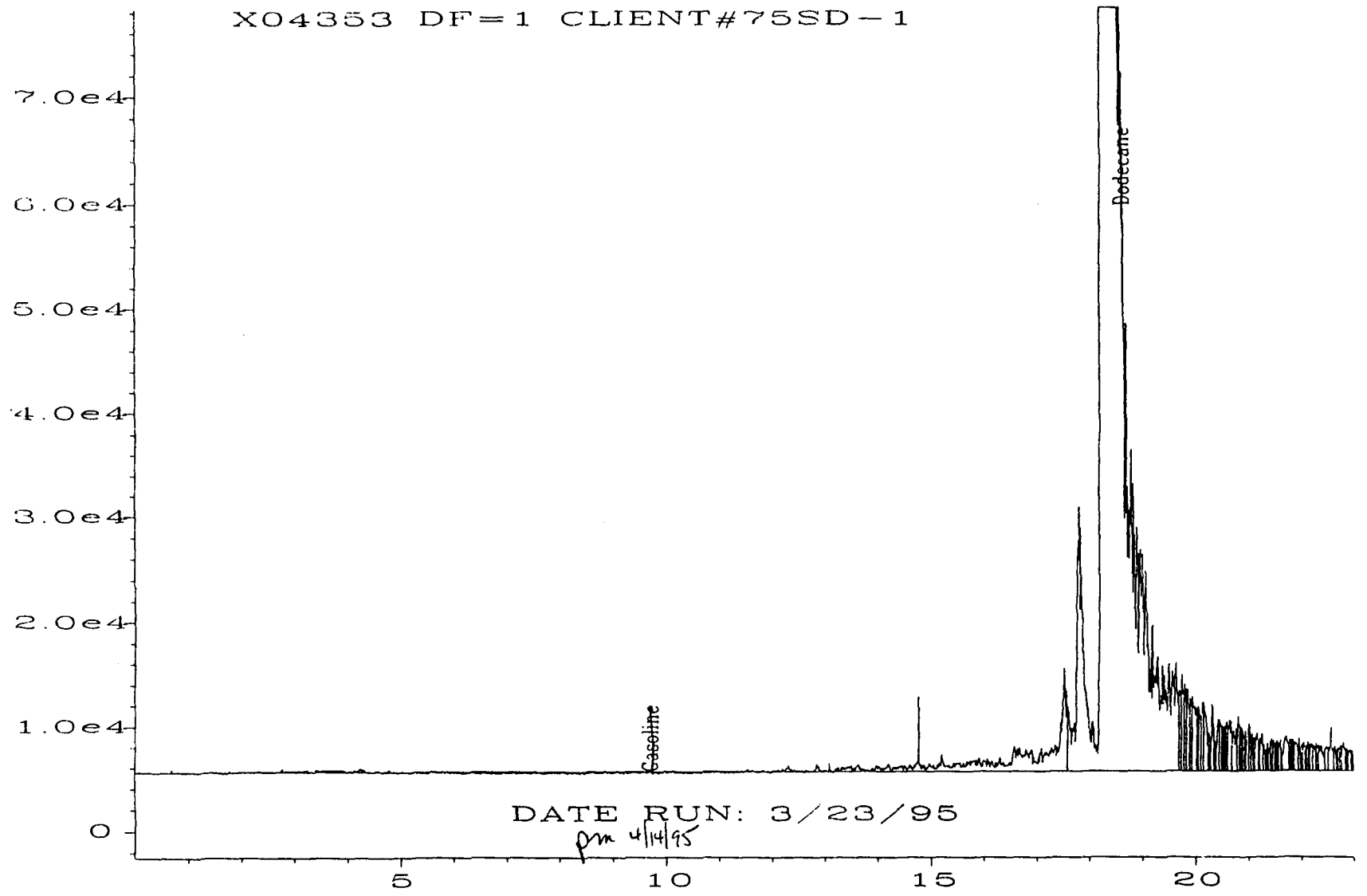
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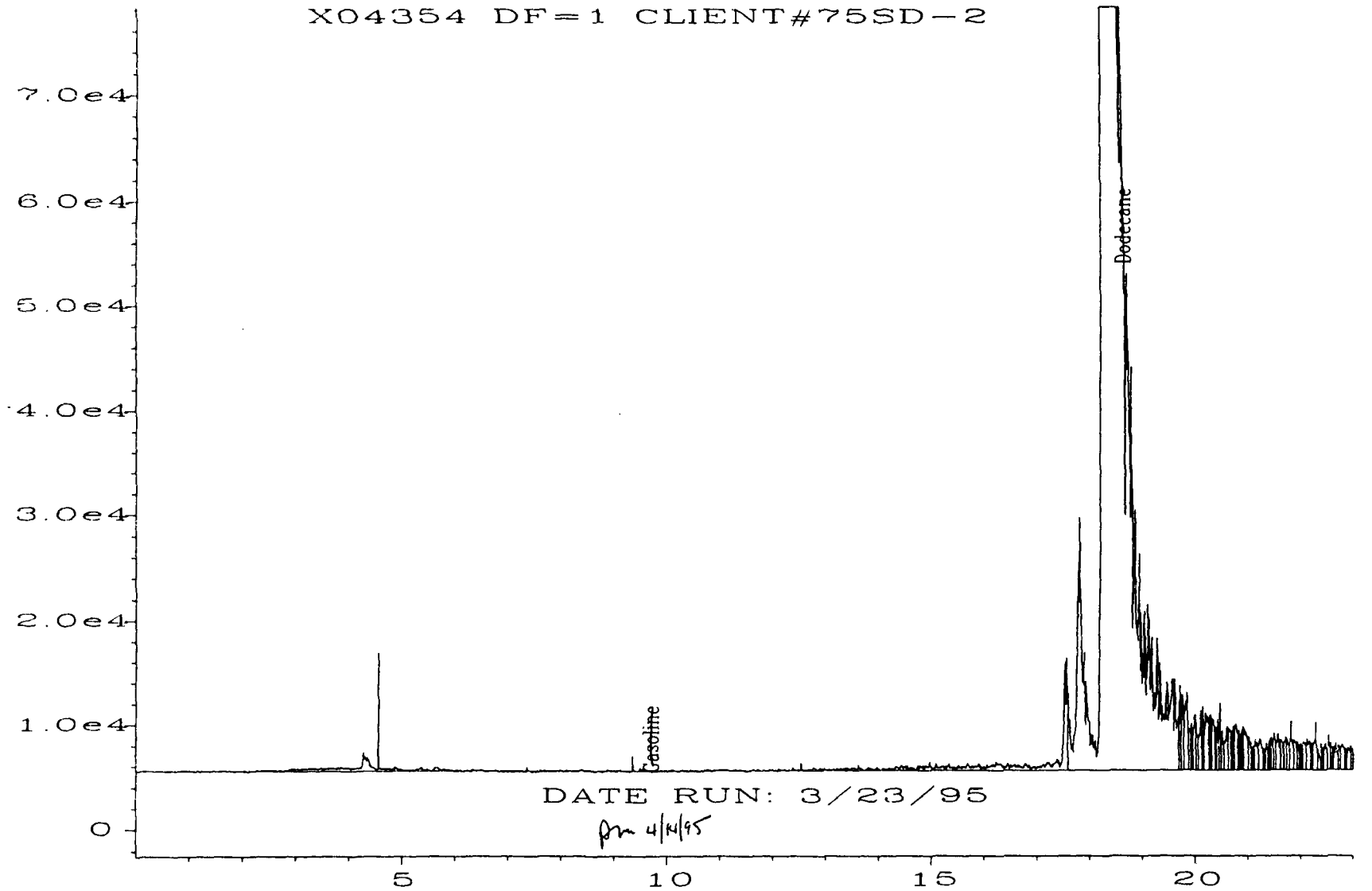
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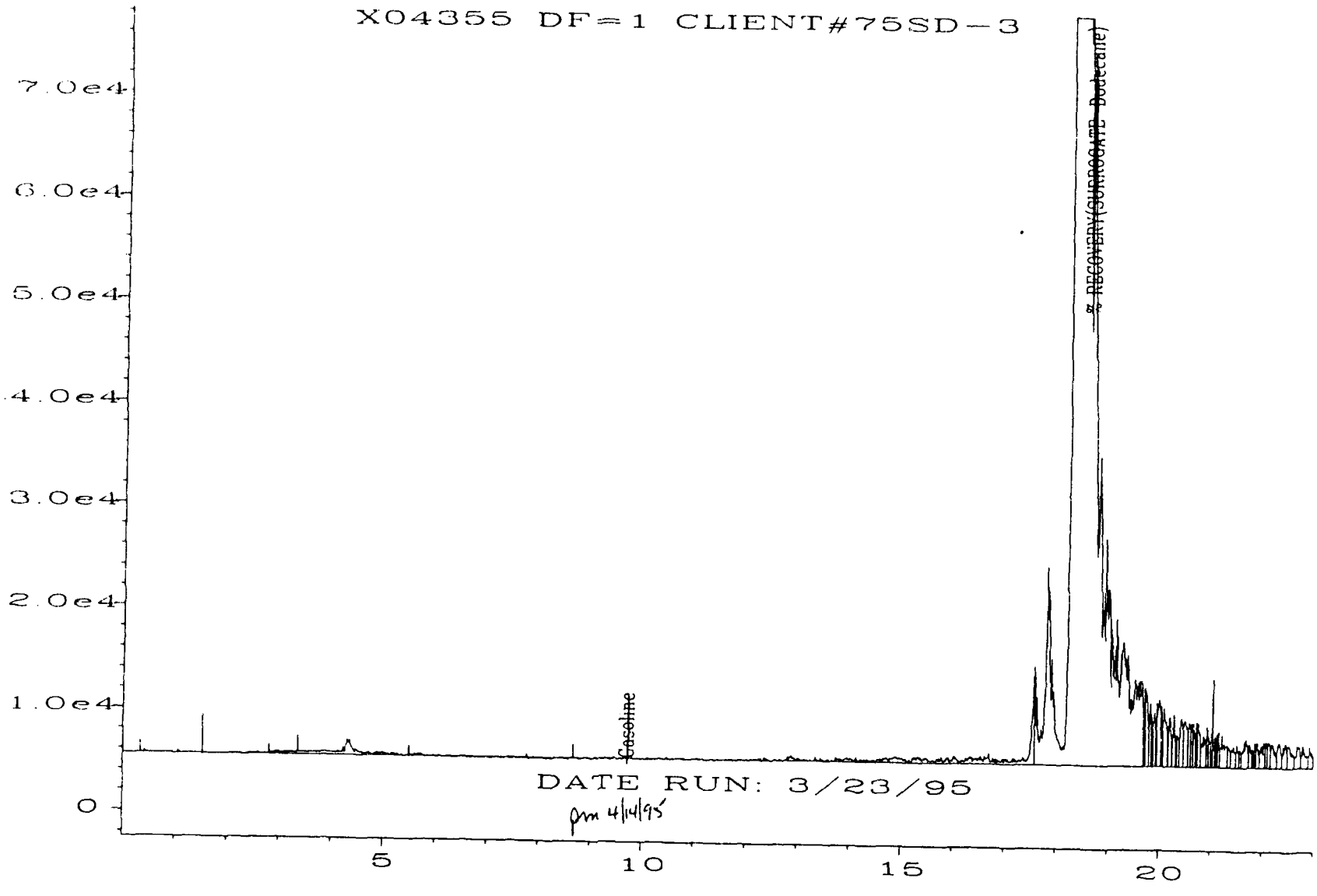
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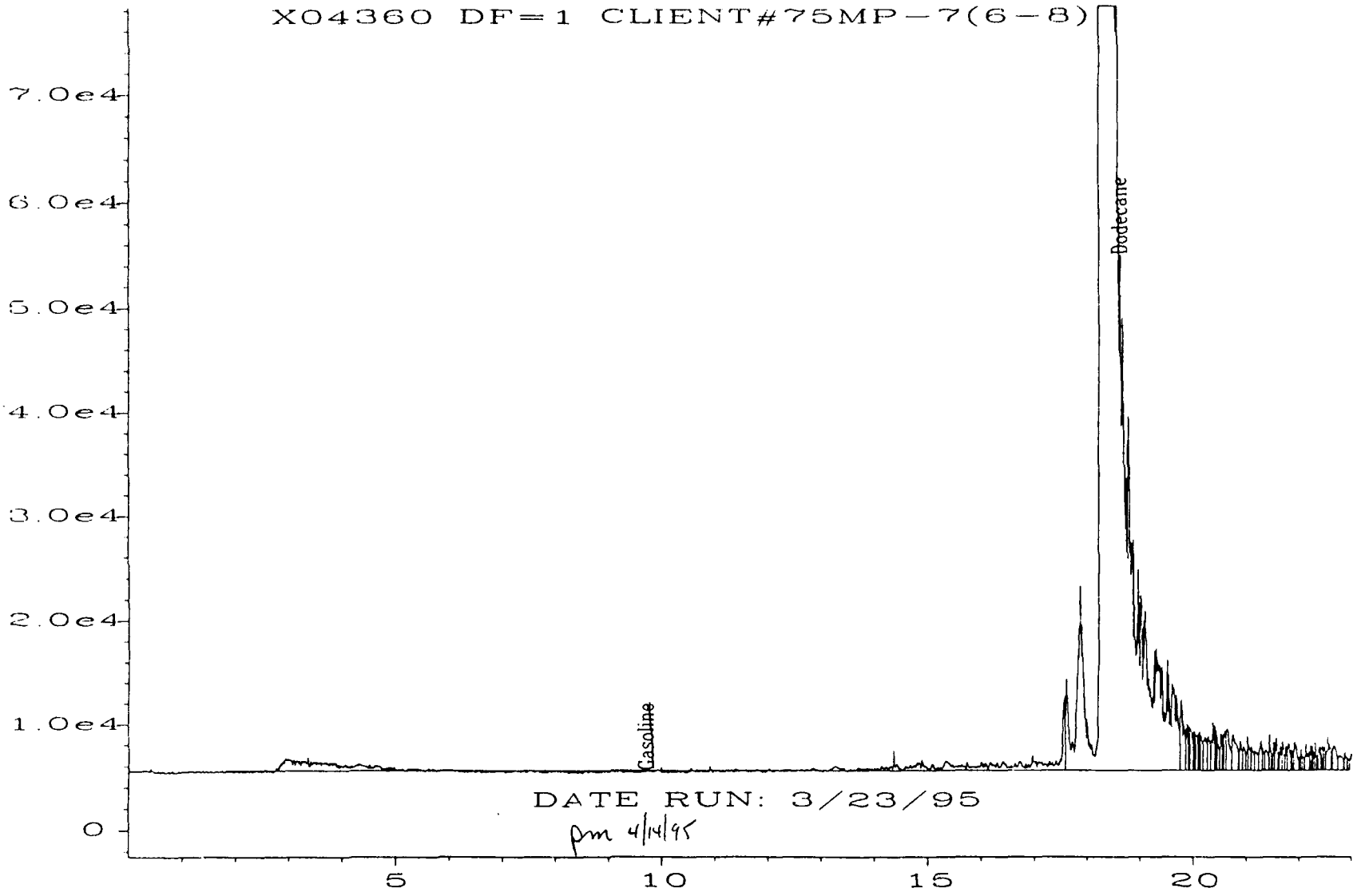
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Sig. 1 in C:\HPCHEM\1\DATA\TVH0322\034F0101.D



Sig. 1 in C:\HPCHEM\1\DATA\TVH0322\035F0101.D



Sig. 1 in C:\HPCHEM\1\DATA\TVH0322\036F0101.D

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS (TVH)
Laboratory Control Sample (LCS)

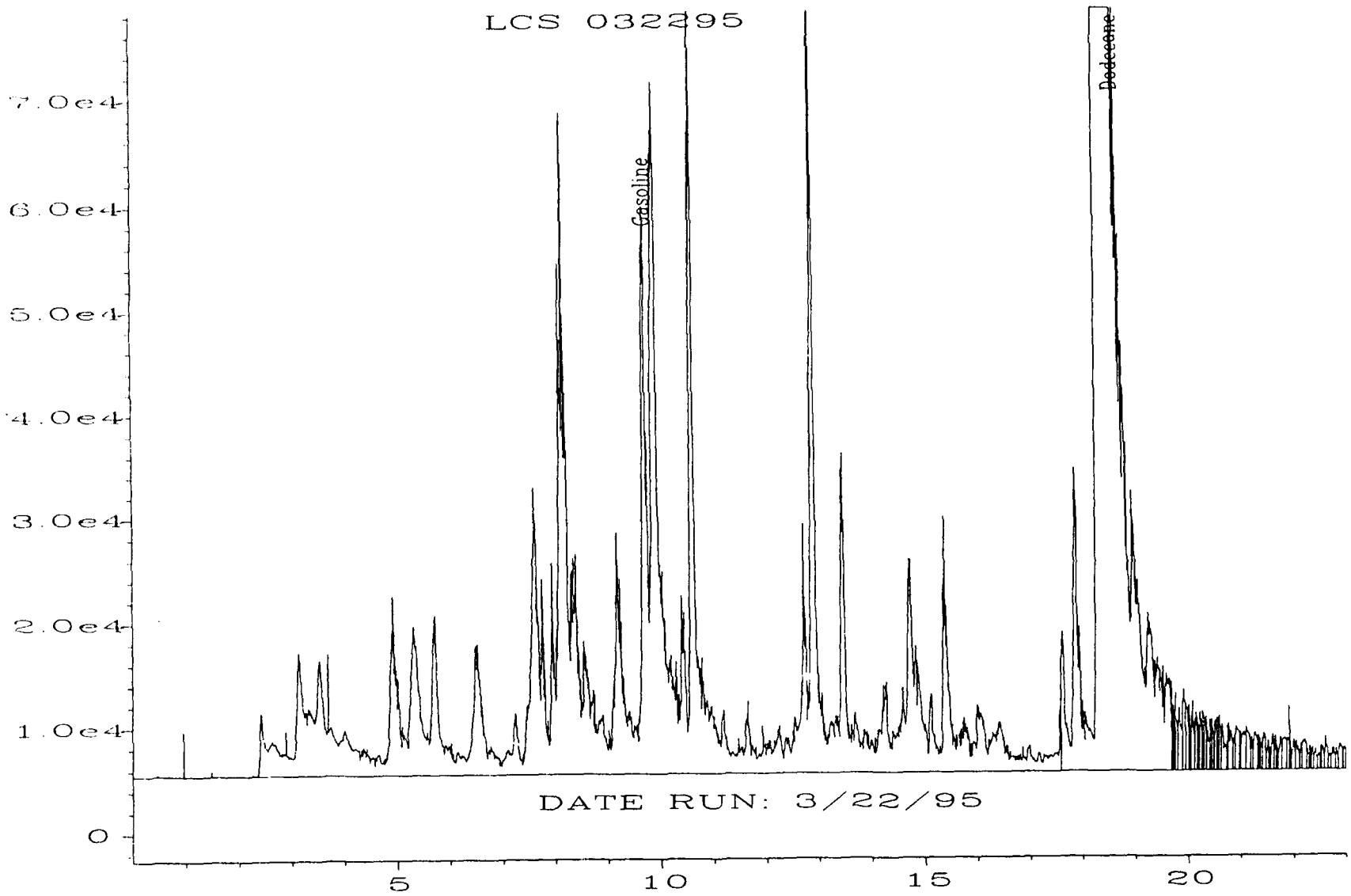
LCS Number	: LCS032295	Client Project Number	: 722450.21020/MACDILL AFB
Date Prepared	: 3/22/95	Lab Project Number	: 95-0871
Date Analyzed	: 3/22/95	Matrix	: SOIL
Sequence Number	: TVH7	Method Number	: 5030/MOD. 8015

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/ L	QC Limit mg/L
Gasoline	5.00	6.30	3.5-6.5

QUALIFIERS
U = TEH analyzed for but not detected.
B = TEH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

Analyst

Approved



Sig. 1 in C:\HPCHEM\1\DATA\TVH0322\007F0101.D

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL EXTRACTABLE HYDROCARBONS (TEH)

Jet Fuel

Date Sampled	: 3/13-15/95	Client Project Number	: 722450.21020/MACDILL AFB
Date Received	: 3/17/95	Lab Project Number	: 95-0871
Date Prepared	: 3/20,21/95	Matrix	: Soil
Date Analyzed	: 3/24-25/95	Method Number	: 3500/Mod. 8015

Evergreen Sample #	Client Sample #	Surrogate Recovery	TEH* mg/Kg	RL* mg/Kg
SB032095	SOIL METHOD BLANK	96%	U	10
SB032195	SOIL METHOD BLANK	110%	U	10
X04340	75MP-2(8-10)	94%	17	12
X04341	75SS-3(3-4)	94%	U	12
X04342	75SS-3(8-10)	91%	U	12
X04342 DUP	75SS-3(8-10)	90%	U	12
X04344	75MP-3(3-5)	92%	U	12
X04347	75MP-5(4-6)	88%	U	12
X04349	75SS-15(4-6)	93%	U	12
X04350	75SS-6(3-5)	89%	U	12
X04351	75SS-6(7-9)	108%	U	12
X04351 DUP	75SS-6(7-9)	109%	U	12
X04339	75MP-2(2-4)	79%	4000	580

* = Based on dry weight.

QUALIFIERS

U = TEH analyzed for but not detected.

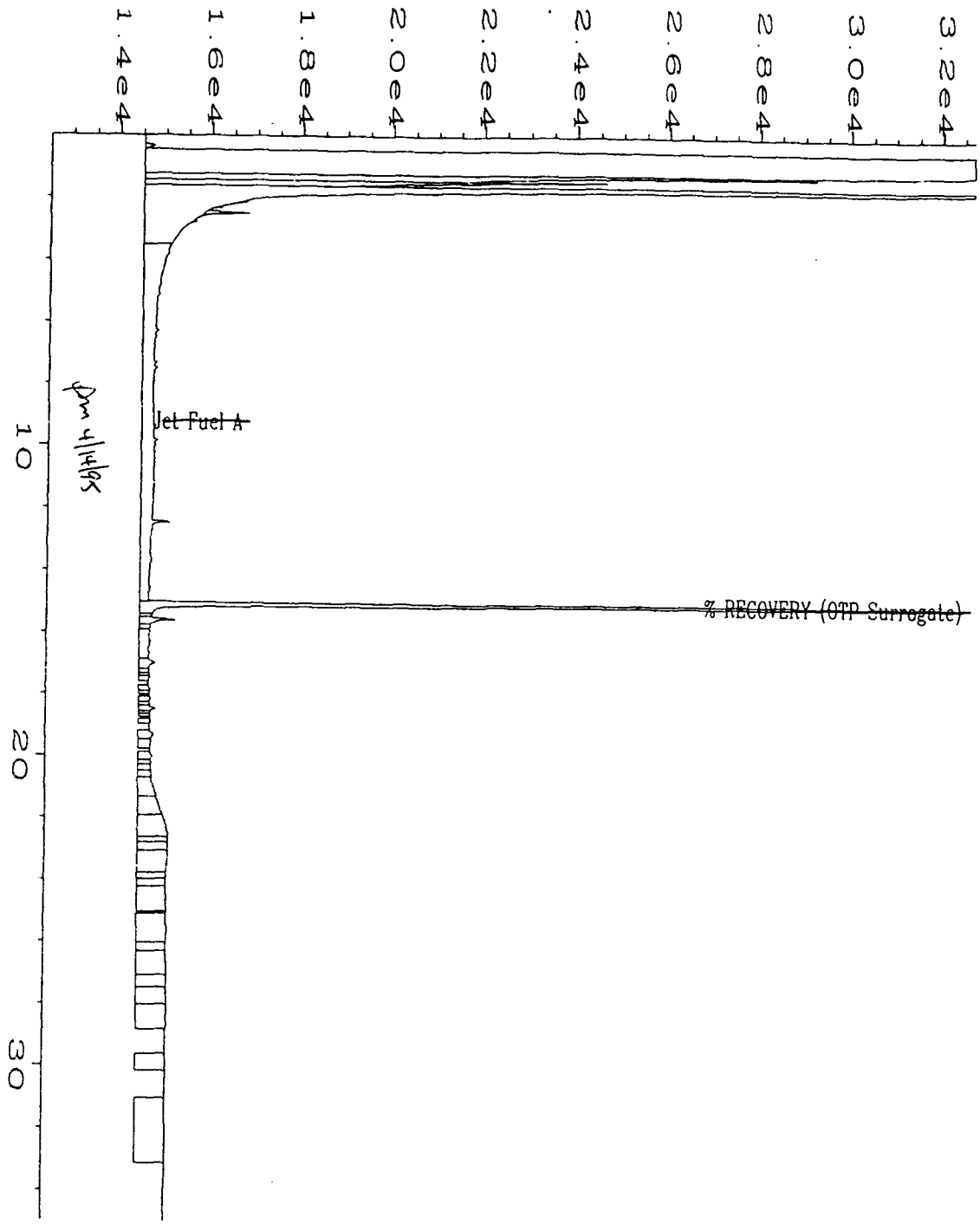
B = TEH found in blank as well as sample (blank data should be compared).

E = Extrapolated value.

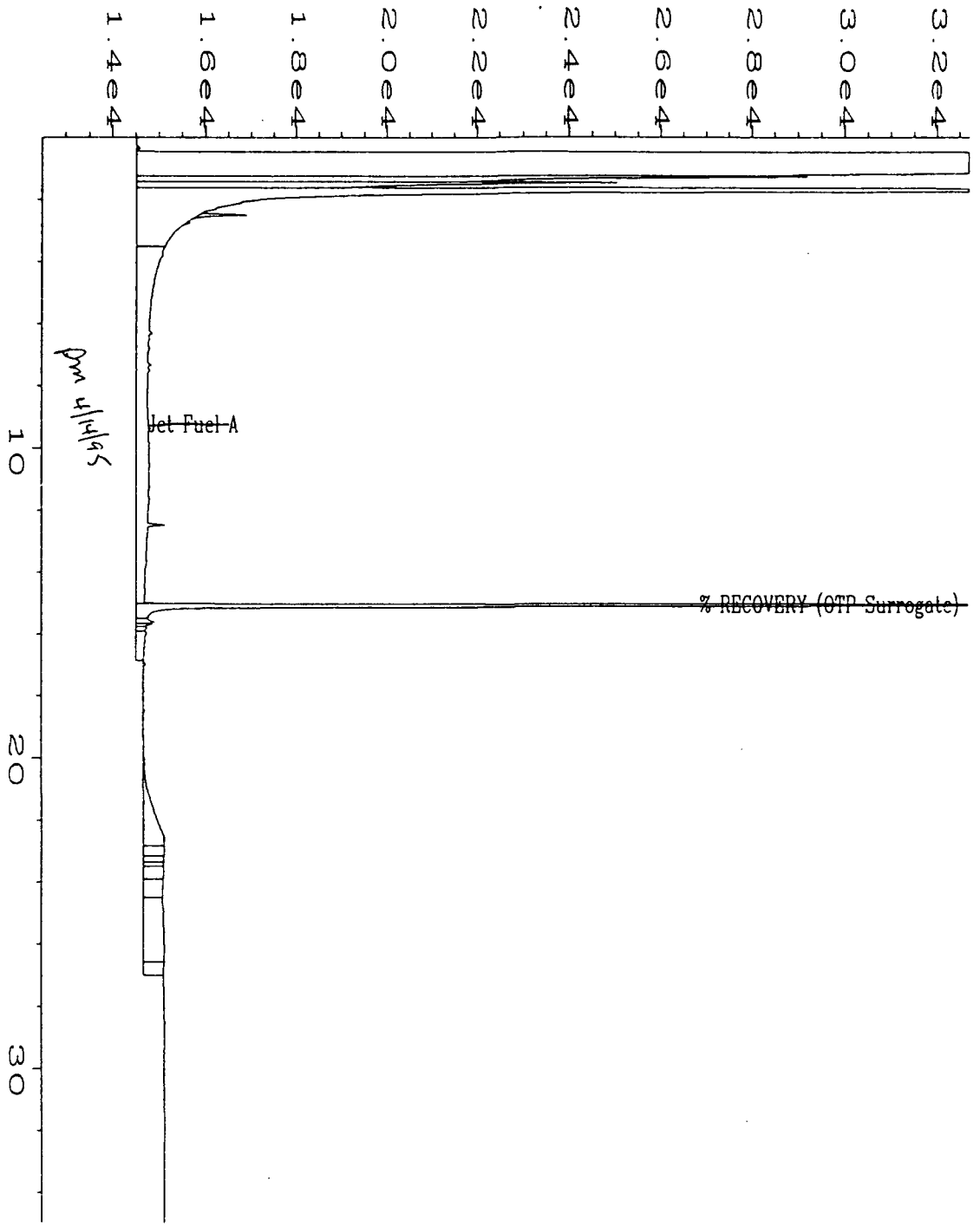
RL = Reporting Limit

Analyst

Approved

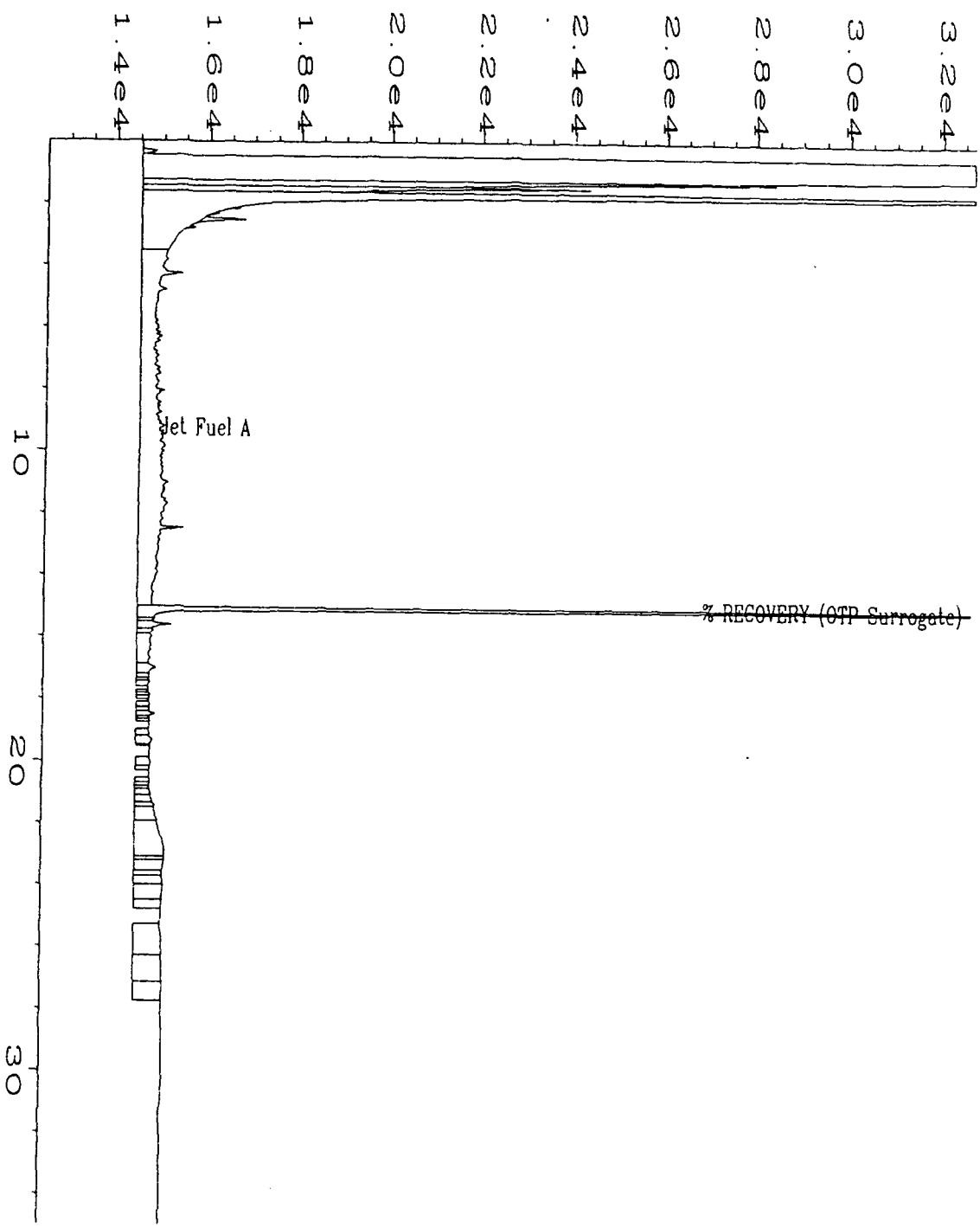


Data File Name	: C:\HPCHEM\2\DATA\JET0323\010R1001.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 10
Sample Name	: SB032095	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 10
Acquired on	: 24 Mar 95 07:06 AM	Instrument Method	: JET0323
Report Created on	: 24 Mar 95 09:25 AM	Analysis Method	: JET0323.MT
Last Recalib on	: 24 Mar 95 08:06 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

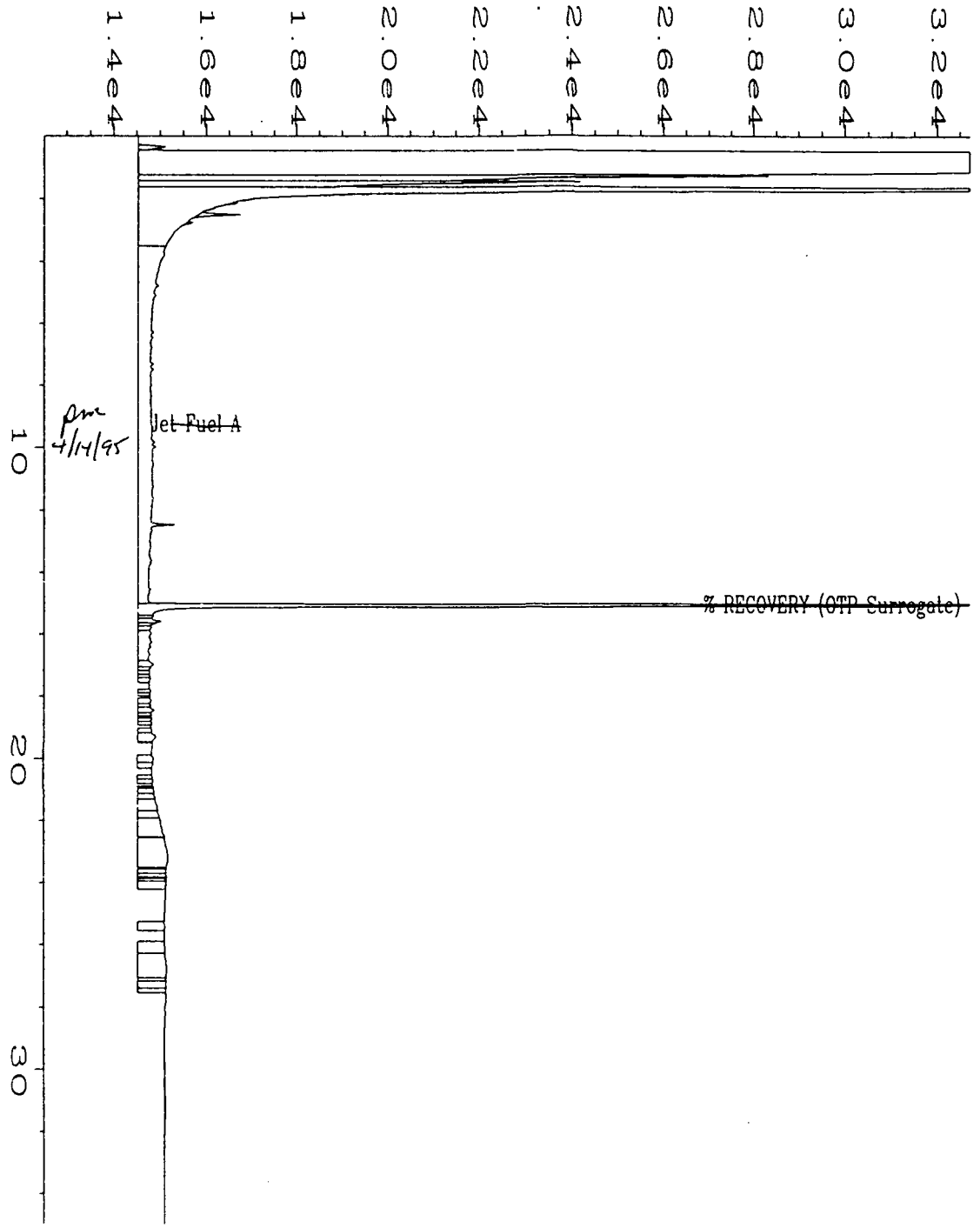


Data File Name : C:\HPCHEM\2\DATA\JET0323\012R1001.D

Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 12
Sample Name	: SB032195	Injection Number	: 1
In Time Bar Code:		Sequence Line	: 10
Acquired on	: 24 Mar 95 08:46 AM	Instrument Method	: JET0323.MTH
Report Created on	: 24 Mar 95 09:30 AM	Analysis Method	: JET0323.MTH
Last Recalib on	: 24 Mar 95 08:06 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

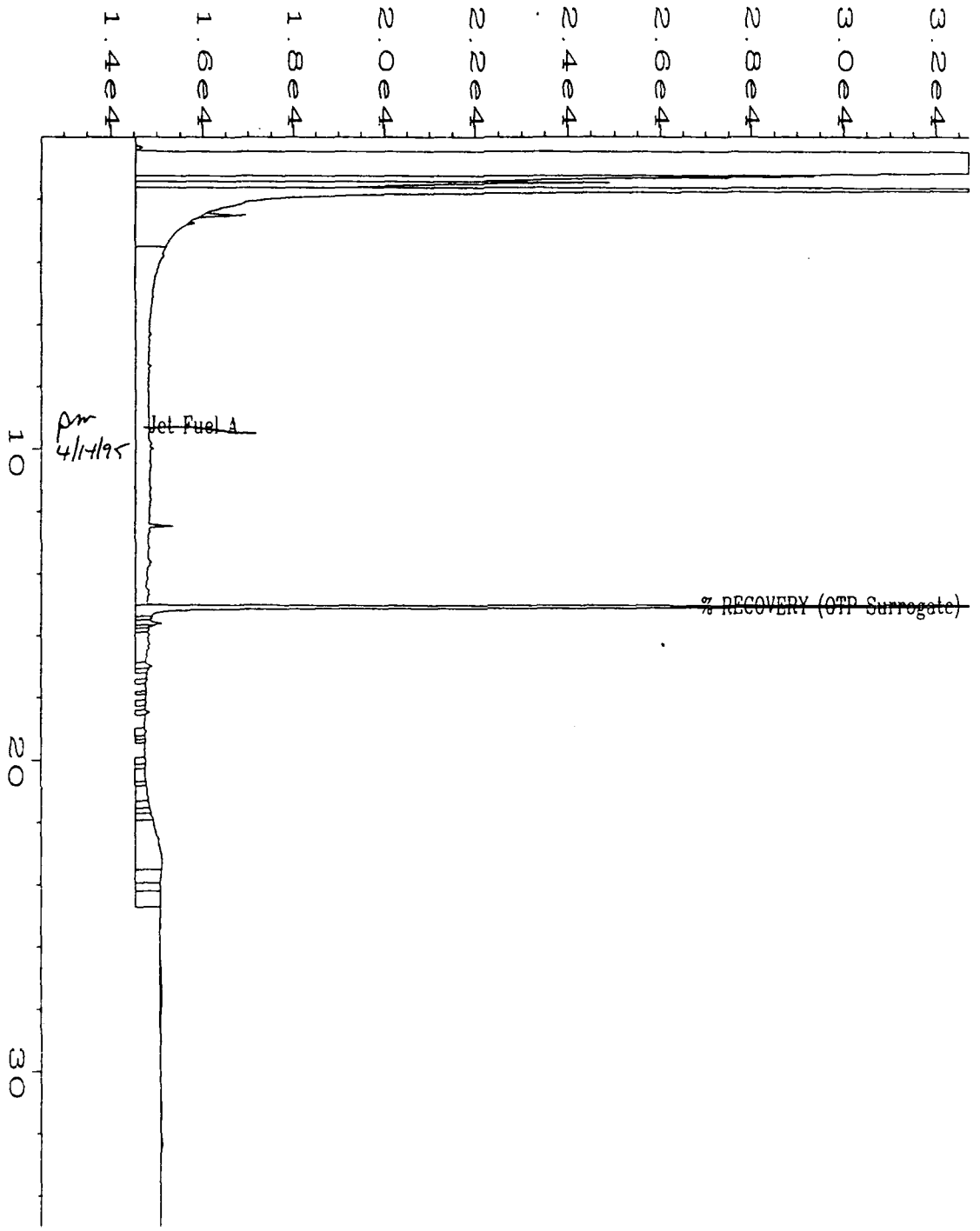


Data File Name	: C:\HPCHEM\2\DATA\JET0323\015R0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 15
Sample Name	: X04340 DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 24 Mar 95 11:15 AM	Instrument Method	: JET0323
Report Created on	: 24 Mar 95 11:50 AM	Analysis Method	: JET0323.MT
Last Recalib on	: 24 MAR 95 08:06 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project # 95-0871 Client # 75MP-2(8-10) Soil		

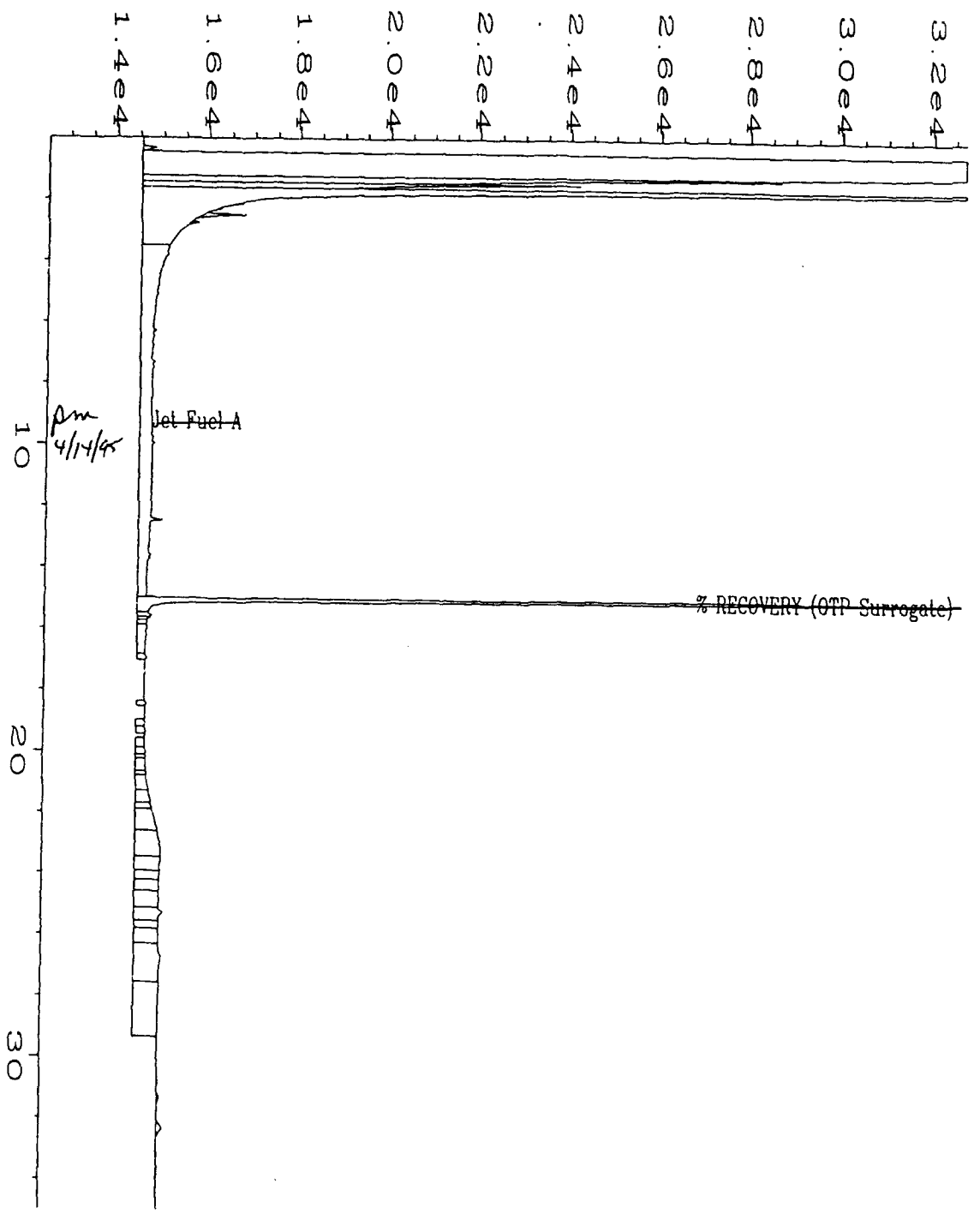


Data File Name : C:\HPCHEM\2\DATA\JET0323\018R0101.D
Operator : Dawn N. Guildner
Instrument : TEH
Sample Name : X04341 DF=1
'n Time Bar Code:
.quired on : 24 Mar 95 01:44 PM
Report Created on: 24 Mar 95 02:20 PM
Last Recalib on : 24 MAR 95 08:06 AM
Multiplier : 1
Sample Info : Project # 95-0871 Client # 75SS-3(3-4) Soil

Page Number : 1
Vial Number : 18
Injection Number : 1
Sequence Line : 1
Instrument Method: JET0323.MTH
Analysis Method : JET0323.MTH
Sample Amount : 0
ISTD Amount :

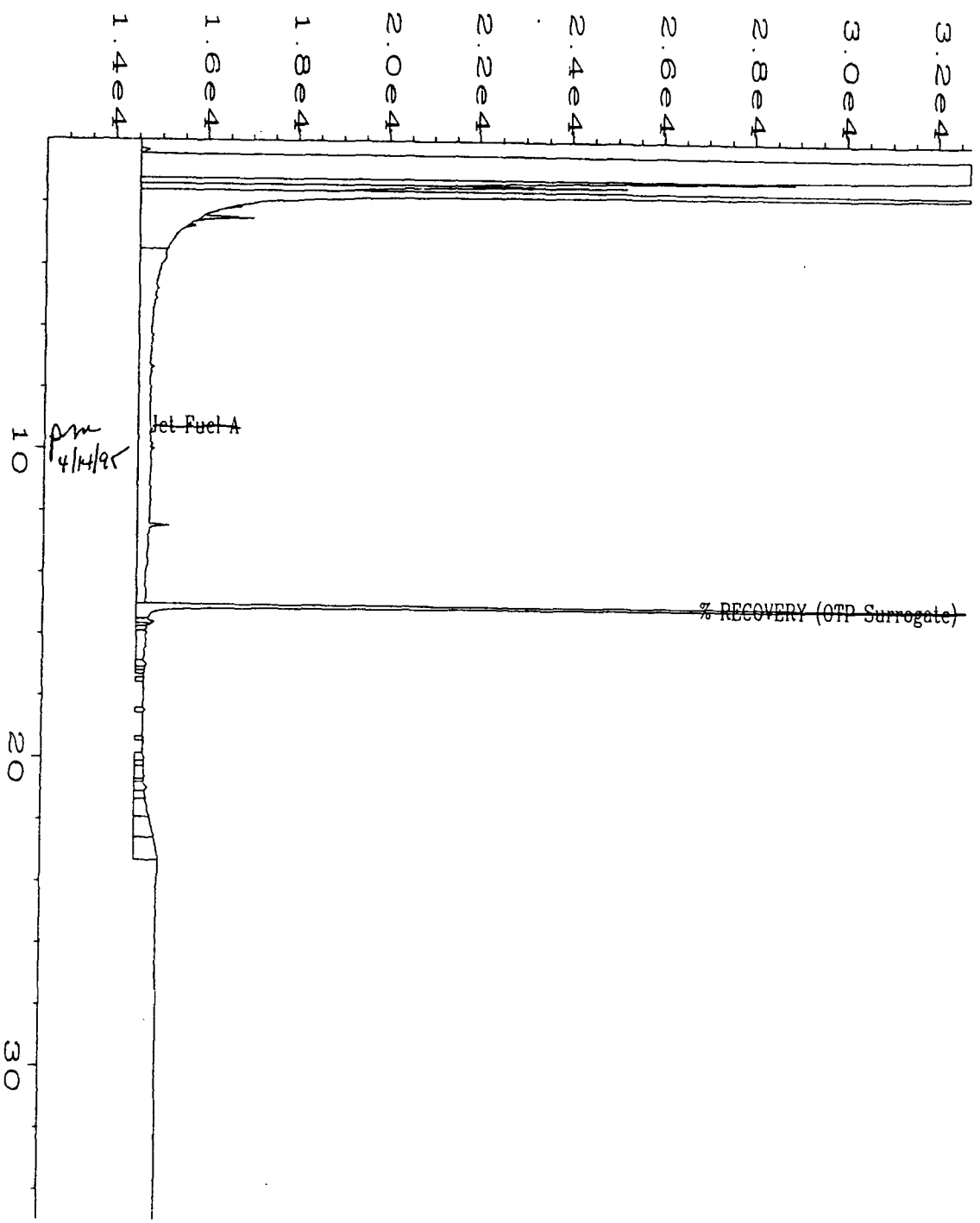


Data File Name	: C:\HPCHEM\2\DATA\JET0323\019R0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 19
Sample Name	: X04342 DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 24 Mar 95 02:34 PM	Instrument Method	: JET032_ [illegible]
Report Created on	: 24 Mar 95 03:10 PM	Analysis Method	: JET0323.MT
Last Recalib on	: 24 MAR 95 08:06 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project # 95-0871 Client # 75SS-3(8-10) Soil		

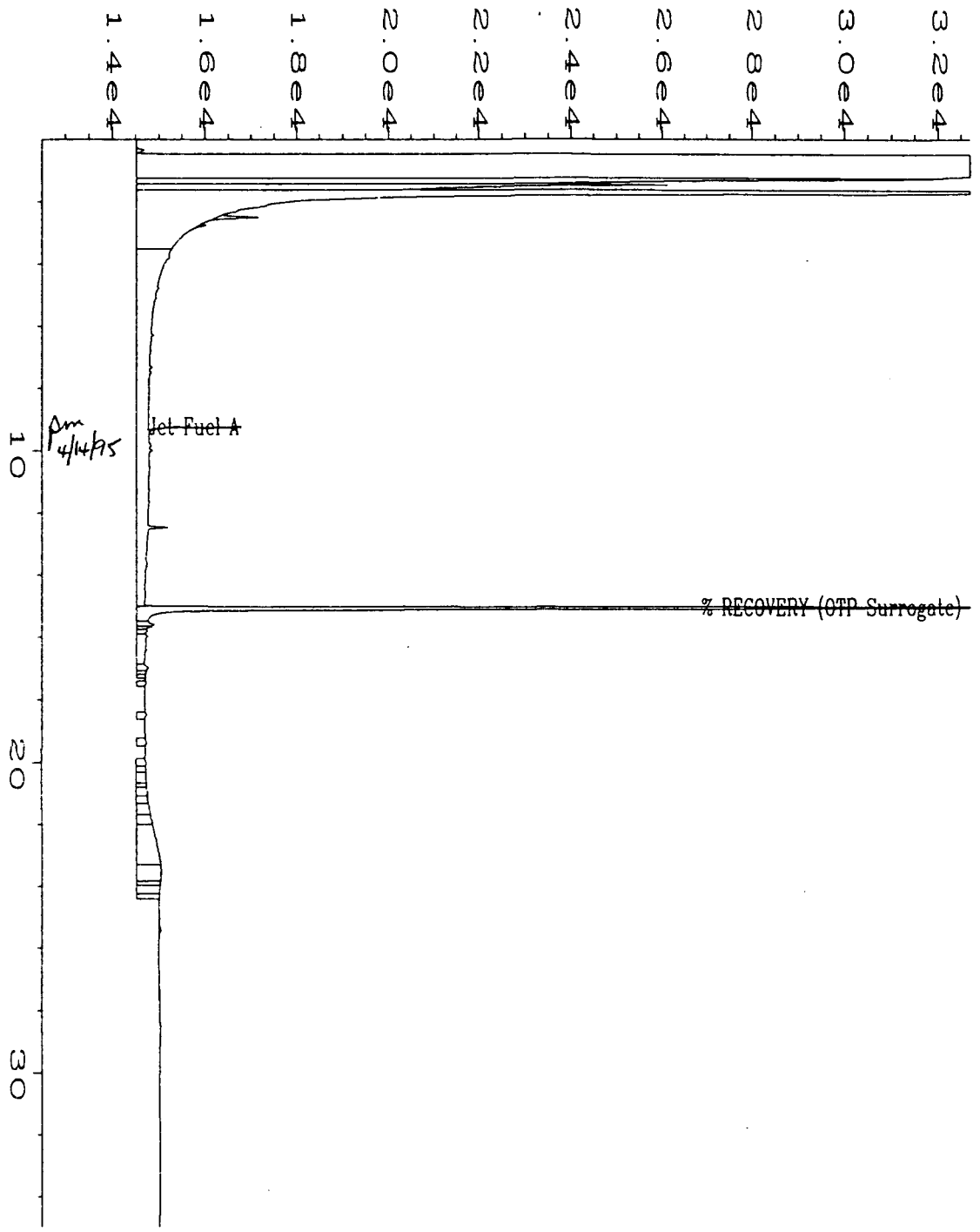


Data File Name : C:\HPCHEM\2\DATA\JET0323\020R0101.D
Operator : Dawn N. Guildner
Instrument : TEH
Sample Name : X04342 Dupl.
Run Time Bar Code:
Acquired on : 24 Mar 95 03:24 PM
Report Created on: 24 Mar 95 04:00 PM
Last Recalib on : 24 MAR 95 08:06 AM
Multiplier : 1
Sample Info : Project # 95-0871 Client # 75SS-3(8-10) Soil

Page Number : 1
Vial Number : 20
Injection Number : 1
Sequence Line : 1
Instrument Method: JET0323.MTH
Analysis Method : JET0323.MTH
Sample Amount : 0
ISTD Amount :

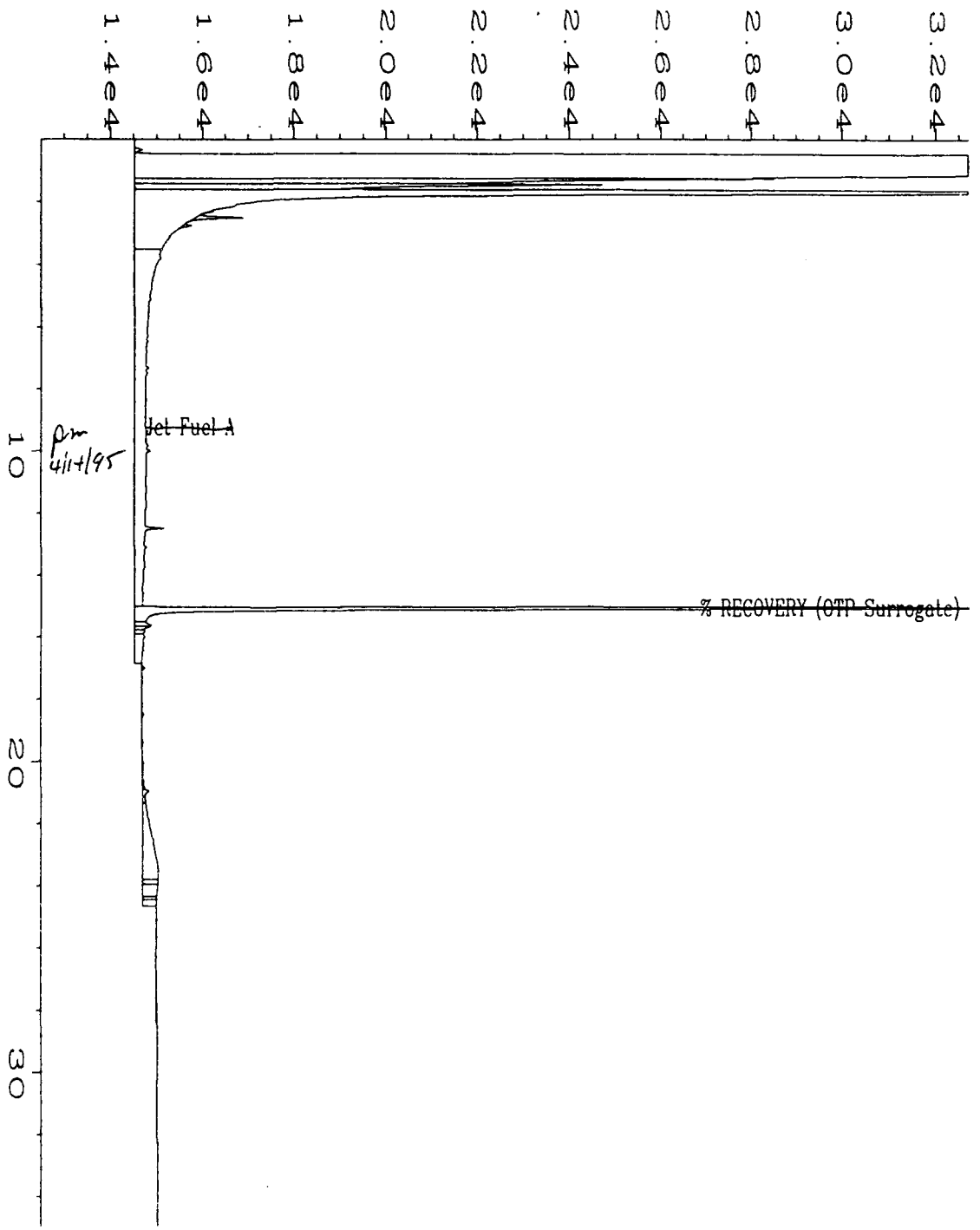


Data File Name	: C:\HPCHEM\2\DATA\JET0323\022R0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 22
Sample Name	: X04344 DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 24 Mar 95 05:04 PM	Instrument Method	: JET032
Report Created on	: 24 Mar 95 05:39 PM	Analysis Method	: JET0323.MT
Last Recalib on	: 24 MAR 95 08:06 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project # 95-0871 Client # 75MP-3(3-5) Soil		

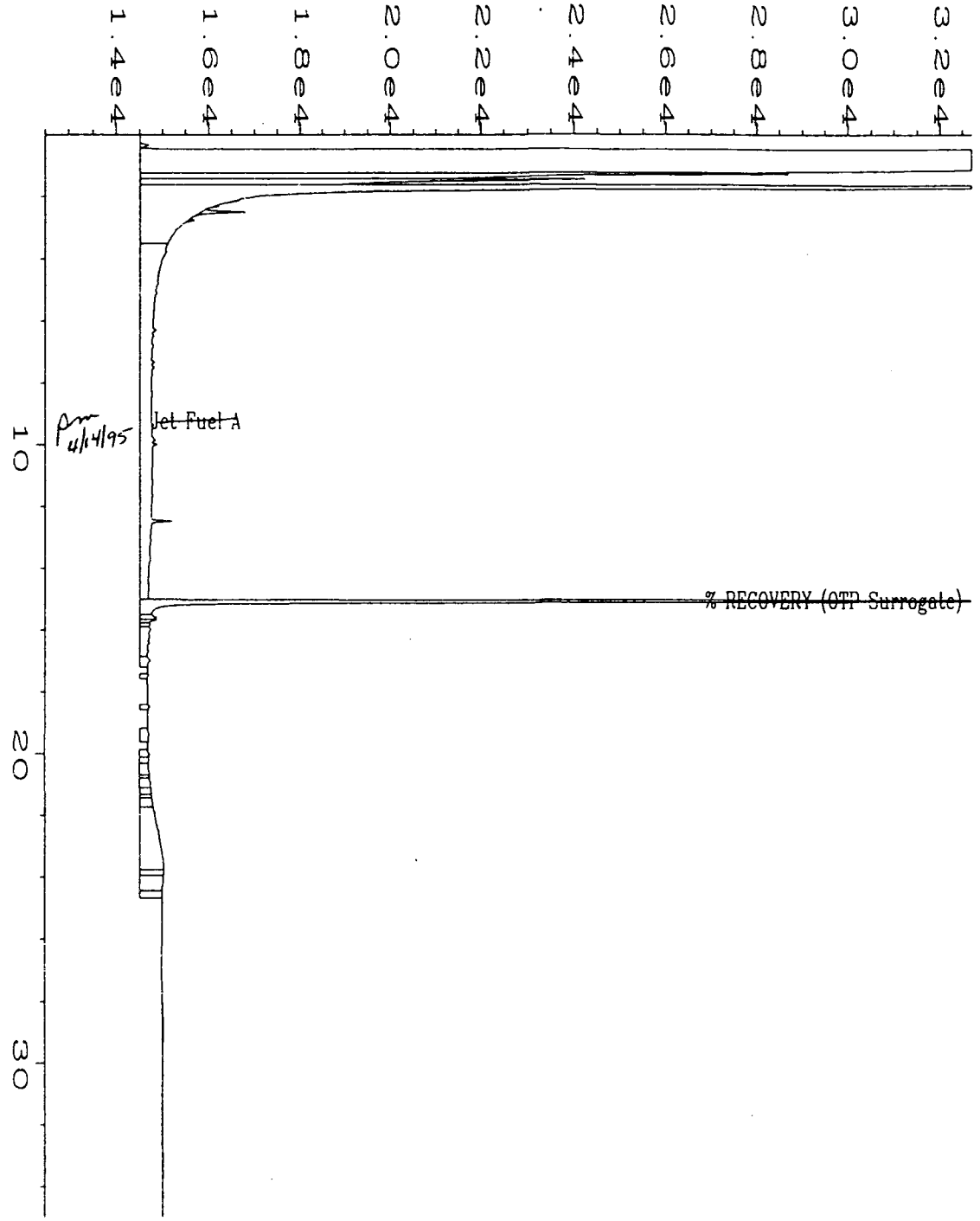


Data File Name : C:\HPCHEM\2\DATA\JET0323\023R0101.D
Operator : Dawn N. Guildner
Instrument : TEH
Sample Name : X04347 DF=1
Run Time Bar Code:
Acquired on : 24 Mar 95 05:53 PM
Report Created on: 24 Mar 95 06:29 PM
Last Recalib on : 24 MAR 95 08:06 AM
Multiplier : 1
Sample Info : Project # 95-0871 Client # 75MP-5(4-6) Soil

Page Number : 1
Vial Number : 23
Injection Number : 1
Sequence Line : 1
Instrument Method: JET0323.MTH
Analysis Method : JET0323.MTH
Sample Amount : 0
ISTD Amount :

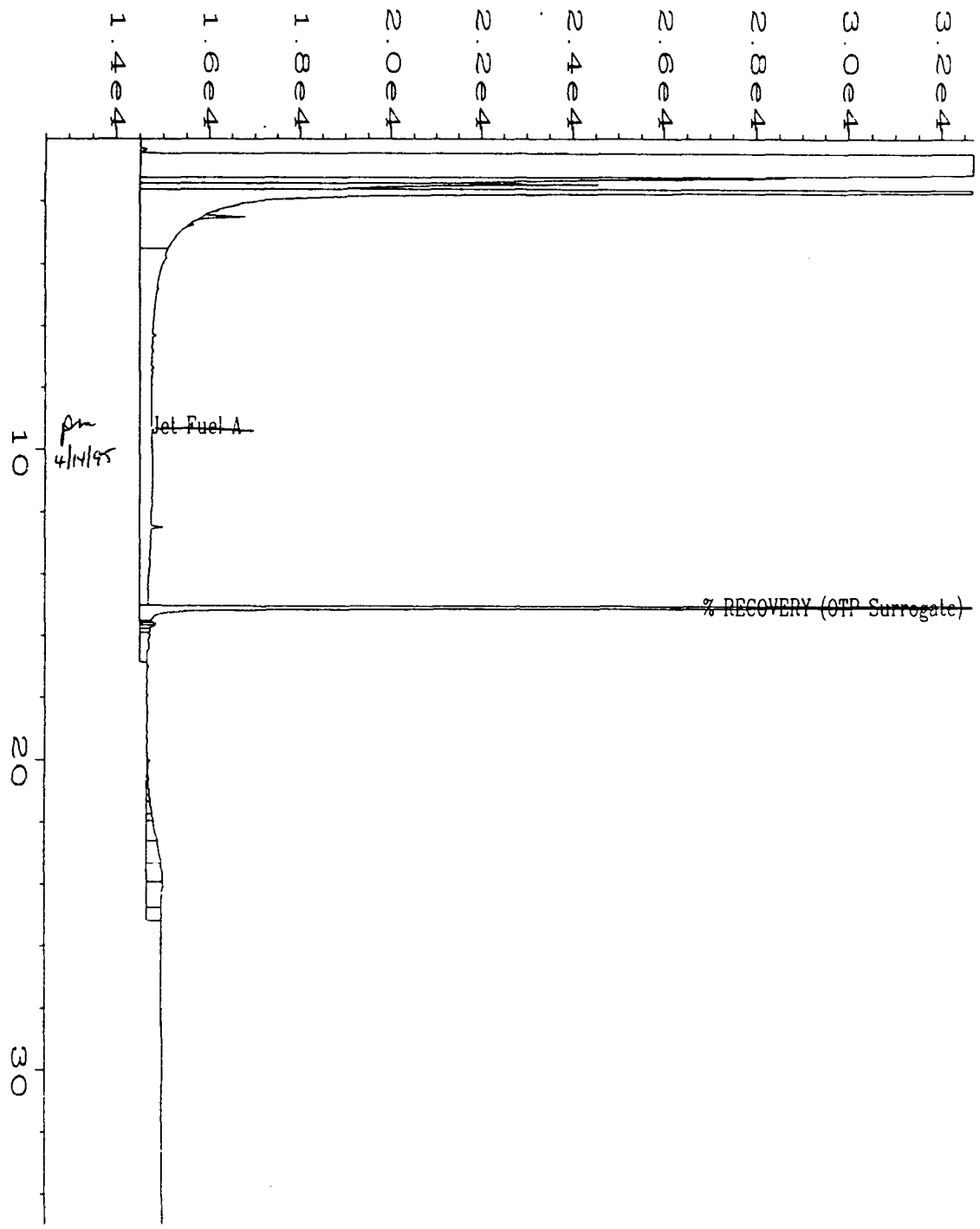


Data File Name	: C:\HPCHEM\2\DATA\JET0323\024R0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 24
Sample Name	: X04349 DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 24 Mar 95 06:43 PM	Instrument Method	: JET032.
Report Created on	: 24 Mar 95 07:18 PM	Analysis Method	: JET0323.M
Last Recalib on	: 24 MAR 95 08:06 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project # 95-0871 Client # 75SS-15(4-6) Soil		

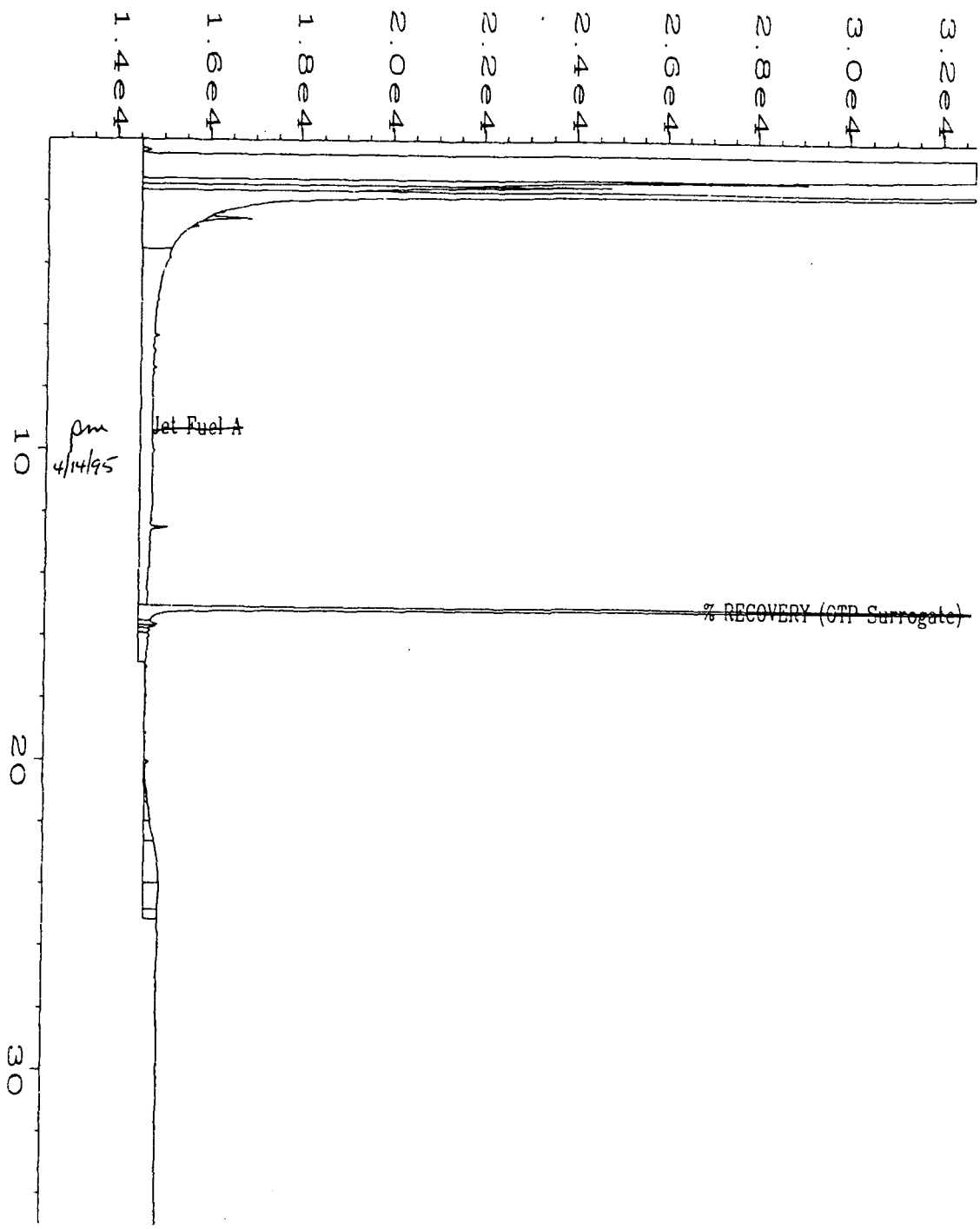


Data File Name : C:\HPCHEM\2\DATA\JET0323\025R0101.D
Operator : Dawn N. Guildner
Instrument : TEH
Sample Name : X04350 DF=1
Run Time Bar Code:
Acquired on : 24 Mar 95 07:32 PM
Report Created on: 24 Mar 95 08:08 PM
Last Recalib on : 24 MAR 95 08:06 AM
Multiplier : 1
Sample Info : Project # 95-0871 Client # 75SS-6(3-5) Soil

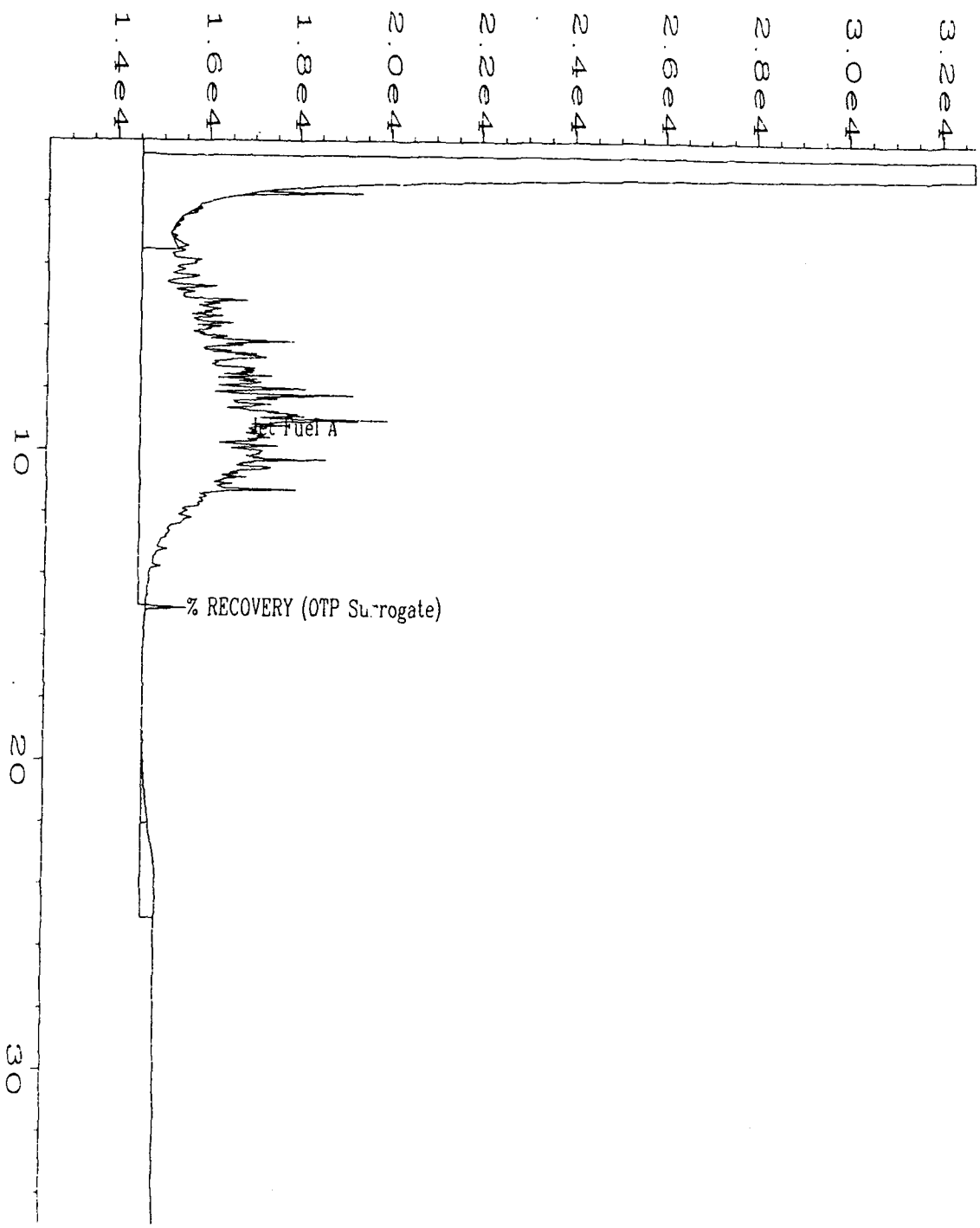
Page Number : 1
Vial Number : 25
Injection Number : 1
Sequence Line : 1
Instrument Method: JET0323.MTH
Analysis Method : JET0323.MTH
Sample Amount : 0
ISTD Amount :



Data File Name	: C:\HPCHEM\2\DATA\JET0323\026R0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 26
Sample Name	: X04351 DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 24 Mar 95 08:22 PM	Instrument Method	: JET032
Report Created on	: 24 Mar 95 08:57 PM	Analysis Method	: JET0323.M
Last Recalib on	: 24 MAR 95 08:06 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project # 95-0871 Client # 75SS-6(7-9) Soil		



Data File Name	: C:\HPCHEM\2\DATA\JET0323\027R0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 27
Sample Name	: X04351 Dupl.	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 24 Mar 95 09:12 PM	Instrument Method	: JET0323.MTH
Report Created on	: 24 Mar 95 09:47 PM	Analysis Method	: JET0323.MTH
Last Recalib on	: 24 MAR 95 08:06 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project # 95-0871 Client # 75SS-6(7-9) Soil		



Data File Name	: C:\HPCHEM\2\DATA\JET0323\031R0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 31
Sample Name	: X04339 DF=50	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 25 Mar 95 00:30 AM	Instrument Method	: JET032[illegible]
Report Created on	: 25 Mar 95 01:06 AM	Analysis Method	: JET0323.MT[illegible]
Last Recalib on	: 24 MAR 95 08:06 AM	Sample Amount	: 0
Multiplier	: 50	ISTD Amount	:
Sample Info	: Project # 95-0871 Client # 75MP-2(2-4) Soil		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL EXTRACTABLE HYDROCARBONS (TEH)
Laboratory Control Sample (LCS)

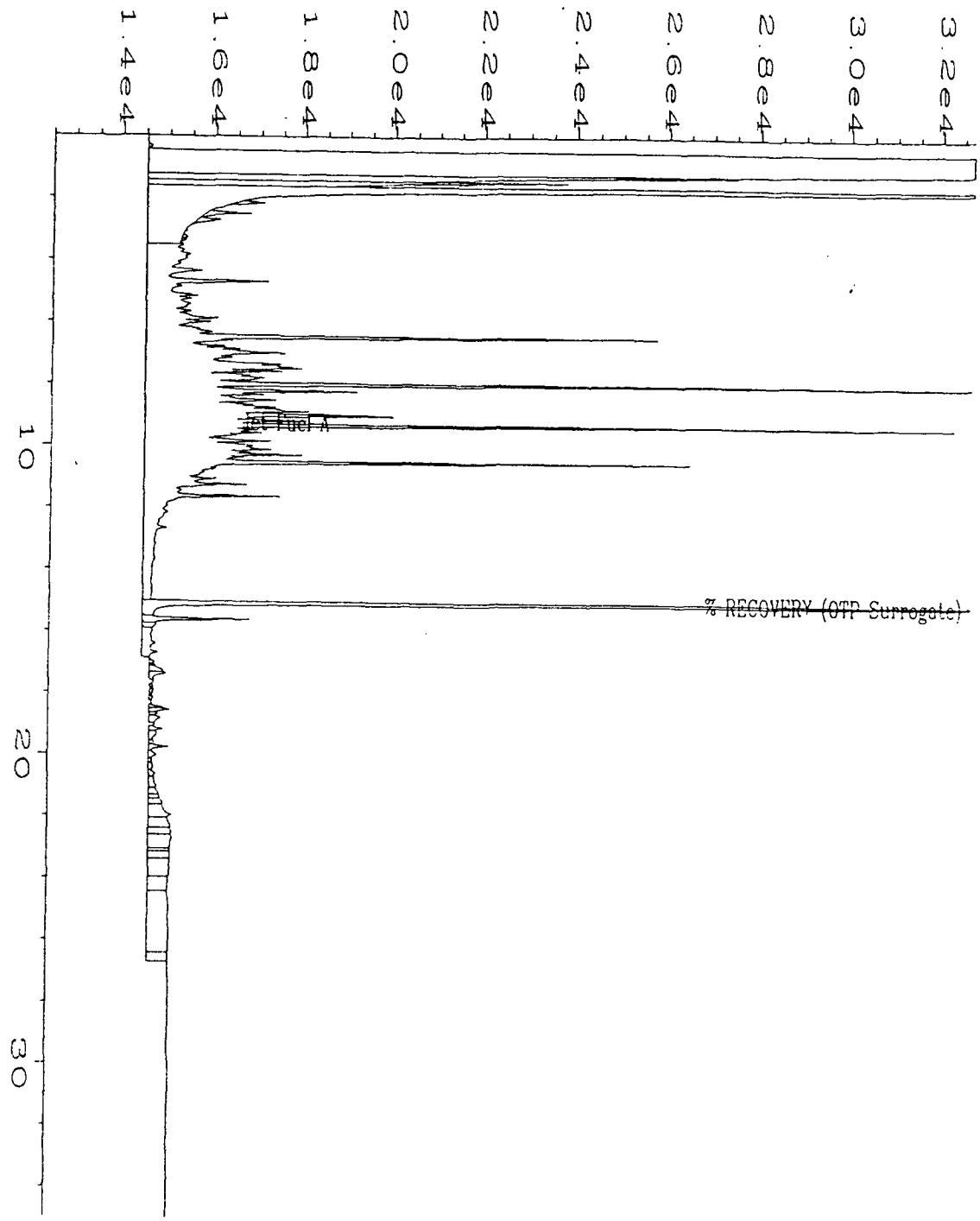
LCS Number	: LCS032195	Client Project Number	: 722450.21020/MACDILL AFB
Date Prepared	: 3/21/95	Lab Project Number	: 95-0871
Date Analyzed	: 3/24/95	Matrix	: SOIL
Sequence Number	: JET11	Method Number	: 3500/Mod. 8015

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/L	QC Limit mg/L
JET FUEL	1000	1020	600-1400

QUALIFIERS
U = TEH analyzed for but not detected.
B = TEH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\JET0323\011R1001.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 11
Sample Name	: LCS032195	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 10
Acquired on	: 24 Mar 95 07:56 AM	Instrument Method	: JET0323. .H
Report Created on	: 24 Mar 95 09:30 AM	Analysis Method	: JET0323.MTH
Last Recalib on	: 24 Mar 95 08:06 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

722450.21020

Date Sampled	: 3/13-15/95	Client Project ID.	: MacDill AFB
Date Received	: 3/17/95	Lab Project No.	: 95-0871
Date Prepared	: 3/20/95	Matrix	: Soil
Date Analyzed	: 3/20/95	Method	: EPA 160.3

Evergreen Sample #	Client Sample ID	Moisture %
X04339	75MP-2 (2-4)	13.8
X04340	75MP-2 (8-10)	17.4
X04341	75SS-3 (3-4)	14.4
X04342	75SS-3 (8-10)	18.0
X04344	75MP-3 (3-5)	15.0
X04347	75MP-5 (4-6)	15.1
X04350	75SS-6 (3-5)	15.1
X04351	75SS-6 (7-9)	19.7

Analyst

Approved

0871tm.4

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403

NON-CLP ANALYSIS RESULTS

Date: 03/24/95
Lab Name: Huffman Labs — Client: Evergreen Analytical
Contact: Sue Zeller — Contact: Patty McClellan
Sample Matrix: soil — Huffman Lab #: 143595

	Client Smp#	Lab ID #	Element/ Compound	Dilution Factor	Results	Units	Prep Date	Analysis Date	Sample Size (g)	Method #	Instrument ID
	75SS-4 (3-4)	14359501	TC	NA	<0.05	%	NA	03/23/95	2.195	Leco CR12	#7
	75SS-4 (3-4)	14359501	TC	NA	<0.05	%	NA	03/23/95	2.067	Leco CR12	#7
	75SS-6 (3-5)	14359502	TC	NA	<0.05	%	NA	03/23/95	2.154	Leco CR12	#7
	75MP-7 (4-6)	14359503	TC	NA	<0.05	%	NA	03/23/95	3.332	Leco CR12	#7
	75MP-17 (4-6)	14359504	TC	NA	<0.05	%	NA	03/23/95	2.888	Leco CR12	#7
	24MP-7 (2-4)	14359505	TC	NA	<0.05	%	NA	03/23/95	3.555	Leco CR12	#7
	24MP-3 (3-5)	14359506	TC	NA	0.21	%	NA	03/23/95	3.331	Leco CR12	#7
	24MP-4 (3-5)	14359507	TC	NA	0.13	%	NA	03/23/95	2.908	Leco CR12	#7
	24MP-6 (4-6)	14359508	TC	NA	2.21	%	NA	03/23/95	3.093	Leco CR12	#7
	24MP-16 (4-6)	14359509	TC	NA	0.73	%	NA	03/23/95	3.394	Leco CR12	#7
	75SS-4 (3-4)	14359501	CC	NA	<0.02	%	NA	03/21/95	0.111	COU-02	"tower"
	75SS-4 (3-4)	14359501	CC	NA	<0.02	%	NA	03/21/95	0.259	COU-02	"tower"
	75SS-6 (3-5)	14359502	CC	NA	<0.02	%	NA	03/21/95	0.185	COU-02	"tower"
	75MP-7 (4-6)	14359503	CC	NA	<0.02	%	NA	03/21/95	0.248	COU-02	"tow
	75MP-17 (4-6)	14359504	CC	NA	<0.02	%	NA	03/21/95	0.221	COU-02	"tower
	24MP-7 (2-4)	14359505	CC	NA	<0.02	%	NA	03/21/95	0.127	COU-02	"tower"
	24MP-3 (3-5)	14359506	CC	NA	<0.02	%	NA	03/21/95	0.130	COU-02	"tower"
	24MP-4 (3-5)	14359507	CC	NA	<0.02	%	NA	03/21/95	0.128	COU-02	"tower"
	24MP-6 (4-6)	14359508	CC	NA	<0.02	%	NA	03/21/95	0.138	COU-02	"tower"
	24MP-16 (4-6)	14359509	CC	NA	<0.02	%	NA	03/21/95	0.165	COU-02	"tower"
			% moisture			adjusted result					
	75SS-4 (3-4)	14359501	TOC	NA	<0.05 0.06	%	NA	NA	NA	by calc	NA
	75SS-4 (3-4)	14359501	TOC	NA	<0.05 0.06	%	NA	NA	NA	by calc	NA
0871	75SS-6 (3-5)	14359502	TOC	NA	<0.05 0.06	%	NA	NA	NA	by calc	NA
	75MP-7 (4-6)	14359503	TOC	NA	<0.05 0.06	%	NA	NA	NA	by calc	NA
	75MP-17 (4-6)	14359504	TOC	NA	<0.05 0.06	%	NA	NA	NA	by calc	NA
0819	24MP-7 (2-4)	14359505	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
	24MP-3 (3-5)	14359506	TOC	NA	0.21	%	NA	NA	NA	by calc	NA
0820	24MP-4 (3-5)	14359507	TOC	NA	0.13	%	NA	NA	NA	by calc	NA
	24MP-6 (4-6)	14359508	TOC	NA	2.21	%	NA	NA	NA	by calc	NA
	24MP-16 (4-6)	14359509	TOC	NA	0.73	%	NA	NA	NA	by calc	NA

Samples analyzed and results reported on an as received basis.
Soil samples are not homogeneous.
Values reported below Detection Limits are for reference only.
TC detection limit = 0.05%
CC detection limit = 0.02%
TOC detection limit = 0.05%

The numbers to the left above represent the last four digits of the EAL project number under which the samples were analyzed.
The original report and quality control results are filed with EAL project 95-08

Evergreen

CASE NARRATIVE

Evergreen Analytical Laboratory (EAL) Project #: 95-0861

Parsons Engineering Science, Inc. (PES) Project: MacDill AFB (722450.21020)

Sample Receipt

On March 17, 1995, 12 water samples were received in good condition at Evergreen Analytical Laboratory. The chain of custody requested BTEX, TVH, anions and alkalinity analyses be performed on the trip and field blanks, however, due to lack of sample, only the BTEX and TVH analyses could be performed. Refer to the EAL Sample Log Sheet for specific log-in information and cross-reference of EAL and PES sample identifications.

BTEX, Water Matrix, Method 602

Sample MD24-6A was analyzed at a 10x dilution due to the concentration of benzene in the sample. The reporting limit was increased accordingly. There were no quality control anomalies to report.

Total Volatile Hydrocarbon (TVH)

There were no quality control anomalies to report.

Sulfate, Chloride, Nitrite and Nitrate, Water Matrix, Method E300.0

There were no quality control anomalies to report.

Alkalinity, Water Matrix, Method E310.1

There were no quality control anomalies to report.

P. McClellan

Patricia A. McClellan, Project Manager

Evergreen Analytical Sample Log Sheet

Project # 95-0861

Date(s) Sampled: 03/15,16/95 COC

Date Due: 03/22/95

Date Received: 03/17/95 1000

Holding Time(s): 3/17,18-NO_2,NO_3,3/2[illegible] 3 BTEX,TVH,3/29,30-[illegible]

Client Project I.D. 722450.21020/MacDILL AFB

Rush STANDARD-UST 2-OTHERS

Client: Parsons Engineering Science, Inc.

Shipping Charges N/A

Address: 1700 Broadway Suite 900
Denver, CO 80290

E.A. Cooler # 383

Airbill # FEDEX 9581826192

Contact: TODD WIEDEMEIER

Custody Seal Intact? N/A
Cooler ___ Bottles ___

Client P.O. 722450.21020

COC Present Y

Sample Tags Present? Y

Phone #831-8100 Fax #831-8208

Sample Tags Listed? Y

Sample(s) Sealed? Y

Special Invoicing/Billing

Special Instructions *PLUS CHLOROBENZENE, TMB & TEMB. ANALYZE AN MS/MSD AND DUPLICATE ON THIS CLIENT's SAMPLES.

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
3					
X04288A/B	24MP-10D	*BTEX	W	40V	2
X04289A/B	24MP-10S	*BTEX	W	40V	2
X04290A/B	MD24-6A	*BTEX	W	40V	2
X04291A/B	MD24-6	*BTEX	W	40V	2
X04292A/B	24MP-9D	*BTEX	W	40V	2
X04293A/B	24MP-9S	*BTEX	W	40V	2
X04297A/B	24MP-7D	*BTEX	W	40V	2
X04298A/B	24MP-7S	*BTEX	W	40V	2
X04299A/B	75MP-1S	*BTEX	W	40V	2
X04300A/B	75MP-1D	*BTEX	W	40V	2
X04294A/B	FIELD BLANK	*BTEX,TVH	W	40V	2
X04296A/B	TRIP BLANK	*BTEX,TVH	W	40V	2
X04288C/D	24MP-10D	TVH	W	40V	2
X04289C/D	24MP-10S	TVH	W	40V	2
X04290C/D	MD24-6A	TVH	W	40V	2
X04291C/D	MD24-6	TVH	W	40V	2
X04292C/D	24MP-9D	TVH	W	40V	2

R=Sample to be returned

Route To: GC/MS ___ GC 3 Metals ___ Wet Chem 2 SxPrep ___ Acctg ___ SxRec C QA/QC C Sales C File Orig

Custodian/Date: [signature] [illegible]

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
4293C/D	24MP-9S	TVH	W	40V	2
X04297C/D	24MP-7D	TVH	W	40V	2
X04298C/D	24MP-7S	TVH	W	40V	2
X04299C/D	75MP-1S	TVH	W	40V	2
X04300C/D	75MP-1D	TVH	W	40V	2
X04288E	24MP-10D	ALKALINITY	W	250P	B6
X04289E	24MP-10S	ALKALINITY	W	250P	B6
X04290E	MD24-6A	ALKALINITY	W	250P	B6
X04291E	MD24-6	ALKALINITY	W	250P	B6
X04292E	24MP-9D	ALKALINITY	W	250P	B6
X04293E	24MP-9S	ALKALINITY	W	250P	B6
X04297E	24MP-7D	ALKALINITY	W	250P	B6
X04298E	24MP-7S	ALKALINITY	W	250P	B6
X04299E	75MP-1S	ALKALINITY	W	250P	B6
X04300E	75MP-1D	ALKALINITY	W	250P	B6
X04288F	24MP-10D	Cl^-, SO_4, NO_2NO_3	W	250P	B6
X04289F	24MP-10S	Cl^-, SO_4, NO_2NO_3	W	250P	B6
4290F	MD24-6A	Cl^-, SO_4, NO_2NO_3	W	250P	B6
X04291F	MD24-6	Cl^-, SO_4, NO_2NO_3	W	250P	B6
X04292F	24MP-9D	Cl^-, SO_4, NO_2NO_3	W	250P	B6
X04293F	24MP-9S	Cl^-, SO_4, NO_2NO_3	W	250P	B6
X04297F	24MP-7D	Cl^-, SO_4, NO_2NO_3	W	250P	B6
X04298F	24MP-7S	Cl^-, SO_4, NO_2NO_3	W	250P	B6
X04299F	75MP-1S	Cl^-, SO_4, NO_2NO_3	W	250P	B6
X04300F	75MP-1D	Cl^-, SO_4, NO_2NO_3	W	250P	B6

Project # 95-0861

R=Sample to be returned

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY: PARSONS ENGINEERING SCIENCE
ADDRESS: 1700 S. BROADWAY Suite 900
CITY: DENVER STATE: CO ZIP: 80290
PHONE#: 303 831-8100 FAX#: 303 831-8208
FAX RESULTS: (Y) / N

CLIENT CONTACT (print): TODD WIEDEMEIER
PROJECT I.D.: MacDill AFB
EAL QUOTE #: 72245D.2102 P.O.#:
TURNAROUND REQUIRED*: ~~30 days~~ 10 7
*expedited turnaround subject to additional fee

Sampler Name:
(signature) JGetkenhour
(print) JEFF FETKENHOUR

Evergreen Analytical Cooler No.: 383
Cooler Received:

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/(Ground) (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle) & TMB & Tetrachloroethene	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Alkalinity	Cl⁻, SO₄⁻², NO₃⁻, NO₂⁻	EAL Sample No.
24MP-10D	3/15/95	1130	6	X									X		X				X	X		04288
24MP-10S	3/15/95	1153	6	X									X		X				X	X		89
MD24-6A	3/15/95	1320	6	X									X		X				X	X		90
MD24-6	3/15/95	1515	6	X									X		X				X	X		91
24MP-9D	3/15/95	1400	6	X									X		X				X	X		92
24MP-9S	3/15/95	1445	6	X									X		X				X	X		93
FIELD BLANK	3/15/95	1450	1	DI H₂O									X		X				X	X		94
~~MD24-6~~ JG7																						~~95~~ # not used, pg
TRIP BLANK			1										X		X				X	X		96
24MP-7D	3/16/95	0800	6	X									X		X				X	X		97
HT:													40V		40V			250P	125P			Location B-6
DD:																						Container Size

Instructions: All samples placed in ice
Please analyze trip blank & field blank for BTEX, TVH, Alkalinity, Anions
All groundwater samples preliminary - Please analyze ASAP.

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
	3/16/95						

Evergreen Analytical Inc.

4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY PARSONS ENGINEERING SCIENCE
ADDRESS 1700 S. BROADWAY, SUITE 900
CITY DENVER STATE CO ZIP 80210
PHONE # 303 831-8100 FAX # 303 831-8208
FAX RESULTS (Y) ~~N~~ 67

CLIENT CONTACT (print) TODD WIEDEMEIER
PROJECT I.D. MacDill AFD
EAL QUOTE # 722450.21020 P.O.#
TURNAROUND REQUIRED* ~~30 days~~ NA
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Jeff Ketkenhour
(print) JEFF KETKENHOUR

Evergreen Analytical Cooler No. 383
Cooler Received

Please **PRINT** all information.

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/506 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle) + Fuels	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Alkalinity	Cl⁻, SO₄⁻², NO₃⁻, NO₂⁻	EAL Sample No.
24MP-7S	3/16/95	0845	6	X										X		X			X	X		04298
75MP-1S	3/16/95	1440	6	X										X		X			X	X		↓ 99
75MP-1D	3/16/95	1530	6	X										X		X			X	X		04300
														40ml		40ml			250P	125P		
HT:																						Location B-6
DD:																						Container Size

EAL use only
Do not write in shaded area

EAL Project # 0861
Custodian

Instructions: All samples placed in ice
All groundwater samples preliminary - Please analyze ASAP

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Jeff Ketkenhour	3/16/95	FED EX		FED EX			3/18/95

Evergreen Analytical Sample Receipt/Check-in Record

Date & Time Rec'd: 3-17-95 1130 Shipped Via: H.D.
(Airbill # if applicable)

Client : Parsons ES

Client Project ID(s): 722450207

EAL Project #(s): 95- 0861 EAL Cooler(s): Y (N)

Cooler#	client								
Ice packs	(Y)	N	Y	N	Y	N	Y	N	Y	N
Temperature °C	chilled								

	Y	N	N/A
1. Custody seal(s) present:		X	
Seals on cooler intact			
Seals on bottle intact			
2. Chain of Custody present:	X		
3. Containers broken or leaking: (Comment on COC if Y)		X	
4. Containers labeled:	X		
5. COC agrees w/ bottles received: (Comment on COC if N)	X		
6. COC agrees w/ labels: (Comment on COC if N)	X		
7. Headspace in VOA vials-waters only (comment on COC if Y)			X
8. VOA samples preserved:			X
9. pH measured on metals, cyanide or phenolics*:			X
List discrepancies			
*Non-EAL provided containers only, water samples only.			
10. Metal samples present:			X
Total _____ , Dissolved _____			
D or PD to be filtered:			
T,TR,D,PD to be Preserved:			
11. Short holding times:		X	
Specify parameters			
12. Multi-phase sample(s) present:		X	
13. COC signed w/ date/time:	X		

Comments: _____

(Additional comments on back)
Custodian Signature/Date: [signature] 3-17-95

Evergreen Analytical Inc.

4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY PARSONS ENGINEERING SCIENCE
ADDRESS 1700 S BROADWAY Suite 900
CITY DENVER STATE CO ZIP 80210
PHONE # 303 831-8100 FAX # 303 831-8208 FAX RESULTS (Y) / N

CLIENT CONTACT (print) TODD WIEDEMEIER
PROJECT I.D. MacDill AFB
EAL QUOTE # 722450.2102 P.O. #
TURNAROUND REQUIRED* ~~30 days~~ 10d
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Jeff Fetterhour
(print) JEFF FETTERHOUR

Evergreen Analytical Cooler No 383
Cooler Received

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	ANALYSIS REQUESTED: TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle) & TMB & Tetrachloroethene	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Alkalinity	Cl⁻, SO₄⁻², NO₃⁻, NO₂⁻						EAL Sample No.
24MP-10D	3/15/95	1130	6	X									X		X				X	X						
24MP-10S	3/15/95	1153	6	X									X		X				X	X						
MD24-6A	3/15/95	1320	6	X									X		X				X	X						
MD24-6	3/15/95	1515	6	X									X		X				X	X						
24MP-9D	3/15/95	1400	6	X									X		X				X	X						
24MP-9S	3/15/95	1445	6	X									X		X				X	X						
FIELD BLANK	3/15/95	1450	1	DI H_2O									X		X				X	X						
~~MD24-6~~ DG7																										
TRIP BLANK			1										X		X				X	X						
24MP-7D	3/16/95	0800	6	X									X		X				X	X						
HT:																									Location	
DD:																									Container Size	

EAL use only
Do not write in shaded area

EAL
Project #
Custodian

Instructions: All samples placed in ice
Please analyze trip blank & field blank for BTEX, TVH, Alkalinity, Anions
All groundwater samples preliminary - Please analyze ASAP.

3/16/95 Insufficient sample volume to analyze trip + field blank for all parameters, pm

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Jeff Fetterhour	3/16/95	FED EX		FED EX			3-17-95 1020

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.

4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY PARSONS ENGINEERING SCIENCE
ADDRESS 1700 S BROADWAY, SUITE 700
CITY DENVER STATE CO ZIP 80210
PHONE # 303 831-8100 FAX # 303 831-8208 FAX RESULTS (Y) N

CLIENT CONTACT (print) TODD WIEDEMEIER
PROJECT I.D. MacDill AFB
EAL. QUOTE # 72450.21020 P.O.#
TURNAROUND REQUIRED* ~~30 days~~ 7 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) [signature]
(print) JEFF FETHERNOUR

Evergreen Analytical Cooler No 383
Cooler Received

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	ANALYSIS REQUESTED: TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle) & Ena 5 1412 MB	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Alkalinity	Cl, SO4, NO2, NO3						EAL Sample No.
24MP-7S	3/16/95	0845	6	X									X		X				X	X						
7SMP-1S	3/16/95	1440	6	X									X		X				X	X						
7SMP-1D	3/16/95	1530	6	X									X		X				X	X						
HT:																									Location	
DD:																									Container Size	

EAL use only
Do not write in shaded area

EAL
Project #
Custodian

Instructions: All samples placed in ice
All groundwater samples preliminary - Please analyze ASAP

Relinquished by	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

Client Sample Number	: 75MP-1S	Client Project No.	: 722450.21020 MacDill
Lab Sample Number	: X04299	Lab Project No.	: 95-0861
Date Sampled	: 3/16/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 602
Date Extracted/Prepared	: 3/21/95	Matrix	: Water
Date Analyzed	: 3/22/95	Lab File No.	: BX2032127
		Method Blank No.	: MB032195

Compound Name	Cas Number	Sample Concentration ug/L		PQL ug/L
Benzene	71-43-2		U	4.0
Toluene	108-88-3	3.9	J	4.0
Ethyl Benzene	100-41-4		U	4.0
Total Xylene	1330-20-7		U	4.0
Chlorobenzene	108-90-7		U	4.0
1,3,5-trimethylbenzene	108-67-8		U	4.0
1,2,4-trimethylbenzene	95-63-6		U	4.0
1,2,3-trimethylbenzene	526-73-8		U	4.0
1,2,3,4-tetramethylbenzene	488-23-3		U	4.0

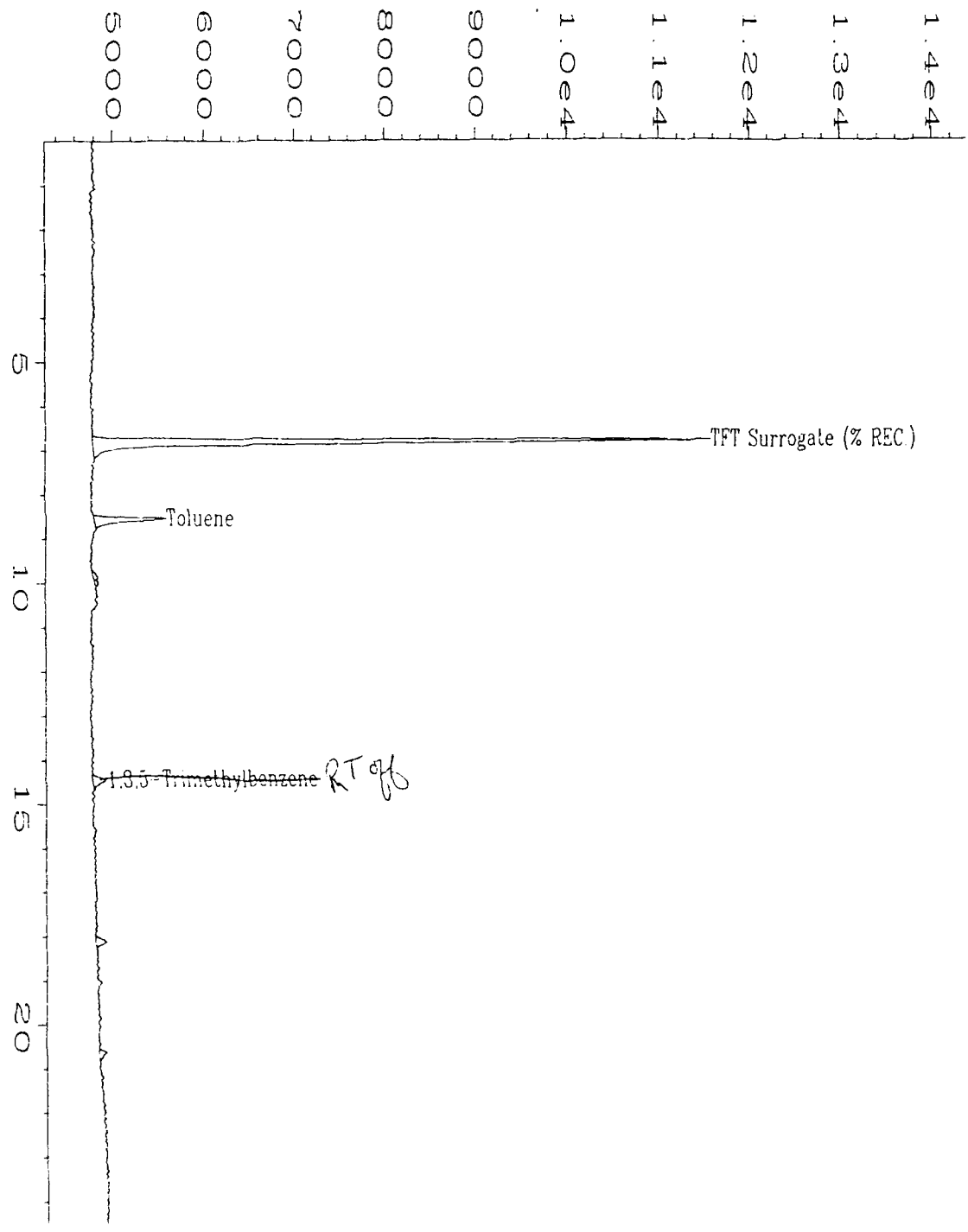
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

Surrogate Recovery:
α,α,α-Trifluorotoluene : 86%
QC Reporting Limits : 70%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20321\027R0901.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04299 DF=1
Run Time Bar Code:
Acquired on : 22 Mar 95 05:58 AM
Report Created on: 22 Mar 95 06:23 AM
Last Recalib on : 21 Mar 95 03:32 PM
Multiplier : 1
Sample Info : Project#: 95-0861 Client#: 2MP-1S Water

Page Number : 1
Vial Number : 27
Injection Number : 1
Sequence Line : 9
Instrument Method: BX20321
Analysis Method : BX20321.MT
Sample Amount : 0
ISTD Amount :

Cw 4/18/95

75

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

Client Sample Number	: 75MP-1D	Client Project No.	: 722450.21020 MacDill
Lab Sample Number	: X04300	Lab Project No.	: 95-0861
Date Sampled	: 3/16/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 602
Date Extracted/Prepared	: 3/21/95	Matrix	: Water
Date Analyzed	: 3/22/95	Lab File No.	: BX2032128
		Method Blank No.	: MB032195

Compound Name	Cas Number	Sample Concentration ug/L		PQL ug/L
Benzene	71-43-2	1.7	J	4.0
Toluene	108-88-3	0.5	J	4.0
Ethyl Benzene	100-41-4	5.0		4.0
Total Xylene	1330-20-7		U	4.0
Chlorobenzene	108-90-7		U	4.0
1,3,5-trimethylbenzene	108-67-8		U	4.0
1,2,4-trimethylbenzene	95-63-6		U	4.0
1,2,3-trimethylbenzene	526-73-8		U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	11		4.0

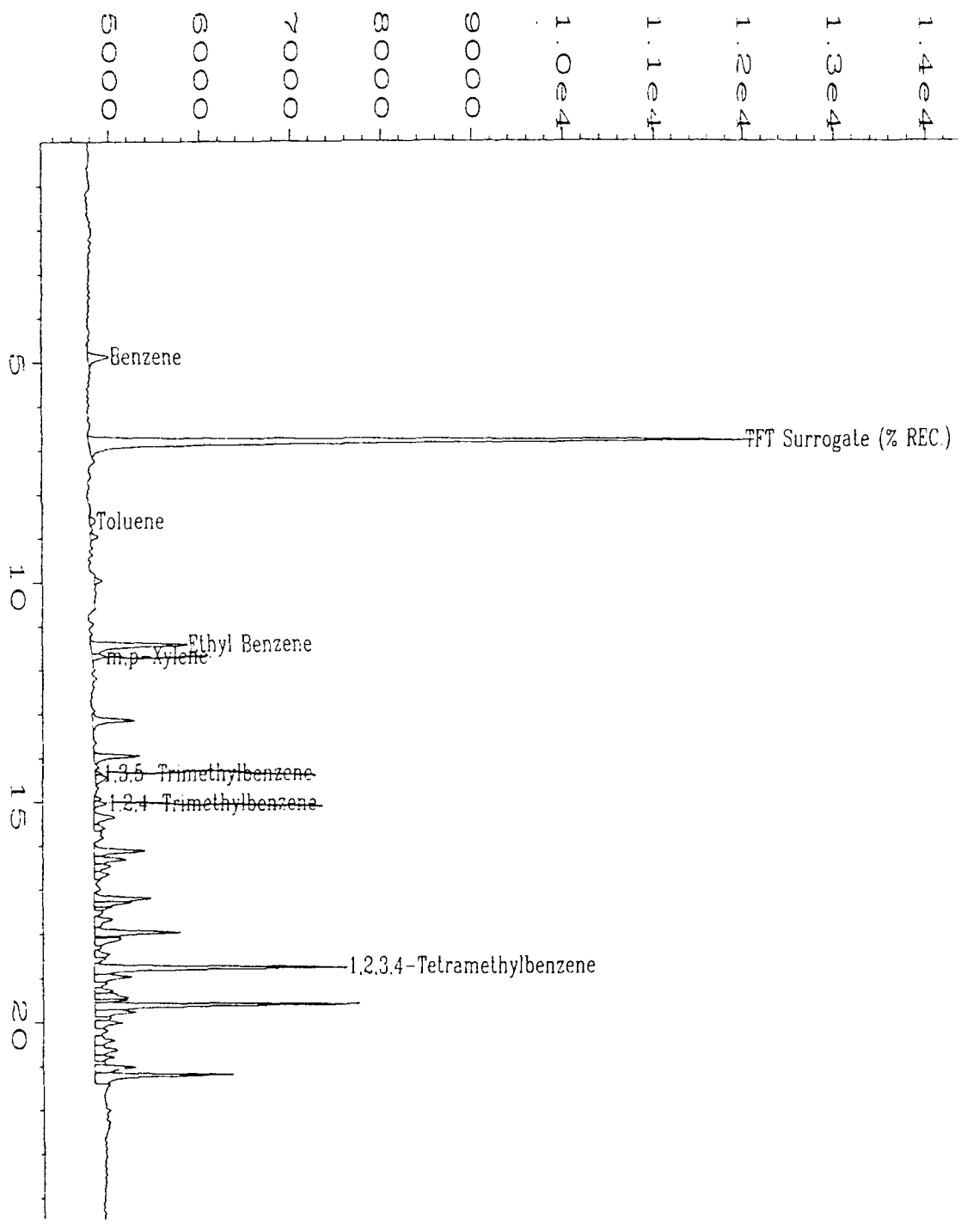
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

Surrogate Recovery:
α,α,α-Trifluorotoluene : 92%
QC Reporting Limits : 70%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20321\028R0901.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04300 DF=1
Run Time Bar Code:
Acquired on : 22 Mar 95 06:43 AM
Report Created on: 22 Mar 95 07:08 AM
Last Recalib on : 21 Mar 95 03:32 PM
Multiplier : 1
Sample Info : Project#: 95-0861 Client#: 24MP-1D Water

Page Number : 1
Vial Number : 28
Injection Number : 1
Sequence Line : 9
Instrument Method: BX20321
Analysis Method : BX20321....
Sample Amount : 0
ISTD Amount :

75

4/13/95

Evergreen Analytical, Inc.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS
TVH Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: 24MP-10D	Client Project No.	: 722450.21020 MACDI
Lab Sample No.	: X04288	Lab Project No.	: 95-0861
Date Sampled	: 3/15/95	EPA Method No.	: 5030/8015 Mod
Date Received	: 3/17/95	Matrix	: Water
Date Prepared	: 3/20/95	Method Blank	: MB032095
Date Analyzed	: 3/20/95		

Compound	Spike Added (mg/L)	Sample Concentration (mg/L)	MS Concentration (mg/L)	MS %REC	QC Limits %REC
Gasoline	5.00	0.00	5.18	104	60-140

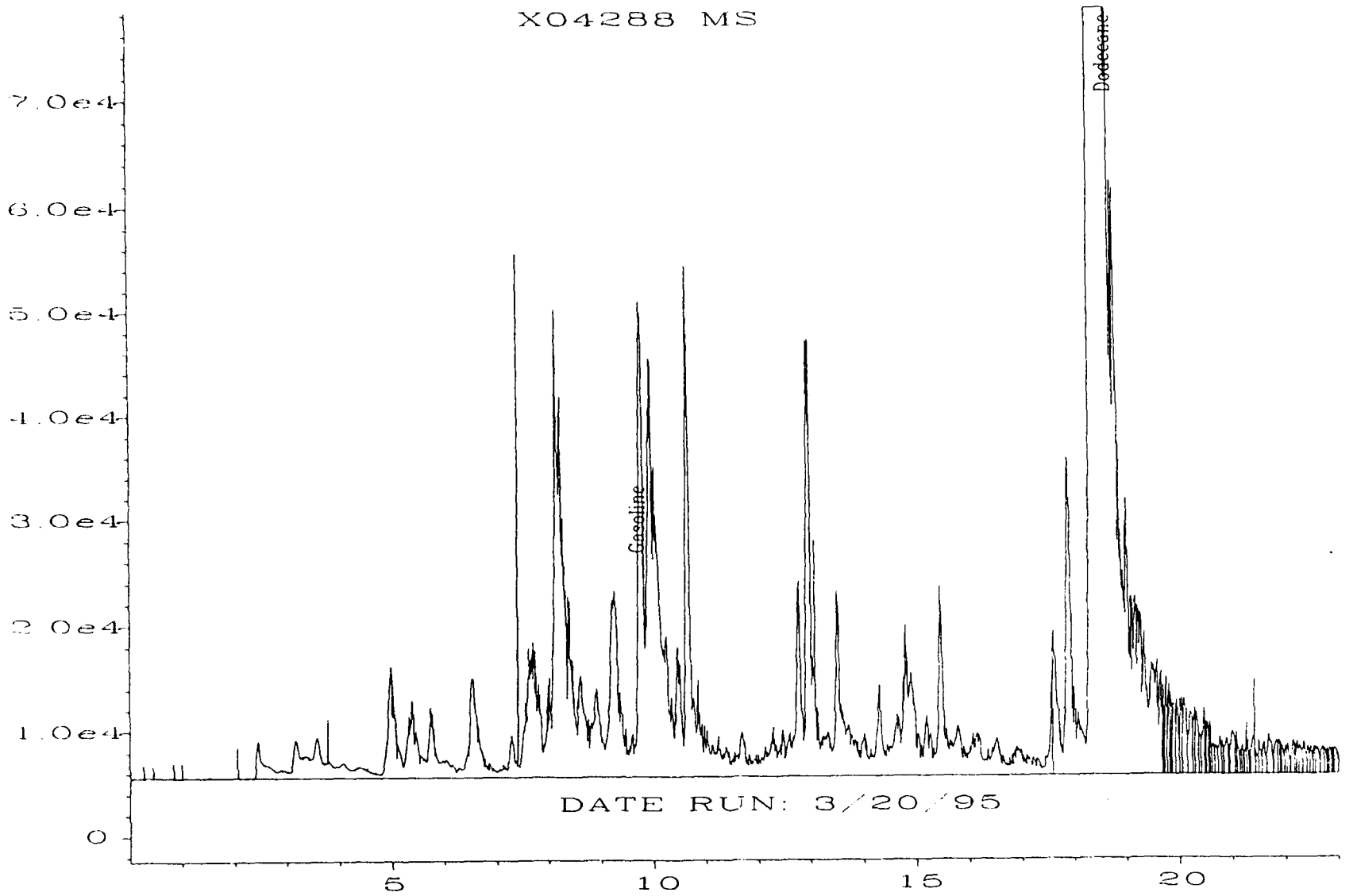
Compound	Spike Added (mg/L)	MSD Concentration (mg/L)	MS %REC	RPD	QC Limits RPD	QC Limits %REC
Gasoline	5.00	5.64	113	8.5	50	60-140

* = Values outside of QC limits.

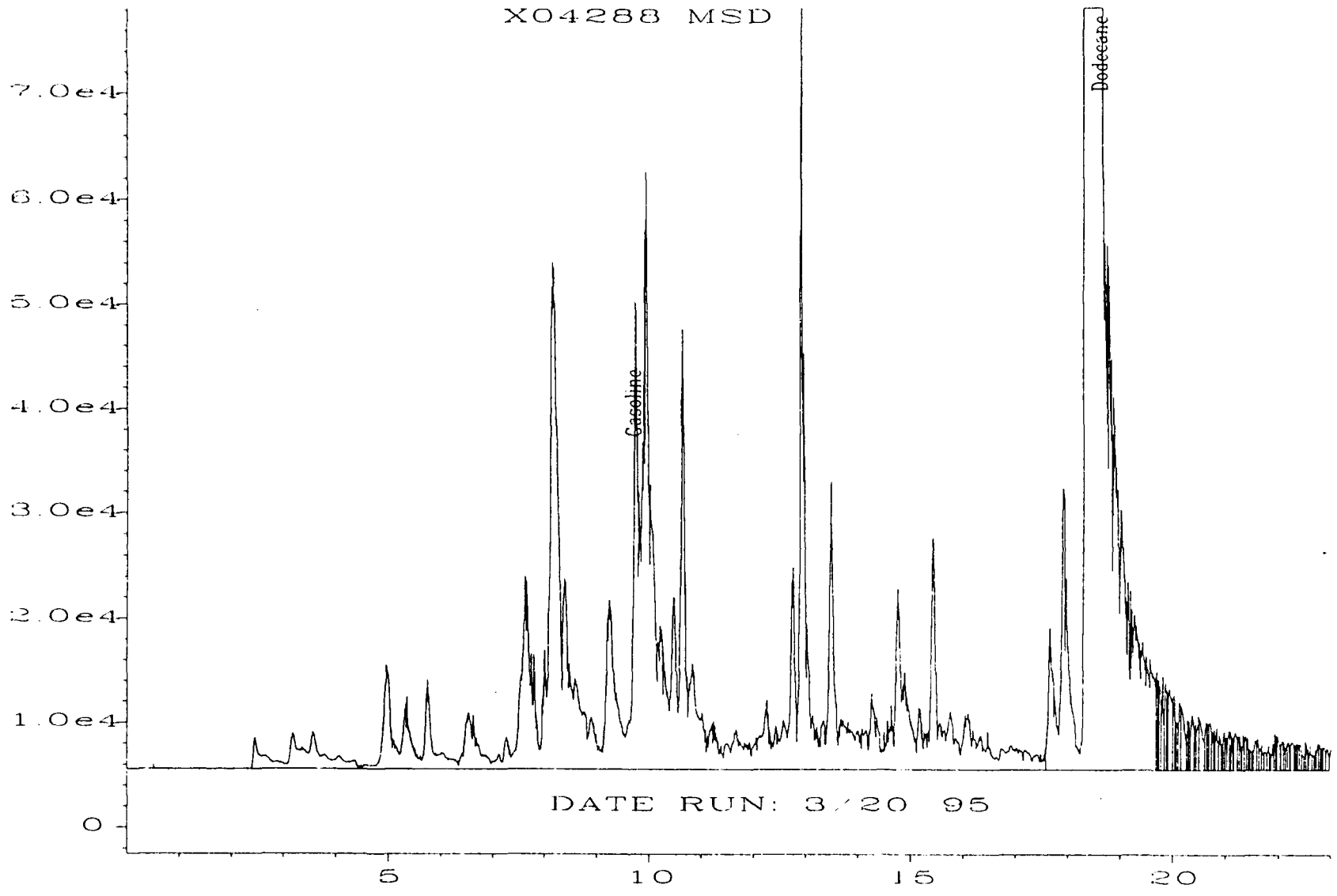
RPD: 0 out of (1) outside limits.

Spike Recovery: 0 out of (2) outside limits.

Comments: NA = Not analyzed/not applicable.



Sig. 1 in C:\HPCHEM\1\DATA\TVH0320.011F0101.D



Sig. 1 in C:\HPCHEM\1\DATA\VH0320\012F0101.D

Evergreen Analytical, Inc.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

BTEX Water Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: MD24-6	Client Project No.	: 722450.21020 MacDill
Lab Sample No.	: X04291	Lab Project No.	: 95-0861
Date Sampled	: 3/15/95	EPA Method No.	: 602
Date Received	: 3/17/95	Matrix	: Water
Date Prepared	: 3/21/95	Lab File Number(s)	: BX2032119,20
Date Analyzed	: 3/21/95	Method Blank	: MB032195

Compound	Spike Added (ug/L)	Sample Concentration (ug/L)	MS Concentration (ug/L)	MS %REC	QC Limits %REC
Benzene	20	0.0	17.1	85.5	65-121
Toluene	20	0.0	17.1	85.5	69-117
Ethyl Benzene	20	0.0	17.5	87.5	68-118
m/p-Xylene	40	0.0	35.1	87.8	66-116
o-Xylene	20	0.0	17.1	85.5	73-117
Chlorobenzene	20	0.0	17.1	85.5	65-121
1,3,5-TMB	20	0.0	16.4	82.0	65-121
1,2,4-TMB	20	0.0	16.5	82.5	65-121
1,2,3-TMB	20	0.0	17.0	85.0	65-121
1,2,3,4-TeMB	20	1.0	18.2	86.0	65-121

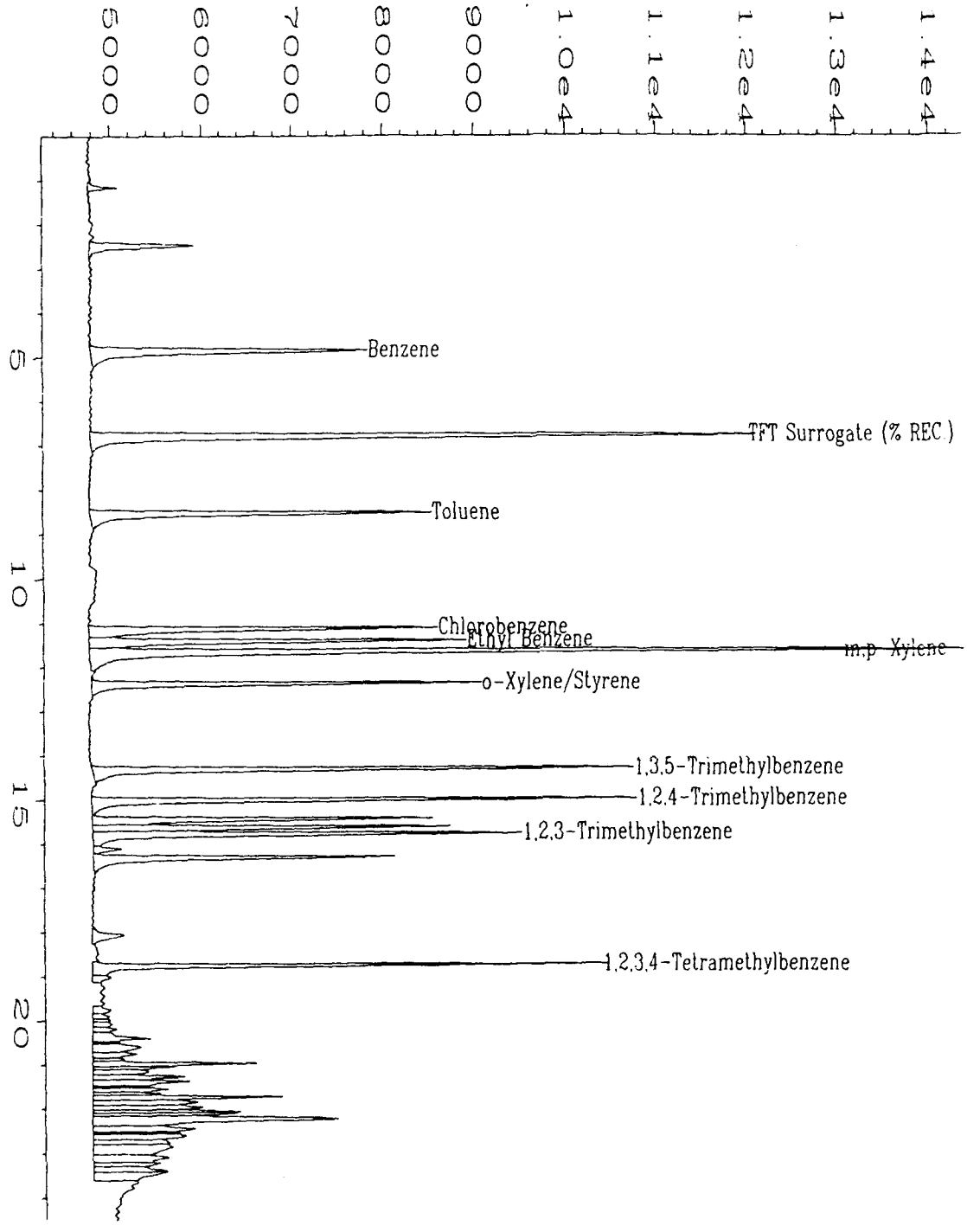
Compound	Spike Added (ug/L)	MSD Concentration (ug/L)	MS %REC	RPD	QC Limits RPD	QC Limits %REC
Benzene	20	16.6	83.0	3.0	17.4	65-121
Toluene	20	17.3	86.5	1.2	15.8	69-117
Ethyl Benzene	20	17.1	85.5	2.3	11.9	68-118
m/p-Xylene	40	34.4	86.0	2.0	15.4	66-116
o-Xylene	20	16.9	84.5	1.2	13.2	73-117
Chlorobenzene	20	16.9	84.5	1.2	17.4	65-121
1,3,5-TMB	20	16.8	84.0	2.4	17.4	65-121
1,2,4-TMB	20	16.7	83.5	1.2	17.4	65-121
1,2,3-TMB	20	16.2	81.0	4.8	17.4	65-121
1,2,3,4-TeMB	20	16.1	75.5	13.0	17.4	65-121

* = Values outside of QC limits.

RPD: 0 out of (10) outside limits.

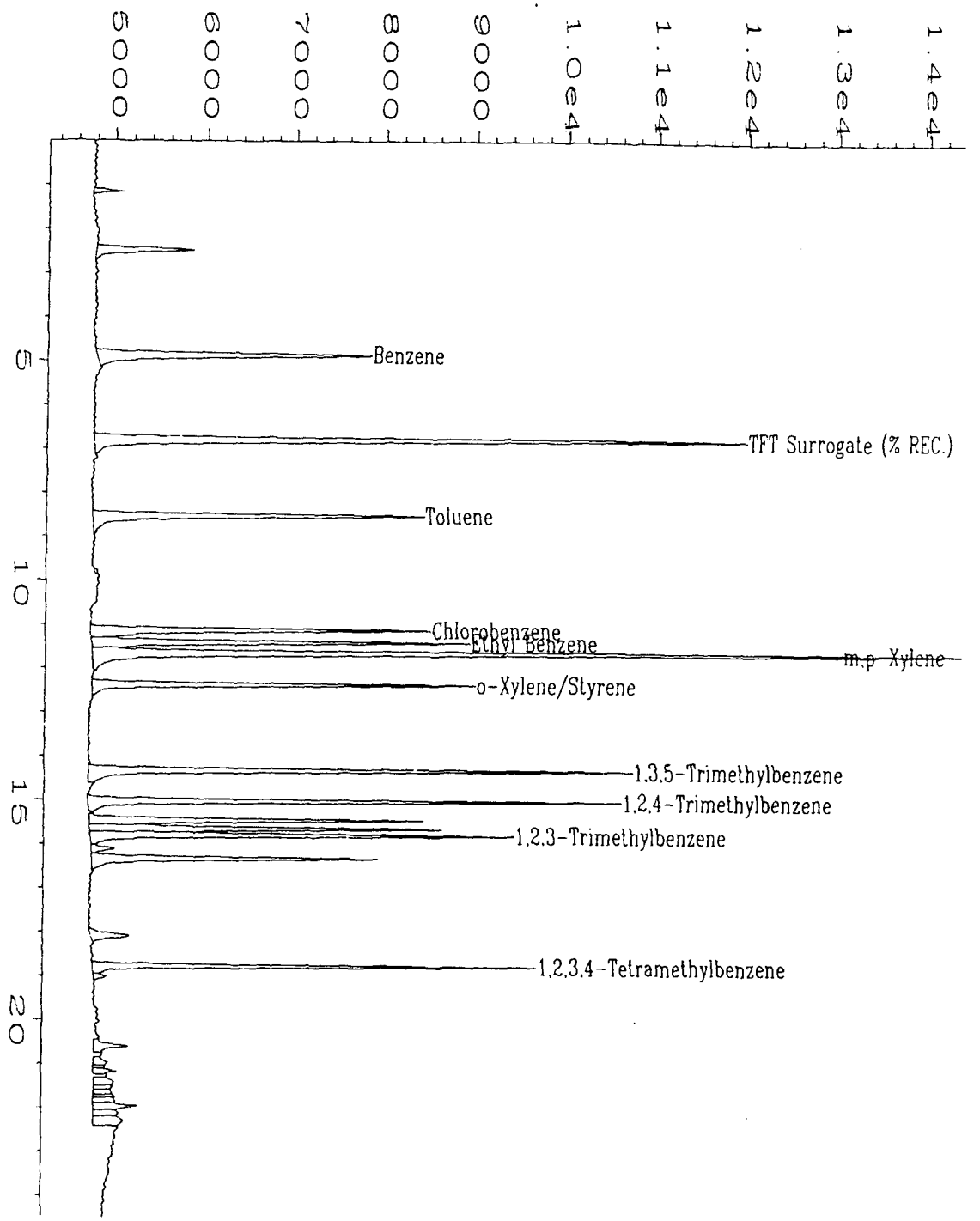
Spike Recovery: 0 out of (20) outside limits.

Comments: CJC 4/2



Data File Name : C:\HPCHEM\2\DATA\BX20321\019R0901.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04291MS DF=1
P . Time Bar Code:
. uired on : 21 Mar 95 11:44 PM
Report Created on: 22 Mar 95 00:09 AM
Last Recalib on : 21 Mar 95 03:32 PM
Multiplier : 1
Sample Info : Project#: 95-0861 Client#: ~~24MP-6~~ MDJ4 Water

Page Number : 1
Vial Number : 19
Injection Number : 1
Sequence Line : 9
Instrument Method: BX20321.MTH
Analysis Method : BX20321.MTH
Sample Amount : 0
ISTD Amount :



Data File Name : C:\HPCHEM\2\DATA\BX20321\020R0901.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04291MSD DF=1
Run Time Bar Code:
Acquired on : 22 Mar 95 00:31 AM
Report Created on: 22 Mar 95 00:56 AM
Last Recalib or : 21 Mar 95 03:32 PM
Multiplier : 1
Sample Info : Project#: 95-0861 Client#: 2-MP-6 Water

Page Number : 1
Vial Number : 20
Injection Number : 1
Sequence Line : 9
Instrument Method: BX20321.MTH
Analysis Method : BX20321.MTH
Sample Amount : 0
ISTD Amount :

rm024

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

Client Sample Number	: Field Blank	Client Project No.	: 722450.21020 MacDill
Lab Sample Number	: X04294	Lab Project No.	: 95-0861
Date Sampled	: 3/15/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 602
Date Extracted/Prepared	: 3/21/95	Matrix	: Water
Date Analyzed	: 3/22/95	Lab File No.	: BX2032129
		Method Blank No.	: MB032195

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4.0
Toluene	108-88-3	U	4.0
Ethyl Benzene	100-41-4	U	4.0
Total Xylene	1330-20-7	U	4.0
Chlorobenzene	108-90-7	U	4.0
1,3,5-trimethylbenzene	108-67-8	U	4.0
1,2,4-trimethylbenzene	95-63-6	U	4.0
1,2,3-trimethylbenzene	526-73-8	U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	U	4.0

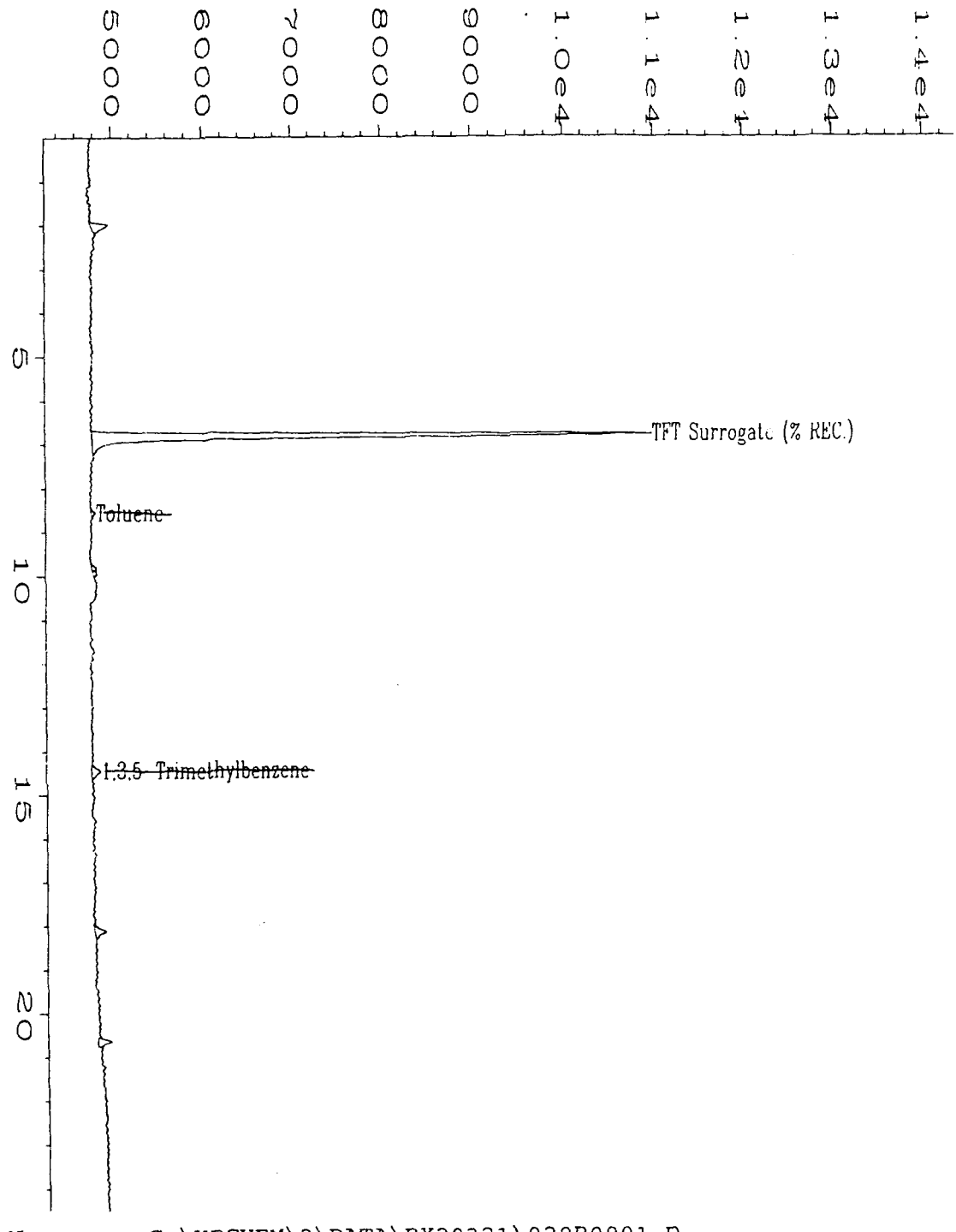
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

Surrogate Recovery:
α,α,α-Trifluorotoluene : 81%
QC Reporting Limits : 70%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

K. Cox
Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20321\029R0901.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04294 DF=1
Run Time Bar Code:
Acquired on : 22 Mar 95 07:31 AM
Report Created on: 22 Mar 95 07:56 AM
Last Recalib on : 21 Mar 95 03:32 PM
Multiplier : 1
Sample Info : Project#: 95-0861 Client#: Field Blank Water

Page Number : 1
Vial Number : 29
Injection Number : 1
Sequence Line : 9
Instrument Method: BX20321
Analysis Method : BX20321.M
Sample Amount : 0
ISTD Amount :

pm 4/13/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

		Client Project No.	: 722450.21020
Client Sample Number	: Trip Blank		MacDill
Lab Sample Number	: X04296	Lab Project No.	: 95-0861
Date Sampled	: 3/15/95	Dilution Factor	: 1.00
Date Received	: 3/17/95	Method	: 602
Date Extracted/Prepared	: 3/21/95	Matrix	: Water
Date Analyzed	: 3/22/95	Lab File No.	: BX2032130
		Method Blank No.	: MB032195

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4.0
Toluene	108-88-3	U	4.0
Ethyl Benzene	100-41-4	U	4.0
Total Xylene	1330-20-7	U	4.0
Chlorobenzene	108-90-7	U	4.0
1,3,5-trimethylbenzene	108-67-8	U	4.0
1,2,4-trimethylbenzene	95-63-6	U	4.0
1,2,3-trimethylbenzene	526-73-8	U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	U	4.0

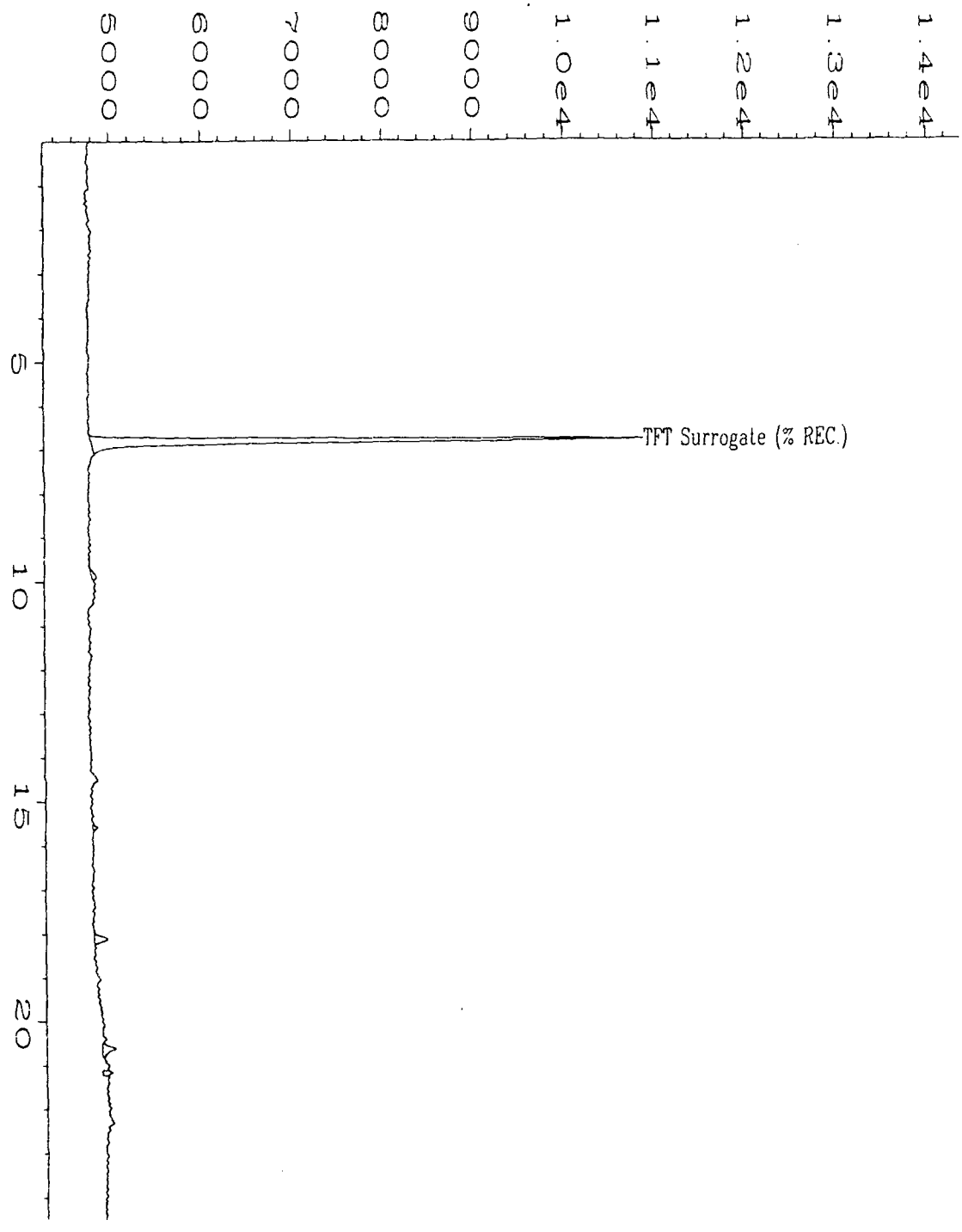
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

Surrogate Recovery:
α,α,α-Trifluorotoluene : 78%
QC Reporting Limits : 70%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

K. Cone
Analyst

P. McClelland
Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20321\030R0901.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 30
Sample Name	: X04296 DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 9
Acquired on	: 22 Mar 95 08:16 AM	Instrument Method	: BX20321....
Report Created on	: 22 Mar 95 08:41 AM	Analysis Method	: BX20321.MT
Last Recalib on	: 21 Mar 95 03:32 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-0861 Client#: Trip Blank Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Method Blank Report

		Client Project No.	: 722450.21020
			MacDill
Method Blank Number	: MB032195		
Date Extracted/Prepared	: 3/21/95	Lab Project No.	: 95-0861
Date Analyzed	: 3/21/95	Dilution Factor	: 1.00
		Method	: 602
		Matrix	: Water
		Lab File No.	: BX2032111

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4.0
Toluene	108-88-3	U	4.0
Ethyl Benzene	100-41-4	U	4.0
Total Xylene	1330-20-7	U	4.0
Chlorobenzene	108-90-7	U	4.0
1,3,5-trimethylbenzene	108-67-8	U	4.0
1,2,4-trimethylbenzene	95-63-6	U	4.0
1,2,3-trimethylbenzene	526-73-8	U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	U	4.0

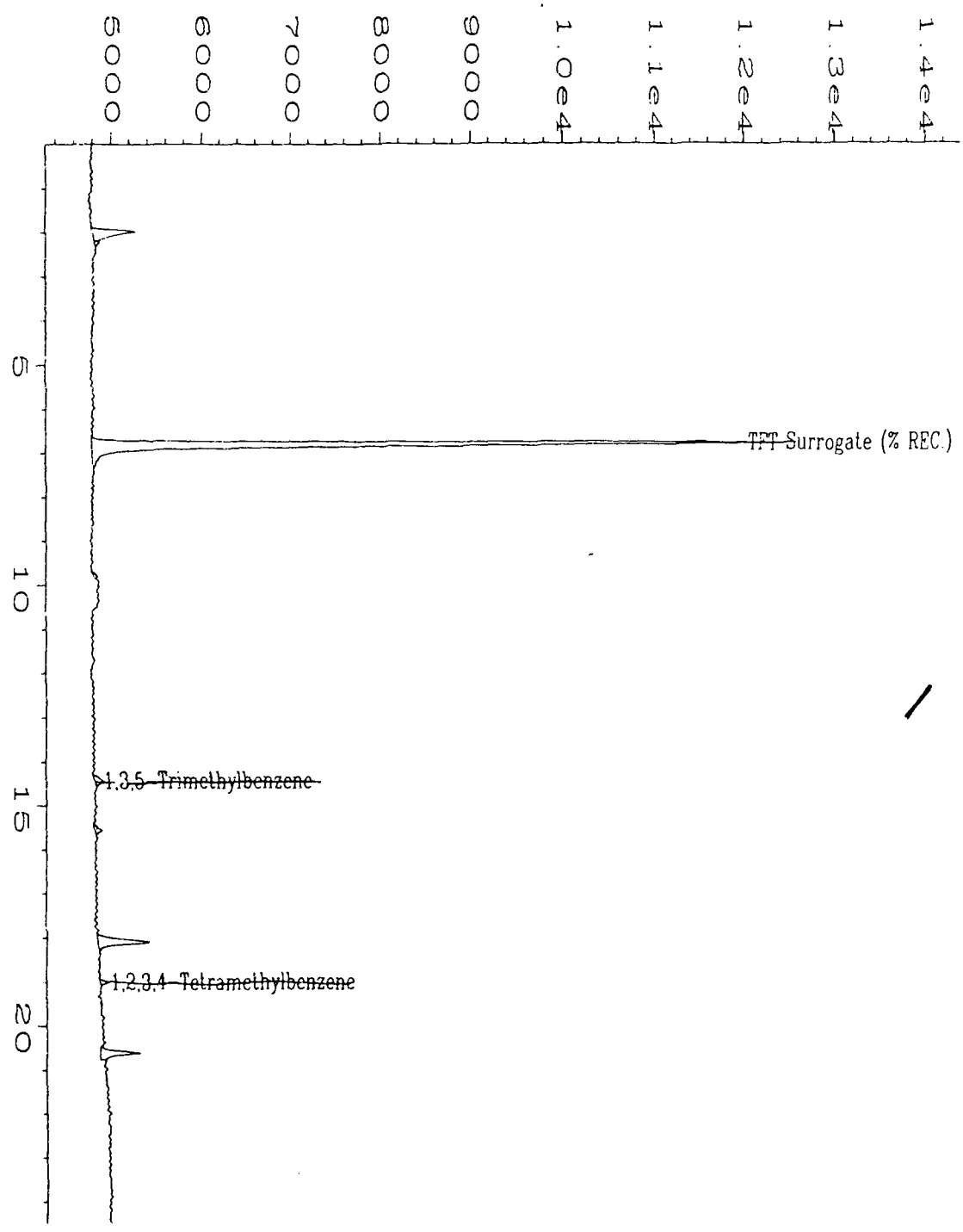
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak

Surrogate Recovery:
α,α,α-Trifluorotoluene : 102%
QC Reporting Limits : 70%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

K. Cone
Analyst

P. McClellan
Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20321\011R0901.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 11
Sample Name	: MB032195-WATER	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 9
Acquired on	: 21 Mar 95 05:32 PM	Instrument Method	: BX20321.M...
Report Created on	: 21 Mar 95 05:57 PM	Analysis Method	: BX20321.MTH
Last Recalib on	: 21 Mar 95 03:32 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

fm 4/13/95

EVERGREEN ANALYTICAL, INC.
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(303) 425-6021

BTEX Data Report
Method Blank Report

		Client Proiect No.	: 722450.21020
			MacDill
Method Blank Number	: MB032295	Lab Project No.	: 95-0861
Date Extracted/Prepared	: 3/22/95	Dilution Factor	: 1.00
Date Analyzed	: 3/22/95	Method	: 602
		Matrix	: Water
		Lab File No.	: BX2032210

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4.0
Toluene	108-88-3	U	4.0
Ethyl Benzene	100-41-4	U	4.0
Total Xylene	1330-20-7	U	4.0
Chlorobenzene	108-90-7	U	4.0
1,3,5-trimethylbenzene	108-67-8	U	4.0
1,2,4-trimethylbenzene	95-63-6	U	4.0
1,2,3-trimethylbenzene	526-73-8	U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	U	4.0

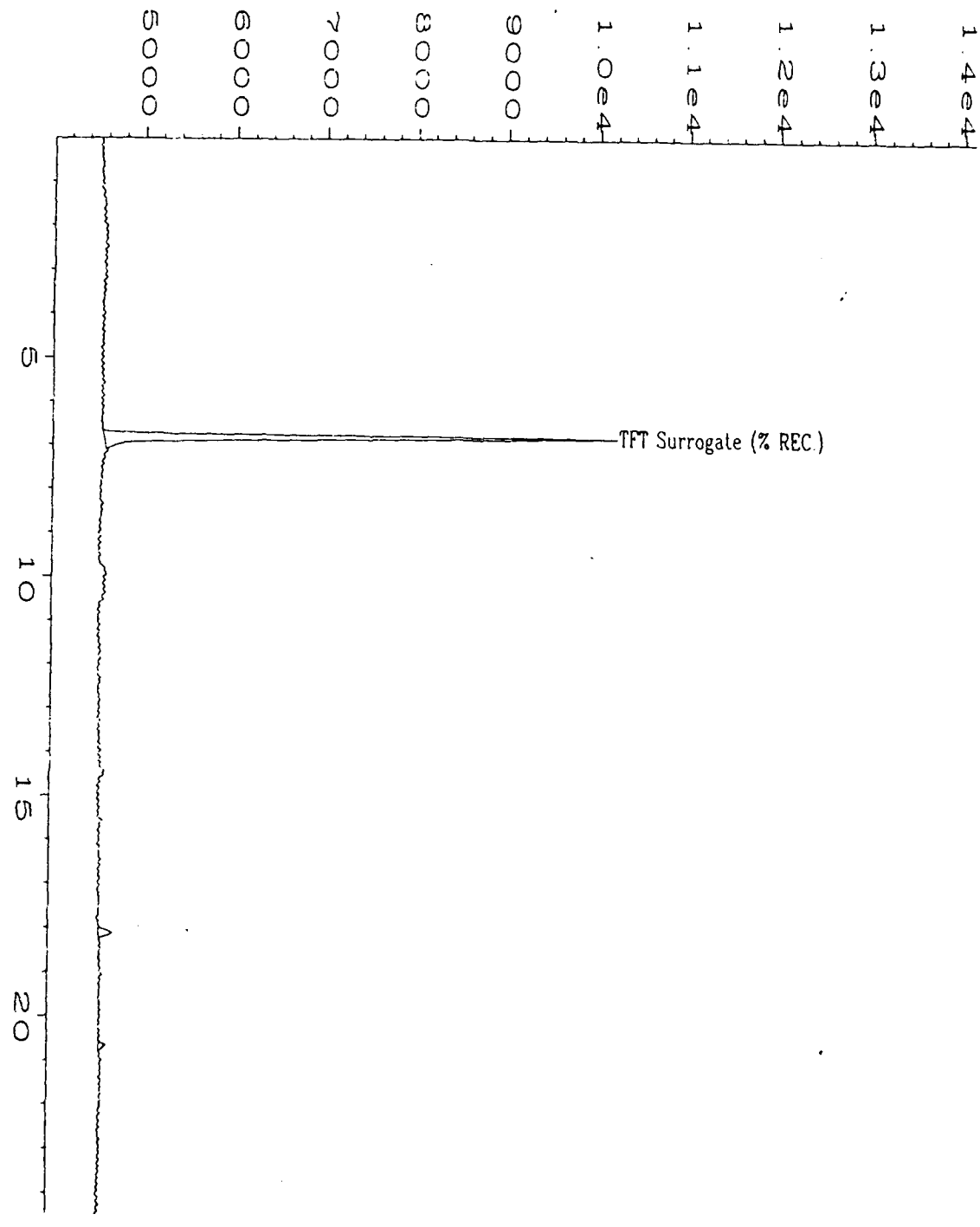
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak

Surrogate Recovery:
α,α,α-Trifluorotoluene : 81%
QC Reporting Limits : 70%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

K. Cone
Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20322\010R0701.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 10
Sample Name	: MB032295-WATER	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
Acquired on	: 22 Mar 95 05:57 PM	Instrument Method	: BX20322
Report Created on	: 22 Mar 95 06:22 PM	Analysis Method	: BX20322.MTH
Last Recalib on	: 22 Mar 95 04:04 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Laboratory Control Sample (LCS)

		Client Project No.	: 722450.21020
			MacDill
LCS Number	: LCS032195		
Date Extracted/Prepared	: 3/21/95	Lab Project No.	: 95-0861
Date Analyzed	: 3/21/95	Dilution Factor	: 1.00
		Method	: 602
		Matrix	: Water
		Lab File No.	: BX2032112

Compound Name	Cas Number	LCS Concentration ug/L	QC Limit ug/L
Benzene	71-43-2	37	23-44
Toluene	108-88-3	36	26-43
Ethyl Benzene	100-41-4	36	26-48
m,p-Xylene	NA	37	25-47
o-Xylene	95-47-6	35	26-48
Chlorobenzene	108-90-7	36	28-46
1,3,5-trimethylbenzene	108-67-8	37	24-47
1,2,4-trimethylbenzene	95-63-6	30	23-46
1,2,3-trimethylbenzene	526-73-8	35	29-49
1,2,3,4-tetramethylbenzene	488-23-3	34	NA

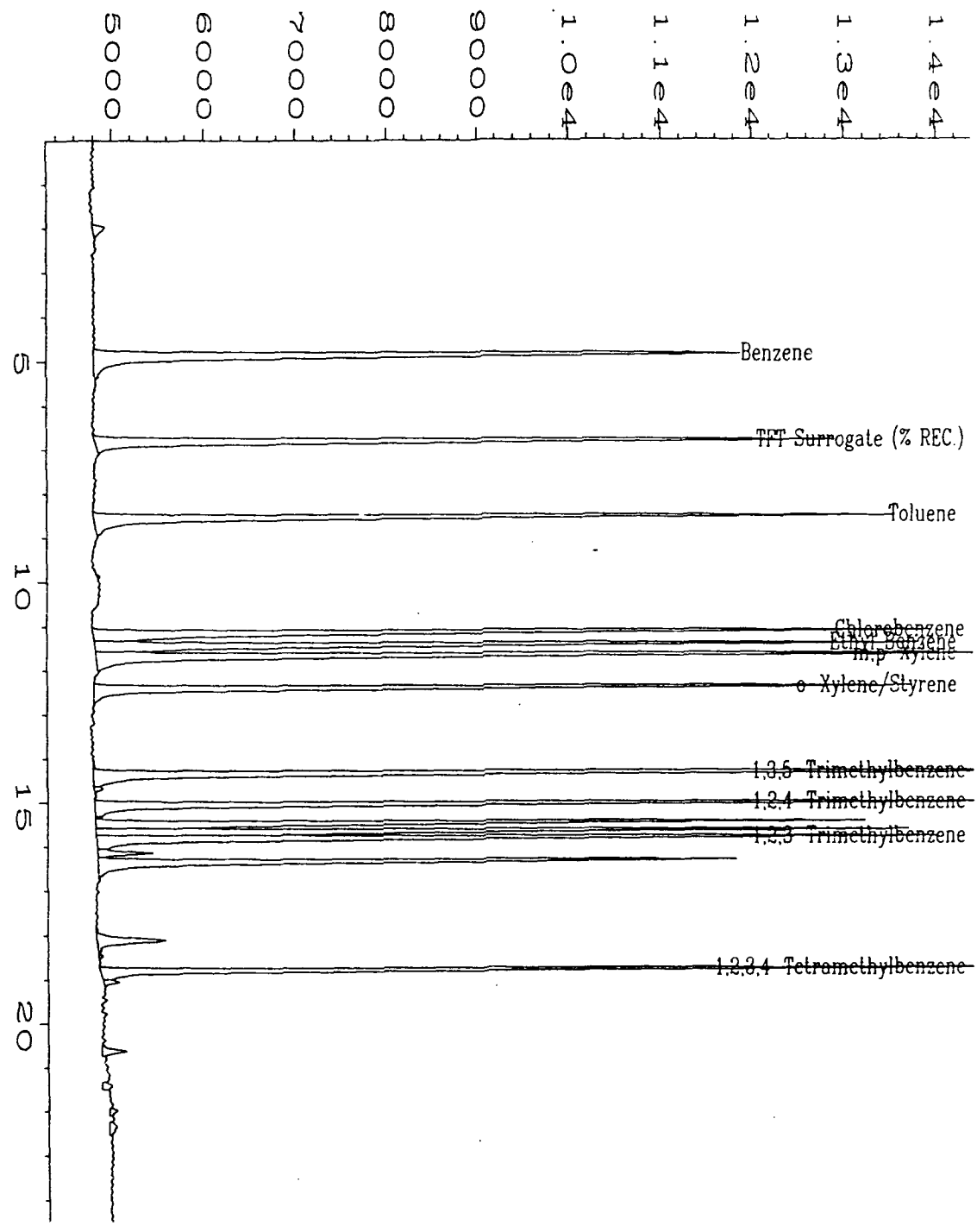
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

Surrogate Recovery:
α,α,α-Trifluorotoluene : 101%
QC Reporting Limits : 70%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20321\012R0901.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : LCS032195
Run Time Bar Code:
Acquired on : 21 Mar 95 06:19 PM
Report Created on: 21 Mar 95 06:44 PM
Last Recalib on : 21 Mar 95 03:32 PM
Multiplier : 1

Page Number : 1
Vial Number : 12
Injection Number : 1
Sequence Line : 9
Instrument Method: BX20321.
Analysis Method : BX20321.MTH
Sample Amount : 0
ISTD Amount :

External Standard Report

Data File Name : C:\HPCHEM\2\DATA\BX20321\010R0901.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : 1.0 ppb BTEX MIX
Run Time Bar Code:
Acquired on : 21 Mar 95 04:44 PM
Report Created on: 22 Mar 95 08:57 AM
Last Recalib on : 22 Mar 95 08:53 AM
Multiplier : 1

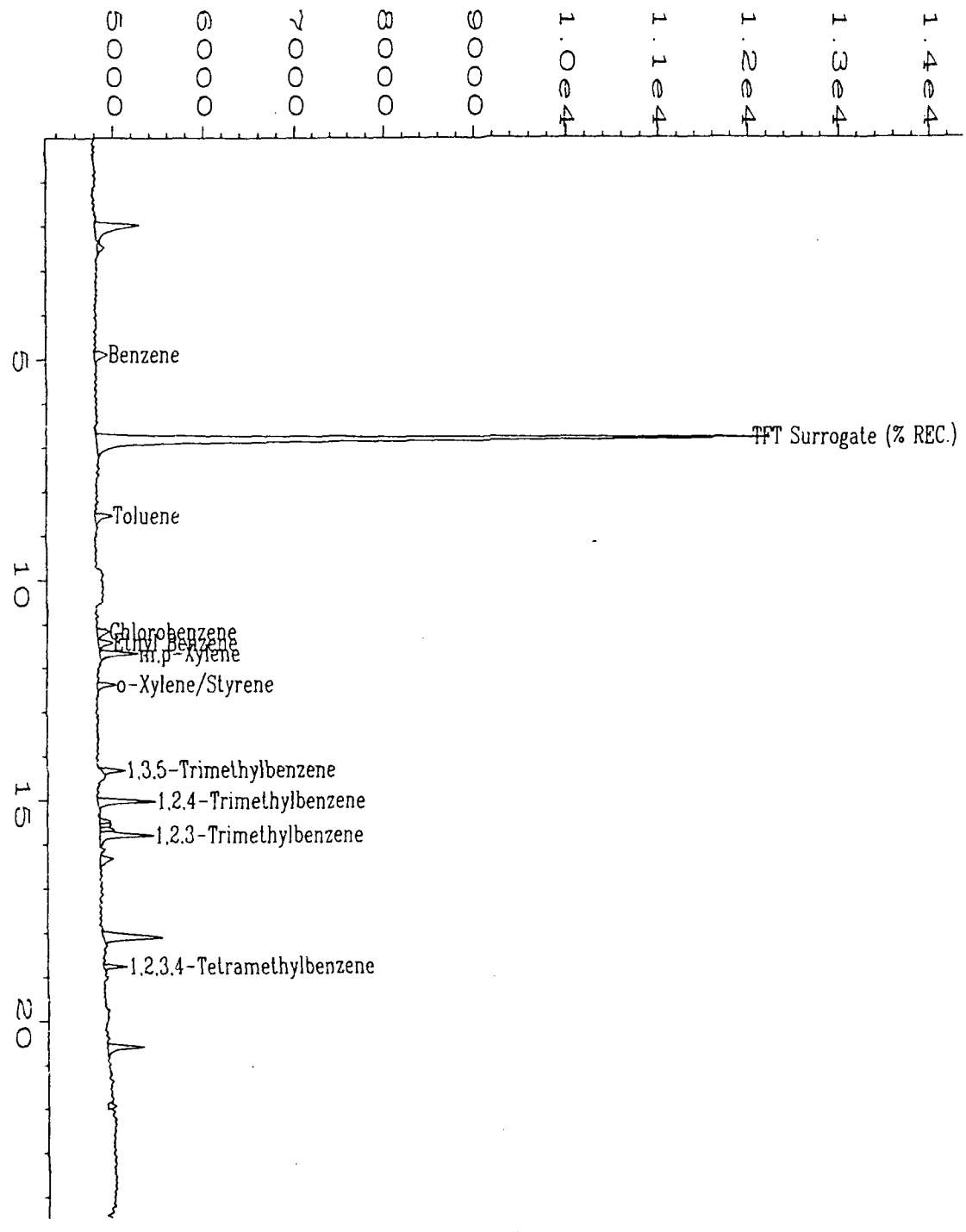
Page Number : 1
Vial Number : 10
Injection Number : 1
Sequence Line : 9
Instrument Method: BX20321.MTH
Analysis Method : BX20321.MTH
Sample Amount : 0
ISTD Amount :

Sig. 2 in C:\HPCHEM\2\DATA\BX20321\010R0901.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
2.472	562	VV	0.093	1	0.898	
4.890	1177	PV	0.110	1	2.727	Benzene
6.805	48550	PV	0.100	1-R	94.975	TFT Surrogate (% REC.)
8.553	1297	PV	0.089	1	2.663	Toluene
11.183	1029	BV	0.099	1	2.691	Chlorobenzene
11.440	1070	VV	0.095	1	1.471	Ethyl Benzene
11.675	2403	VV	0.085	1	0.493	m,p-Xylene
12.389	1070	BV	0.076	1	1.698	o-Xylene/Styrene
14.330	1247	PV	0.073	1	0.439	1,3,5-Trimethylbenzene
15.030	3592	PV	0.084	1	1.226	1,2,4-Trimethylbenzene
15.240	* not found *			1		
15.488	484	BV	0.068	1	1.358	
15.797	3755	VV	0.089	1	0.580	1,2,3-Trimethylbenzene
16.331	1098	VV	0.101	1	13.315	
18.769	1068	PV	0.062	1	1.525	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
3	6.760	6.805	0.045

Not all calibrated peaks were found



Data File Name	: C:\HPCHEM\2\DATA\BX20321\010R0901.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 10
Sample Name	: 1.0 ppb BTEX MIX	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 9
Acquired on	: 21 Mar 95 04:44 PM	Instrument Method	: BX20321.[illegible]
Report Created on	: 21 Mar 95 05:09 PM	Analysis Method	: BX20321.MTH
Last Recalib on	: 21 Mar 95 03:32 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: STD REF #1644, 3/10/95, 0.5 UG/ML (M & P-XYLENE PRESENT); 1,2,3 & 1,2,4-Trimethylbenzene		

External Standard Report

Data File Name : C:\HPCHEM\2\DATA\BX20322\008R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : 1.0 ppb BTEX MIX
Run Time Bar Code:
Acquired on : 22 Mar 95 04:24 PM
Report Created on: 23 Mar 95 08:56 AM
Last Recalib on : 22 MAR 95 04:04 PM
Multiplier : 1
Sample Info : STD REF #1644, 3/10/95, 0.5 UG/ML (M & P-XYLENE PRESENT); + 1,2,3 & 1,2,4-Trimethylbenzene

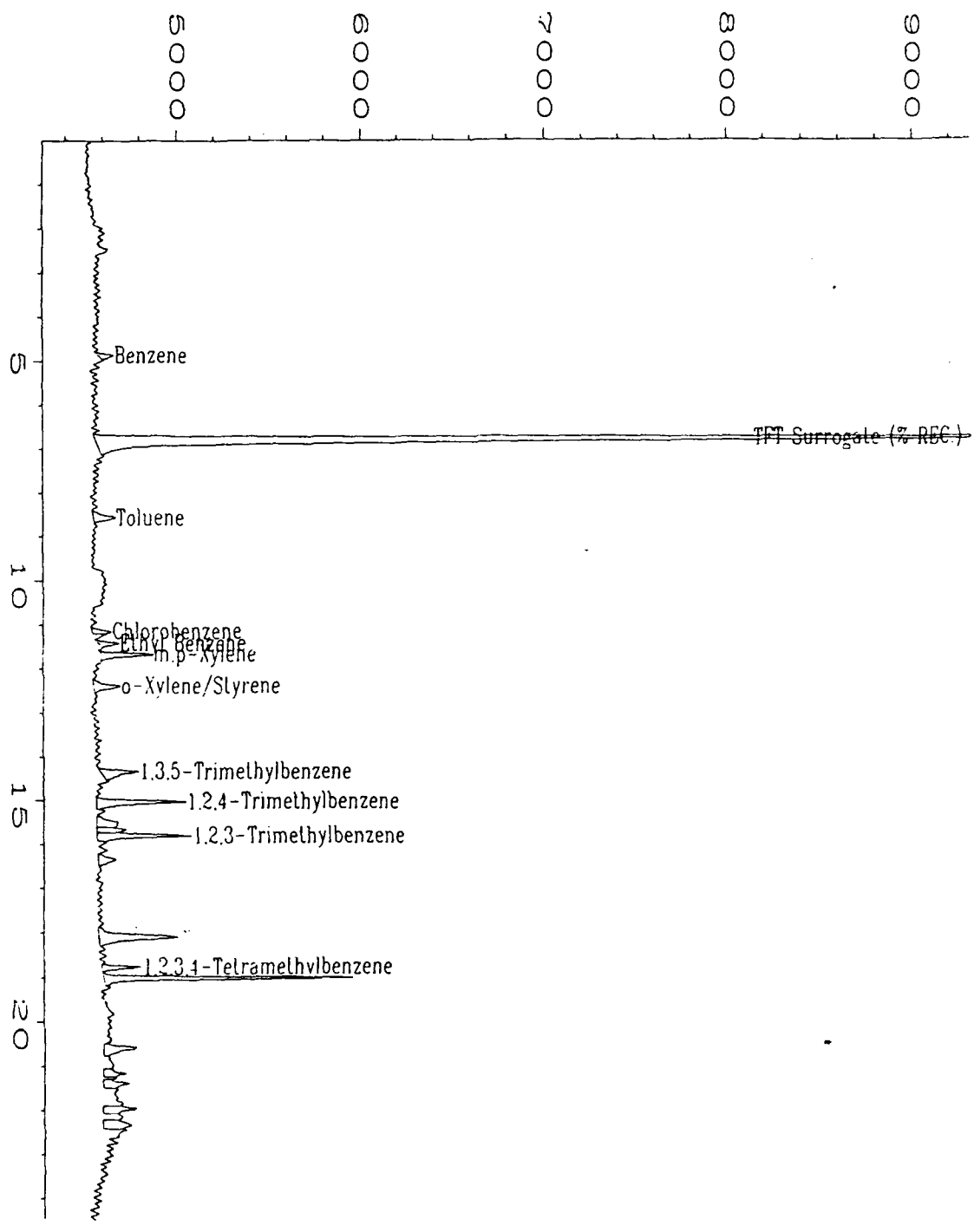
Page Number : 1
Vial Number : 8
Injection Number : 1
Sequence Line : 7
Instrument Method: BX20322.MTH
Analysis Method : BX20322.MTH
Sample Amount : 0
ISTD Amount :

Sig. 2 in C:\HPCHEM\2\DATA\BX20322\008R0701.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
2.452	* not found *			1		
4.860	438	PV	0.067	1	1.864	Benzene
6.789	39381	PV	0.099	1-R	87.650	TFT Surrogate (% REC.)
8.562	933	PV	0.094	1	1.820	Toluene
11.144	534	BV	0.069	1	1.698	Chlorobenzene
11.428	529	PV	0.064	1	0.289	Ethyl Benzene
11.672	1477	BV	0.077	1	-2.219	m,p-Xylene
12.389	1035	BV	0.093	1	1.133	o-Xylene/Styrene
14.332	1481	BV	0.103	1	-0.0133	1,3,5-Trimethylbenzene
15.022	2932	BV	0.083	1	1.035	1,2,4-Trimethylbenzene
15.240	* not found *			1		
15.484	1180	PV	0.154	1	4.187	
15.799	2933	VV	0.079	1	0.0762	1,2,3-Trimethylbenzene
16.330	794	VV	0.105	1	10.218	
18.764	948	VV	0.059	1	0.600	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
3	6.750	6.789	0.039

Not all calibrated peaks were found



Data File Name : C:\HPCHEM\2\DATA\BX20322\008R0701.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : 1.0 ppb BTEX MIX
Run Time Bar Code:
Acquired on : 22 Mar 95 04:24 PM
Report Created on: 22 Mar 95 04:50 PM
Last Recalib on : 22 Mar 95 04:04 PM
Multiplier : 1
Sample Info : STD REF #1644, 3/10/95, 0.5 UG/ML (M & P-XYLENE PRESENT); + 1,2,3 & 1,2,4-Trimethylbenzene

Page Number : 1
Vial Number : 8
Injection Number : 1
Sequence Line : 7
Instrument Method: BX20322
Analysis Method : BX20322...
Sample Amount : 0
ISTD Amount :

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(303) 425-6021

TOTAL VOLATILE HYDROCARBONS (TVH)
Laboratory Control Sample (LCS)

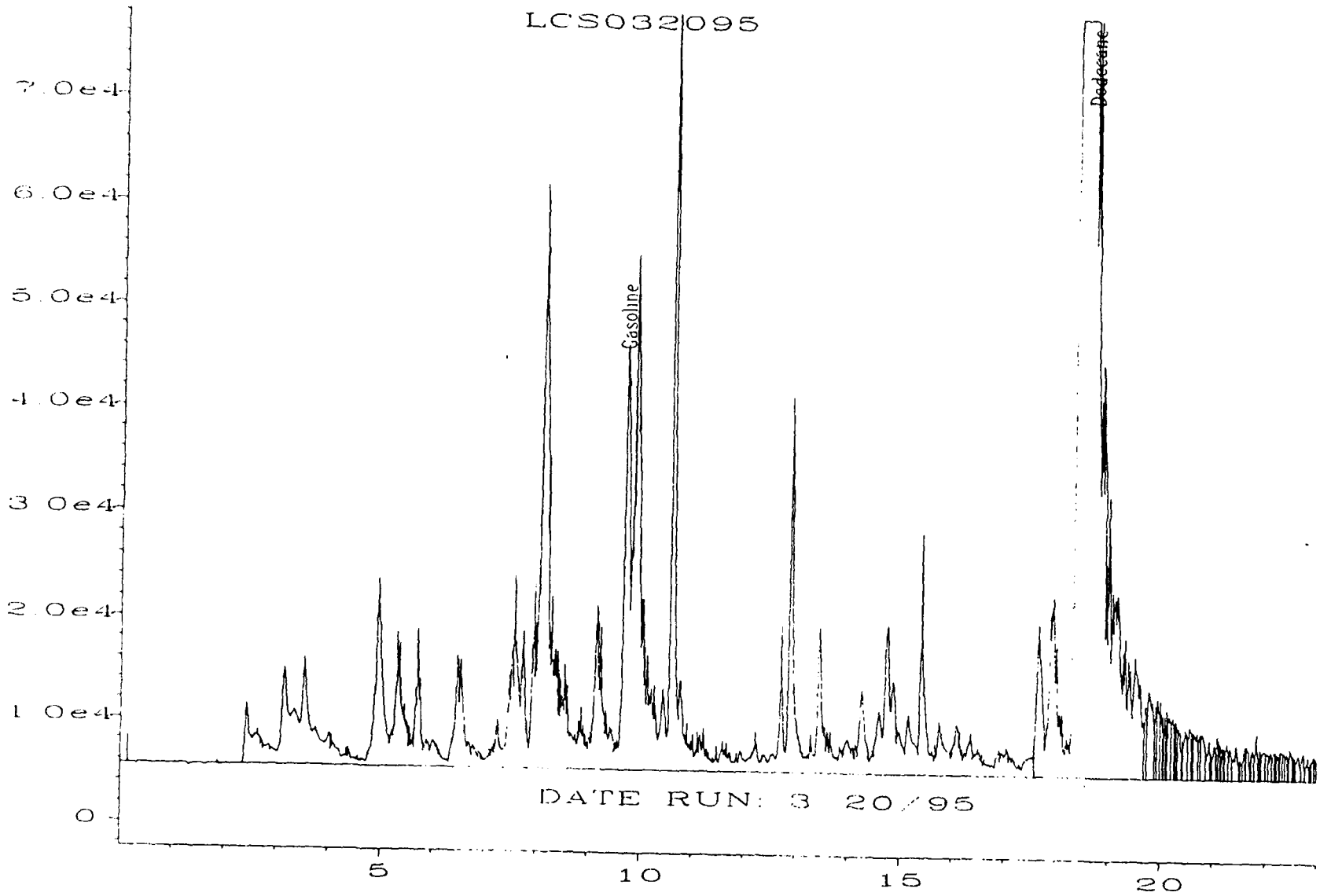
LCS Number	: LCS032095	Client Project Number	: 722450.21020/MACDILL AFB
Date Prepared	: 3/20/95	Lab Project Number	: 95-0861
Date Analyzed	: 3/20/95	Matrix	: WATER
Sequence Number	: TVH9	Method Number	: 5030/8015 MOD

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/L	QC Limit mg/L
Gasoline	5.00	5.39	3.5-6.5

QUALIFIERS
U = TEH analyzed for but not detected.
B = TEH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

Analyst

Approved



Sig 1 in C:\HPCHEM 1\DATA\TVH0320\009F0101.D

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

Date Sampled	: 3/15,16/95	Client Project ID.	: 722450.21020 /Mac Dill AFB
Date Received	: 3/16/95	Lab Project No.	: 95-0861
Date Prepared	: 3/17/95	Method	: EPA 300.0
Date Analyzed	: 3/17/95	Matrix	: Water
		Detection Limit	: 0.25 (mg/L)

Evergreen Sample #	Client Sample ID	Sulfate (mg/L)
X04288	24MP-10D	5.78
X04289	24MP-10S	3.64
X04290	MD24-6A	7.34
X04291	MD24-6	6.38
X04292	24MP-9D	12.1
X04293	24MP-9S	1.91
X04297	24MP-7D	79.2
X04298	24MP-7S	76.0
X04299	75MP-1S	35.8
X04300	75MP-1D	15.1
X04300 Dup	75MP-1D Dup	14.7
Method Blank 3-17-95		<0.250

Quality Assurance

		Spike Amount (mg/L)	Sample Result (mg/L)	Spike Result (mg/L)	% Recovery
X04300	75MP-1D Matrix Spike	10.0	15.2	25.7	105
X04300	75MP-1D Matrix Spike Dup	10.0	15.2	25.3	102
	MS/MSD RPD				3.09
X04300/X04300 Dup RPD					2.68

Analyst

Approved

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EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

Date Sampled	: 3/15,16/95	Client Project ID.	: 722450.21020 /Mac Dill AFB
Date Received	: 3/16/95	Lab Project No.	: 95-0861
Date Prepared	: 3/17/95	Method	: EPA 300.0
Date Analyzed	: 3/17/95	Matrix	: Water
		Detection Limit	: 0.25 (mg/L)

Evergreen Sample #	Client Sample ID	Chloride (mg/L)
X04288	24MP-10D	144
X04289	24MP-10S	4.18
X04290	MD24-6A	16.8
X04291	MD24-6	637
X04292	24MP-9D	329
X04293	24MP-9S	12.1
X04297	24MP-7D	1130
X04298	24MP-7S	115
X0429[illegible]	75MP-1S	13.4
X0430[illegible]	75MP-1D	9.75
X04300 Dup	75MP-1D Dup	9.62
Method Blank 3-17-95		<0.250

Quality Assurance

		Spike Amount (mg/L)	Sample Result (mg/L)	Spike Result (mg/L)	% Recovery
X04300	75MP-1D Matrix Spike	10.0	9.75	20.1	104
X04300	75MP-1D Matrix Spike Dup	10.0	9.75	20.0	102
	MS/MSD RPD				1.36
X04300/X04300 Dup RPD					1.34

Debra L. Byers
Analyst

Approved

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EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

Date Sampled	: 3/15,16/95	Client Project ID.	: 722450.21020 /Mac Dill AFB
Date Received	: 3/16/95	Lab Project No.	: 95-0861
Date Prepared	: 3/17/95	Method	: EPA 300.0
Date Analyzed	: 3/17/95	Matrix	: Water
		Detection Limit	: 0.076 (mg/L)

Evergreen Sample #	Client Sample ID	Nitrite-N (mg/L)
X04288	24MP-10D	<0.076
X04289	24MP-10S	<0.076
X04290	MD24-6A	<0.076
X04291	MD24-6	<0.760*
X04292	24MP-9D	<0.760*
X04293	24MP-9S	<0.076
X04297	24MP-7D	<7.60*
X04298	24MP-7S	<0.760*
X04299	75MP-1S	<0.076
X04300	75MP-1D	<0.076
X04300 Dup	75MP-1D Dup	<0.076
Method Blank 3-17-95		<0.076

Quality Assurance**

		Spike Amount (mg/L)	Sample Result (mg/L)	Spike Result (mg/L)	% Recovery
X04300	75MP-1D Matrix Spike	10.0	<0.250	9.86	98.6
X04300	75MP-1D Matrix Spike Dup	10.0	<0.250	9.05	90.5
	MS/MSD RPD				8.57
X04300/X04300 Dup RPD					NC

* = Increased detection limit due to matrix interference.
** = Quality assurance results reported as Nitrite (NO_2).
NC = Not Calculated because sample and/or duplication results below detection limit.

Analyst

Approved

0861cm 25

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

			722450.21020
Date Sampled	: 3/15,16/95	Client Project ID.	: /Mac Dill AFB
Date Received	: 3/16/95	Lab Project No.	: 95-0861
Date Prepared	: 3/17/95	Method	: EPA 300.0
Date Analyzed	: 3/17/95	Matrix	: Water
		Detection Limit	: 0.056 (mg/L)

Evergreen Sample #	Client Sample ID	Nitrate-N (mg/L)
X04288	24MP-10D	<0.056
X04289	24MP-10S	<0.056
X04290	MD24-6A	<0.056
X04291	MD24-6	2.46
X04292	24MP-9D	<0.056
X04293	24MP-9S	<0.056
X04297	24MP-7D	<0.056
X04298	24MP-7S	<0.056
X04299	75MP-1S	<0.056
X04300	75MP-1D	<0.056
X04300 Dup	75MP-1D Dup	<0.056
Method Blank 3-17-95		<0.056

Quality Assurance**

		Spike Amount (mg/L)	Sample Result (mg/L)	Spike Result (mg/L)	% Recovery
X04300	75MP-1D Matrix Spike	10.0	<0.250	9.63	96.3
X04300	75MP-1D Matrix Spike Dup	10.0	<0.250	9.42	94.2
	MS/MSD RPD				2.20
X04300/X04300 Dup RPD					NC

** = Quality assurance results reported as Nitrate (NO_3).
NC = Not Calculated because sample and/or duplication results below detection limit.

Analyst

Approved

096ltm 25

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

Date Sampled : 3/15,16/95
Date Received : 3/17/95
Date Prepared : 3/18/95
Date Analyzed : 3/18/95

Client Project ID. : 722450.21020 MacDill AFB
Lab Project No. : 95-0861
Detection Limit : 5.00 $mgCaCO_3/L$
Method : EPA 310.1

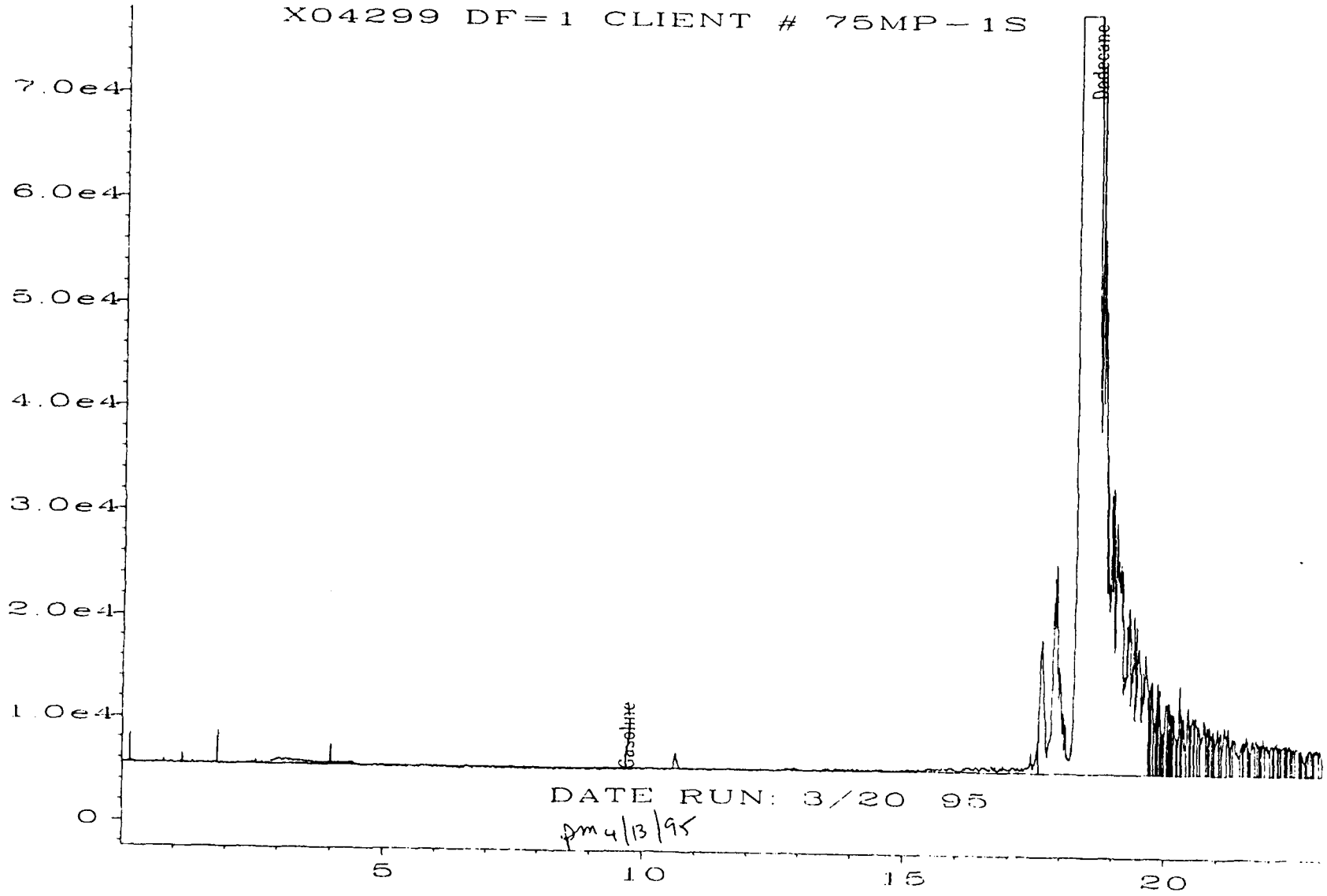
Evergreen Sample #	Client Sample ID	Matrix	Total Alkalinity ($mgCaCO_3/L$)
X04288	24MP-10D	Water	227
X04289	24MP-10S	Water	187
X04290	MD24-6A	Water	309
X04291	MD24-6	Water	173
X04292	24MP-9D	Water	205
X04293	24MP-9S	Water	271
X04297	24MP-7D	Water	200
X04298	24MP-7S	Water	244
X04299	75MP-1S	Water	74.2
X04299 Duplicate	75MP-1S Duplicate	Water	73.7
X04300	75MP-1D	Water	<5.00
Method Blank 3/18/95			<5.00

Quality Assurance

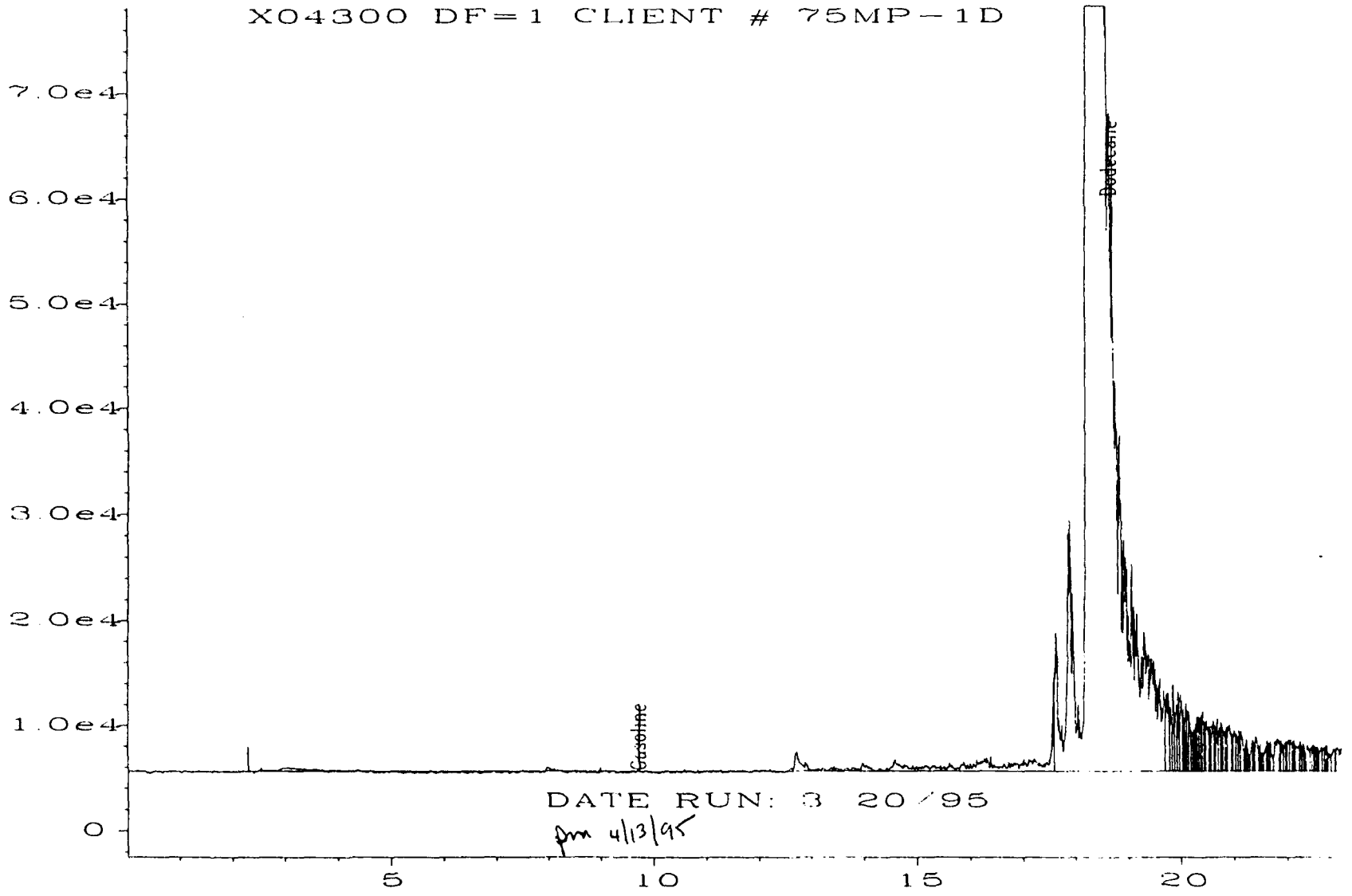
	True Value ($mgCaCO_3/L$)	Result ($mgCaCO_3/L$)	% Recovery
APG Reference Minerals Lot #13862	11.8	10.3	87.3
X04299/X04299 Dup RPD			0.680

Analyst

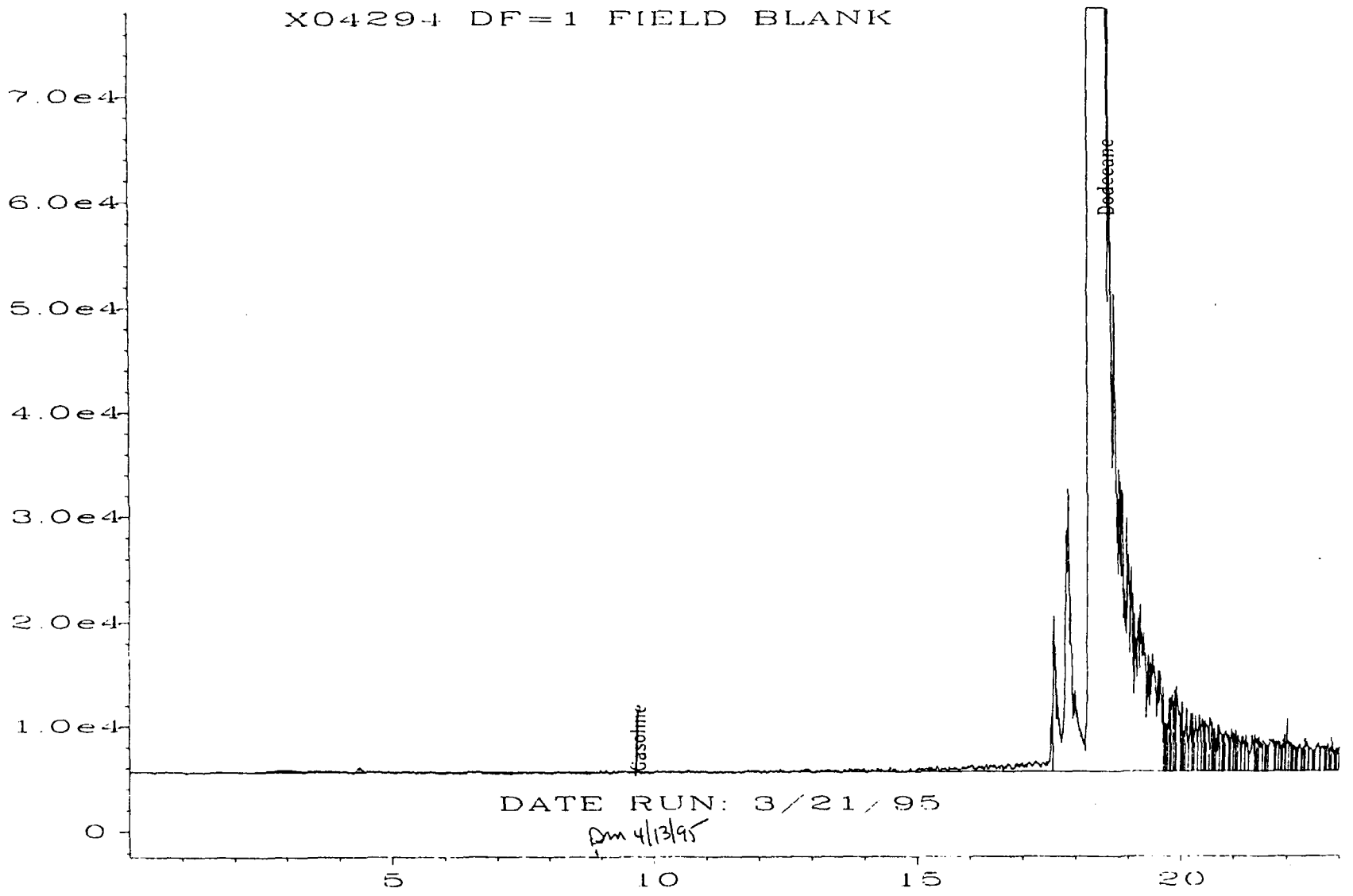
Approved



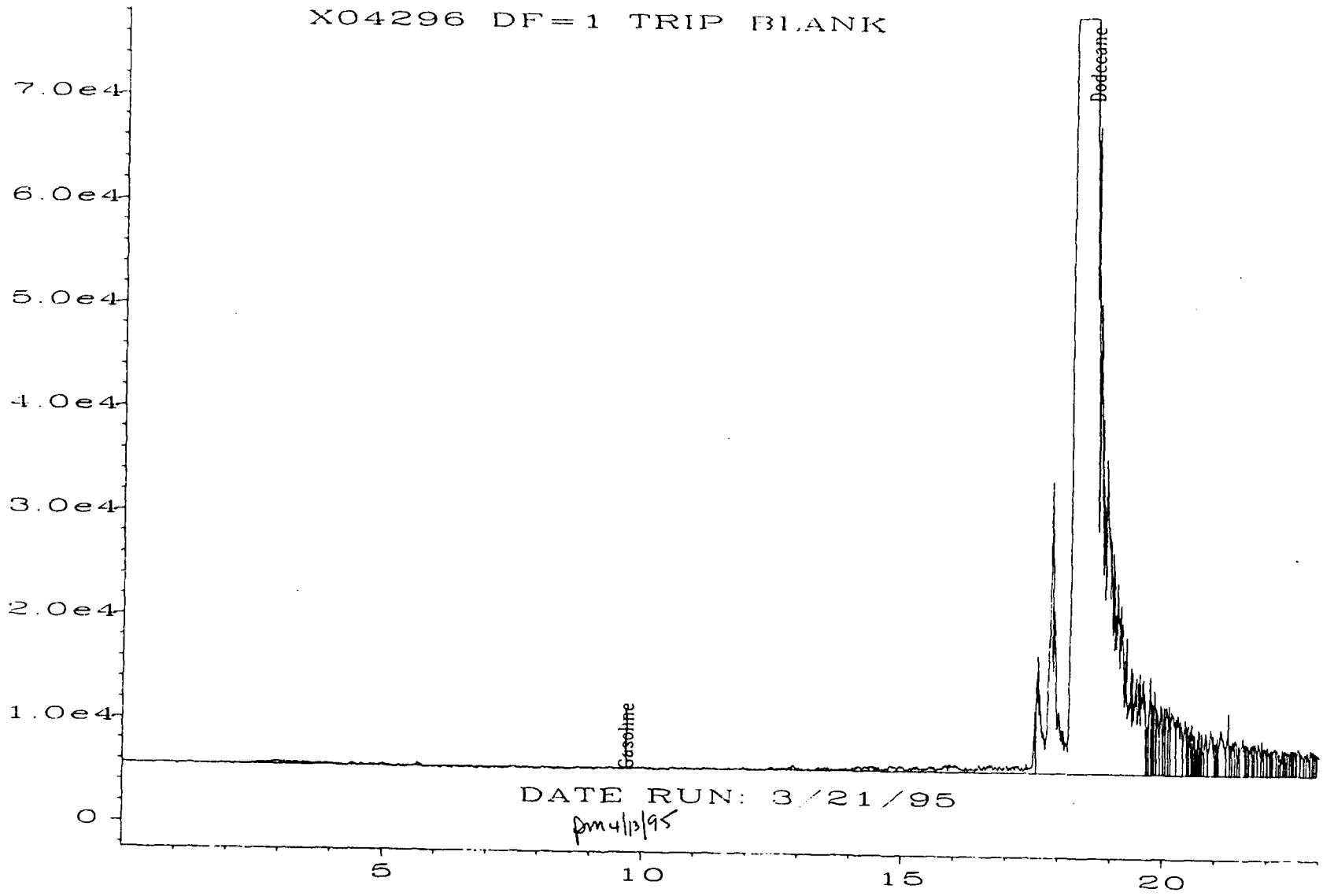
Sig. 1 in C:\HPCHEM\1\DATA\TVH0320 021F0101.D



Sig. 1 in C:\HPCHEM\1\DATA\TVH0320\022F0101.D



Sig 1 in C:\HPCHEM\1\DATA\TVH0320\023F0101.D



Sig. 1 in C:\HPCHEM\1\DATA\TVH0320\024F0101.D

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS (TVH)
Laboratory Control Sample (LCS)

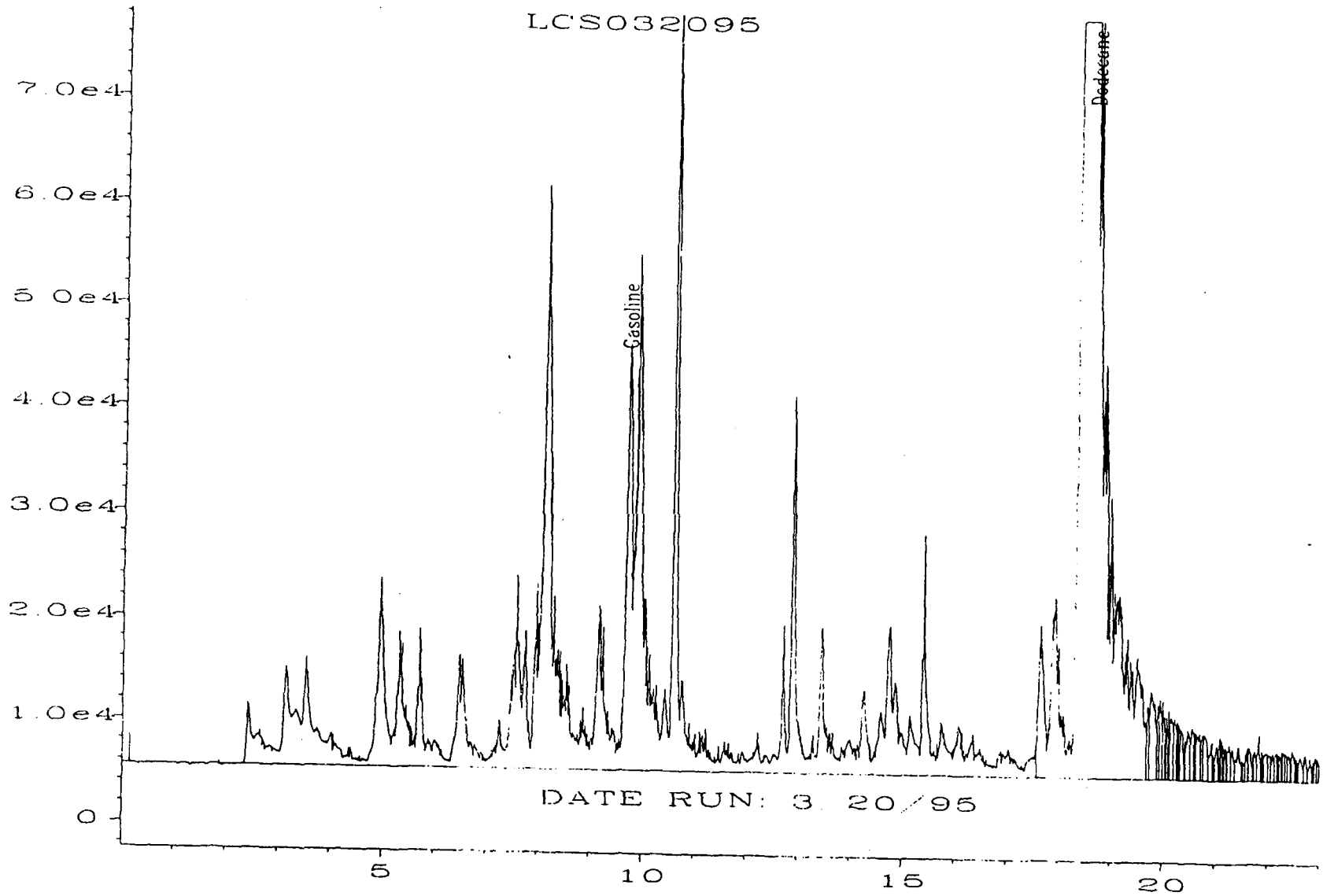
LCS Number	: LCS032095	Client Project Number	: 722450.21020/MACDILL AFB
Date Prepared	: 3/20/95	Lab Project Number	: 95-0861
Date Analyzed	: 3/20/95	Matrix	: WATER
Sequence Number	: TVH9	Method Number	: 5030/8015 MOD

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/L	QC Limit mg/L
Gasoline	5.00	5.39	3.5-6.5

QUALIFIERS
U = TEH analyzed for but not detected.
B = TEH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

Analyst

Approved



Sig. 1 in C:\HPCHEM\1\DATA\TVH0320\009F0101.D

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

Date Sampled : 3/15,16/95
Date Received : 3/16/95
Date Prepared : 3/17/95
Date Analyzed : 3/17/95

Client Project ID. : 722450.21020 /Mac Dill AFB
Lab Project No. : 95-0861
Method : EPA 300.0
Matrix : Water
Detection Limit : 0.25 (mg/L)

Evergreen Sample #	Client Sample ID	Sulfate (mg/L)
X04288	24MP-10D	5.78
X04289	24MP-10S	3.64
X04290	MD24-6A	7.34
X04291	MD24-6	6.38
X04292	24MP-9D	12.1
X04293	24MP-9S	1.91
X04297	24MP-7D	79.2
X04298	24MP-7S	76.0
X04299	75MP-1S	35.8
X04300	75MP-1D	15.1
X04300 Dup	75MP-1D Dup	14.7
Method Blank 3-17-95		<0.250

Quality Assurance

		Spike Amount (mg/L)	Sample Result (mg/L)	Spike Result (mg/L)	% Recovery
X04300	75MP-1D Matrix Spike	10.0	15.2	25.7	105
X04300	75MP-1D Matrix Spike Dup	10.0	15.2	25.3	102
	MS/MSD RPD				3.09
X04300/X04300 Dup RPD					2.68

Analyst

Approved

0861tm 25

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

Date Sampled	: 3/15,16/95	Client Project ID.	: 722450.21020 /Mac Dill AFB
Date Received	: 3/16/95	Lab Project No.	: 95-0861
Date Prepared	: 3/17/95	Method	: EPA 300.0
Date Analyzed	: 3/17/95	Matrix	: Water
		Detection Limit	: 0.25 (mg/L)

Evergreen Sample #	Client Sample ID	Chloride (mg/L)
X04288	24MP-10D	144
X04289	24MP-10S	4.18
X04290	MD24-6A	16.8
X04291	MD24-6	637
X04292	24MP-9D	329
X04293	24MP-9S	12.1
X04297	24MP-7D	1130
X04298	24MP-7S	115
X04299	75MP-1S	13.4
X04300	75MP-1D	9.75
X04300 Dup	75MP-1D Dup	9.62
Method Blank 3-17-95		<0.250

Quality Assurance

		Spike Amount (mg/L)	Sample Result (mg/L)	Spike Result (mg/L)	% Recovery
X04300	75MP-1D Matrix Spike	10.0	9.75	20.1	104
X04300	75MP-1D Matrix Spike Dup	10.0	9.75	20.0	102
	MS/MSD RPD				1.36
X04300/X04300 Dup RPD					1.34

Analyst

Approved

0861tm 25

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

			22450.21020
Date Sampled	: 3/15,16/95	Client Project ID.	: /Mac Dill AFB
Date Received	: 3/16/95	Lab Project No.	: 95-0861
Date Prepared	: 3/17/95	Method	: EPA 300.0
Date Analyzed	: 3/17/95	Matrix	: Water
		Detection Limit	: 0.076 (mg/L)

Evergreen Sample #	Client Sample ID	Nitrite-N (mg/L)
X04288	24MP-10D	<0.076
X04289	24MP-10S	<0.076
X04290	MD24-6A	<0.076
X04291	MD24-6	<0.760*
X04292	24MP-9D	<0.760*
X04293	24MP-9S	<0.076
X04297	24MP-7D	<7.60*
X04298	24MP-7S	<0.760*
X04299	75MP-1S	<0.076
X04300	75MP-1D	<0.076
X04300 Dup	75MP-1D Dup	<0.076
Method Blank 3-17-95		<0.076

Quality Assurance**

		Spike Amount (mg/L)	Sample Result (mg/L)	Spike Result (mg/L)	% Recovery
X04300	75MP-1D Matrix Spike	10.0	<0.250	9.86	98.6
X04300	75MP-1D Matrix Spike Dup	10.0	<0.250	9.05	90.5
	MS/MSD RPD				8.57
X04300/X04300 Dup RPD					NC

* = Increased detection limit due to matrix interference.
** = Quality assurance results reported as Nitrite (NO_2).
NC = Not Calculated because sample and/or duplication results below detection limit.

Analyst

Approved

08blm 25

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

722450.21020

Date Sampled : 3/15,16/95
Date Received : 3/16/95
Date Prepared : 3/17/95
Date Analyzed : 3/17/95

Client Project ID. : /Mac Dill AFB
Lab Project No. : 95-0861
Method : EPA 300.0
Matrix : Water
Detection Limit : 0.056 (mg/L)

Evergreen Sample #	Client Sample ID	Nitrate-N (mg/L)
X04288	24MP-10D	<0.056
X04289	24MP-10S	<0.056
X04290	MD24-6A	<0.056
X04291	MD24-6	2.46
X04292	24MP-9D	<0.056
X04293	24MP-9S	<0.056
X04297	24MP-7D	<0.056
X04298	24MP-7S	<0.056
X04299	75MP-1S	<0.056
X04300	75MP-1D	<0.056
X04300 Dup	75MP-1D Dup	<0.056
Method Blank 3-17-95		<0.056

Quality Assurance**

		Spike Amount (mg/L)	Sample Result (mg/L)	Spike Result (mg/L)	% Recovery
X04300	75MP-1D Matrix Spike	10.0	<0.250	9.63	96.3
X04300	75MP-1D Matrix Spike Dup	10.0	<0.250	9.42	94.2
	MS/MSD RPD				2.20
X04300/X04300 Dup RPD					NC

** = Quality assurance results reported as Nitrate (NO_3).
NC = Not Calculated because sample and/or duplication results below detection limit.

Analyst

Approved

0861cm.25

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

722450.21020

Date Sampled : 3/15,16/95
Date Received : 3/17/95
Date Prepared : 3/18/95
Date Analyzed : 3/18/95
Client Project ID. : MacDill AFB
Lab Project No. : 95-0861
Detection Limit : 5.00 $mgCaCO_3/L$
Method : EPA 310.1

Evergreen Sample #	Client Sample ID	Matrix	Total Alkalinity ($mgCaCO_3/L$)
X04288	24MP-10D	Water	227
X04289	24MP-10S	Water	187
X04290	MD24-6A	Water	309
X04291	MD24-6	Water	173
X04292	24MP-9D	Water	205
X04293	24MP-9S	Water	271
X04297	24MP-7D	Water	200
X04298	24MP-7S	Water	244
X04299	75MP-1S	Water	74.2
X04299 Duplicate	75MP-1S Duplicate	Water	73.7
X04300	75MP-1D	Water	<5.00
Method Blank 3/18/95			<5.00

Quality Assurance

	True Value ($mgCaCO_3/L$)	Result ($mgCaCO_3/L$)	% Recovery
APG Reference Minerals Lot #13862	11.8	10.3	87.3
X04299/X04299 Dup RPD			0.680

Analyst

Approved

0861JJ 4

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS (TVH)

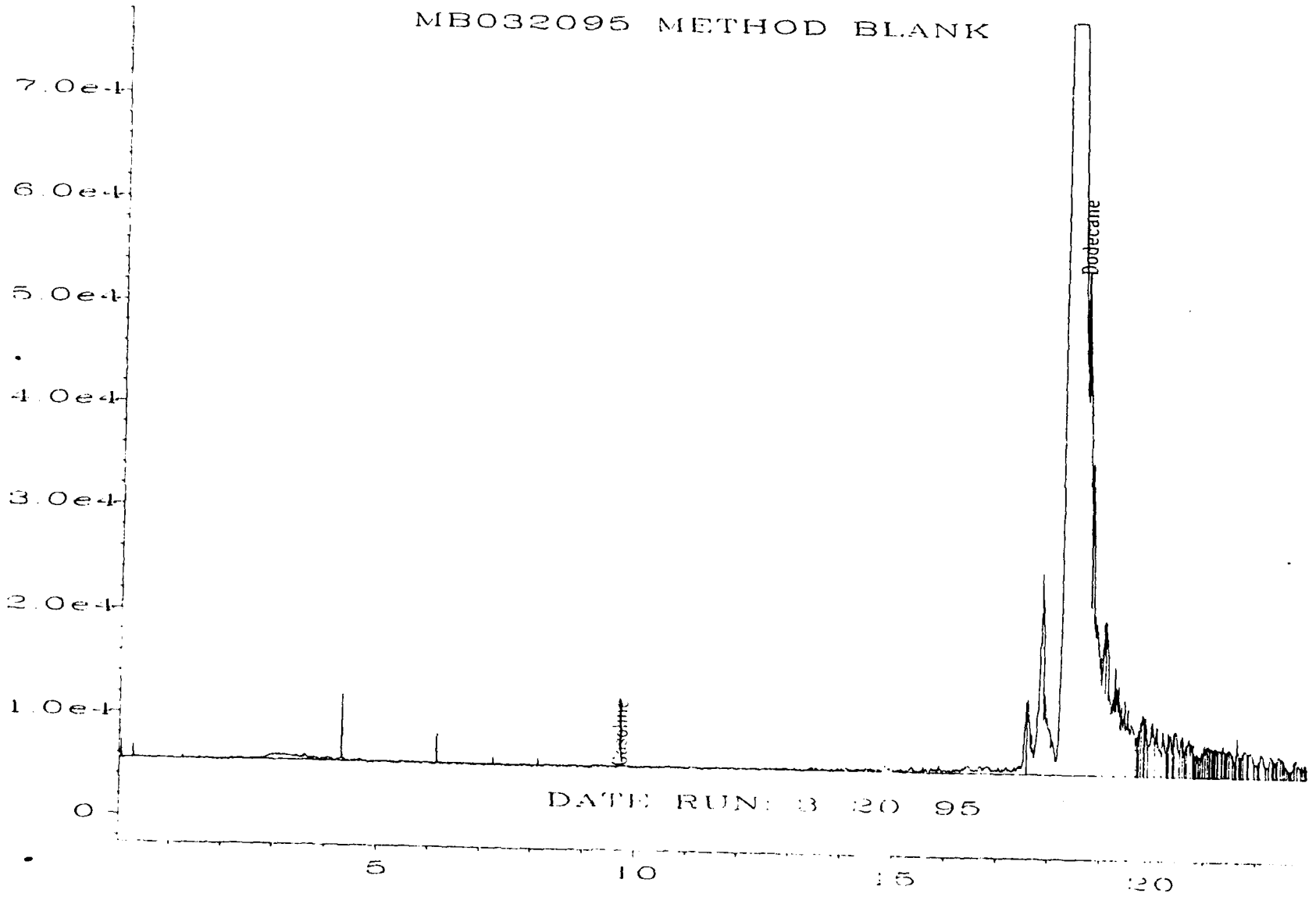
Date Sampled	: 3/15,16/95	Client Project Number	: 722450.21020/MACDILL AFB
Date Received	: 3/17/95	Lab Project Number	: 95-0861
Date Prepared	: 3/20/95	Matrix	: Water
Date Analyzed	: 3/20,21/95	Method Number	: 5030/Mod.8015

Evergreen Sample #	Client Sample #	Surrogate Recovery	TVH mg/L	MDL mg/L
MB032095	METHOD BLANK	100%	U	0.1
X04288	24MP-10D	114%	U	0.1
X04289	24MP-10S	103%	U	0.1
X04290	MD24-6A	116%	0.7	0.1
X04291	MD24-6	121%	U	0.1
X04291 DUP	MD24-6	98%	U	0.1
X04292	24MP-9D	124%	0.3	0.1
X04293	24MP-9S	121%	0.6	0.1
X04294	FIELD BLANK	123%	U	0.1
X04296	TRIP BLANK	128%	U	0.1
X04297	24MP-7D	106%	U	0.1
X04298	24MP-7S	113%	U	0.1
X04299	75MP-1S	120%	U	0.1
X04300	75MP-1D	124%	U	0.1

QUALIFIERS
U = TVH analyzed for but not detected.
B = TVH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
MDL = Method Detection Limit

Analyst

Approved



Sig 1 in C:\HPCHEM\1\DATA\TVH0320\003F0101.D

Evergreen

CASE NARRATIVE

Evergreen Analytical Laboratory Project (EAL) #: 95-0820

Parsons Engineering Science, Inc. (PES) Project: MacDill AFB (722450.21020)

Sample Receipt
On March 14, 1995, 14 soil and one rinseate blank were received in good condition at Evergreen Analytical Laboratory (EAL). Refer to the EAL Sample Log Sheet for specific log-in information and cross-reference of EAL and PES sample identifications.

BTEX, Soil Matrix, Method SW8020
The following PES samples were analyzed at a dilution due to target analytes in the sample, the reporting levels were increased accordingly; 24 MP-1A(3'-4'), 24 MP-2(3'-4'), 24 SS-2(4'-6'), 75SS-1(7-9), and 75SS-2(9-11) at a dilution factor of 5. Sample 75SS-1(3-5) was analyzed at DF = 5 and DF = 125, and 75SS-2(3-5) at DF = 250 and DF = 1250.

The matrix spike sample exhibited surrogate recoveries for the tri- and tetra-methylbenzenes below the EAL control limit, and the matrix spike duplicate sample did not purge. Please see the Laboratory Control Spike (LCS) sample for acceptable spiked sample recovery.

BTEX, Water Matrix, Method 602
The Trip Blank was analyzed with no anomalies to report.

Total Volatile Hydrocarbon (TVH), Soil Matrix, Method 8015M
The relative percent difference (RPD) between the laboratory duplicate samples were not within the control limit of 30% due to sample inhomogeneity. There were no other quality control anomalies to report.

Total Extractable Hydrocarbon (TEH), Soil Matrix, Method 8015M
The surrogate recovery for 75SS-2(3-5) was outside the control limits due to the concentration of analyte in the sample. All other quality control was within limits.

Total Organic Carbon in Soil (TOC)

TOC was analyzed by Huffman Laboratories of Golden, Colorado. TOC was determined by analyzing for total carbon (TC) and inorganic (carbonate) carbon (CC), then calculating the difference as TOC. The report from Huffman is included.

P. McClellan

Patricia A. McClellan, Project Manager

Evergreen Analytical Sample Log Sheet

Project # 95-0820

Date(s) Sampled: 03/08,09,10,13/95 COC

Date Due: 03/17/95

ıte Received: 03/14/95 1000

Holding Time(s): 03/22,23,27-BTEX, TEPH,TVPH

Client Project I.D. 722450.21020/MAC DILL

Rush STANDARD

Client: PARSONS ENGINEERING SCIENCE, INC.

Address: 1700 BROADWAY, SUITE 900
DENVER, CO 80290

Contact: TODD WIEDEMEIER

Client P.O.

Phone #831-8100 **Fax #**831-8208

Shipping Charges N/A

E.A. Cooler # 604

Airbill # FED EX 9581826236

Custody Seal Intact? N/A
Cooler ___ Bottles ___
COC Present Y
Sample Tags Present? Y
Sample Tags Listed? Y
Sample(s) Sealed? Y

Special Invoicing/Billing

Special Instructions * PLUS CHLOROBENZENE, TMB & TEMB. REPORT SOILS ON A DRY WEIGHT BASIS. **ANALYZE AN MS/MSD AND LAB DUPLICATE FOR THIS CLIENT.**

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
4173A/B	24 MP-1A(3'-4')	* BTEX 8020	S	2WM	2
X04174A/B	24 MP-1B(8'-9')	* BTEX	S	2WM	2
X04175A/B	24 MP-2 (3'-4')	* BTEX	S	2WM	2
X04176A/B	24 MP-3 (3-5)	* BTEX	S	2WM	2
X04177A/B	24 MP-4 (3-5)	* BTEX	S	2WM	2
X04178A/B	24 MP-5 (3-5)	* BTEX	S	2WM	2
X04179A/B	24 MP-6 (4-6)	* BTEX	S	2WM	2
X04181A/B	24SS-1 (4-6)	* BTEX	S	2WM	2
X04182A/B	24SS-2 (4-6)	* BTEX	S	2WM	2
X04183A/B	75SS-1 (3-5)	* BTEX	S	2WM	2
X04184A/B	75SS-1 (7-9)	* BTEX (% moisture) ✓	S	2WM	2
X04185A/B	75SS-2 (3-5)	* BTEX	S	2WM	2
X04186A/B	75SS-2 (9-11)	* BTEX	S	2WM	2
X04187A	TRIP BLANK	* BTEX ✓	W	40V	2

R=Sample to be returned

Route GC/MS ___ GC 4 Metals ___ Wet Chem 1 SxPrep 1 Acctg 1

To SxRec C QA/QC C Sales C File Orig

e 1 of 1 Page(s)

Custodian/Date: JW 3/14/95
Am 3/15/95

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
X04173C	24 MP-1A(3'-4')	TVH MSC15 GMSCCMP	S	2WM	2
X04174C	24 MP-1B(8'-9')	TVH	S	2WM	2
X04175C	24 MP-2 (3'-4')	TVH	S	2WM	2
X04176C	24 MP-3 (3-5)	TVH	S	2WM	2
X04177C	24 MP-4 (3-5)	TVH	S	2WM	2
X04178C	24 MP-5 (3-5)	TVH	S	2WM	2
X04179C	24 MP-6 (4-6)	TVH	S	2WM	2
X04181C	24SS-1 (4-6)	TVH	S	2WM	2
X04182C	24SS-2 (4-6)	TVH 2 duplicates (17)	S	2WM	2
X04183C	75SS-1 (3-5)	TVH ms/msd	S	2WM	2
X04184C	75SS-1 (7-9)	TVH	S	2WM	2
X04185C	75SS-2 (3-5)	TVH	S	2WM	2
X04186C	75SS-2 (9-11)	TVH	S	2WM	2
X04173D	24 MP-1A(3'-4')	TEH	S	2WM	B2
X04174D	24 MP-1B(8'-9')	TEH (% MOISTURE)	S	2WM	B2
X04175D	24 MP-2(3'-4')	TEH MSC15 JP5	S	2WM	B2
X04176D	24 MP-3 (3-5)	TEH	S	2WM	B2
X04177D	24 MP-4 (3-5)	TEH	S	2WM	B2
X04178D	24 MP-5 (3-5)	TEH	S	2WM	B2
X04179D	24 MP-6 (4-6)	TEH	S	2WM	B2
X04181D	24SS-1 (4-6)	TEH 12 sample 1 duplicate	S	2WM	B2
X04182D	24SS-2(4-6)	TEH	S	2WM	B2
X04183D	75SS-1 (3-5)	TEH ms/msd	S	2WM	B2
X04184D	75SS-1 (7-9)	TEH	S	2WM	B2
X04185D	75SS-2(3-5)	TEH	S	2WM	B2
X04186D	75SS-2(9-11)	TEH	S	2WM	B2
X04173E	24 MP-1A(3'-4')	% MOISTURE	S	2WM	B2
X04175E	24 MP-2(3'-4')	% MOISTURE	S	2WM	B2
X04176E	24 MP-3 (3-5)	% MOISTURE	S	2WM	B2
X04177E	24 MP-4 (3-5)	% MOISTURE	S	2WM	B2
X04178E	24 MP-5 (3-5)	% MOISTURE	S	2WM	B2
X04179E	24 MP-6 (4-6)	% MOISTURE	S	2WM	B2
X04181E	24SS-1 (4-6)	% MOISTURE	S	2WM	B2
X04182E	24SS-2(4-6)	% MOISTURE	S	2WM	B2
X04183E	75SS-1 (3-5)	% MOISTURE	S	2WM	B2
X04184E	75SS-1 (7-9)	% MOISTURE	S	2WM	B2

R=Sample to be returned

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
X04185E	75SS-2(3-5)	% MOISTURE	S	2WM	B2
4186E	75SS-2(9-11)	% MOISTURE	S	2WM	B2
X04176D	24 MP-3 (3-5)	TOC	S	2WM	OUT
X04177D	24 MP-4 (3-4)	TOC	S	2WM	OUT
X04179D	24 MP-6 (4-6)	TOC	S	2WM	OUT
X04180A	24 MP-16 (4-6)	TOC(% MOISTURE)	S	2WM	OUT

Project # 95-0820

R=Sample to be returned

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Engineering Science
ADDRESS 1700 Broadway Ste 900
CITY Denver STATE CO ZIP 80290-
PHONE# 831-8100 FAX # FAX RESULTS Y / N

CLIENT CONTACT (print) Weidemeier
PROJECT I.D. 722450.27020
EAL. QUOTE # P.O.#
TURNAROUND REQUIRED*
*expedited turnaround subject to additional fee

Sampler Name:
(signature)
(print) Kyle Cannon

Evergreen Analytical Cooler No. 604
Cooler Received

Please **PRINT** all information:

EAL use only
Do not write in shaded area

EAL Project # 0820
Custodian

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil (Solid)	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle)	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Moisture	TOC						EAL Sample No.
24MP-1A (3'-4')	3-8-95	1105	5		X								X		X	X			X							X04173
24MP-1B (8'-9')	3-8-95	1200	5		X								X		X	X			X	None other analyzed per COC						74
24MP-2 (3'-4')	3-8-95	1605	5		X								X		X	X			X							75
24MP-3 (3-5)	3-9-95	0900	6		X								X		X	X			X	X						76
24MP-4 (3-5')	3-9-95	1040	6		X								X		X	X			X	X						77
24MP-5 (3-5')	3-9-95	1630	5		X								X		X	X			X							78
24MP-6 (4-6)	3-9-95	1615	6		X								X		X	X			X	X						79
24MP-16 (4-6)	3-9-95	1615	1		X															X	WWM					80
~~24MP-7~~ 24S-1 (DUP)	3-10-95	0800	5		X								X		X	X			X							81
~~24MP-8~~ 24S-2 (DUP)	3-10-95	0900	5		X								2WM	X	2WM	X	2WM	4WM	X							82
HT:																										Location 2,B2
DD:																										Container Size

Instructions:

packed in ice

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons ES
ADDRESS 1700 Broadway Ste 900
CITY Denver STATE CO ZIP 80290
PHONE # 831-8100 FAX # _____ FAX RESULTS Y / N

CLIENT CONTACT (print) WEIDEMEIER
PROJECT I.D. 722450.2100
EAL QUOTE # _____ P.O.# _____
TURNAROUND REQUIRED* _____
*expedited turnaround subject to additional fee

Sampler Name (signature) _____
(print) Kyle Cannon
Evergreen Analytical Cooler No. 604
Cooler Received _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil Solid (circle)	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle)	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Moisture	TOC	EAL Sample No.
7555-1(3-5')	3-13-95	0830	5		X									X		X	X			X		X09183
7555-1(7-9')	3-13-95	1000	5		X									X		X	X			X		84
7555-2(3-5')	3-13-95	1215	5		X									X		X	X			X		85
7555-2(9-11')	3-13-95	1245	5		X									X		X	X			X		86
trip blank																						87
HT:																						Location
DD:																						Container Size

EAL use only
Do not write in shaded area

EAL Project # 0820
Custodian _____

Instructions:
packed in ice.

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time

Evergreen Analytical Sample Receipt/Check-in Record

Date & Time Rec'd: 3/14/95 1000 Shipped Via: Fedex 9521 8862 (Airbill # if applicable)

Client : Parsons ES

Client Project ID(s): 722450.27000

EAL Project #(s): 95- 0500 EAL Cooler(s): (Y) N

Cooler#	1001									
Ice packs	(Y)	N	Y	N	Y	N	Y	N	Y	N
Temperature °C	11.0°									

	Y	N	N/A
1. Custody seal(s) present:	✓	✓	✓
Seals on cooler intact	✓		✓
Seals on bottle intact		✓	
2. Chain of Custody present:	✓		
3. Containers broken or leaking: (Comment on COC if Y)		✓	
4. Containers labeled:	✓		
5. COC agrees w/ bottles received: (Comment on COC if N)	✓		
6. COC agrees w/ labels: (Comment on COC if N)	✓		
7. Headspace in VOA vials-waters only (comment on COC if Y)			✓
8. VOA samples preserved:			✓
9. pH measured on metals, cyanide or phenolics*:			✓
List discrepancies			
*Non-EAL provided containers only, water samples only.			
10. Metal samples present:			✓
Total _____ , Dissolved _____			
D or PD to be filtered:			
T,TR,D,PD to be Preserved:			
11. Short holding times:		✓	
Specify parameters			
12. Multi-phase sample(s) present:		✓	
13. COC signed w/ date/time:	✓		

Comments: _____

(Additional comments on back)

Custodian Signature/Date: Dina Dacus 3/14/95

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Engineering Science
ADDRESS 1700 Broadway Ste 900
CITY Denver STATE CO ZIP 80290
PHONE # 831-8100 FAX # FAX RESULTS Y / N

CLIENT CONTACT (print) Weidemeier
PROJECT I D 722450.23020
EAL QUOTE # P.O #
TURNAROUND REQUIRED*
*expedited turnaround subject to additional fee

Sampler Name (signature) Kyle Cannon
(print) Kyle Cannon
Evergreen Analytical Cooler No 604
Cooler Received

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil (Solid)	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle)	TRPH 418.1/Oil & Grease 413.* (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Moisture	TOC	EAL Sample No.
24MP-1A (3'-4')	3-8-95	1100	5		X									X		X	X			X		
24MP-1B (8'-9')	3-8-95	1200	5		X									X		X	X			X		
24MP-2 (3'-4')	3-8-95	1600	5		X									X		X	X			X		
24MP-3 (3'-5')	3-9-95	0900	6		X									X		X	X			X	X	
24MP-4 (3'-5')	3-9-95	1200	6		X									X		X	X			X	X	
24MP-5 (3'-5')	3-9-95	1630	5		X									X		X	X			X		
24MP-6 (4'-6')	3-9-95	1615	6		X									X		X	X			X	X	
24MP-16 (4'-6')	3-9-95	1615	1		X									~~X~~							X	
~~24MP-7~~ 24S-1 (dup)	3-10-95	0800	5		X									X		X	Y			X		
~~24MP-8~~ 24S-2 (dup)	3-10-95	0900	5		X									X		X	X			X		
HT:																						Location
DD:																						Container Size

EAL use only
Do not write in shaded area

EAL
Project #
Custodian

Instructions: Moisture container not recd for sample 24MP-1B (8'-9') BB Black 3/14/95
packed in ice

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
KC N(illegible)	3/14/95 1330	AGuttenhorn	3/13/95 1300	FedEx	3/13/95 (illegible)	(illegible) RO	(illegible)

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.

4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons ES
ADDRESS 1700 Broadway Ste 900
CITY Denver STATE CO ZIP 80290
PHONE # 831-3100 FAX # FAX RESULTS Y / N
Sampler Name (print) Kyle Cannon
Evergreen Analytical Cooler No 604
Cooler Received

CLIENT CONTACT (print) WEIDEMEIER
PROJECT I D 722450.21020
EAL QUOTE # PO #
TURNAROUND REQUIRED*
*expedited turnaround subject to additional fee

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water/Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid (circle)	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle) MTBE (circle)	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Moisture	TOC	EAL Sample No.
7555-1(3-5')	3-13-95	0830	5		X									X		X	X			X		
7555-1(7-9')	3-13-95	1000	5		X									X		X	X			X		
7555-2(3-5')	3-13-95	1215	5		X									X		X	X			X		
7555-2(9-11')	3-13-95	1245	5		X									X		X	X			X		
HT																						Location
TD																						Container Size

EAL use only
Do not write in shaded area

EAL
Project #
Custodian

Instructions:
Packed in Ice

Relinquished by (Signature) | Date/Time | Received by (Signature) | Relinquished by (Signature) | Date/Time | Received by (Signature) | Date/Time

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

		Client Project No.	: 722450.21020
Client Sample Number	: 75SS-1(3-5)		MacDill
Lab Sample Number	: X04183	Lab Project No.	: 95-0820
Date Sampled	: 3/13/95	Dilution Factor	: 5.00
Date Received	: 3/14/95	Method	: 8020
Date Extracted/Prepared	: 3/18/95	Matrix	: Soil
Date Analyzed	: 3/19/95	Lab File No.	: BX2031823
Methanol Extract?	: No	Method Blank No.	: MB031895

Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	U	24
Toluene	108-88-3	37	24
Ethyl Benzene	100-41-4	550	24
Total Xylene	1330-20-7	**	**
Chlorobenzene	108-90-7	340	24
1,3,5-trimethylbenzene	108-67-8	**	**
1,2,4-trimethylbenzene	95-63-6	**	**
1,2,3-trimethylbenzene	526-73-8	**	**
1,2,3,4-tetramethylbenzene	488-23-3	**	**

Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Sample results & PQLs are reported on a dry weight basis.
** = SeeBX2031916 for noted values, df = 125, 03/20/95.

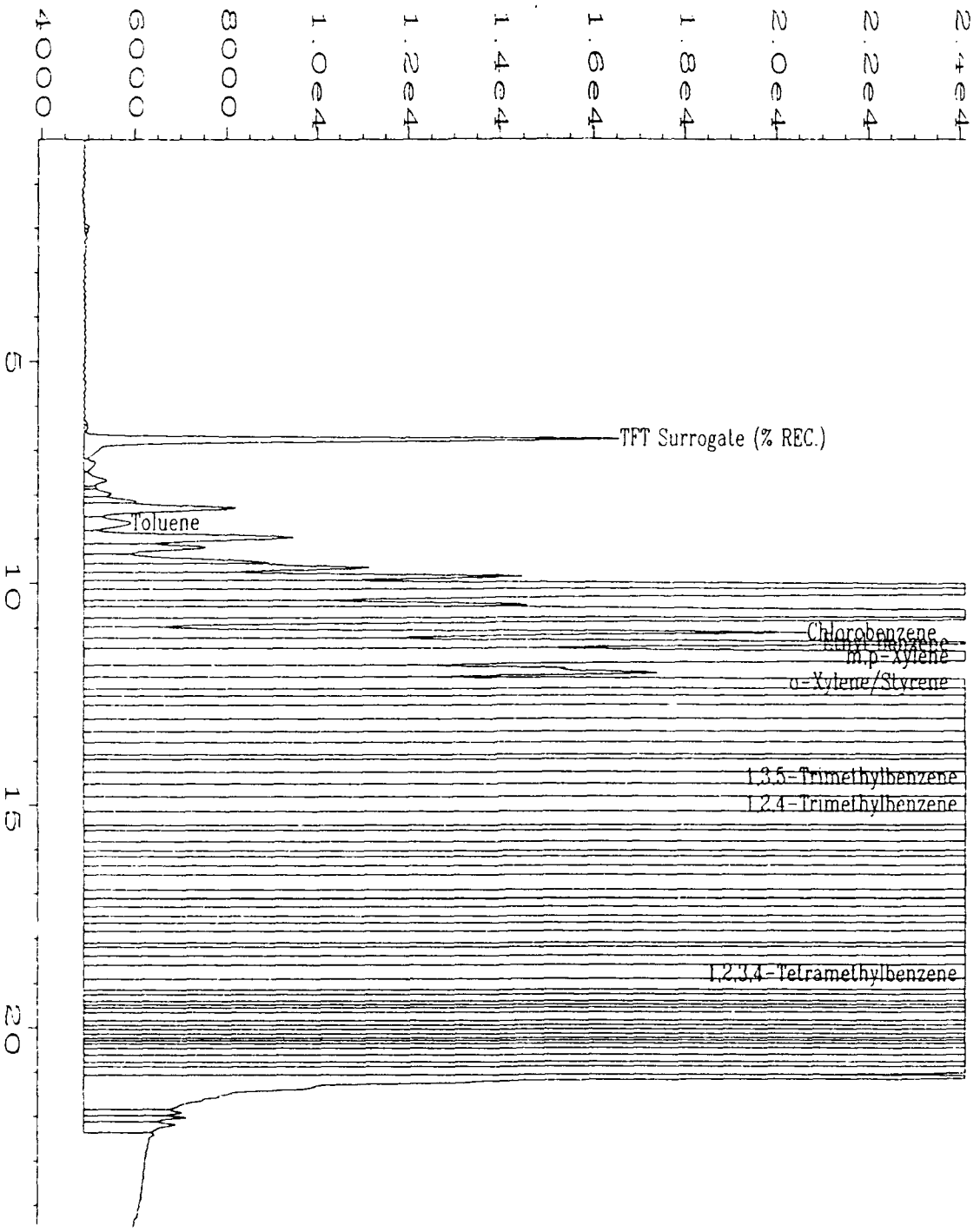
Surrogate Recovery:

a,a,a,-Trifluorotoluene	: 96%
QC Reporting Limits	: 64%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20318\023R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04183 DF=5
Run Time Bar Code:
Acquired on : 19 Mar 95 08:17 AM
Report Created on: 19 Mar 95 01:38 PM
Last Recalib on : 18 MAR 95 11:33 PM
Multiplier : 5
Sample Info : Project#: 95-0820 Client#: 75SS-1(3-5) Soil

Page Number : 1
Vial Number : 23
Injection Number : 1
Sequence Line : 8
Instrument Method: BX20318
Analysis Method : BX20318 MT
Sample Amount : 0
ISTD Amount :

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

Client Sample Number	: 75SS-1(3-5)	Client Project No.	: 722450.21020 MacDill
Lab Sample Number	: X04183	Lab Project No.	: 95-0820
Date Sampled	: 3/13/95	Dilution Factor	: 125.00
Date Received	: 3/14/95	Method	: 8020
Date Extracted/Prepared	: 3/19/95	Matrix	: Soil
Date Analyzed	: 3/20/95	Lab File No.	: BX2031916
Methanol Extract?	: Yes	Method Blank No.	: MEB031995

Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	**	**
Toluene	108-88-3	**	**
Ethyl Benzene	100-41-4	**	**
Total Xylene	1330-20-7	4900	600
Chlorobenzene	108-90-7	**	**
1,3,5-trimethylbenzene	108-67-8	3200	600
1,2,4-trimethylbenzene	95-63-6	2200	600
1,2,3-trimethylbenzene	526-73-8	2300	600
1,2,3,4-tetramethylbenzene	488-23-3	12000	600

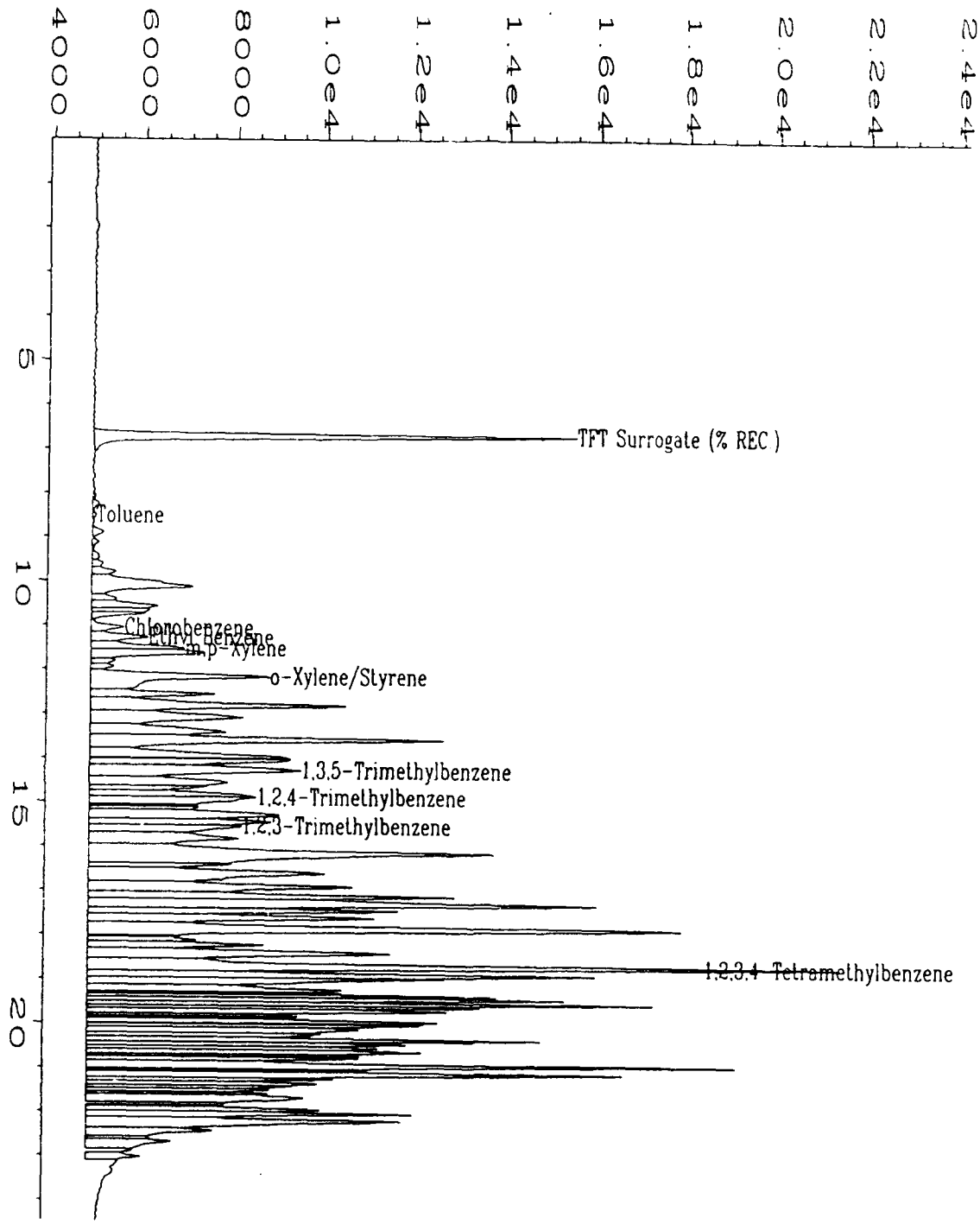
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Sample results & PQLs are reported on a dry weight basis.
** = SeeBX2031823 for noted values, df = 5, 03/19/95.

Surrogate Recovery:
a,a,a,-Trifluorotoluene : 105%
QC Reporting Limits : 64%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20319\016R1101.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04183 DF=125
Run Time Bar Code:
Acquired on : 20 Mar 95 02:58 AM
Report Created on: 20 Mar 95 03:23 AM
Last Recalib on : 19 Mar 95 10:59 PM
Multiplier : 125
Sample Info : Project#: 95-0820 Client#: 75SS-1(9-5) Soil

Page Number : 1
Vial Number : 16
Injection Number : 1
Sequence Line : 11
Instrument Method: BX2031
Analysis Method : BX20319.M
Sample Amount : 0
ISTD Amount :

(2-5)

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

Client Sample Number	: 75SS-1(7-9)	Client Project No.	: 722450.21020 MacDill
Lab Sample Number	: X04184	Lab Project No.	: 95-0820
Date Sampled	: 3/13/95	Dilution Factor	: 5.00
Date Received	: 3/14/95	Method	: 8020
Date Extracted/Prepared	: 3/18/95	Matrix	: Soil
Date Analyzed	: 3/20/95	Lab File No.	: BX2031915
Methanol Extract?	: No	Method Blank No.	: MEB031995

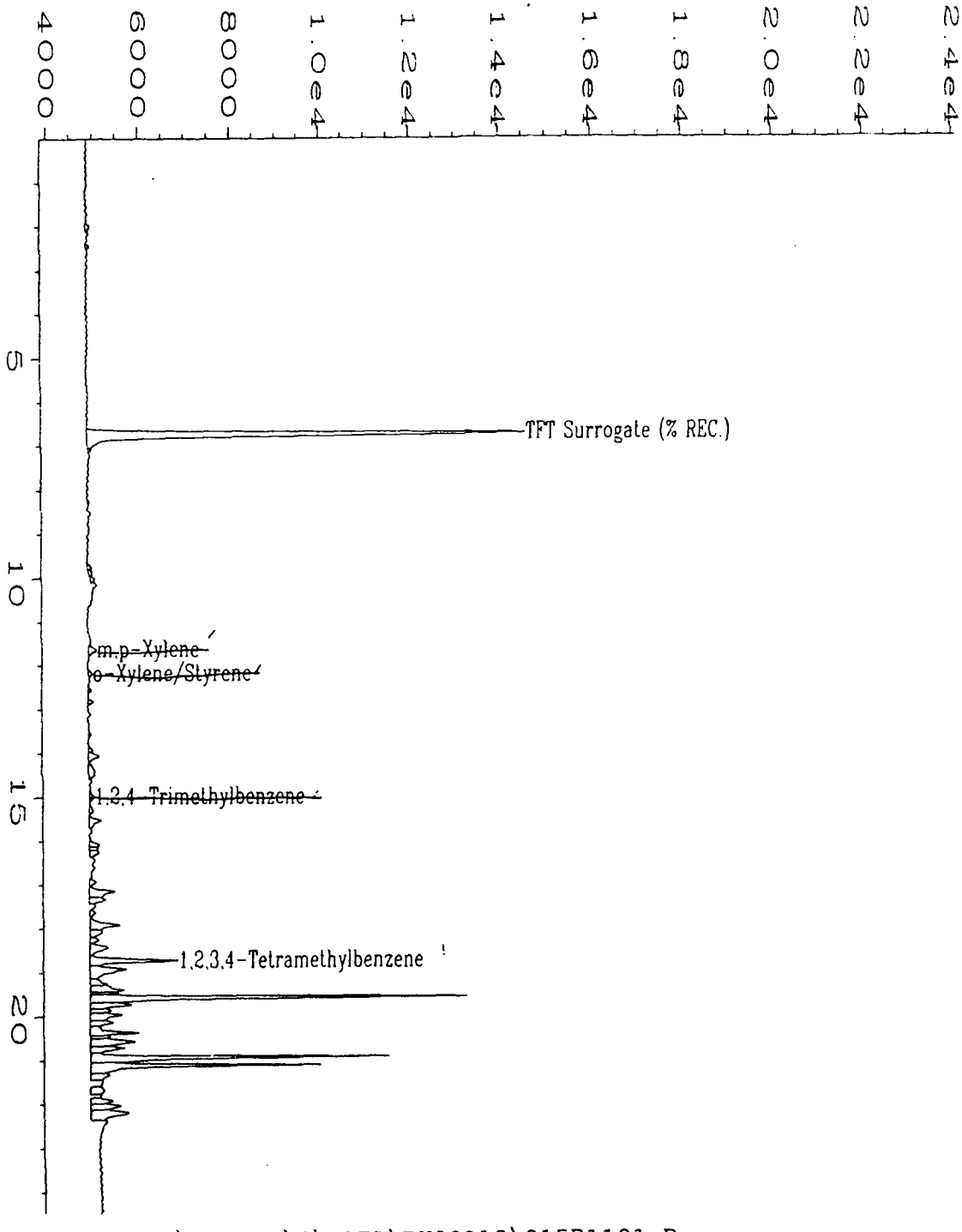
Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	U	24
Toluene	108-88-3	U	24
Ethyl Benzene	100-41-4	U	24
Total Xylene	1330-20-7	U	24
Chlorobenzene	108-90-7	U	24
1,3,5-trimethylbenzene	108-67-8	U	24
1,2,4-trimethylbenzene	95-63-6	U	24
1,2,3-trimethylbenzene	526-73-8	U	24
1,2,3,4-tetramethylbenzene	488-23-3	34	24

Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Sample results & PQLs are reported on a dry weight basis.
Surrogate Recovery:
a,a,a,-Trifluorotoluene : 99%
QC Reporting Limits : 64%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available

Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20319\015R1101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 15
Sample Name	: X04184 DF=5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 11
Acquired on	: 20 Mar 95 02:14 AM	Instrument Method	: BX20315
Report Created on	: 20 Mar 95 02:39 AM	Analysis Method	: BX20319.M
Last Recalib on	: 19 Mar 95 10:59 PM	Sample Amount	: 0
Multiplier	: 5	ISTD Amount	:
Sample Info	: Project#: 95-0820 Client#: 75SS-1(7-9) Soil		

Dm 4/11/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

		Client Project No.	: 722450.21020 MacDill
Client Sample Number	: 75SS-1(7-9)		
Lab Sample Number	: X04184DUP	Lab Project No.	: 95-0820
Date Sampled	: 3/13/95	Dilution Factor	: 5.00
Date Received	: 3/14/95	Method	: 8020
Date Extracted/Prepared	: 3/19/95	Matrix	: Soil
Date Analyzed	: 3/20/95	Lab File No.	: BX2031919
Methanol Extract?	: No	Method Blank No.	: MEB031995

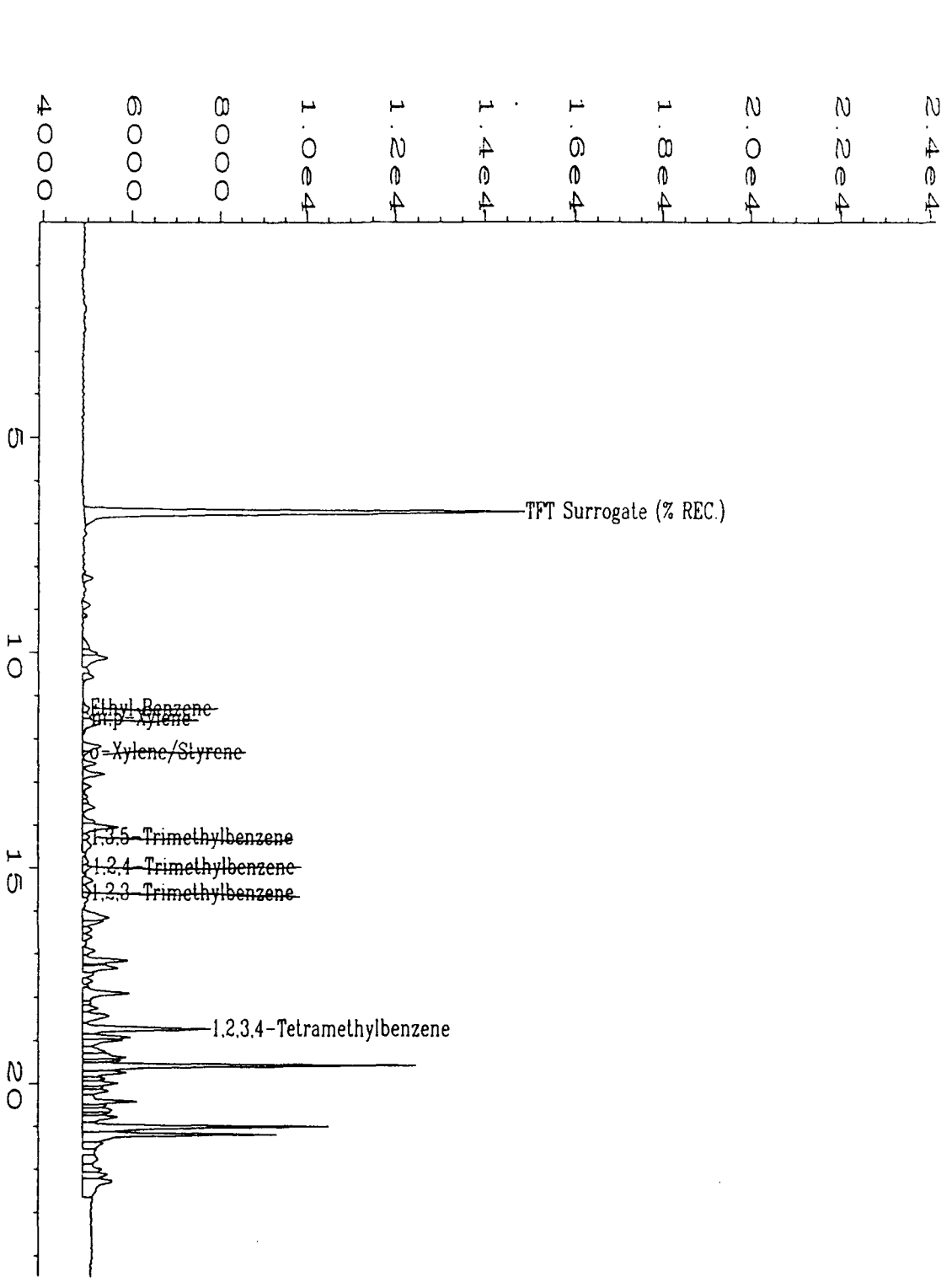
Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	U	24
Toluene	108-88-3	U	24
Ethyl Benzene	100-41-4	U	24
Total Xylene	1330-20-7	U	24
Chlorobenzene	108-90-7	U	24
1,3,5-trimethylbenzene	108-67-8	U	24
1,2,4-trimethylbenzene	95-63-6	U	24
1,2,3-trimethylbenzene	526-73-8	U	24
1,2,3,4-tetramethylbenzene	488-23-3	54	24

Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Sample results & PQLs are reported on a dry weight basis.
** = Sample run at DF = 5 due to inability to purge at DF = 1.
Surrogate Recovery:
a,a,a,-Trifluorotoluene : 101%
QC Reporting Limits : 64%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20319\019R1101.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04184DUP DF=5
Run Time Bar Code:
Acquired on : 20 Mar 95 05:07 AM
Report Created on: 20 Mar 95 05:32 AM
Last Recalib on : 19 Mar 95 10:59 PM
Multiplier : 5
Sample Info : Project#: 95-0820 Client#: 75SS-1(7-9) Soil

Page Number : 1
Vial Number : 19
Injection Number : 1
Sequence Line : 11
Instrument Method: BX20319
Analysis Method : BX20319.MT
Sample Amount : 0
ISTD Amount :

4/11/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

Client Sample Number	: 75SS-2(3-5)	Client Project No.	: 722450.21020 MacDill
Lab Sample Number	: X04185	Lab Project No.	: 95-0820
Date Sampled	: 3/13/95	Dilution Factor	: 250.00
Date Received	: 3/14/95	Method	: 8020
Date Extracted/Prepared	: 3/19/95	Matrix	: Soil
Date Analyzed	: 3/20/95	Lab File No.	: BX2031917
Methanol Extract?	: Yes	Method Blank No.	: MEB031995

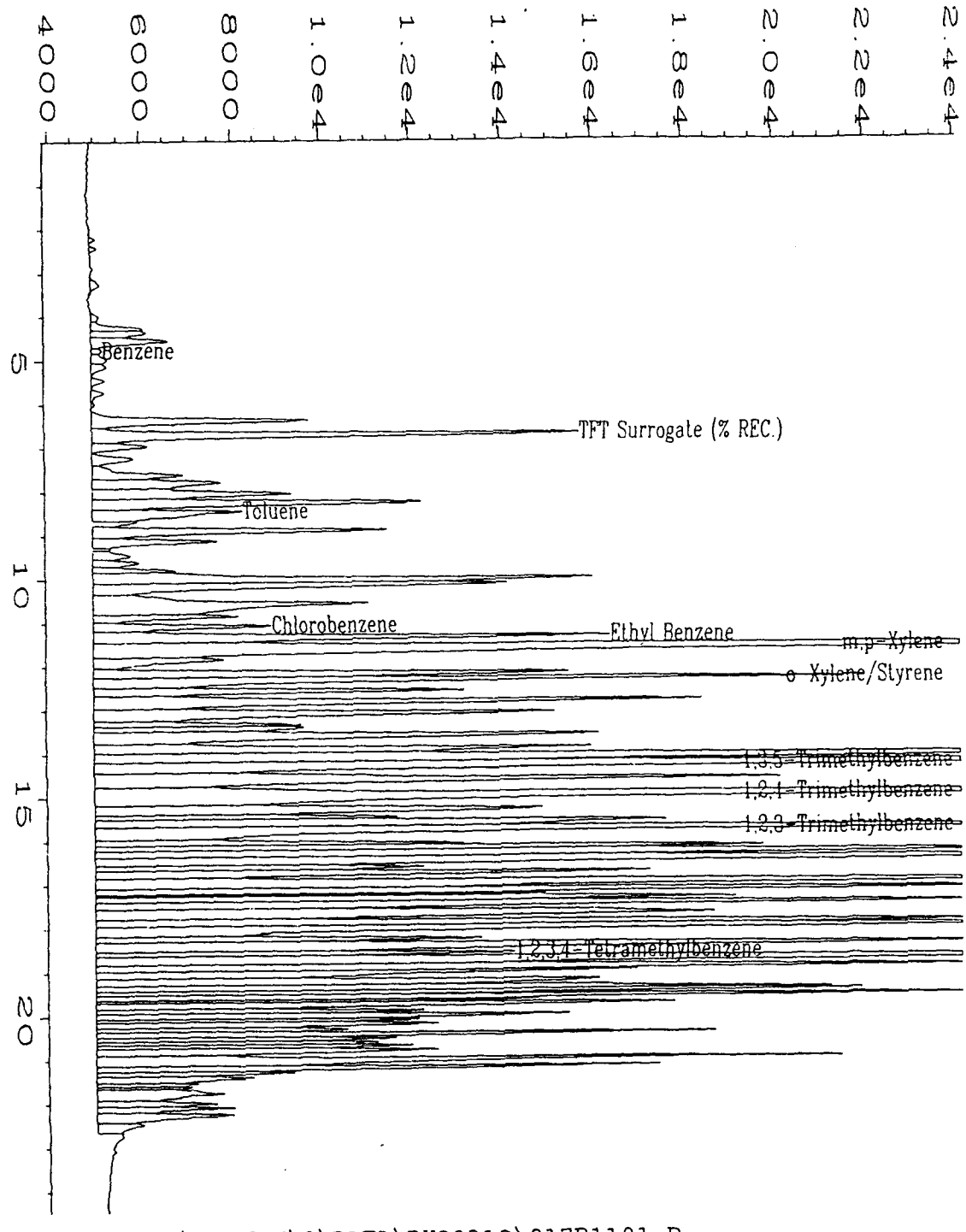
Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2	330	J	1100
Toluene	108-88-3	5300		1100
Ethyl Benzene	100-41-4	14000		1100
Total Xylene	1330-20-7	67000		1100
Chlorobenzene	108-90-7	4500		1100
1,3,5-trimethylbenzene	108-67-8		**	**
1,2,4-trimethylbenzene	95-63-6		**	**
1,2,3-trimethylbenzene	526-73-8		**	**
1,2,3,4-tetramethylbenzene	488-23-3		**	**

Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Sample results & PQLs are reported on a dry weight basis.
** = SeeBX2032014 for noted values, df = 1250, 03/20/95.
Surrogate Recovery:
a,a,a,-Trifluorotoluene : 116%
QC Reporting Limits : 64%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20319\017R1101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 17
Sample Name	: X04185 DF=250	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 11
Acquired on	: 20 Mar 95 03:41 AM	Instrument Method	: BX20319.
Report Created on	: 20 Mar 95 04:06 AM	Analysis Method	: BX20319.MTH
Last Recalib on	: 19 Mar 95 10:59 PM	Sample Amount	: 0
Multiplier	: 250	ISTD Amount	:
Sample Info	: Project#: 95-0820 Client#: 75SS-2(3-5) Soil		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

		Client Project No.	: 722450.21020 MacDill
Client Sample Number	: 75SS-2(3-5)		
Lab Sample Number	: X04185	Lab Project No.	: 95-0820
Date Sampled	: 3/13/95	Dilution Factor	: 1250.00
Date Received	: 3/14/95	Method	: 8020
Date Extracted/Prepared	: 3/20/95	Matrix	: Soil
Date Analyzed	: 3/20/95	Lab File No.	: BX2032014
Methanol Extract?	: Yes	Method Blank No.	: MEB032095

Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	**	**
Toluene	108-88-3	**	**
Ethyl Benzene	100-41-4	**	**
Total Xylene	1330-20-7	**	**
Chlorobenzene	108-90-7	**	**
1,3,5-trimethylbenzene	108-67-8	59000	5600
1,2,4-trimethylbenzene	95-63-6	73000	5600
1,2,3-trimethylbenzene	526-73-8	46000	5600
1,2,3,4-tetramethylbenzene	488-23-3	50000	5600

Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Sample results & PQLs are reported on a dry weight basis.
** = SeeBX2031917 for noted values, df=250, 03/20/95.

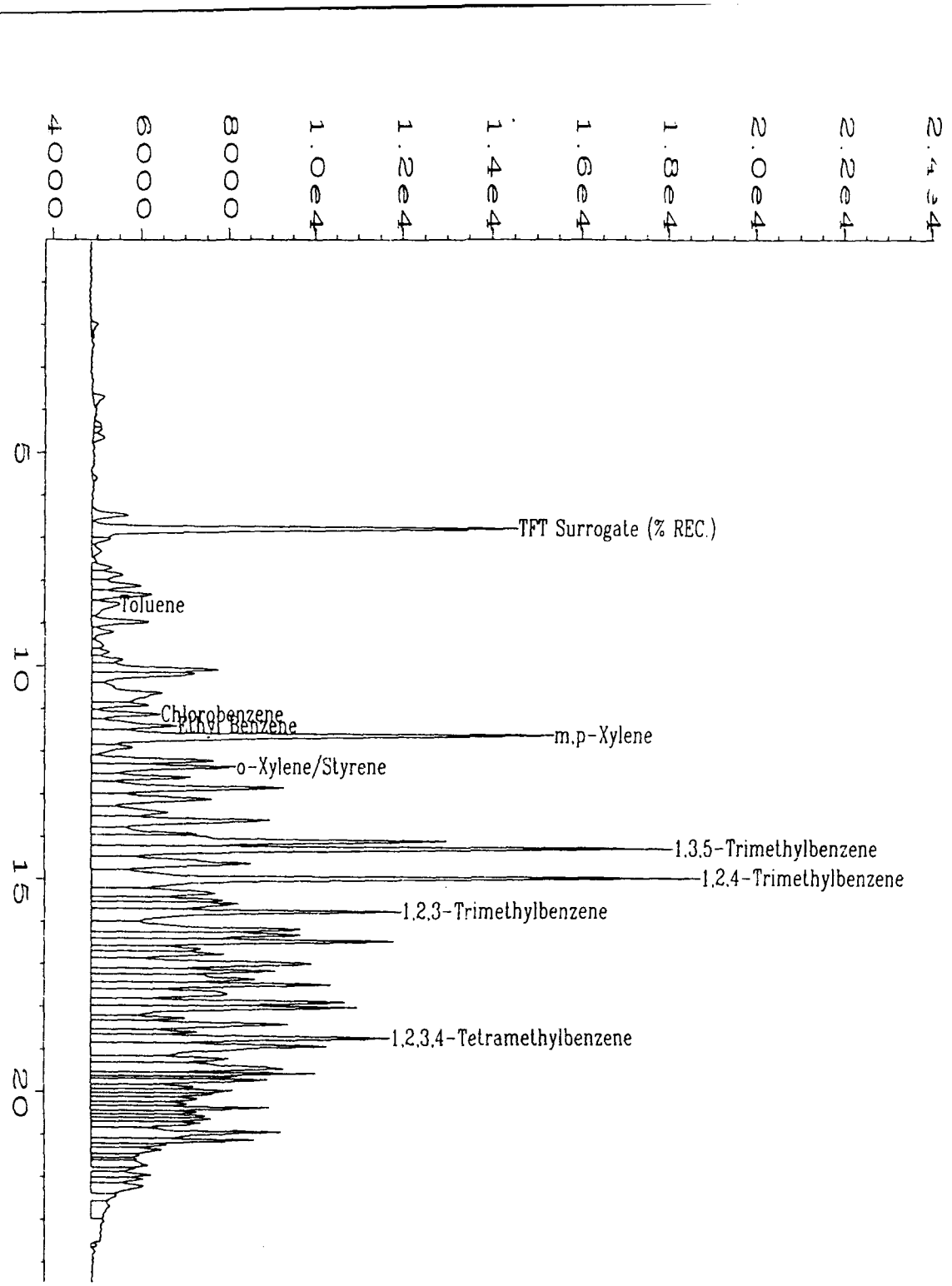
Surrogate Recovery:

a,a,a,-Trifluorotoluene	: 123%
QC Reporting Limits	: 64%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

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Data File Name : C:\HPCHEM\2\DATA\BX20320\014R1001.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04185 DF=1250
Run Time Bar Code:
Acquired on : 20 Mar 95 10:41 PM
Report Created on: 20 Mar 95 11:06 PM
Last Recalib on : 20 Mar 95 06:26 PM
Multiplier : 1250
Sample Info : Project#: 95-0820 Client#: 75SS-2(3-5) Soil/Ext

Page Number : 1
Vial Number : 14
Injection Number : 1
Sequence Line : 10
Instrument Method: BX20320
Analysis Method : BX20320.MT
Sample Amount : 0
ISTD Amount :

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BTEX Data Report

		Client Project No.	: 722450.21020 MacDill
Client Sample Number	: 75SS-2(9-11)		
Lab Sample Number	: X04186	Lab Project No.	: 95-0820
Date Sampled	: 3/13/95	Dilution Factor	: 5.00
Date Received	: 3/14/95	Method	: 8020
Date Extracted/Prepared	: 3/18/95	Matrix	: Soil
Date Analyzed	: 3/19/95	Lab File No.	: BX2031826
Methanol Extract?	: No	Method Blank No.	: MB031895

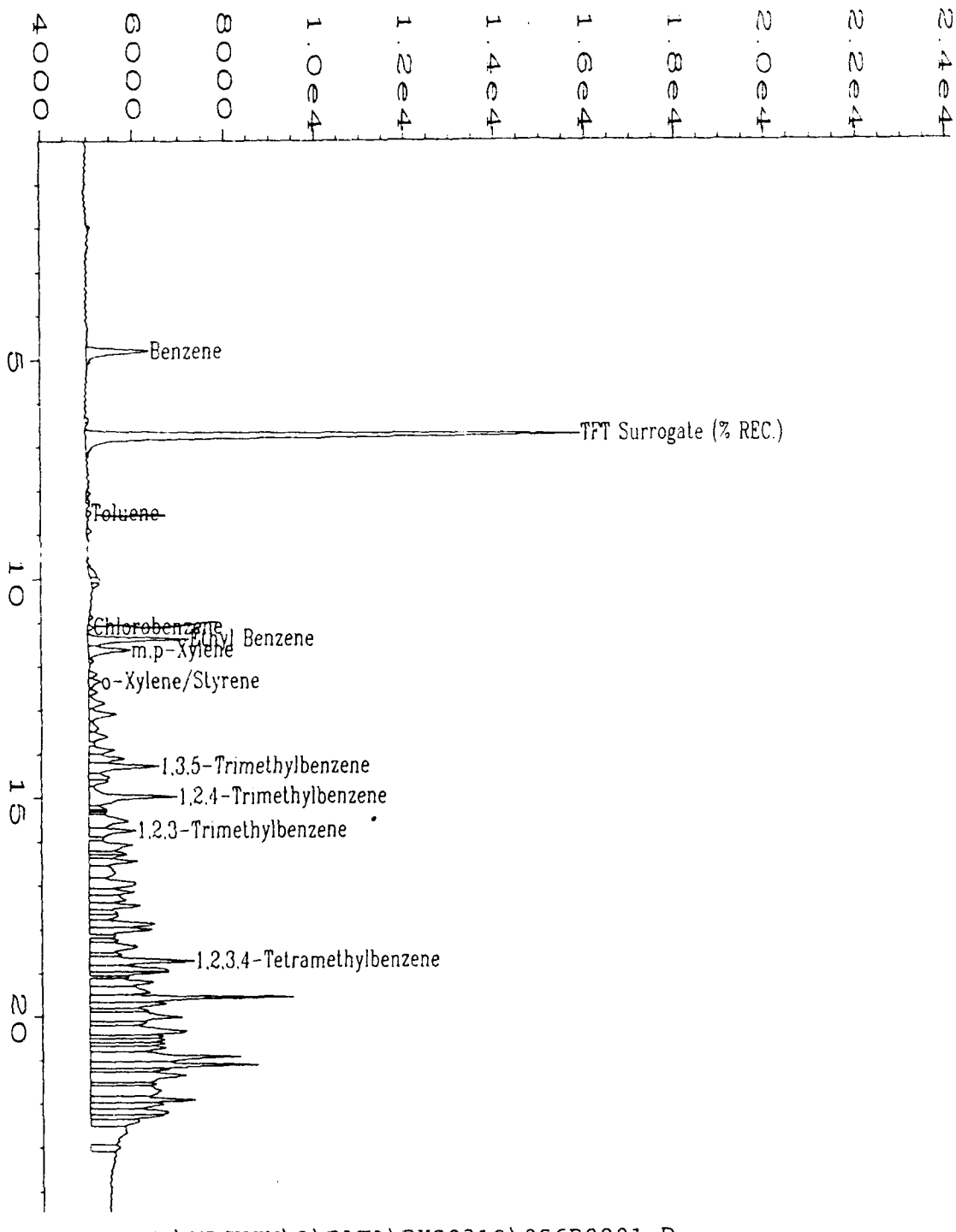
Compound Name	Cas Number	Sample Concentration* ug/kg		PQL* ug/kg
Benzene	71-43-2	32		24
Toluene	108-88-3		U	24
Ethyl Benzene	100-41-4	39		24
Total Xylene	1330-20-7	25	J	24
Chlorobenzene	108-90-7		U	24
1,3,5-trimethylbenzene	108-67-8	22	J	24
1,2,4-trimethylbenzene	95-63-6	21	J	24
1,2,3-trimethylbenzene	526-73-8	9.8	J	24
1,2,3,4-tetramethylbenzene	488-23-3	34		24

Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Sample results & PQLs are reported on a dry weight basis.
Surrogate Recovery:
a,a,a,-Trifluorotoluene : 89%
QC Reporting Limits : 64%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20318\026R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04186 DF=5
Run Time Bar Code:
Acquired on : 19 Mar 95 10:31 AM
Report Created on: 19 Mar 95 01:39 PM
Last Recalib on : 18 MAR 95 11:33 PM
Multiplier : 5
Sample Info : Project#: 95-0820 Client#: 75SS-2(9-11) Soil

Page Number : 1
Vial Number : 26
Injection Number : 1
Sequence Line : 8
Instrument Method: BX20318
Analysis Method : BX20318...
Sample Amount : 0
ISTD Amount :

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TOTAL VOLATILE HYDROCARBONS
TVH Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: 24 MP-1A(3'-4')	**Client Project No.**	: 722450.21020/MAC DI
Lab Sample No.	: X04173	**Lab Project No.**	: 95-0820
Date Sampled	: 3/8/95	**EPA Method No.**	: 5030/8015 Mod
Date Received	: 3/14/95	**Matrix**	: Water
Date Prepared	: 3/16/95,3/17/95	**Method Blank**	: MB031695
Date Analyzed	: 3/16/95,3/17/95		

Compound	Spike Added (mg/L)	Sample Concentration (mg/L)	MS Concentration (mg/L)	MS %REC	QC Limits %REC
Gasoline	5.00	0.00	6.51	130	60-140

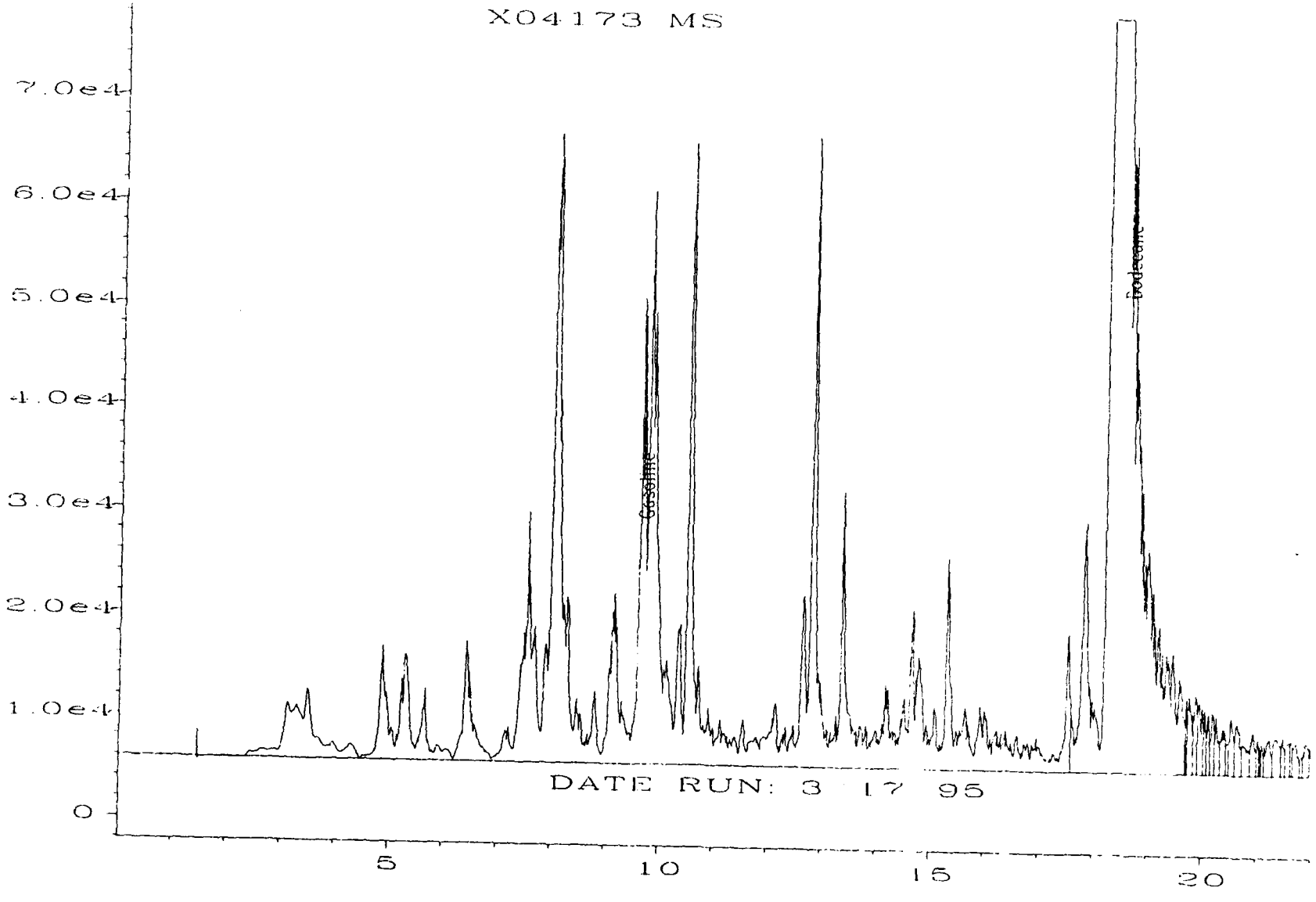
Compound	Spike Added (mg/L)	MSD Concentration (mg/L)	MSD %REC	RPD	QC Limits RPD	QC Limits %REC
Gasoline	5.00	6.01	120	8.0	50	60-140

* = Values outside of QC limits.

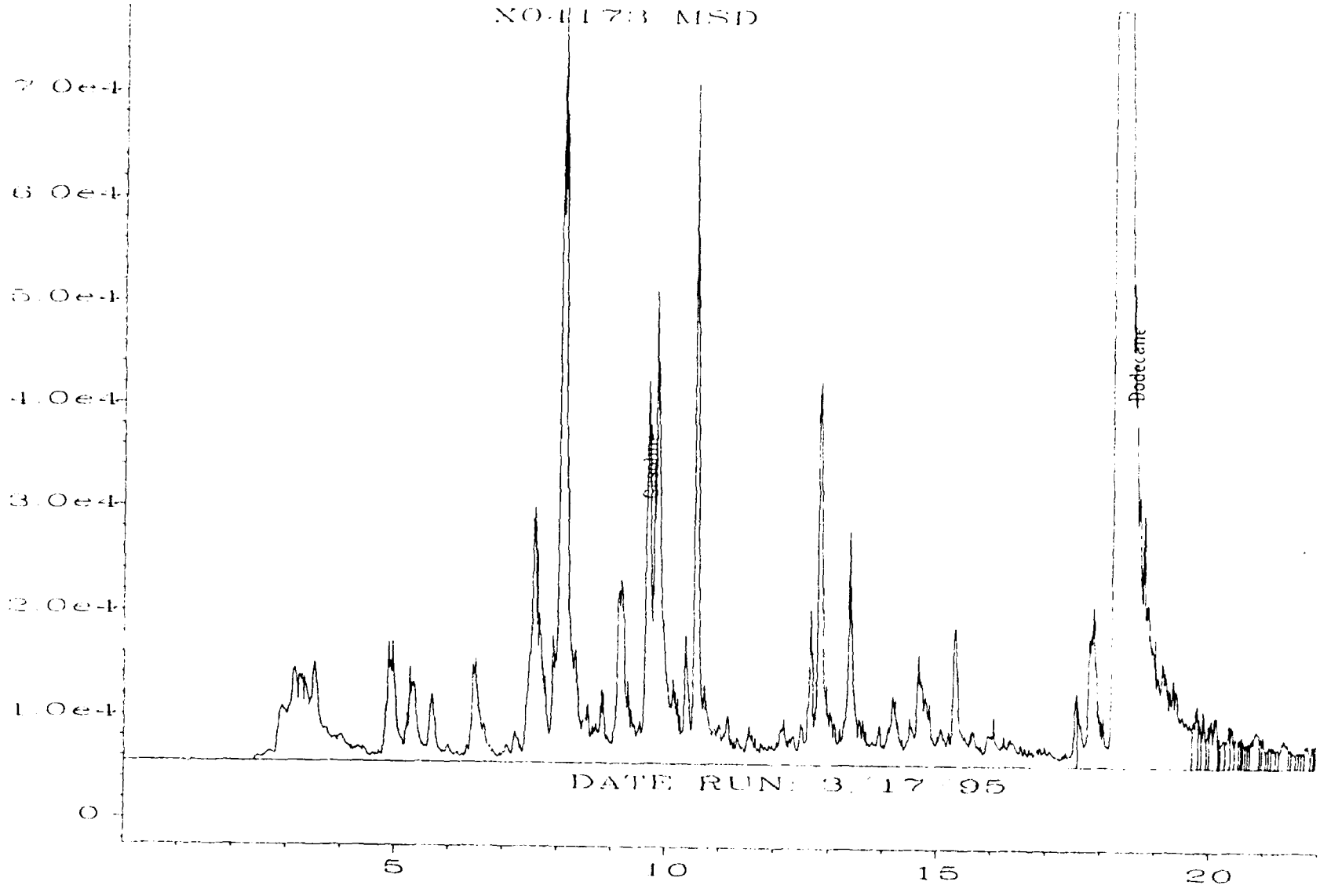
RPD: 0 out of (1) outside limits.

Spike Recovery: 0 out of (2) outside limits.

Comments: NA = Not analyzed/not applicable.



Sig. 1 in C:\HPCHEM\1\DATA\TVH0316 033F0101.D



Sig: 1 in C:\HPCHEM\1\DATA\TVH0316\035F0101.D

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TOTAL EXTRACTABLE HYDROCARBONS
TEH Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: 24MP-7(2-4)	**Client Project No.**	: 722450.21020/MAC D
Lab Sample No.	: X04163	**Lab Project No.**	: 95-0819
Date Sampled	: 3/10/95	**EPA Method No.**	: 3500/MOD.8015
Date Received	: 3/14/95	**Matrix**	: SOIL
Date Prepared	: 3/17/95	**Method Blank**	: SB031795
Date Analyzed	: 3/18/95		

Compound	Spike Added (ug/mL)	Sample Concentration (ug/mL)	MS Concentration (ug/L)	MS %REC	QC Limits %REC
Jet Fuel	1000	0	910	91	60-140

Compound	Spike Added (ug/mL)	MSD Concentration (ug/mL)	MSD %REC	RPD	QC Limits RPD	QC Limits %REC
Jet Fuel	1000	930	93	2.2	50	60-140

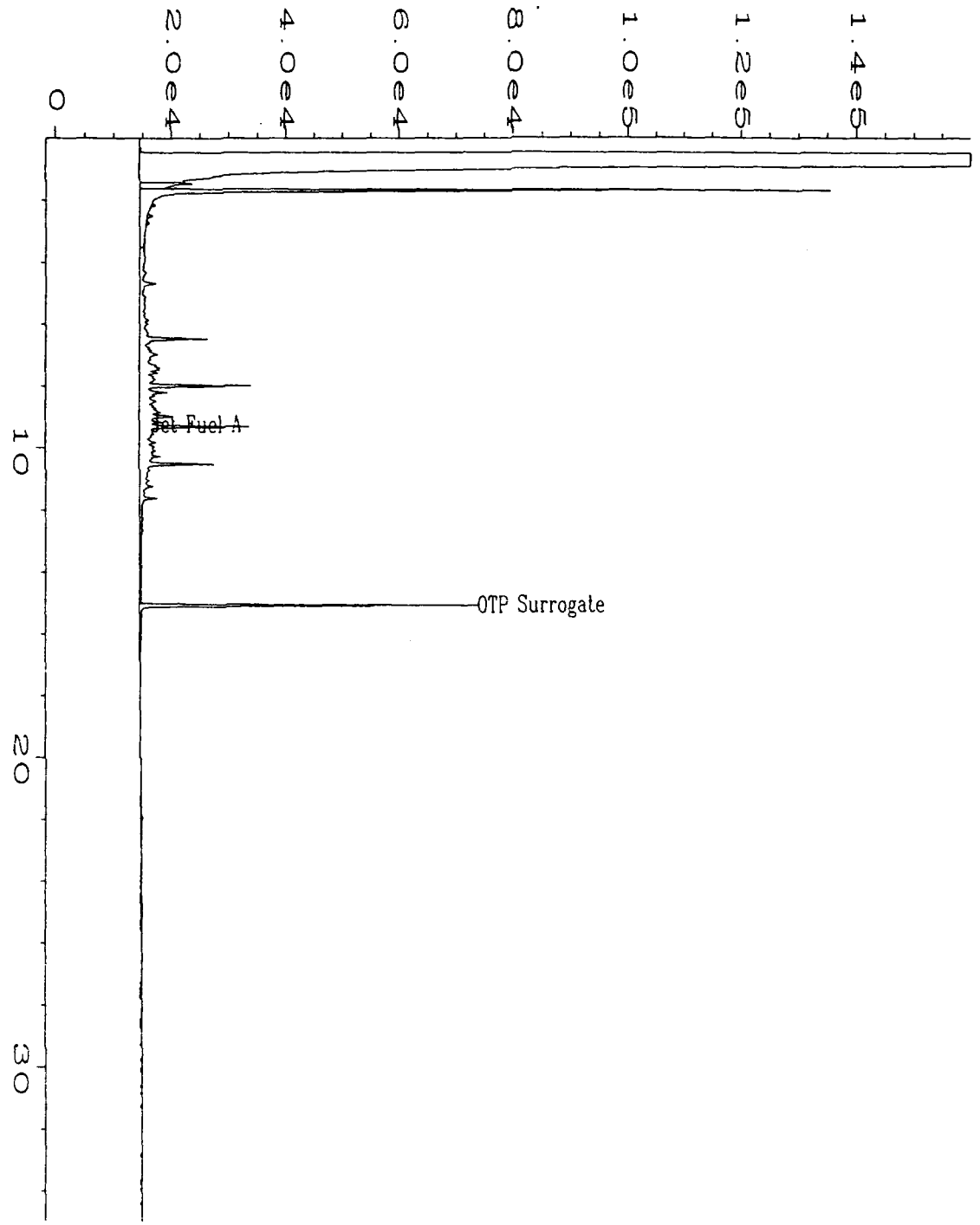
* = Values outside of QC limits.

RPD: 0 out of (1) outside limits.

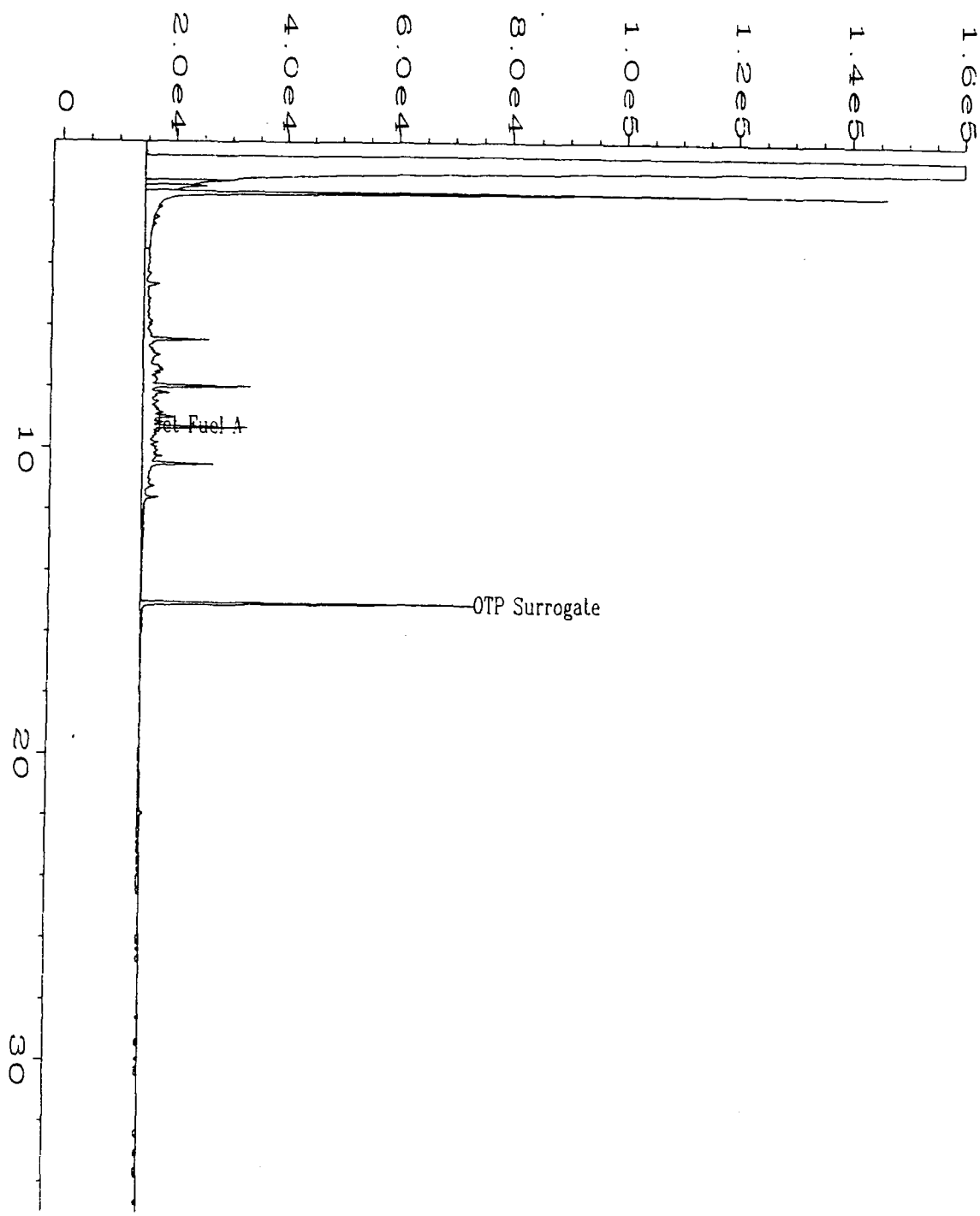
Spike Recovery: 0 out of (1) outside limits.

Comments: NA = Not analyzed/not applicable.

Values reported in ug/mL in the liquid extract.



Data File Name	: C:\HPCHEM\2\DATA\TEH0317\043R0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 43
Sample Name	: X04163 MSD	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 19 Mar 95 00:04 AM	Instrument Method	: FID1BASE.MTH
Report Created on	: 11 Apr 95 12:24 PM	Analysis Method	: JET0317.MTH
Last Recalib on	: 21 MAR 95 09:48 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



Data File Name	: C:\HPCHEM\2\DATA\TEH0317\042R0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 42
Sample Name	: X01463 MS	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 18 Mar 95 11:14 PM	Instrument Method	: FID1BAS
Report Created on	: 11 Apr 95 12:24 PM	Analysis Method	: JET0317.MT
Last Recalib on	: 21 MAR 95 09:48 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

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BTEX Water Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: 24MP-6(4-6)	Client Project No.	: 722450.21020 MacDill
Lab Sample No.	: X04179	Lab Project No.	: 95-0820
Date Sampled	: 3/9/95	EPA Method No.	: 8020
Date Received	: 3/14/95	Matrix	: Soil
Date Prepared	: 3/18/95	Lab File Number(s)	: BX2031816
Date Analyzed	: 3/19/95	Method Blank	: MB031895

Compound	Spike Added (ug/L)	Sample Concentration (ug/L)	MS Concentration (ug/L)	MS %REC	QC Limits %REC
Benzene	20.0	0.0	15	74	65-121
Toluene	20.0	0.8	15	69	69-117
Ethyl Benzene	20.0	0.0	14	71	68-118
m,p-Xylene	40.0	0.0	29	72	66-116
o-Xylene	20.0	0.0	14	70	73-117
Chlorobenzene	20.0	0.0	14	70	65-121
1,3,5-TMB	20.0	0.0	13	63*	65-121
1,2,4-TMB	20.0	0.0	12	60*	65-121
1,2,3-TMB	20.0	0.0	11	54*	65-121
1,2,3,4-TeMB	20.0	0.0	7.5	38*	65-121

Compound	Spike Added (ug/L)	MSD Concentration (ug/L)	MS %REC	RPD	QC Limits RPD	QC Limits %REC
Benzene	20.0	NA	NA	NA	17.4	65-121
Toluene	20.0	NA	NA	NA	15.8	69-117
Ethyl Benzene	20.0	NA	NA	NA	11.9	68-118
m,p-Xylene	40.0	NA	NA	NA	15.4	66-116
o-Xylene	20.0	NA	NA	NA	13.2	73-117
Chlorobenzene	20.0	NA	NA	NA	17.4	65-121
1,3,5-TMB	20.0	NA	NA	NA	17.4	65-121
1,2,4-TMB	20.0	NA	NA	NA	17.4	65-121
1,2,3-TMB	20.0	NA	NA	NA	17.4	65-121
1,2,3,4-TeMB	20.0	NA	NA	NA	17.4	65-121

* = Values outside of QC limits. see LCS 031895

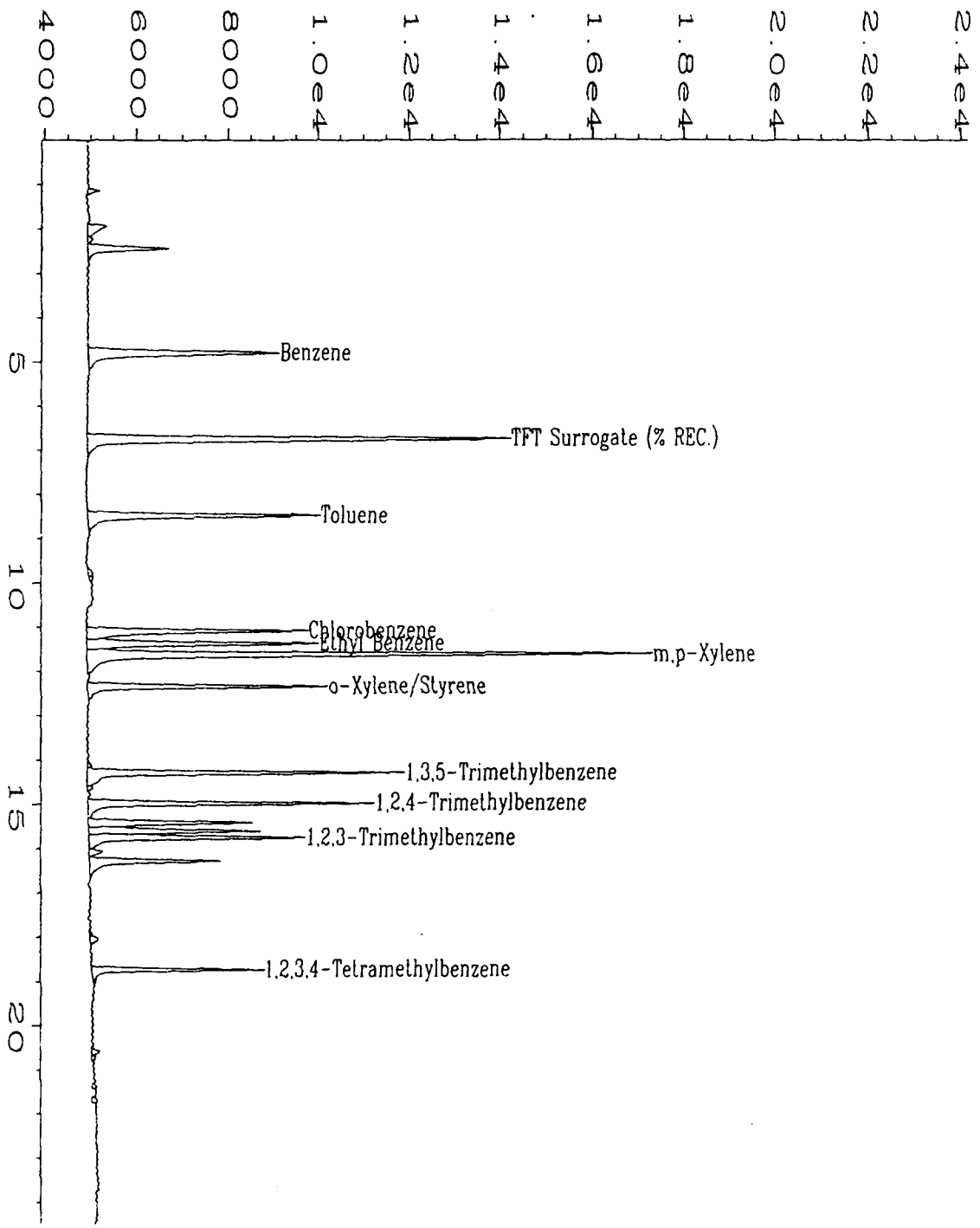
RPD: NA out of (10) outside limits.

Spike Recovery: 4 out of (10) outside limits.

Comments: MSD on this sample did not purge.

Analyst

K. Cone
Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20318\016R0801.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 16
Sample Name	: X04179MS DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 19 Mar 95 03:07 AM	Instrument Method	: BX20318
Report Created on	: 19 Mar 95 01:36 PM	Analysis Method	: BX20318.MT
Last Recalib on	: 18 MAR 95 11:33 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-0320 Client#: 24MP-6(4-5) Soil		

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BTEX Data Report

		Client Project No.	: 722450.21020 MacDill
Client Sample Number	: Trip Blank		
Lab Sample Number	: X04187	Lab Project No.	: 95-0820
Date Sampled	: 3/8/95	Dilution Factor	: 1.00
Date Received	: 3/14/95	Method	: 8020
Date Extracted/Prepared	: 3/17/95	Matrix	: Water
Date Analyzed	: 3/18/95	Lab File No.	: BX2031720
Methanol Extract?	: No	Method Blank No.	: MB031795

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4.0
Toluene	108-88-3	U	4.0
Ethyl Benzene	100-41-4	U	4.0
Total Xylene	1330-20-7	U	4.0
Chlorobenzene	108-90-7	U	4.0
1,3,5-trimethylbenzene	108-67-8	U	4.0
1,2,4-trimethylbenzene	95-63-6	U	4.0
1,2,3-trimethylbenzene	526-73-8	U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	U	4.0

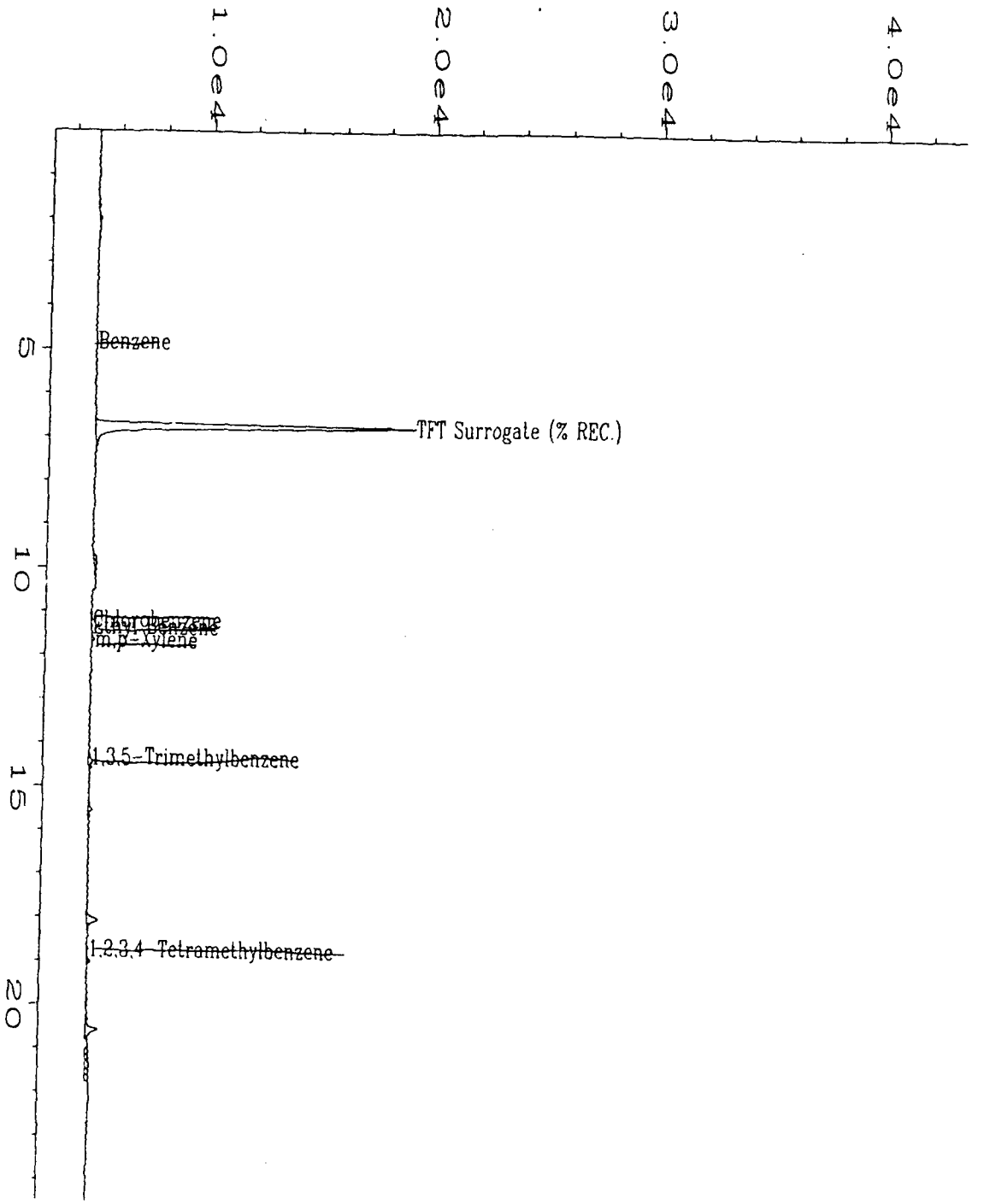
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

Surrogate Recovery:
a,a,a,-Trifluorotoluene : 74%
QC Reporting Limits : 70%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound fou d in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

K. Cone
Approved



Data File Name : C:\HPCHEM\2\DATA\BX20317\020R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04187 DF=1
Run Time Bar Code:
Acquired on : 18 Mar 95 01:25 AM
Report Created on: 18 Mar 95 02:31 PM
Last Recalib on : 18 MAR 95 01:39 PM
Multiplier : 1

Page Number : 1
Vial Number : 20
Injection Number : 1
Sequence Line : 8
Instrument Method: BX20317.
Analysis Method : BX20317.MT
Sample Amount : 0
ISTD Amount :

4/3/95

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BTEX Data Report
Method Blank Report

		Client Project No.	: 722450.21020 MacDill
Method Blank Number	: MB031795		
Date Extracted/Prepared	: 3/17/95	Lab Project No.	: 95-0820
Date Analyzed	: 3/17/94	Dilution Factor	: 1.00
		Method	: 8020
		Matrix	: Water
		Lab File No.	: BX2031709

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4.0
Toluene	108-88-3	U	4.0
Ethyl Benzene	100-41-4	U	4.0
Total Xylene	1330-20-7	U	4.0
Chlorobenzene	108-90-7	U	4.0
1,3,5-trimethylbenzene	108-67-8	U	4.0
1,2,4-trimethylbenzene	95-63-6	U	4.0
1,2,3-trimethylbenzene	526-73-8	U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	U	4.0

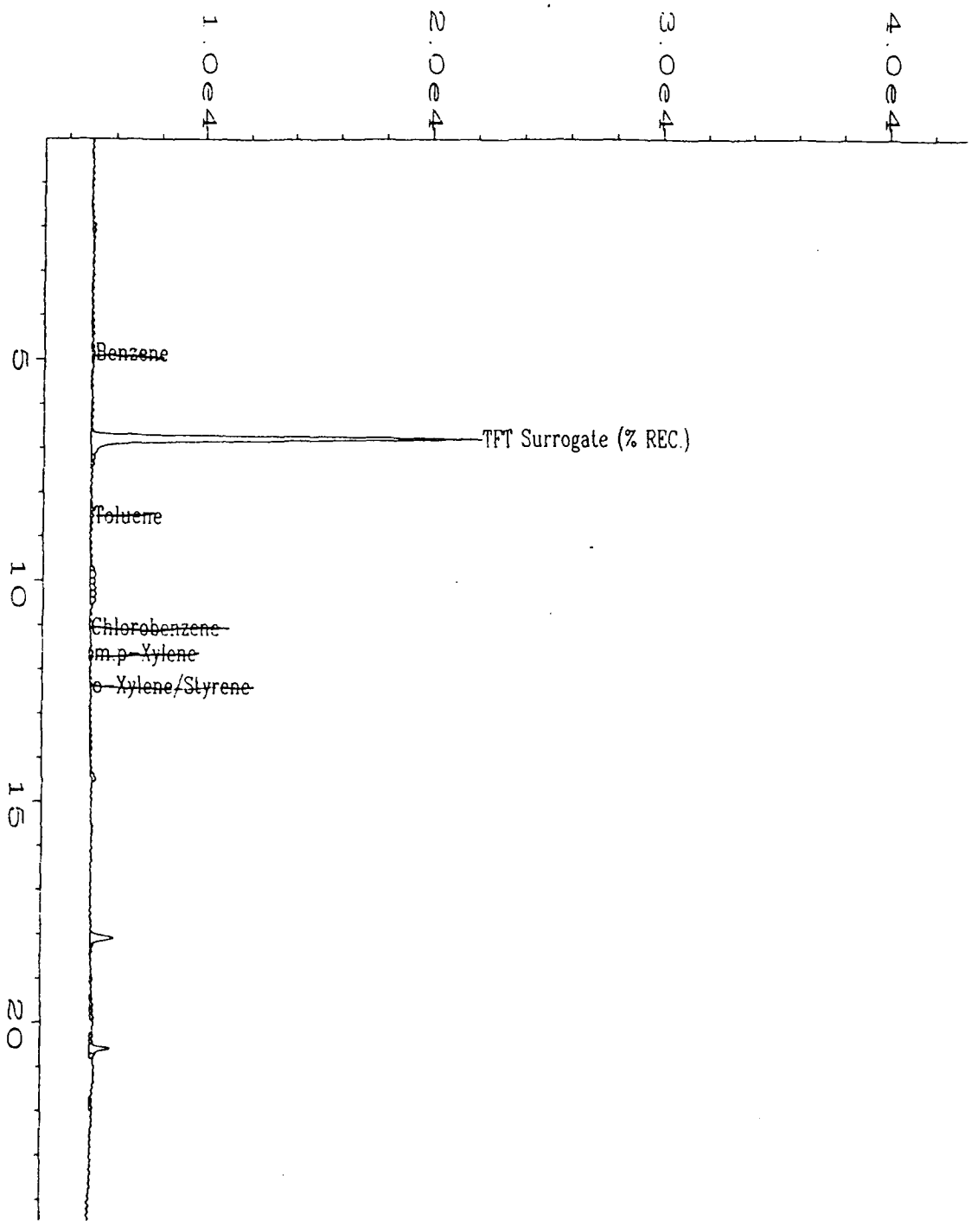
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

Surrogate Recovery:
a,a,a,-Trifluorotoluene : 90%
QC Reporting Limits : 70%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20317\009R0801.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 9
Sample Name	: MB031795-WATER	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 17 Mar 95 05:27 PM	Instrument Method	: BX20317.
Report Created on	: 17 Mar 95 05:52 PM	Analysis Method	: BX20317.MTH
Last Recalib on	: 17 Mar 95 04:23 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

3/20/95

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BTEX Data Report
Method Blank Report

		Client Project No.	: 722450.21020 MacDill
Method Blank Number	: MB031895		
Date Extracted/Prepared	: 3/18/95	Lab Project No.	: 95-0820
Date Analyzed	: 3/19/94	Dilution Factor	: 1.00
		Method	: 8020
		Matrix	: Water
		Lab File No.	: BX2031822

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4.0
Toluene	108-88-3	U	4.0
Ethyl Benzene	100-41-4	U	4.0
Total Xylene	1330-20-7	U	4.0
Chlorobenzene	108-90-7	U	4.0
1,3,5-trimethylbenzene	108-67-8	U	4.0
1,2,4-trimethylbenzene	95-63-6	U	4.0
1,2,3-trimethylbenzene	526-73-8	U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	U	4.0

Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

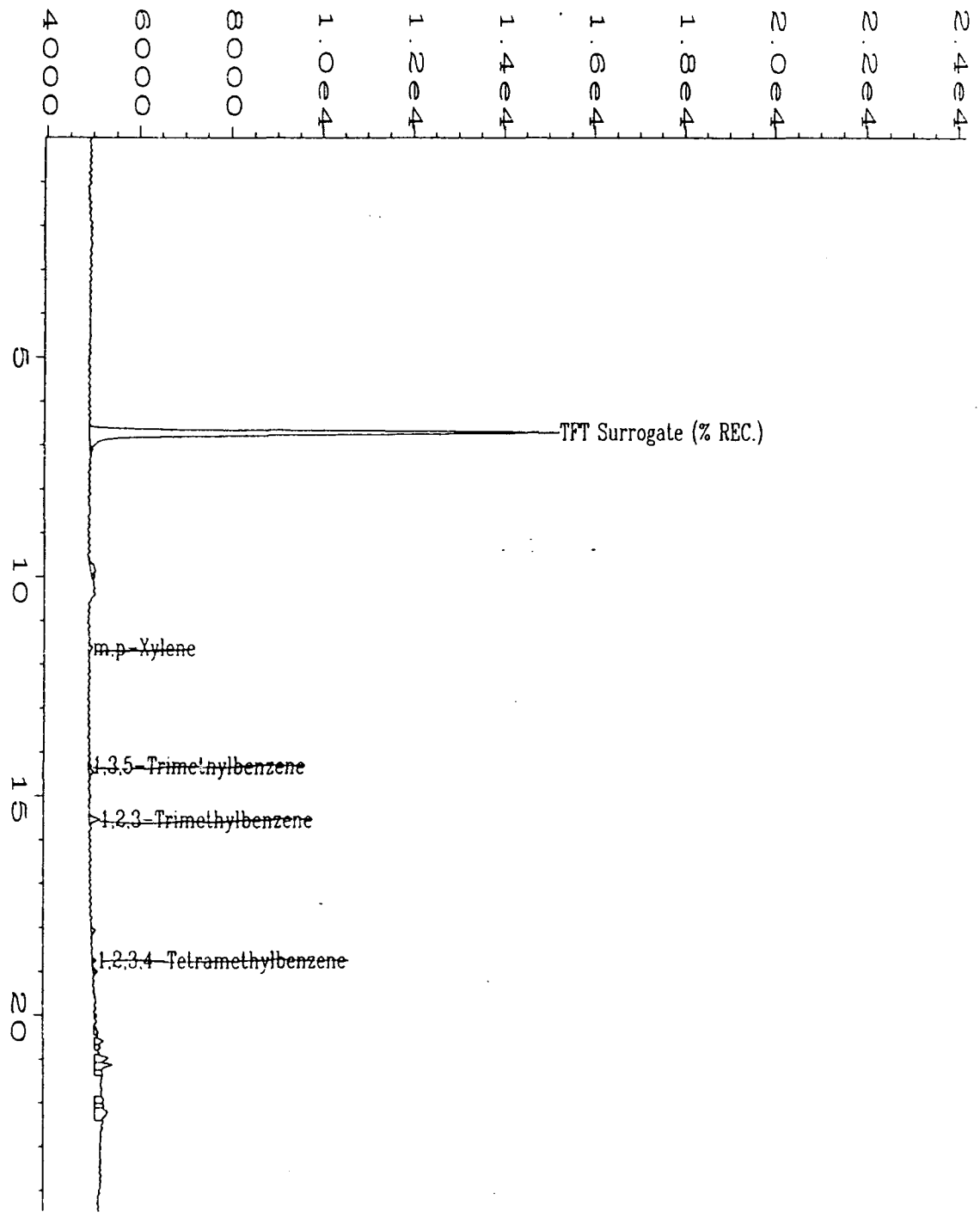
Surrogate Recovery:

a,a,a,-Trifluorotoluene	: 81%
QC Reporting Limits	: 70%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20318\022R0801.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 22
Sample Name	: MB031895-WATER	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 19 Mar 95 07:33 AM	Instrument Method	: BX20318
Report Created on	: 19 Mar 95 01:38 PM	Analysis Method	: BX20318.MTH
Last Recalib on	: 18 MAR 95 11:33 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

4/19/95

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BTEX Data Report
Method Blank Report

Method Blank Number	: MB031995	Client Project No.	: 722450.21020
Date Extracted/Prepared	: 3/19/95		MacDill
Date Analyzed	: 3/20/94	Lab Project No.	: 95-0820
		Dilution Factor	: 1.00
		Method	: 8020
		Matrix	: Water
		Lab File No.	: BX2031914

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4.0
Toluene	108-88-3	U	4.0
Ethyl Benzene	100-41-4	U	4.0
Total Xylene	1330-20-7	U	4.0
Chlorobenzene	108-90-7	U	4.0
1,3,5-trimethylbenzene	108-67-8	U	4.0
1,2,4-trimethylbenzene	95-63-6	U	4.0
1,2,3-trimethylbenzene	526-73-8	U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	U	4.0

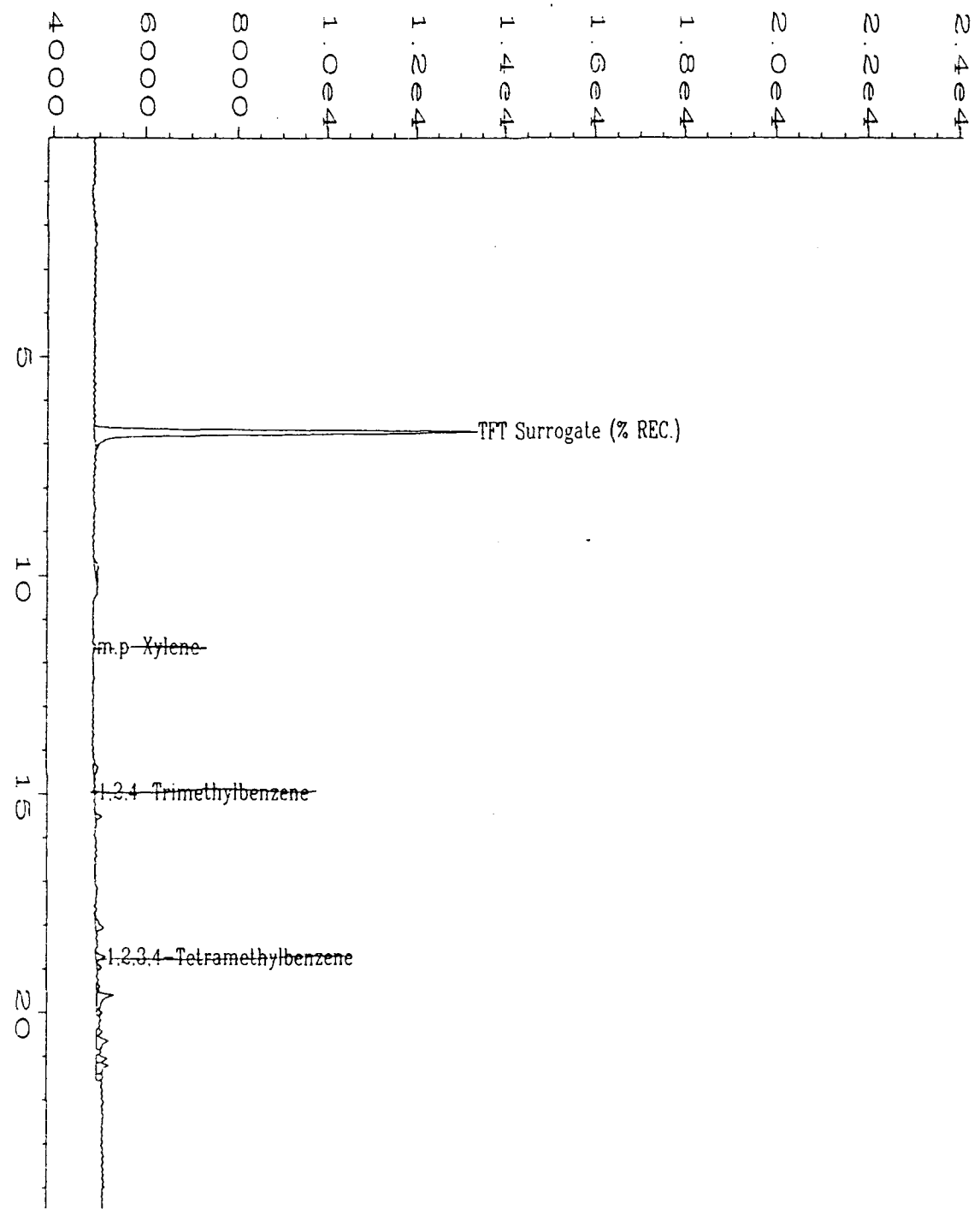
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

Surrogate Recovery:
a,a,a,-Trifluorotoluene : 88%
QC Reporting Limits : 70%-131%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20319\014R1101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 14
Sample Name	: MEB031995	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 11
Acquired on	: 20 Mar 95 01:30 AM	Instrument Method	: BX20319.
Report Created on	: 20 Mar 95 01:55 AM	Analysis Method	: BX20319.MTH
Last Recalib on	: 19 Mar 95 10:59 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

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4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Method Blank Report

Method Blank Number	: ME8032095	Client Project No.	: 722450.21020 MacDill
Date Extracted/Prepared	: 3/20/95	Lab Project No.	: 95-0820
Date Analyzed	: 3/20/94	Dilution Factor	: 1.00
		Method	: 8020
		Matrix	: MeOH
		Lab File No.	: BX2032013

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4
Toluene	108-88-3	U	4
Ethyl Benzene	100-41-4	U	4
Total Xylene	1330-20-7	U	4
Chlorobenzene	108-90-7	U	4
1,3,5-trimethylbenzene	108-67-8	U	4
1,2,4-trimethylbenzene	95-63-6	U	4
1,2,3-trimethylbenzene	526-73-8	U	4
1,2,3,4-tetramethylbenzene	488-23-3	U	4

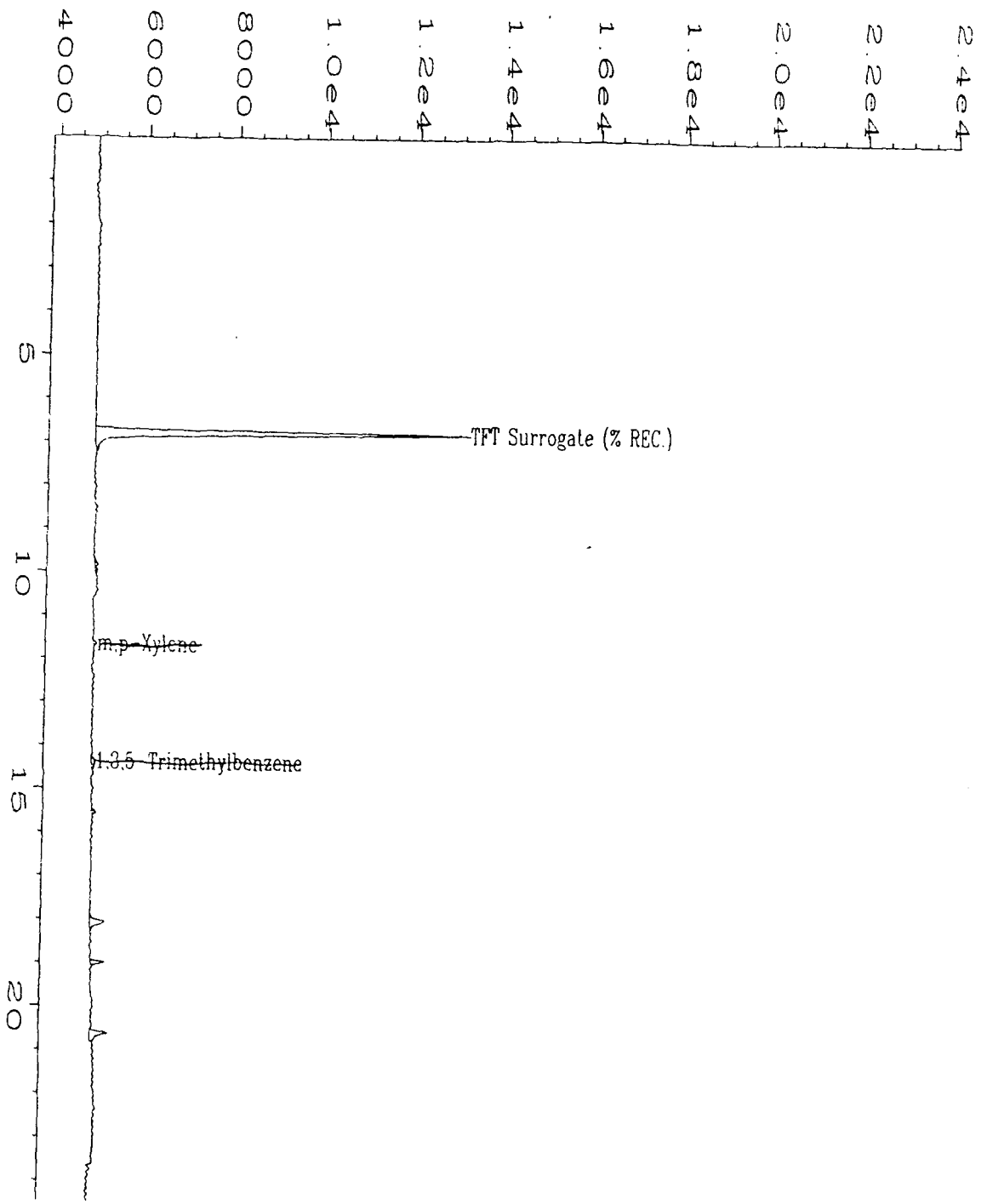
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

Surrogate Recovery:
a,a,a,-Trifluorotoluene : 103%
QC Reporting Limits : 70%-131%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20320\013R1001.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : MEB032095
Run Time Bar Code:
Acquired on : 20 Mar 95 09:53 PM
Report Created on: 20 Mar 95 10:19 PM
Last Recalib on : 20 Mar 95 06:26 PM
Multiplier : 1

Page Number : 1
Vial Number : 13
Injection Number : 1
Sequence Line : 10
Instrument Method: BX20320.. .I
Analysis Method : BX20320.MTH
Sample Amount : 0
ISTD Amount :

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4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Method Blank Report

Method Blank Number	: MB032095	Client Project No.	: 722450.21020 MacDill
Date Extracted/Prepared	: 3/20/95	Lab Project No.	: 95-0820
Date Analyzed	: 3/20/94	Dilution Factor	: 1.00
		Method	: 8020
		Matrix	: Water
		Lab File No.	: BX2032011

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4.0
Toluene	108-88-3	U	4.0
Ethyl Benzene	100-41-4	U	4.0
Total Xylene	1330-20-7	U	4.0
Chlorobenzene	108-90-7	U	4.0
1,3,5-trimethylbenzene	108-67-8	U	4.0
1,2,4-trimethylbenzene	95-63-6	U	4.0
1,2,3-trimethylbenzene	526-73-8	U	4.0
1,2,3,4-tetramethylbenzene	488-23-3	U	4.0

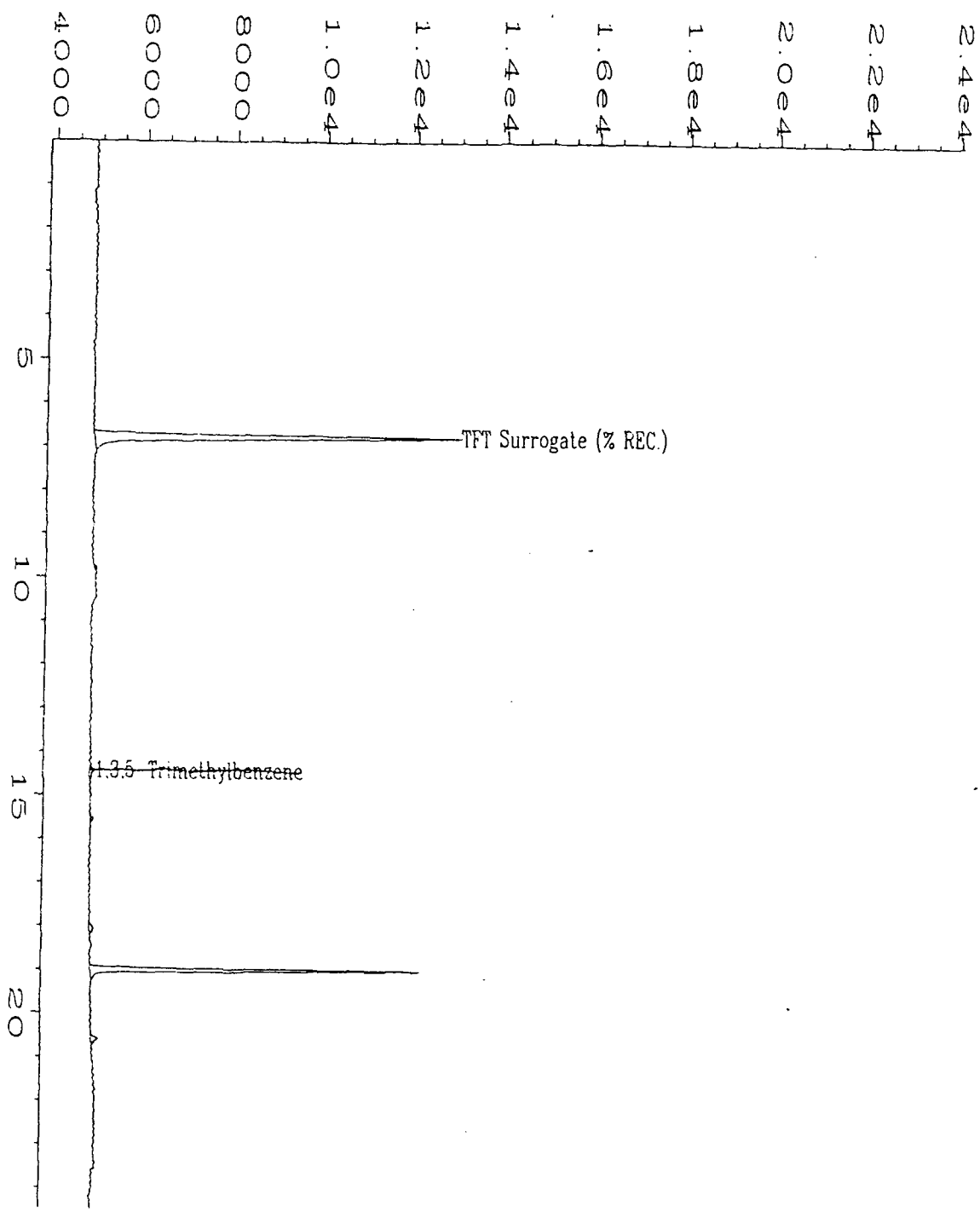
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

Surrogate Recovery:
a,a,a,-Trifluorotoluene : 102%
QC Reporting Limits : 70%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20320\011R1001.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : MB032095-WATER
Run Time Bar Code:
Acquired on : 20 Mar 95 08:20 PM
Report Created on: 20 Mar 95 08:45 PM
Last Recalib on : 20 Mar 95 06:26 PM
Multiplier : 1

Page Number : 1
Vial Number : 11
Injection Number : 1
Sequence Line : 10
Instrument Method: BX20320..
Analysis Method : BX20320.MTH
Sample Amount : 0
ISTD Amount :

fmm 4/13/95

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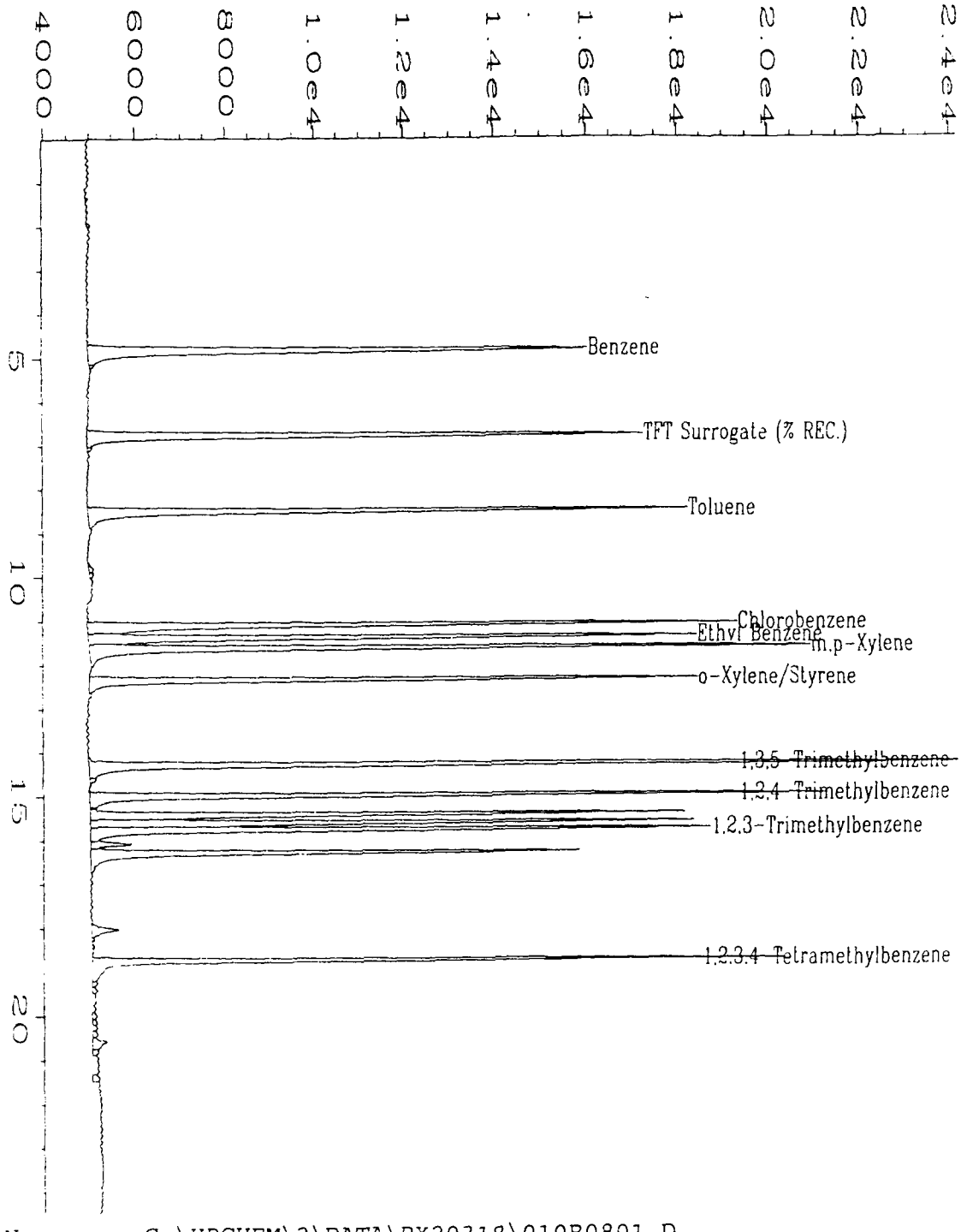
BTEX Data Report
Laboratory Control Sample (LCS)

LCS Number	: LCS031895	Dilution Factor	: 1.00
Date Extracted/Prepared	: 3/18/95	Method	: 602
Date Analyzed	: 3/18/95	Matrix	: Water
Spike Amount (ug/L)	: 40.0	Lab File No.	: BX20318010

Compound Name	Cas Number	LCS Concentration ug/L	LCS % Recovery	QC Limit % Recovery
Benzene	71-43-2	36.0	90.0%	57.5%-110.0%
Toluene	108-88-3	34.7	86.8%	65.0%-107.5%
Ethyl Benzene	100-41-4	35.5	88.8%	65.0%-120.0%
m,p-Xylene	NA	36.2	90.5%	62.5%-117.5%
o-Xylene	95-47-6	34.1	85.3%	65.0%-120.0%
Chlorobenzene	108-90-7	35.2	88.0%	70.0%-115.0%
1,3,5-trimethylbenzene	108-67-8	35.9	89.8%	60.0%-117.5%
1,2,4-trimethylbenzene	95-63-6	30.5	76.3%	57.5%-115.0%
1,2,3-trimethylbenzene	526-73-8	34.3	85.8%	72.5%-122.5%
1,2,3,4-tetramethylbenzene	488-23-3	34.6	86.5%	50.0%-150%
Surrogate Recovery (α,α,α-Trifluorotoluene):		95%	70%-130% (QC limits)	

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
NA = Not available/Not analyzed

K Cone
Analyst



Data File Name : C:\HPCHEM\2\DATA\BX20318\010R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : LCS031895
Run Time Bar Code:
Acquired on : 18 Mar 95 10:39 PM
Report Created on: 04 Apr 95 04:19 AM
Last Recalib on : 18 MAR 95 11:33 PM
Multiplier : 1

Page Number : 1
Vial Number : 10
Injection Number : 1
Sequence Line : 8
Instrument Method: BX20318
Analysis Method : BX20318
Sample Amount : 0
ISTD Amount :

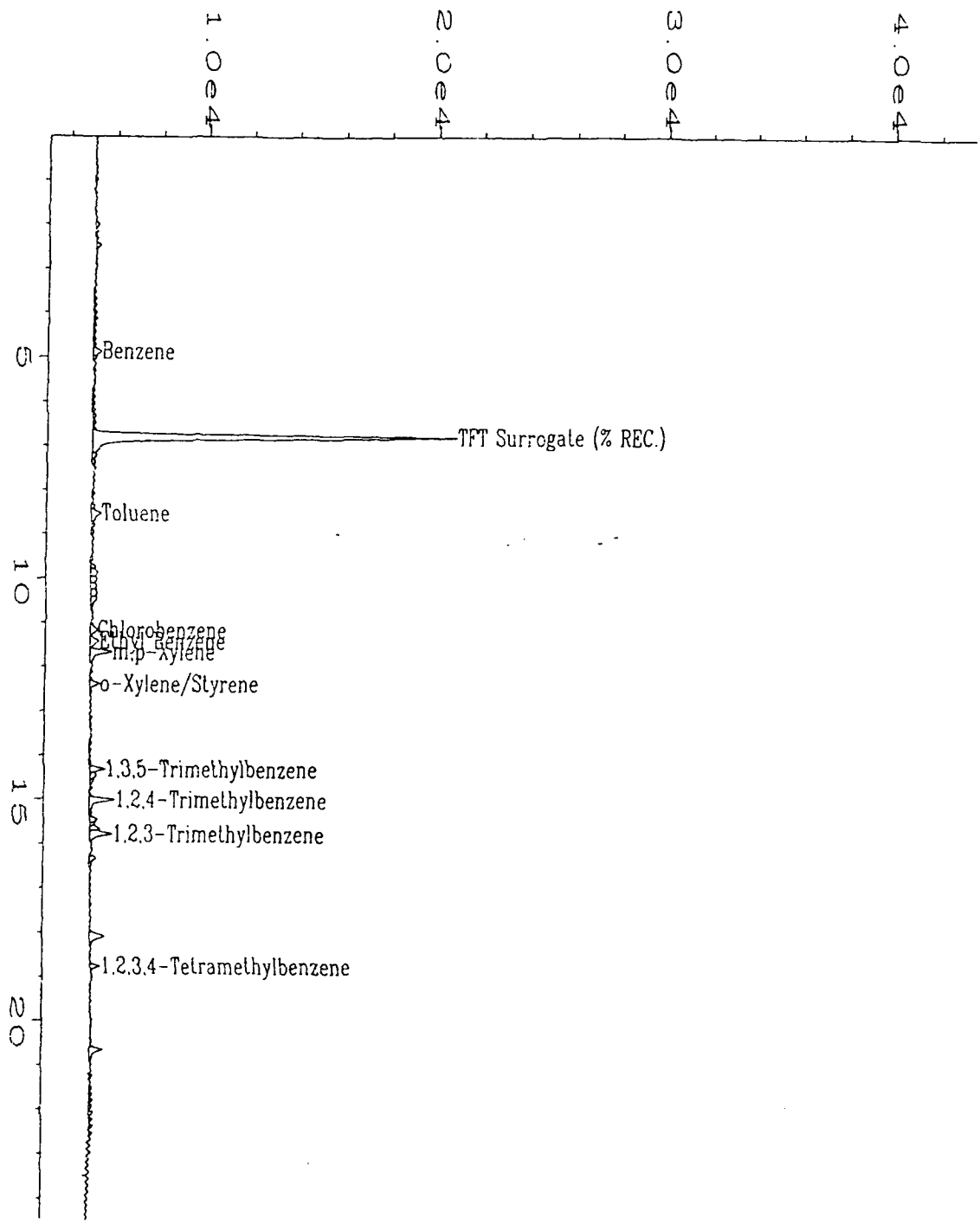
External Standard Report

Data File Name	: C:\HPCHEM\2\DATA\BX20317\008R0801.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 8
Sample Name	: 1.0 ppb BTEX MIX	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 17 Mar 95 04:43 PM	Instrument Method	: BX20317.MTH
Report Created on	: 18 Mar 95 02:05 PM	Analysis Method	: BX20317.MTH
Last Recalib on	: 18 MAR 95 01:39 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 2 in C:\HPCHEM\2\DATA\BX20317\008R0801.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
2.466	1156	PV	0.076	1	0.497	
4.867	2629	VV	0.095	1	2.632	Benzene
6.789	108107	VV	0.105	1-R	81.851	TFT Surrogate (% REC.)
8.526	3772	VV	0.118	1	2.374	Toluene
11.158	2728	VV	0.119	1	2.707	Chlorobenzene
11.410	3157	VV	0.113	1	1.591	Ethyl Benzene
11.654	6815	VV	0.104	1	1.054	m,p-Xylene
12.379	2809	PV	0.094	1	1.931	o-Xylene/Styrene
[illegible].316	3508	VV	0.074	1	0.778	1,3,5-Trimethylbenzene
[illegible].007	7245	VV	0.090	1	0.801	1,2,4-Trimethylbenzene
15.455	1974	VV	0.091	1	1.830	
15.569	803	VV	0.060	1	0.735	
15.781	6531	VV	0.093	1	-1.117	1,2,3-Trimethylbenzene
16.325	1656	VV	0.082	1	0.832	
18.759	1996	VV	0.069	1	0.576	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
3	6.804	6.789	-0.015



)ata File Name	: C:\HPCHEM\2\DATA\BX20317\008R0801.D		
)perator	: C.J. Cook	Page Number	: 1
nstrument	: BTEX2	Vial Number	: 8
'ample Name	: 1.0 ppb BTEX MIX	Injection Number	: 1
un Time Bar Code:		Sequence Line	: 8
cquired on	: 17 Mar 95 04:43 PM	Instrument Method	: BX20317.MT..
eport Created on:	17 Mar 95 05:08 PM	Analysis Method	: BX20317.MTH
ast Recalib on	: 17 Mar 95 04:23 PM	Sample Amount	: 0
ultiplier	: 1	ISTD Amount	:
ample Info	: STD REF #1644, 3/10/95, 0.5 UG/ML (M & P-XYLENE PRESENT); + 1,2,3 & 1,2,4-Trimethylbenzene		

External Standard Report

Data File Name : C:\HPCHEM\2\DATA\BX20318\018R0801.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : 1.0 ppb BTEX MIX
Run Time Bar Code:
Acquired on : 19 Mar 95 04:36 AM
Report Created on: 19 Mar 95 01:36 PM
Last Recalib on : 18 MAR 95 11:33 PM
Multiplier : 1
Sample Info : STD REF #1644, 3/10/95, 0.5 UG/ML (M & P-XYLENE PRESENT); + 1,2,3 & 1,2,4-Trimethylbenzene

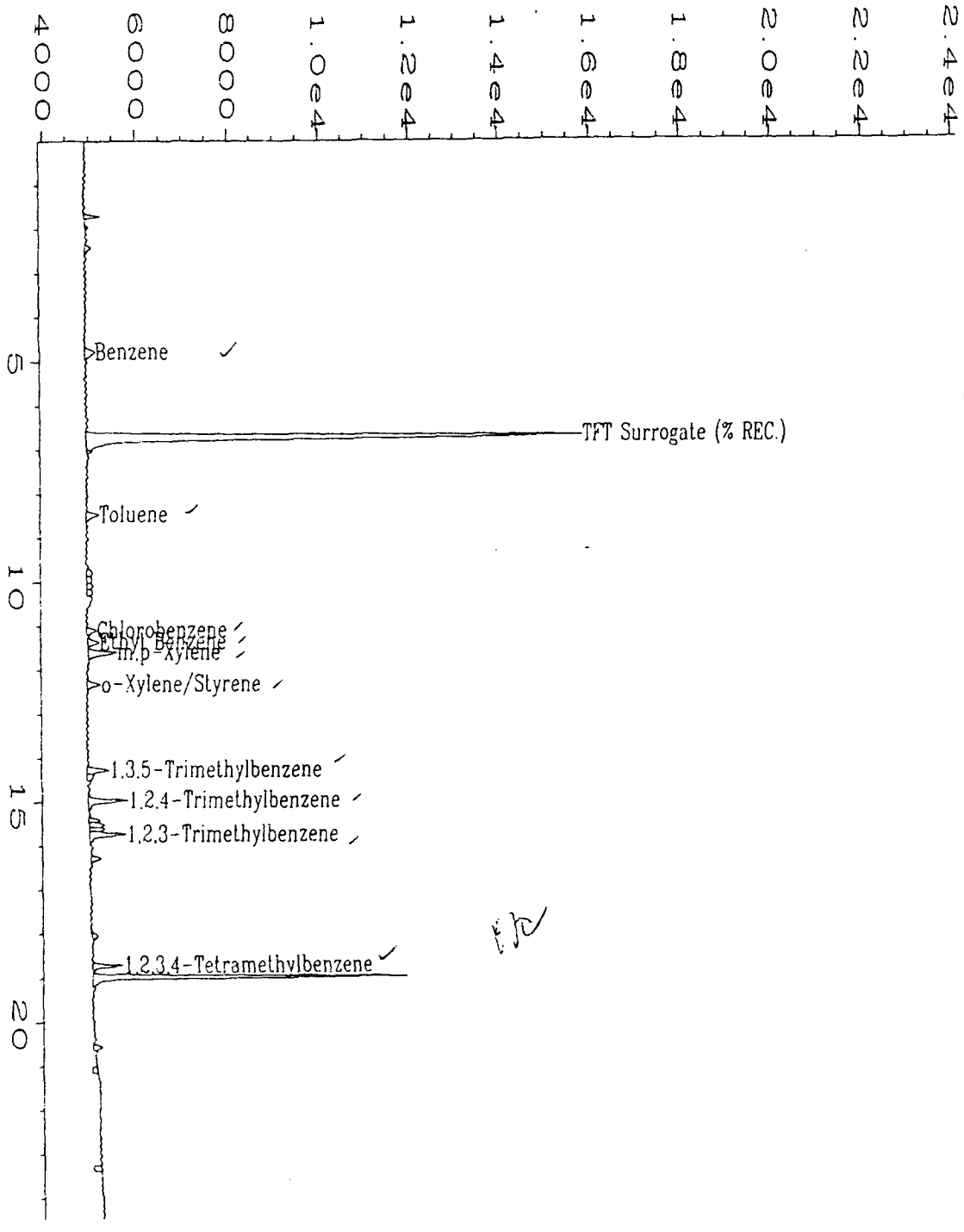
Page Number : 1
Vial Number : 18
Injection Number : 1
Sequence Line : 8
Instrument Method: BX20318.MTH
Analysis Method : BX20318.MTH
Sample Amount : 0
ISTD Amount :

Sig. 2 in C:\HPCHEM\2\DATA\BX20318\018R0801.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
2.418	985	PV	0.100	1	0.909	
4.776	2000	VV	0.114	1	2.263	Benzene
6.713	75070	PV	0.101	1-R	87.562	TFT Surrogate (% REC.)
8.469	1891	VV	0.090	1	1.678	Toluene
11.099	1318	PV	0.088	1	2.299	Chlorobenzene
11.368	1533	VV	0.094	1	1.121	Ethyl Benzene
11.602	3867	VV	0.091	1	0.0462	m,p-Xylene
12.323	1681	BV	0.082	1	1.330	o-Xylene/Styrene
14.273	2648	VV	0.077	1	0.423	1,3,5-Trimethylbenzene
14.967	4818	PV	0.079	1	1.263	1,2,4-Trimethylbenzene
15.240	* not found *			1		
15.418	1124	VV	0.058	1	2.046	
15.739	4645	VV	0.083	1	-0.240	1,2,3-Trimethylbenzene
16.089	* not found *			1		
18.722	2932	PV	0.064	1	0.282	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
3	6.750	6.713	-0.037

Not all calibrated peaks were found



Data File Name	: C:\HPCHEM\2\DATA\BX20318\018R0801.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 18
Sample Name	: 1.0 ppb BTEX MIX	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 19 Mar 95 04:36 AM	Instrument Method	: BX20318.
Report Created on	: 19 Mar 95 01:36 PM	Analysis Method	: BX20318.MTH
Last Recalib on	: 18 MAR 95 11:33 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: STD REF #1644, 3/10/95, 0.5 UG/ML (M & P-XYLENE PRESENT); + 1,2,3 & 1,2,4-Trimethylbenzene		

External Standard Report

Data File Name : C:\HPCHEM\2\DATA\BX20320\010R1001.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : 1.0 ppb BTEX MIX
Run Time Bar Code:
Acquired on : 20 Mar 95 07:34 PM
Report Created on: 20 Mar 95 07:59 PM
Last Recalib on : 20 Mar 95 06:26 PM
Multiplier : 1
Sample Info : STD REF #1644, 3/10/95, 0.5 UG/ML (M & P-XYLENE PRESENT); + 1,2,3 & 1,2,4-Trimethylbenzene

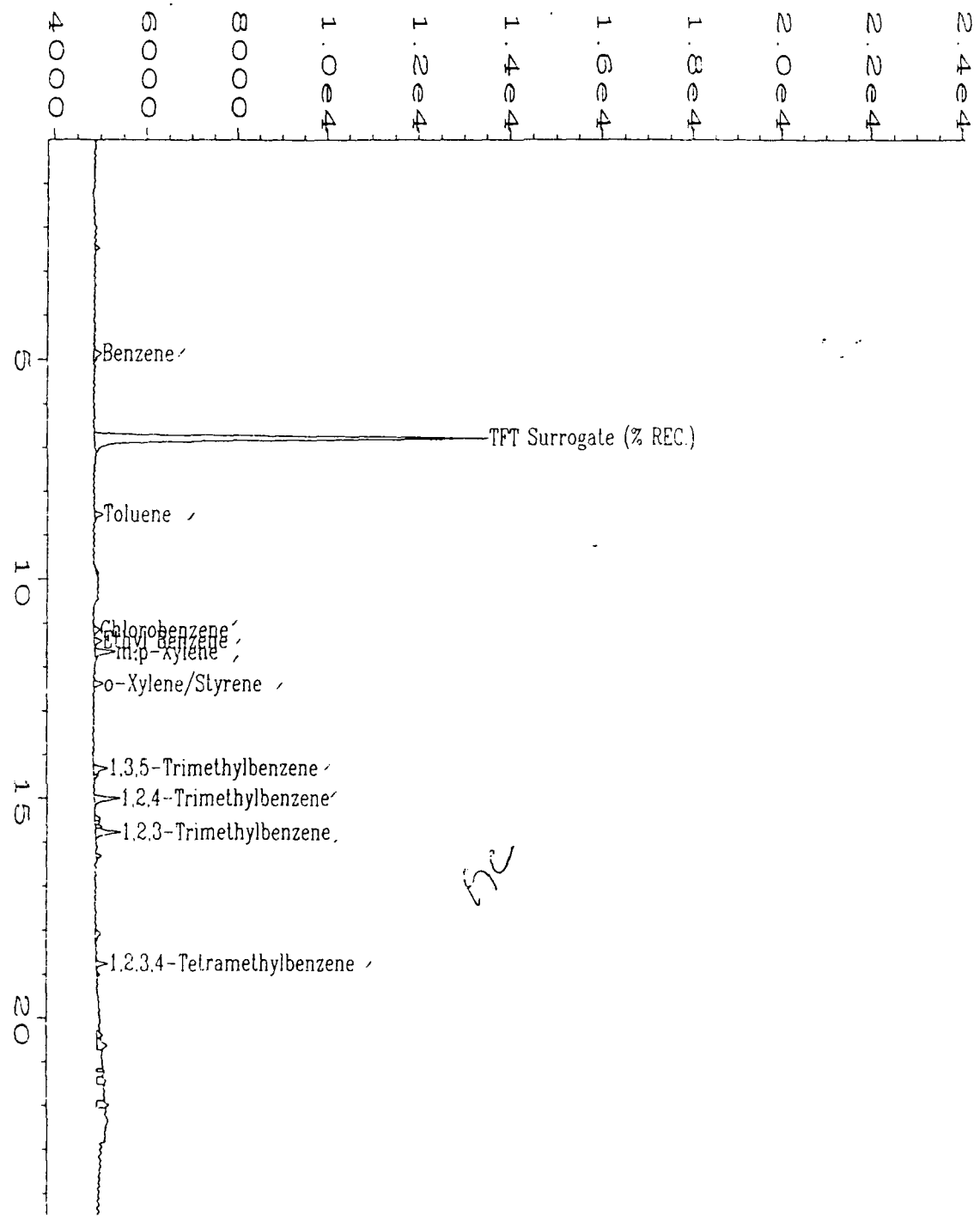
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Vial Number : 10
Injection Number : 1
Sequence Line : 10
Instrument Method: BX20320.MTH
Analysis Method : BX20320.MTH
Sample Amount : 0
ISTD Amount :

Sig. 2 in C:\HPCHEM\2\DATA\BX20320\010R1001.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
2.462	464	PV	0.060	1	1.993	
4.856	1454	VV	0.115	1	3.235	Benzene
6.775	56877	PV	0.092	1-R	107.892	TFT Surrogate (% REC.)
8.514	1060	PV	0.083	1	2.186	Toluene
11.146	1048	PV	0.101	1	3.007	Chlorobenzene
11.395	1128	VV	0.091	1	1.756	Ethyl Benzene
11.648	2569	VV	0.086	1	0.893	m,p-Xylene
12.369	1256	BV	0.080	1	2.110	o-Xylene/Styrene
14.303	2019	PV	0.097	1	1.387	1,3,5-Trimethylbenzene
14.995	3170	PV	0.082	1	1.181	1,2,4-Trimethylbenzene
15.240	* not found *			1		
15.444	724	BV	0.074	1	2.086	
15.771	3314	VV	0.086	1	0.119	1,2,3-Trimethylbenzene
16.089	* not found *			1		
18.751	1242	PV	0.075	1	1.846	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
3	6.750	6.775	0.025

Not all calibrated peaks were found



Data File Name : C:\HPCHEM\2\DATA\BX20320\010R1001.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : 1.0 ppb BTEX MIX
Run Time Bar Code:
Acquired on : 20 Mar 95 07:34 PM
Report Created on: 20 Mar 95 07:59 PM
Last Recalib on : 20 Mar 95 06:26 PM
Multiplier : 1
Sample Info : STD REF #1644, 3/10/95, 0.5 UG/ML (M & P-XYLENE PRESENT); 1,2,3 & 1,2,4-Trimethylbenzene

Page Number : 1
Vial Number : 10
Injection Number : 1
Sequence Line : 10
Instrument Method: BX20320.
Analysis Method : BX20320.MTH
Sample Amount : 0
ISTD Amount :

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TOTAL VOLATILE HYDROCARBONS (TVH)

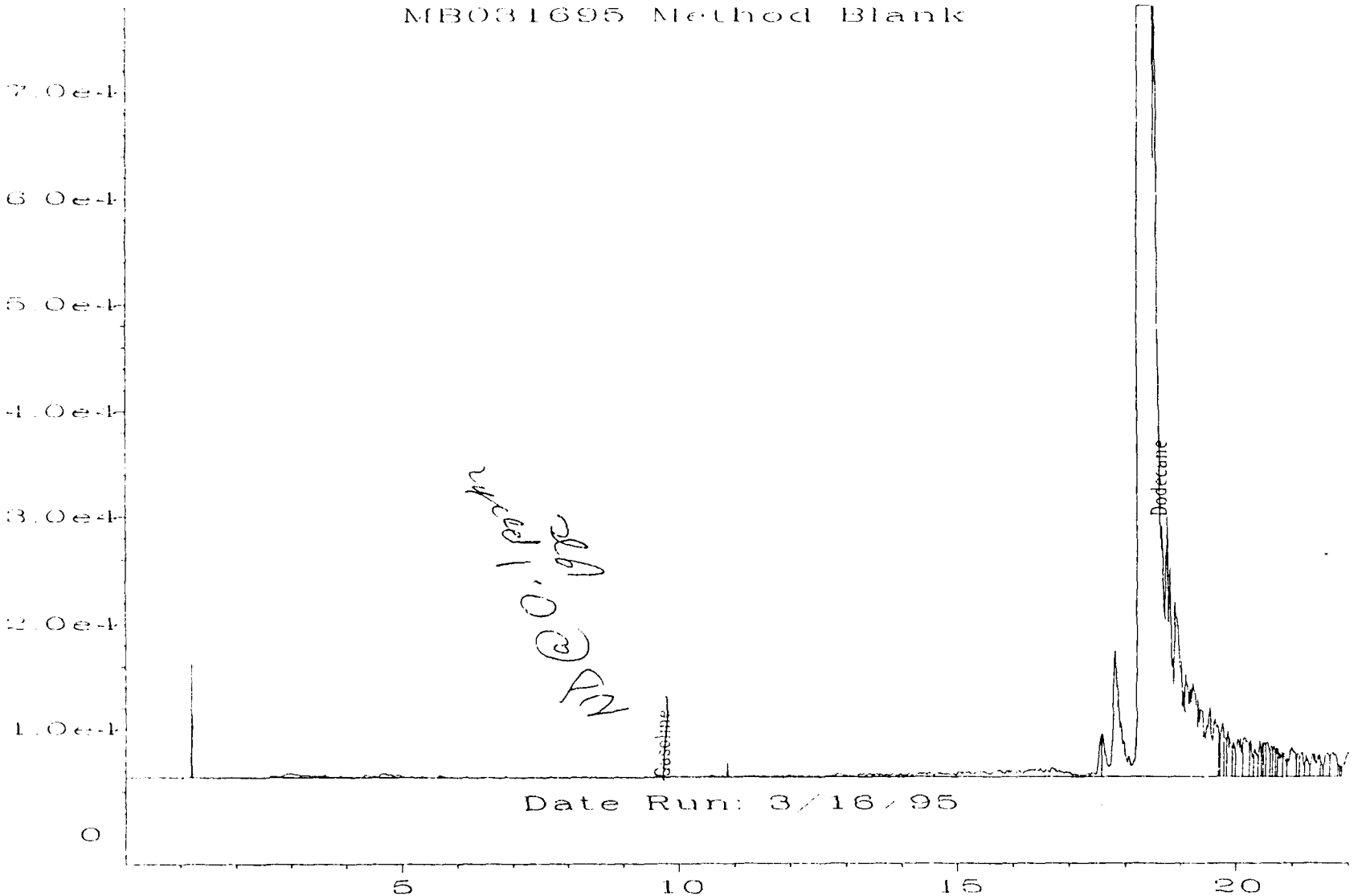
Date Sampled	: 3/8,9,10,13/95	Client Project Number	: 722450.21020/MAC DILL
Date Received	: 3/14/95	Lab Project Number	: 95-0820
Date Prepared	: 3/16,17,22,24/95	Matrix	: Soil
Date Analyzed	: 3/16,17,22,24/95	Method Number	: 5030/Mod.8015

Evergreen Sample #	Client Sample #	Surrogate Recovery	TVH* mg/Kg	RL* mg/Kg
MB031695	METHOD BLANK	100%	U	0.10
MB032295	METHOD BLANK	100%	U	0.10
MB032395	METHOD BLANK	90%	U	0.10
X04173	24 MP-1A(3'-4')	116%	U	0.11
X04174	24 MP-1B(8'-9')	118%	1.1	0.12
X04175	24 MP-2(3'-4')	115%	U	0.12
X04176	24 MP-3 (3-5)	112%	0.36	0.12
X04177	24-MP-4 (3-5)	115%	U	0.12
X04178	24 MP-5 (3-5)	113%	U	0.12
X04179	24 MP-6 (4-6)	114%	U	0.12
X04181	24SS-1 (4-6)	120%	4.7	0.1
X04182	24SS-2 (4-6)	118%	3.0	0.1
X04183	75SS-1 (3-5)	108%	230	6.0
X04183 DUP	75SS-1 (3-5)	113%	590	6.0
X04184	75SS-1 (7-9)	101%	0.36	0.12
X04185	75SS-2 (3-5)	128%	4800E	5.7
X04186	75SS-2 (9-11)	101%	U	0.12
X04186 DUP	75SS-2 (9-11)	116%	0.41	0.12

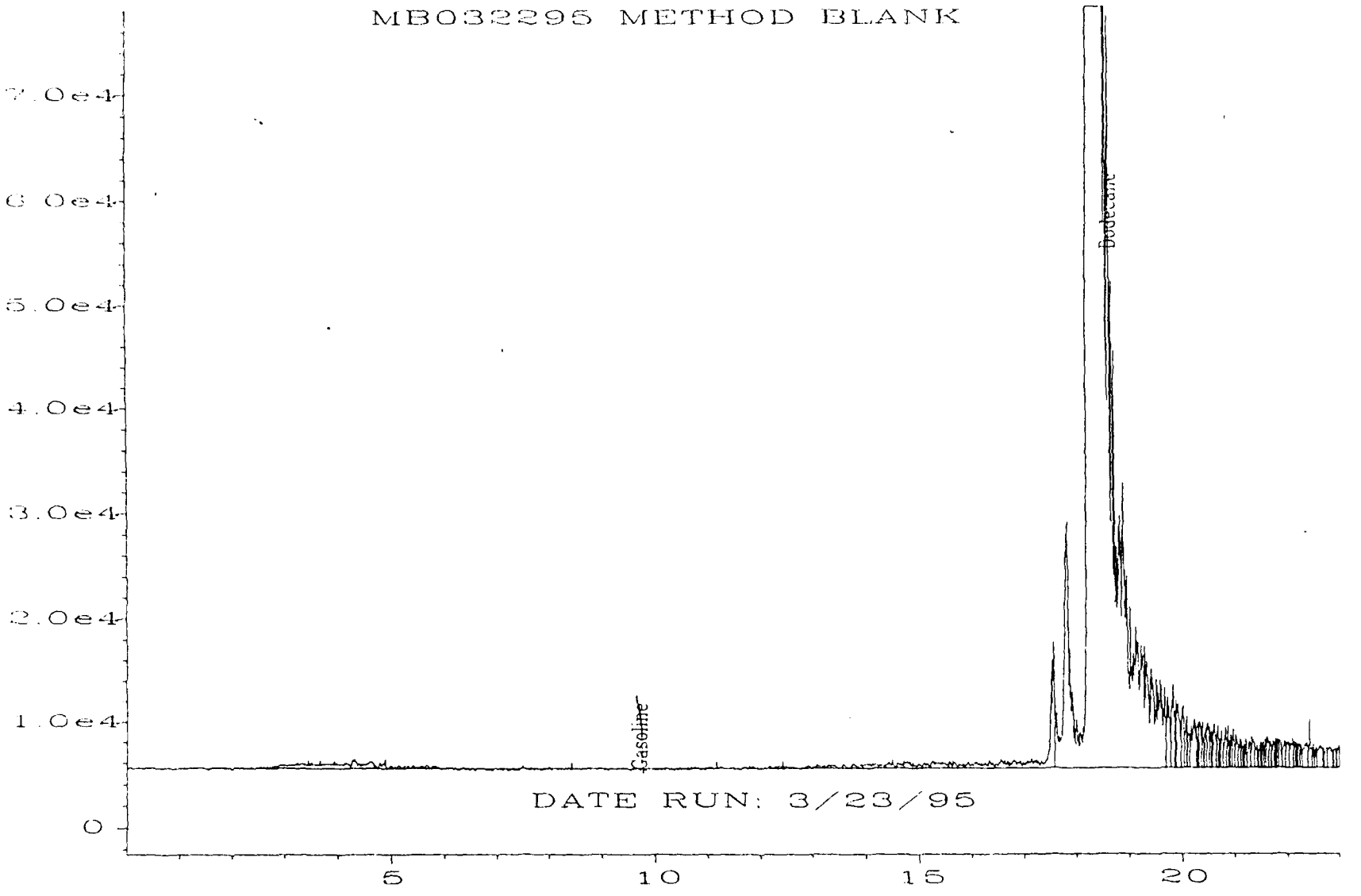
QUALIFIERS
U = TVH analyzed for but not detected.
B = TVH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
RL = Reporting Limit
* = Based on dry weight.

Analyst

Approved

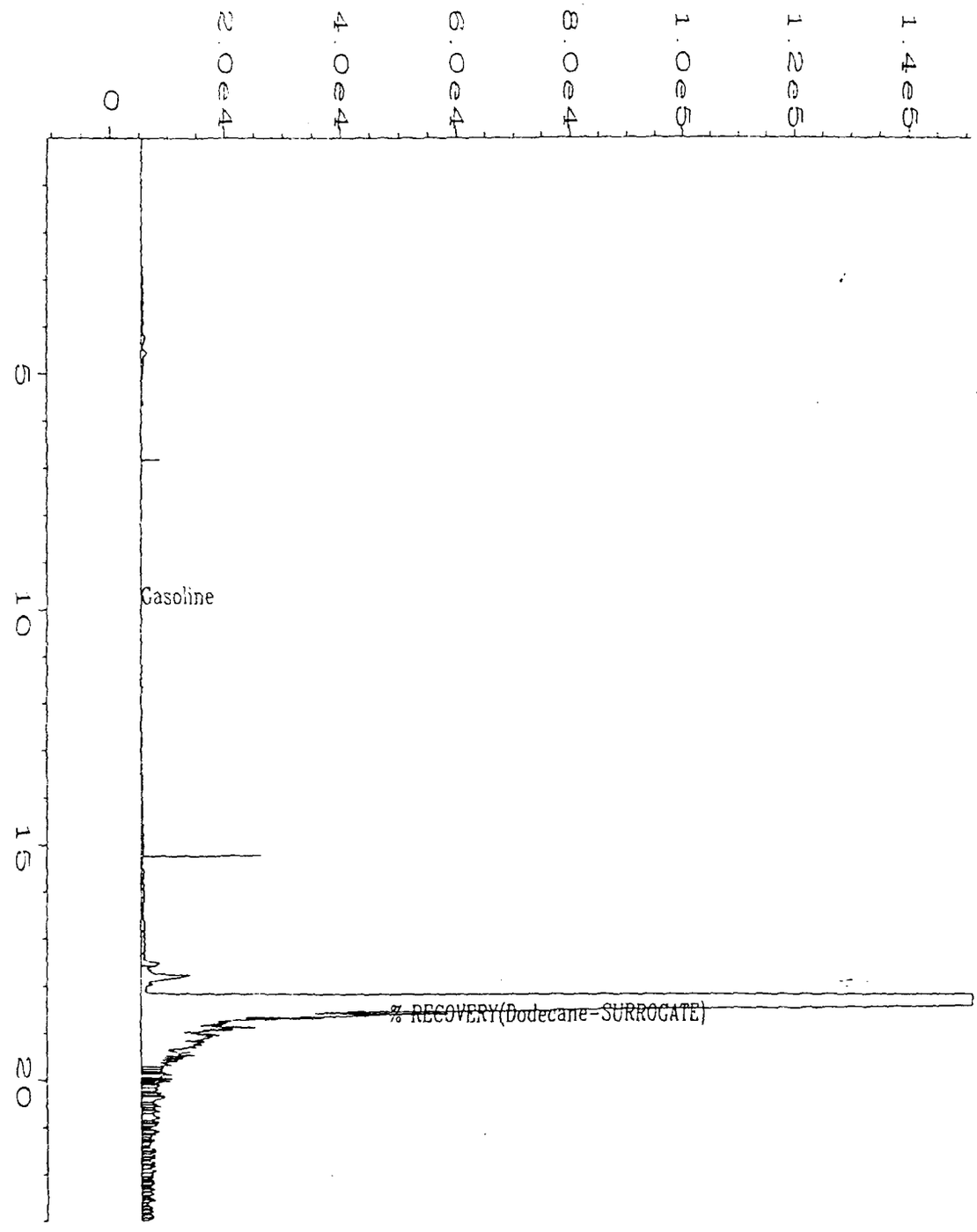


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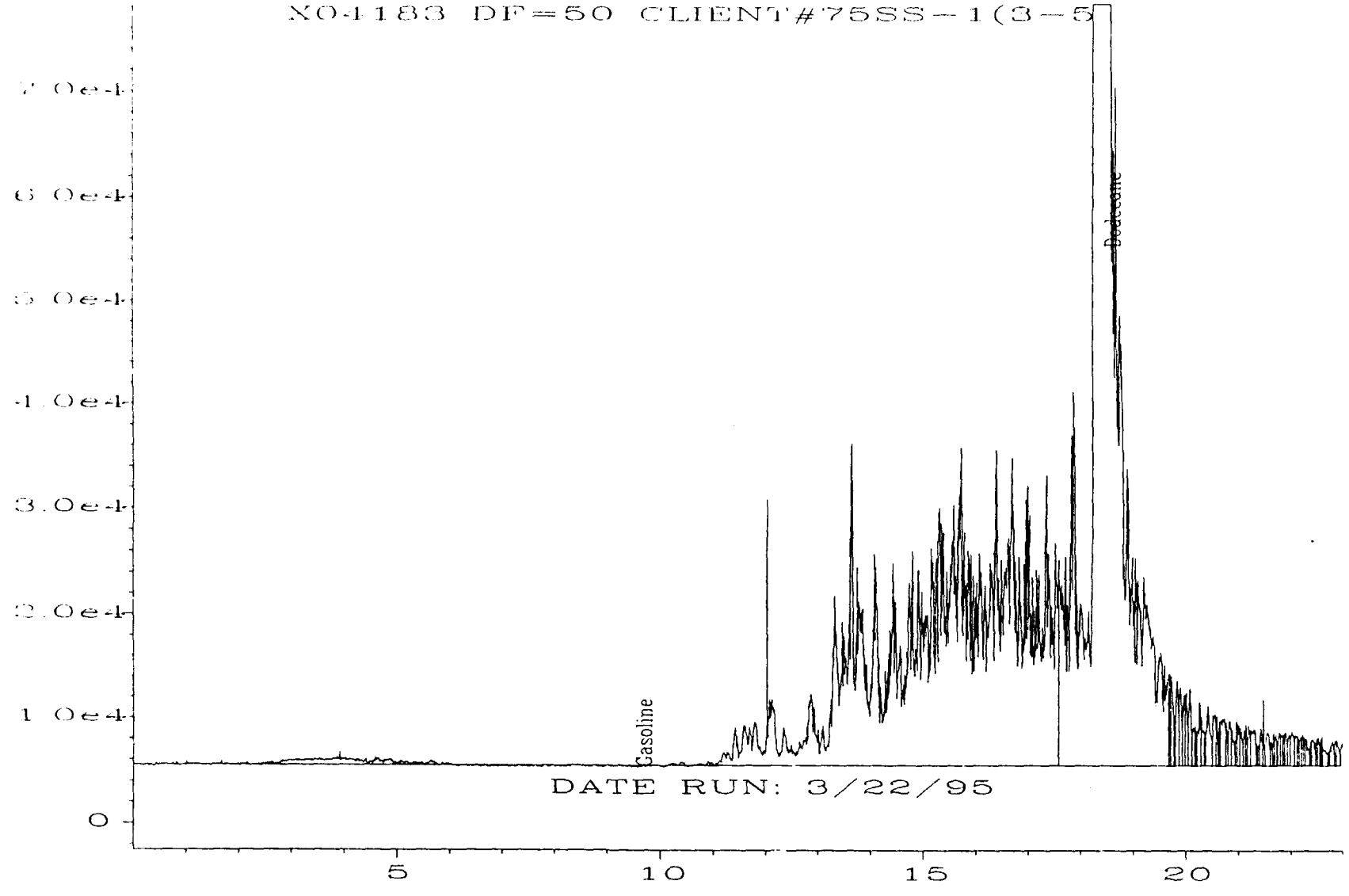


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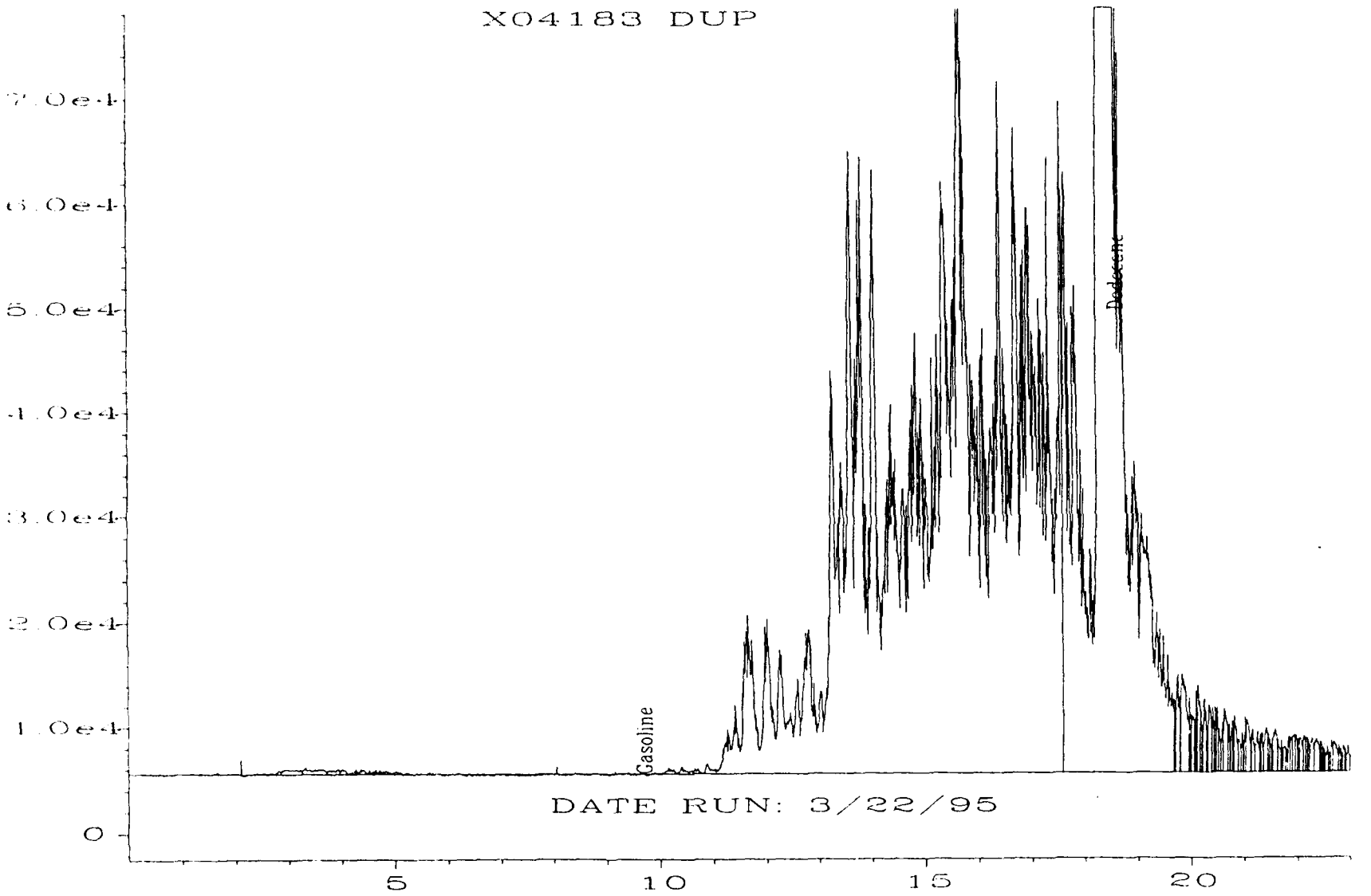
3/23/95



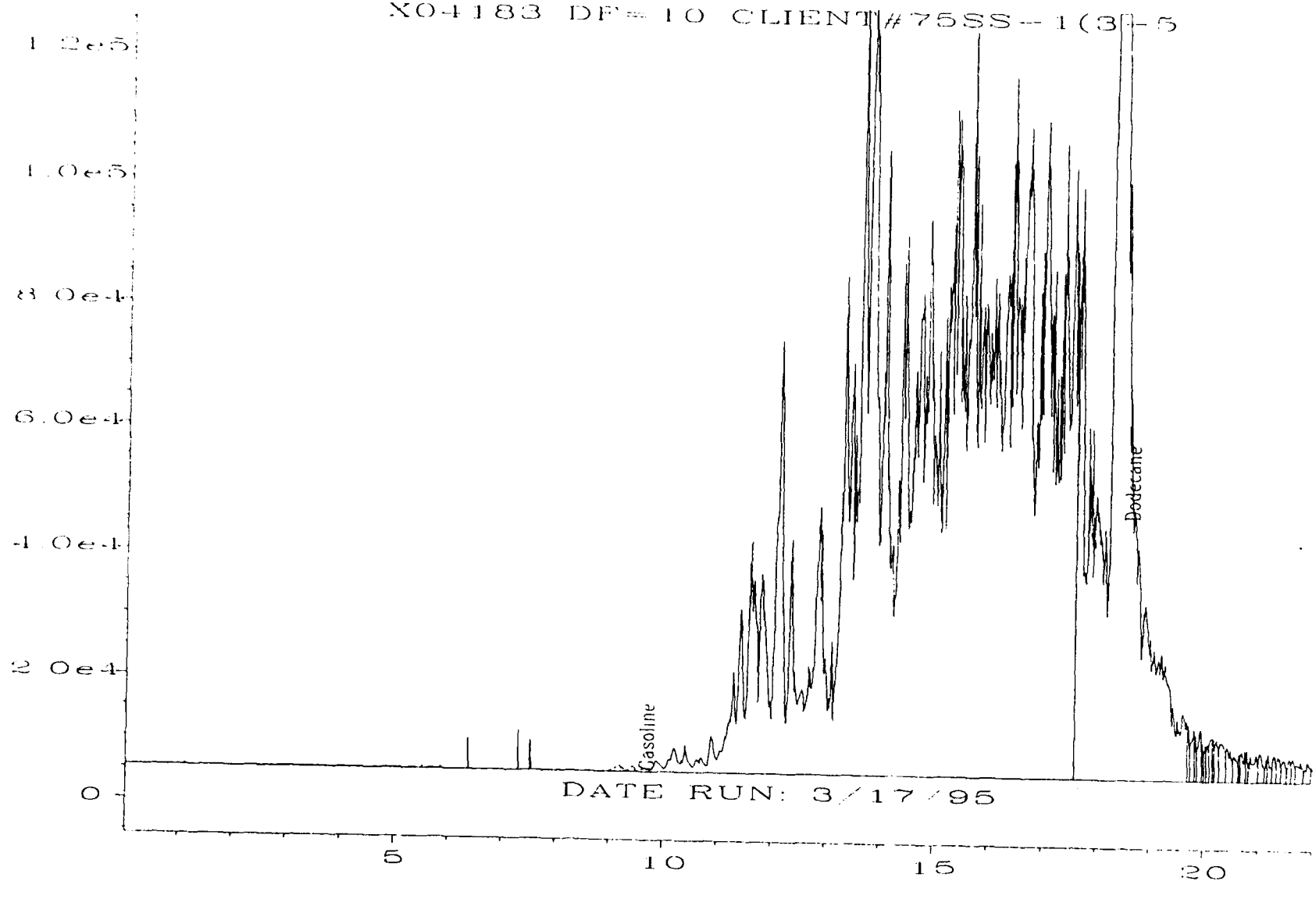
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perator	: Dawn N. Guildner	Page Number	: 1
nstrument	: TVH	Vial Number	: 1
ample Name	: MB032395	Injection Number	: 1
un Time Bar Code:		Sequence Line	: 1
cquired on	: 23 Mar 95 05:56 PM	Instrument Method	: TVH0323.MTH
eport Created on:	23 Mar 95 06:20 PM	Analysis Method	: TVH0323.MTH
ast Recalib on	: 23 MAR 95 12:18 PM	Sample Amount	: 0
ultiplier	: 1	ISTD Amount	:



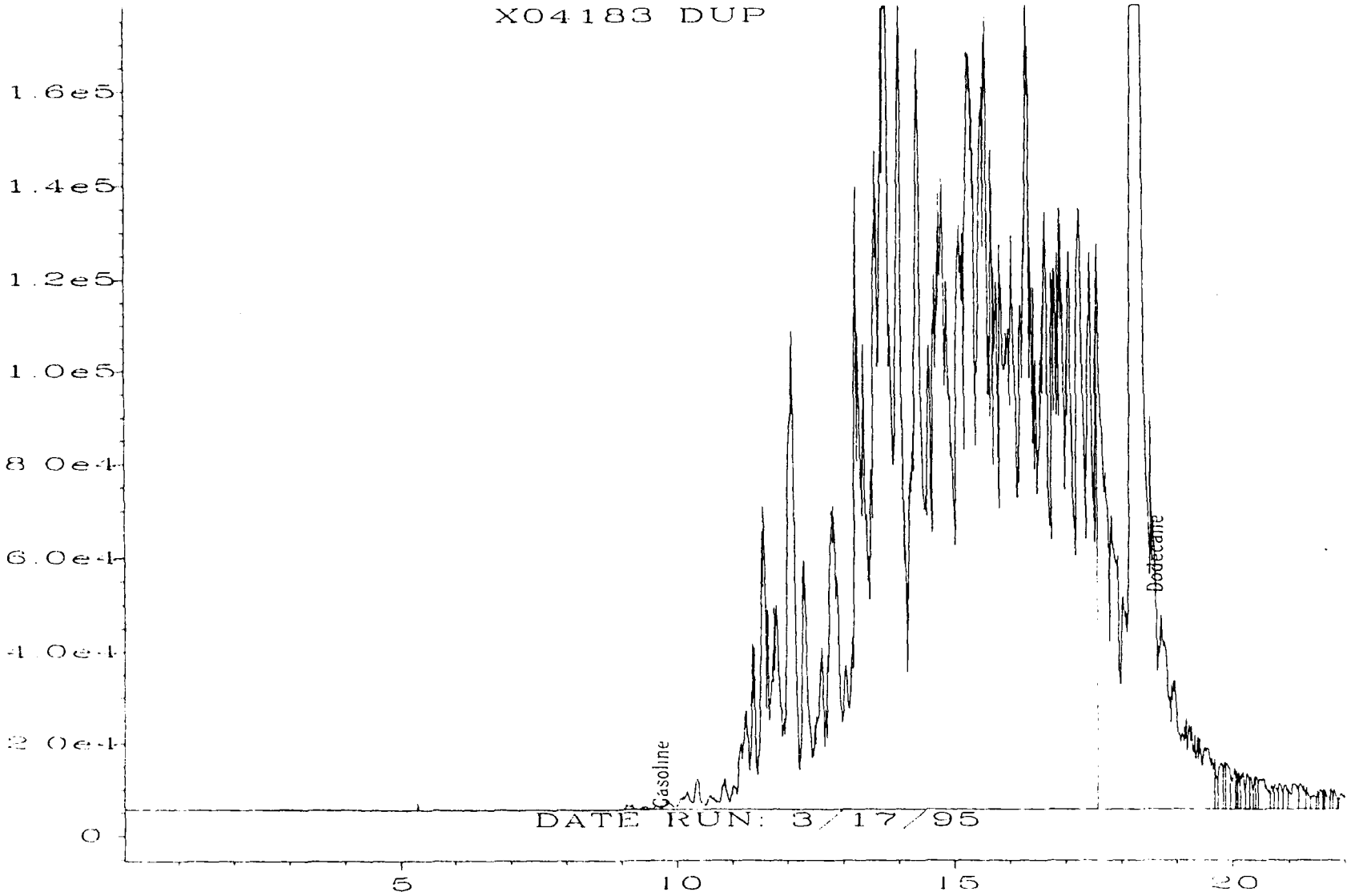
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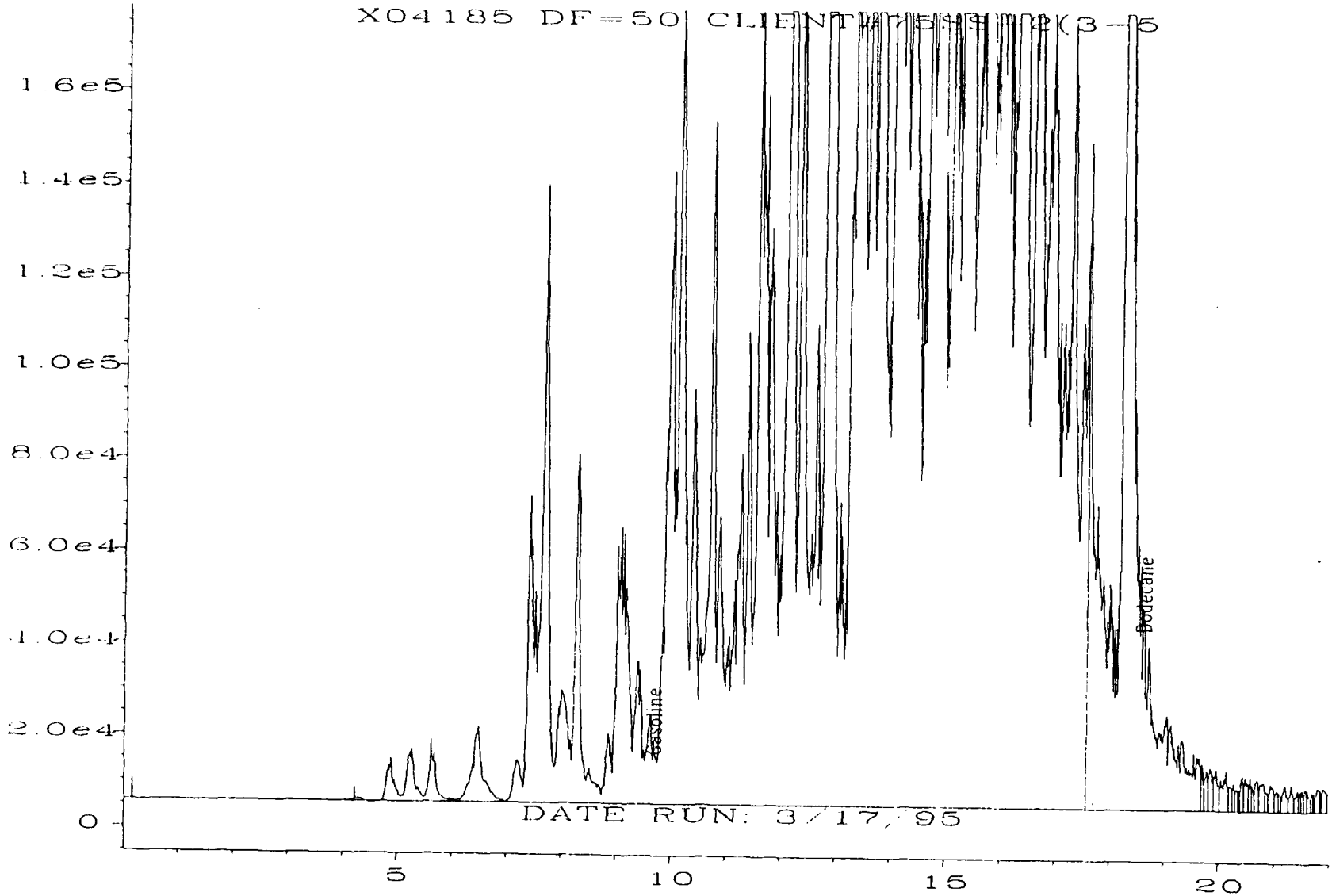
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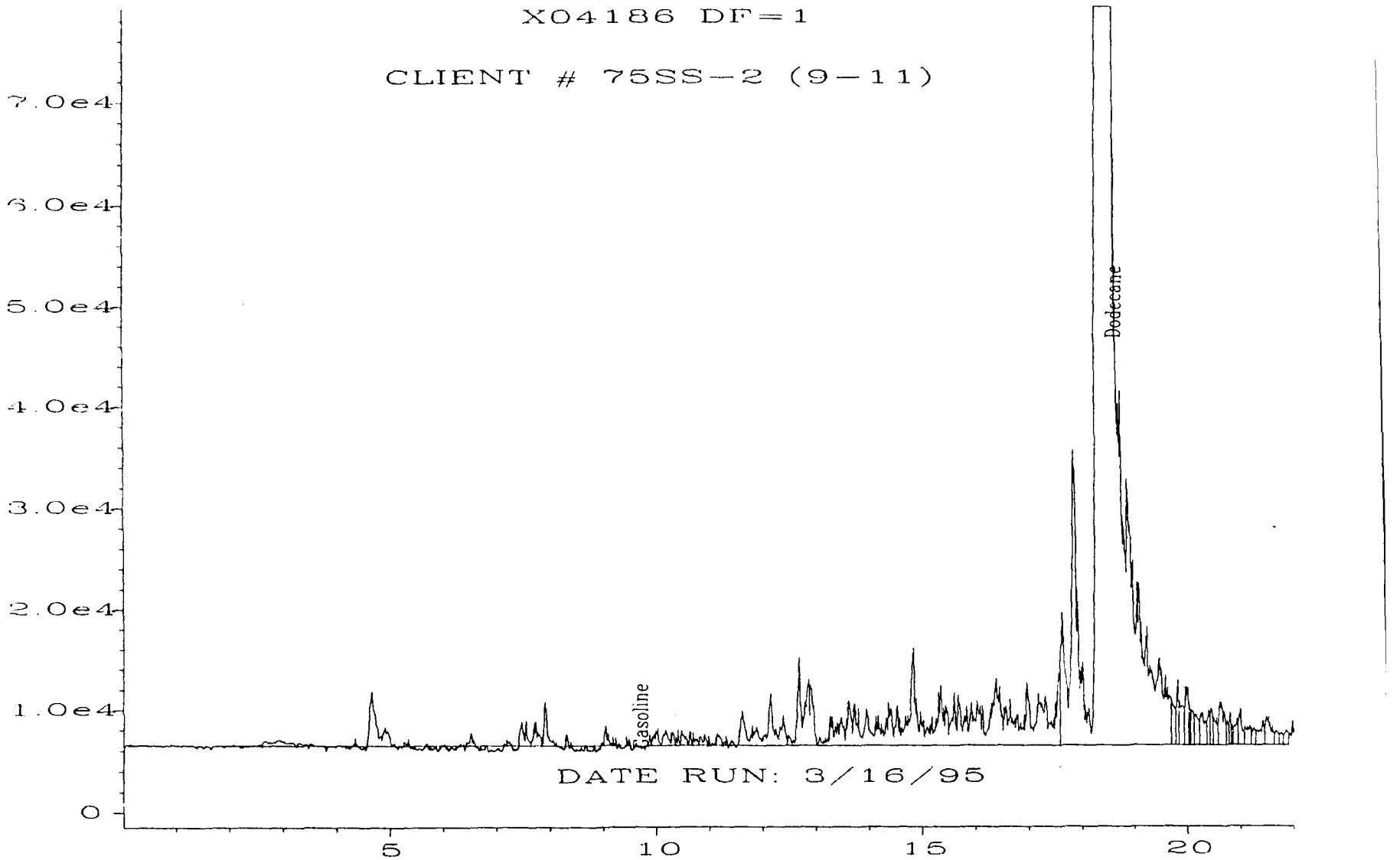
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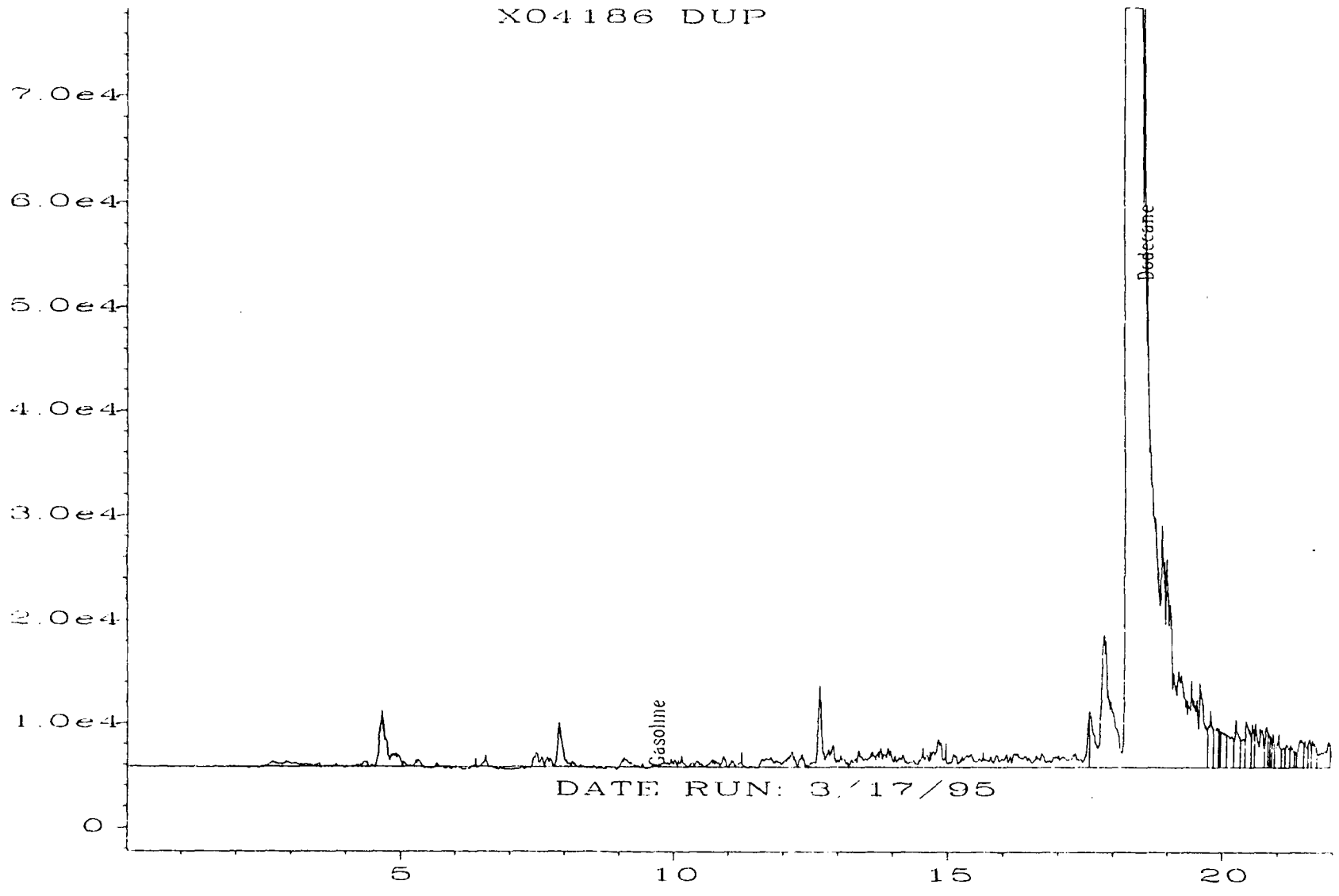
Sig 1 in C:\HPCHEM\1\DATA\TVH0316\031F0101.D



Sig. 1 in C:\HPCHEM\1\DATA\TVH0316\032F0101.D



Sig 1 in C:\HPCHEM\1\DATA\TVH0316\025F0101.D



Sig. 1 in C:\HPCHEM\1\DATA\TVH0316\026F0101.D

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS (TVH)
Laboratory Control Sample (LCS)

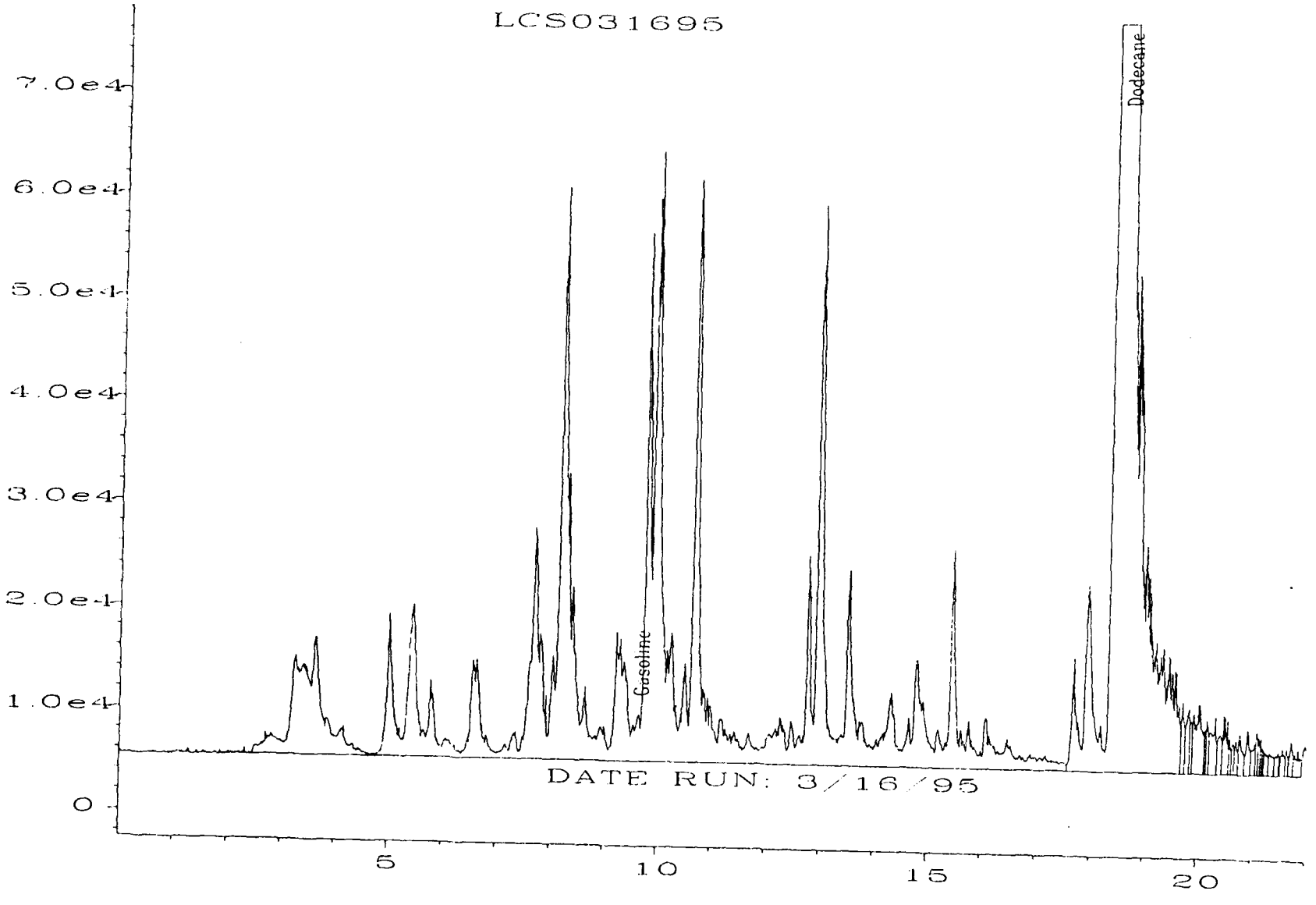
LCS Number	: LCS031695	Client Project Number	: 722450.21020/MACDILL AFB
Date Prepared	: 3/16/95	Lab Project Number	: 95-0820
Date Analyzed	: 3/16/95	Matrix	: SOIL
Sequence Number	: TVH12	Method Number	: 5030/8015 MOD.

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/ L	QC Limit mg/L
Gasoline	5.00	6.21	3.5-6.5

QUALIFIERS
U = TEH analyzed for but not detected.
B = TEH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

Analyst

Approved



Sig. 1 in C:\HPCHEM\1\DATA\TVH0316\012F0101.D

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS (TVH)
Laboratory Control Sample (LCS)

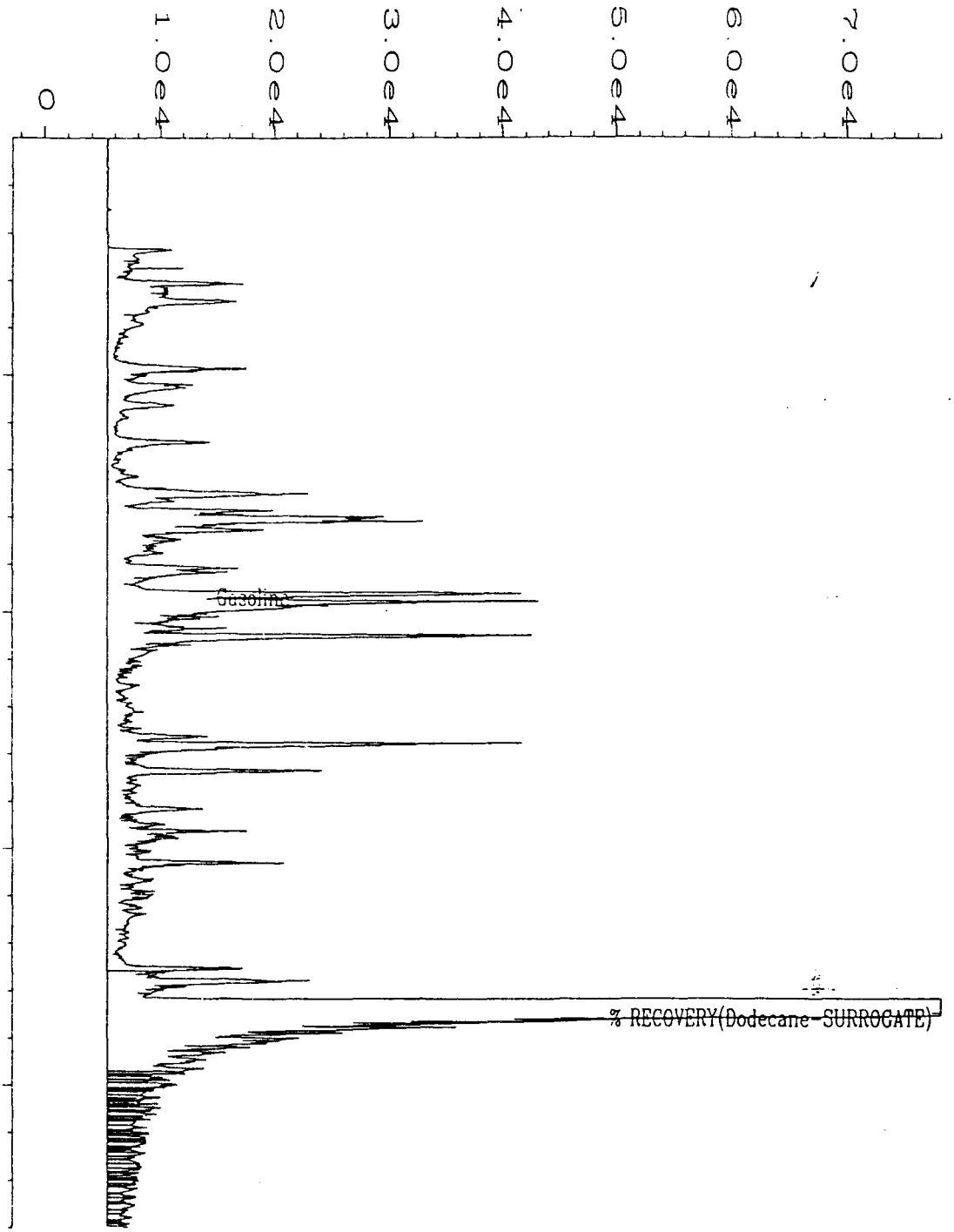
LCS Number	: LCS032395	Client Project Number	: 722450.21020/MACDILL AFB
Date Prepared	: 3/23/95	Lab Project Number	: 95-0820
Date Analyzed	: 3/23/95	Matrix	: SOIL
Sequence Number	: TVH3	Method Number	: 5030/8015 MOD.

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/L	QC Limit mg/L
Gasoline	5.00	3.92	3.5-6.5

QUALIFIERS
U = TEH analyzed for but not detected.
B = TEH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

Analyst

Approved



ta File Name	: C:\HPCHEM\1\DATA\tvh0323\003F0101.D		
erator	: Dawn N. Guildner	Page Number	: 1
strument	: TVH	Vial Number	: 3
mple Name	: LCS032395	Injection Number	: 1
Time Bar Code:		Sequence Line	: 1
ired on	: 23 Mar 95 07:20 PM	Instrument Method	: TVH0323.MTH
port Created on:	23 Mar 95 07:44 PM	Analysis Method	: TVH0323.MTH
st Recalib on	: 23 MAR 95 12:18 PM	Sample Amount	: 0
ltiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL EXTRACTABLE HYDROCARBONS (TEH)
Jet Fuel Boiling Range

Date Sampled	: 3/8,9,10,13/95	Client Project Number	722450.21020/MAC DILL
Date Received	: 3/14/95		
Date Prepared	: 3/15,17/95	Lab Project Number	: 95-0820
Date Analyzed	: 3/18-20,22/95	Matrix	: SOIL
		Method Number	: 3500/MOD.8015

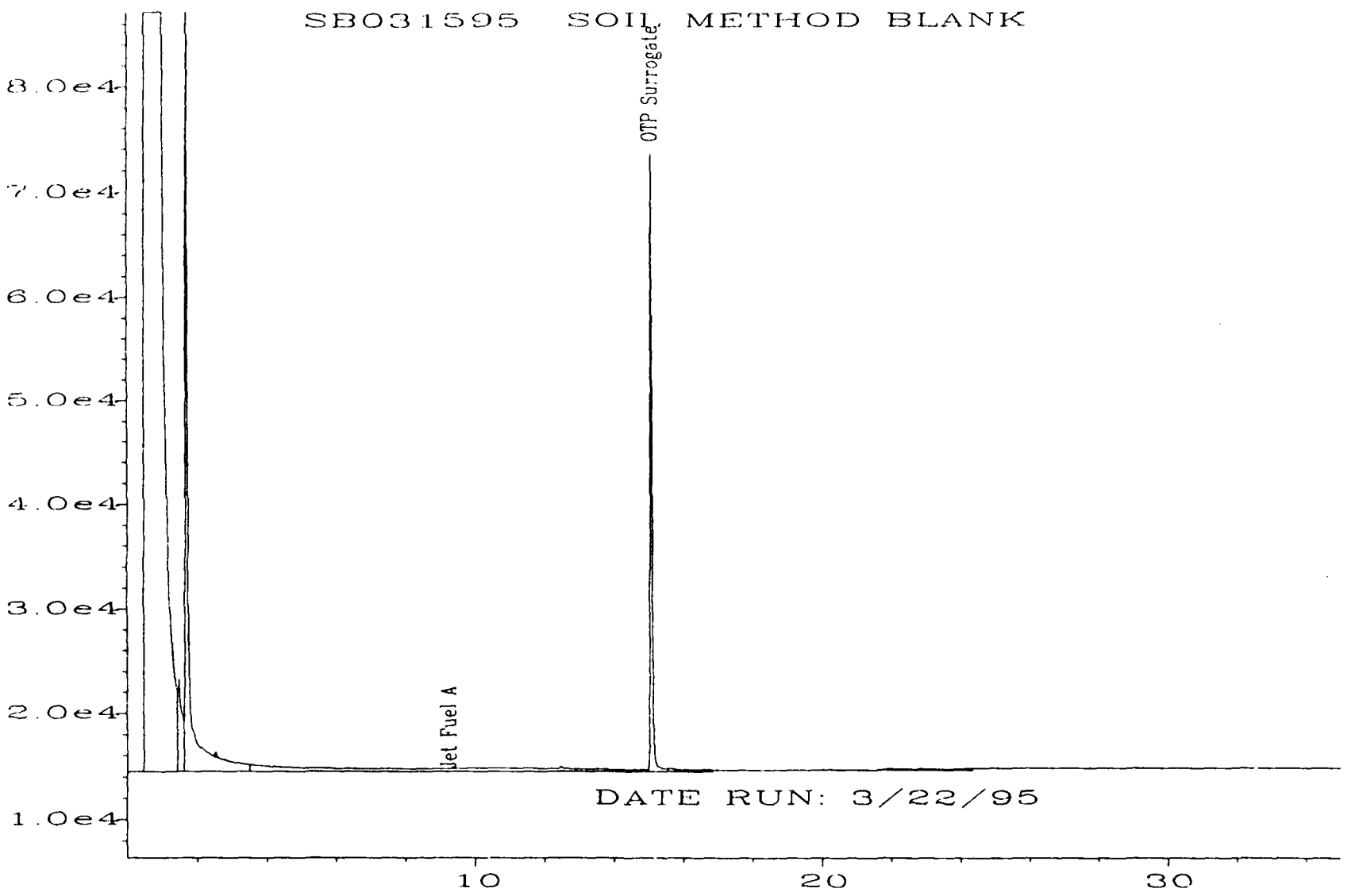
Evergreen Sample #	Client Sample #	Surrogate Recovery	TEH * mg/Kg	MDL mg/Kg
SB031595	SOIL METHOD BLANK	81%	U	10
SB031795	SOIL METHOD BLANK	77%	U	10
X04173	24 MP-1A(3'-4')	87%	U	11
X04174	24 MP-1B(8'-9')	84%	140	12
X04175	24 MP-2 (3'-4')	89%	11	11
X04176	24 MP-3 (3-5)	85%	U	11
X04177	24 MP-4 (3-5)	85%	U	11
X04178	24 MP-5 (3-5)	85%	U	12
X04179	24 MP-6 (4-6)	83%	U	12
X04181	24SS-1 (4-6)	90%	210	12
X04182	24SS-2(4-6)	80%	32	12
X04183	75SS-1 (3-5)	79%	13	12
X04185	75SS-2(3-5)	**	15000	550
X04186	75SS-2(9-11)	78%	16	12
X04186 DUP	75SS-2(9-11)	86%	U	12

** = Unable to separate surrogate from analyte.
* = Sample and MDL values are reported on a dry weight basis.

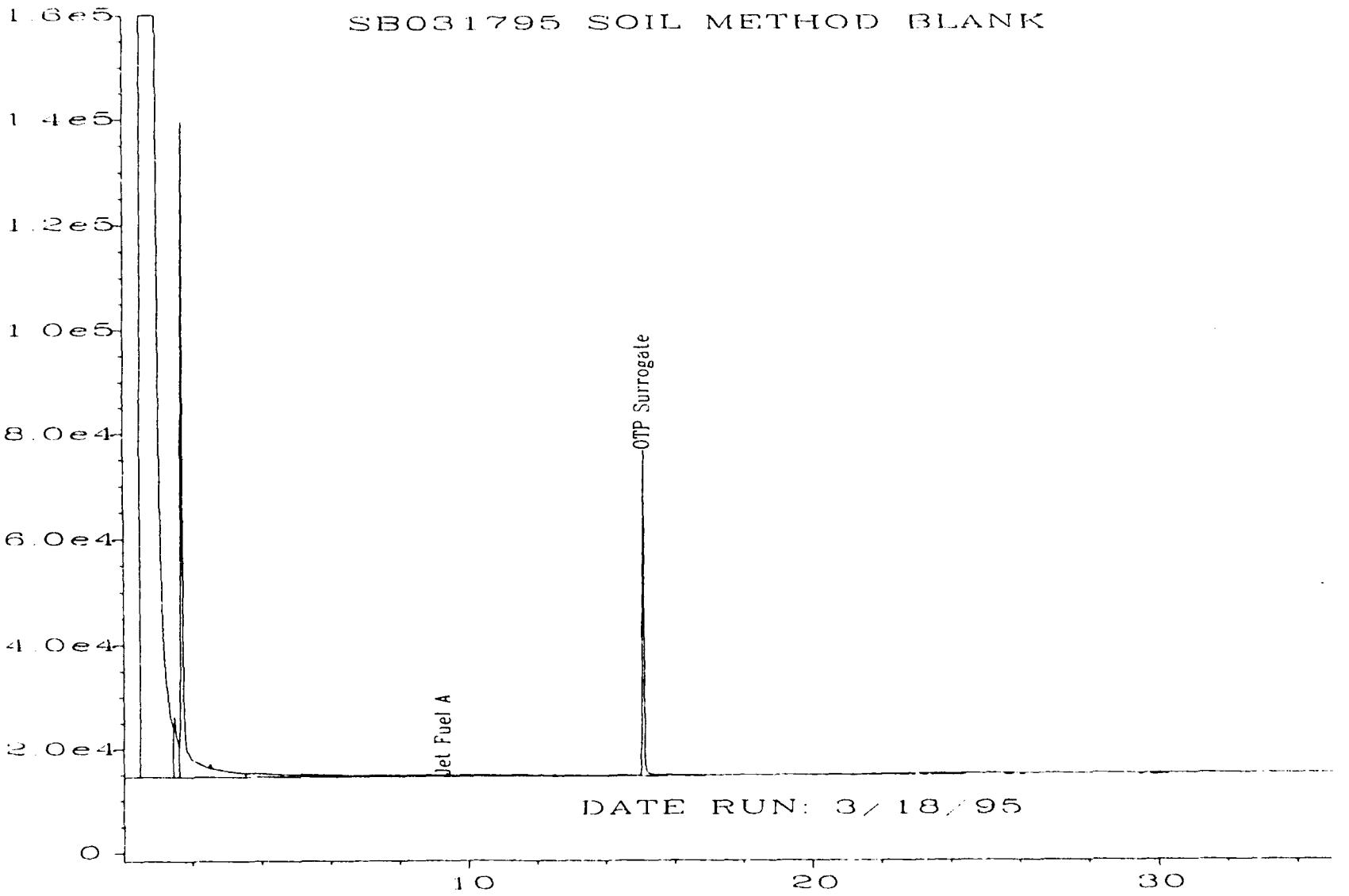
QUALIFIERS
U = TEH analyzed for but not detected.
B = TEH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
MDL = Method Detection Limit

Analyst

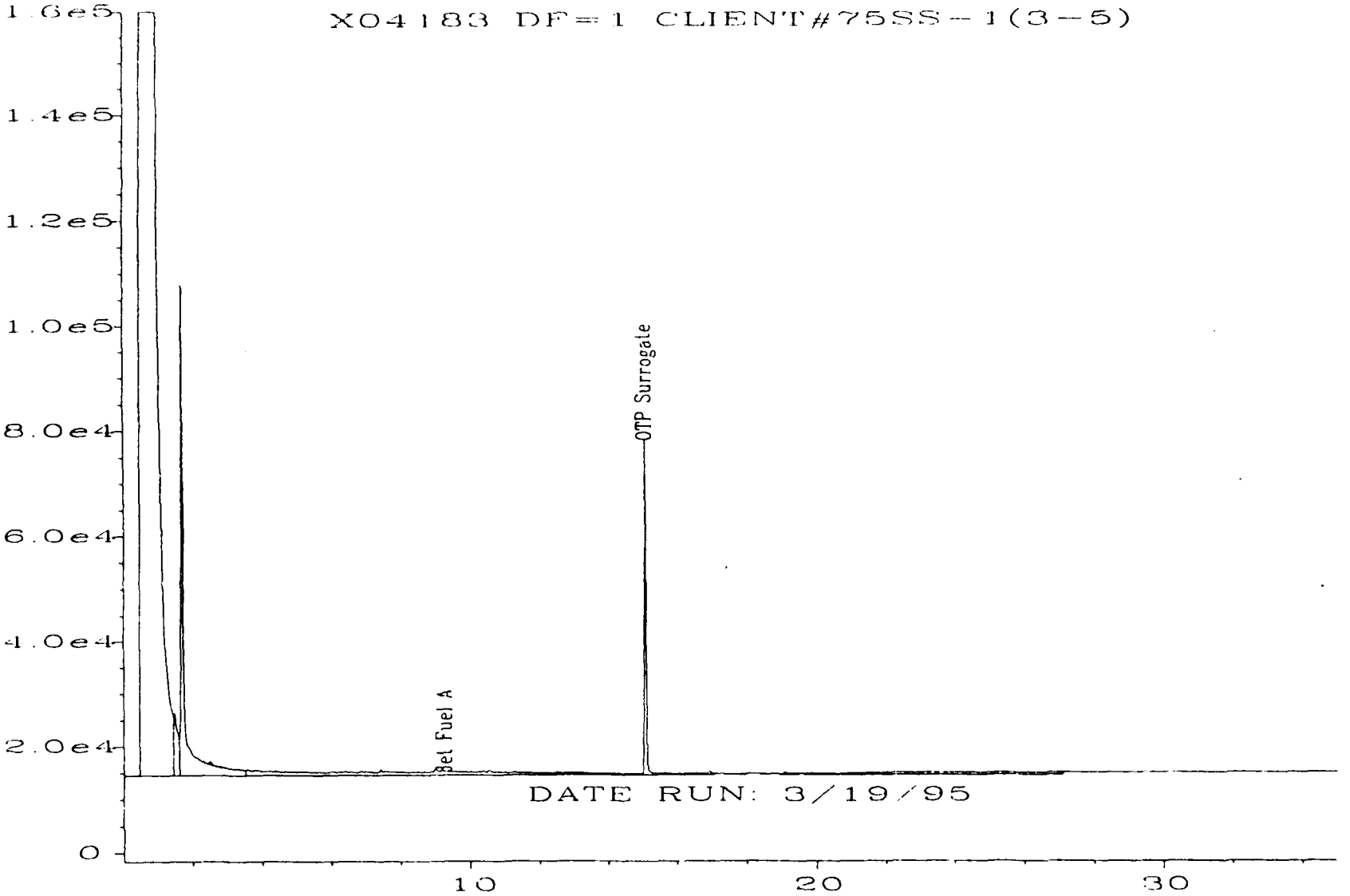
Approved



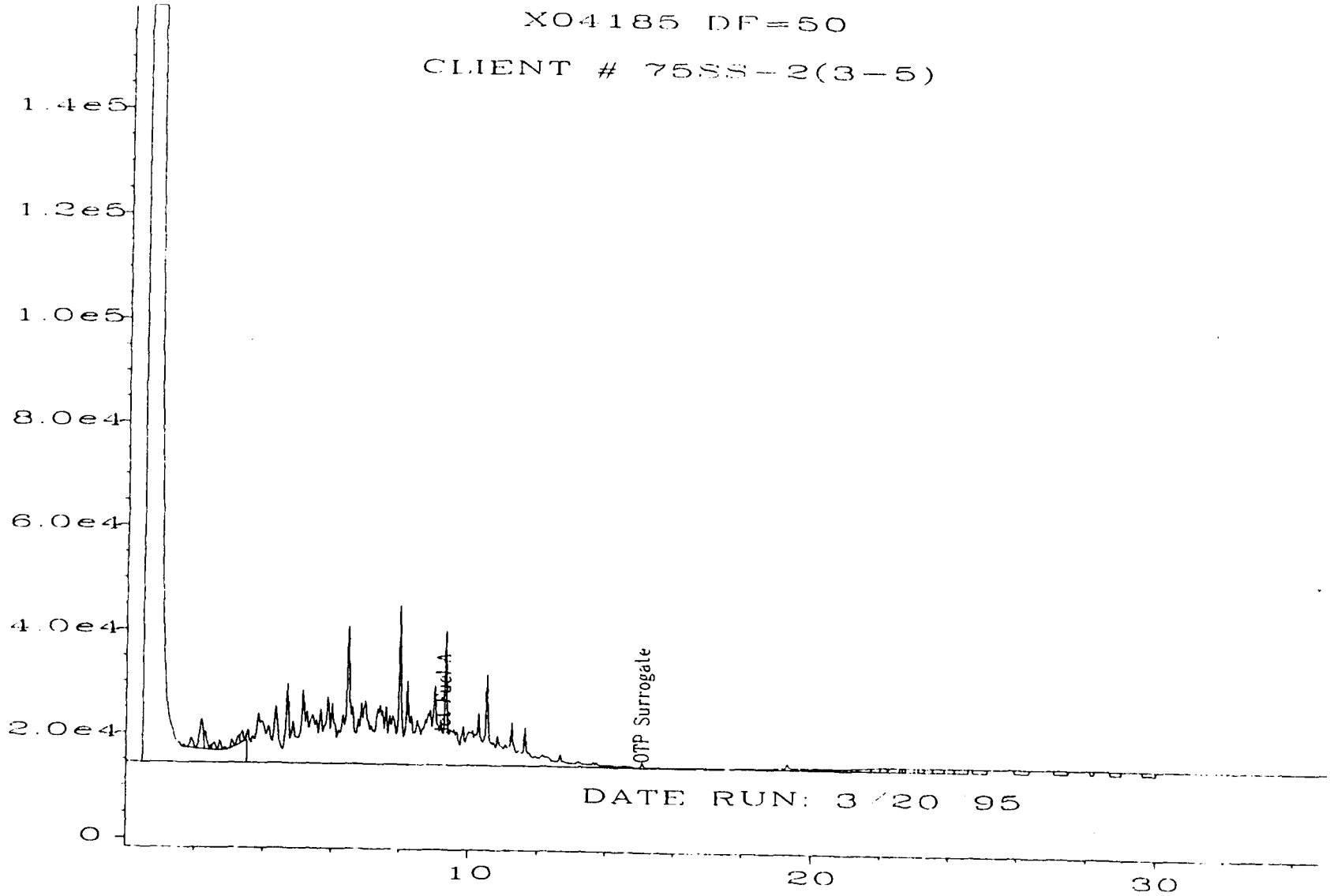
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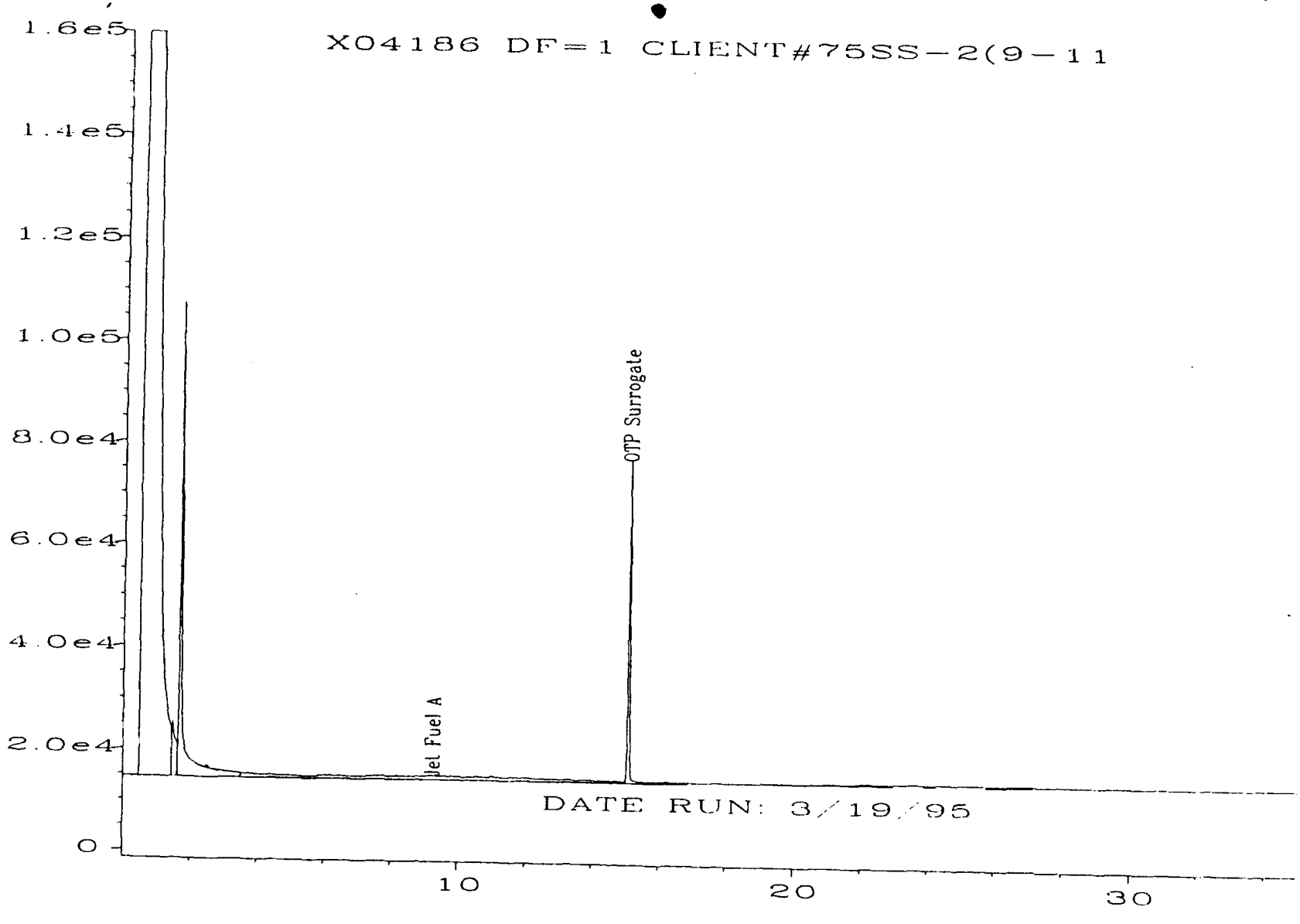
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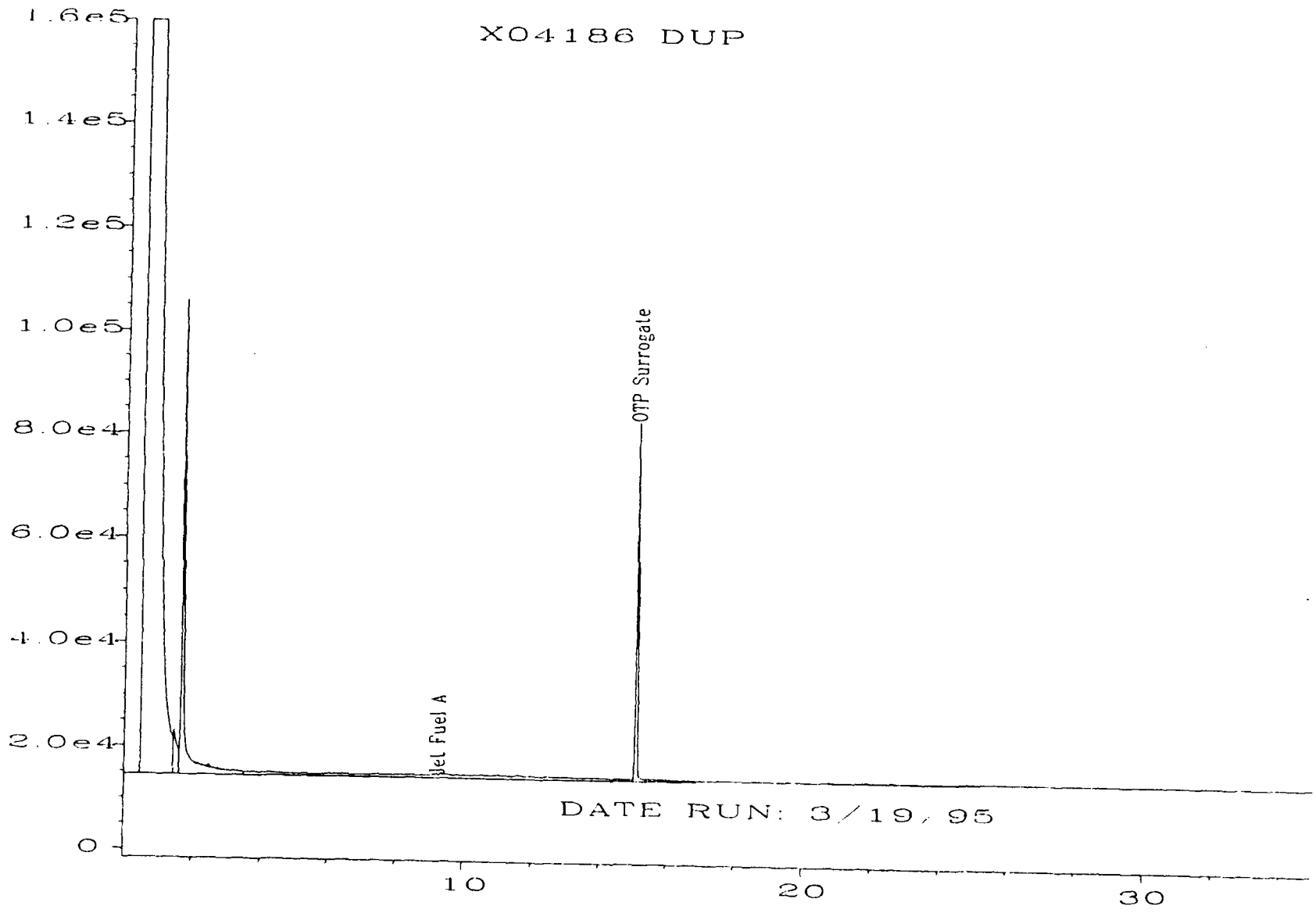
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Sig. 2 in C:\HPCHEM\2\DATA\TEH0320\009R0101.D



Sig. 2 in C:\HPCHEM\2\DATA TEH0317 065R0101.D



Sig. 2 in C:\HPCHEM\2\DATA\TEH0317\066R0101.D

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL EXTRACTABLE HYDROCARBONS (TEH)
Laboratory Control Sample (LCS)

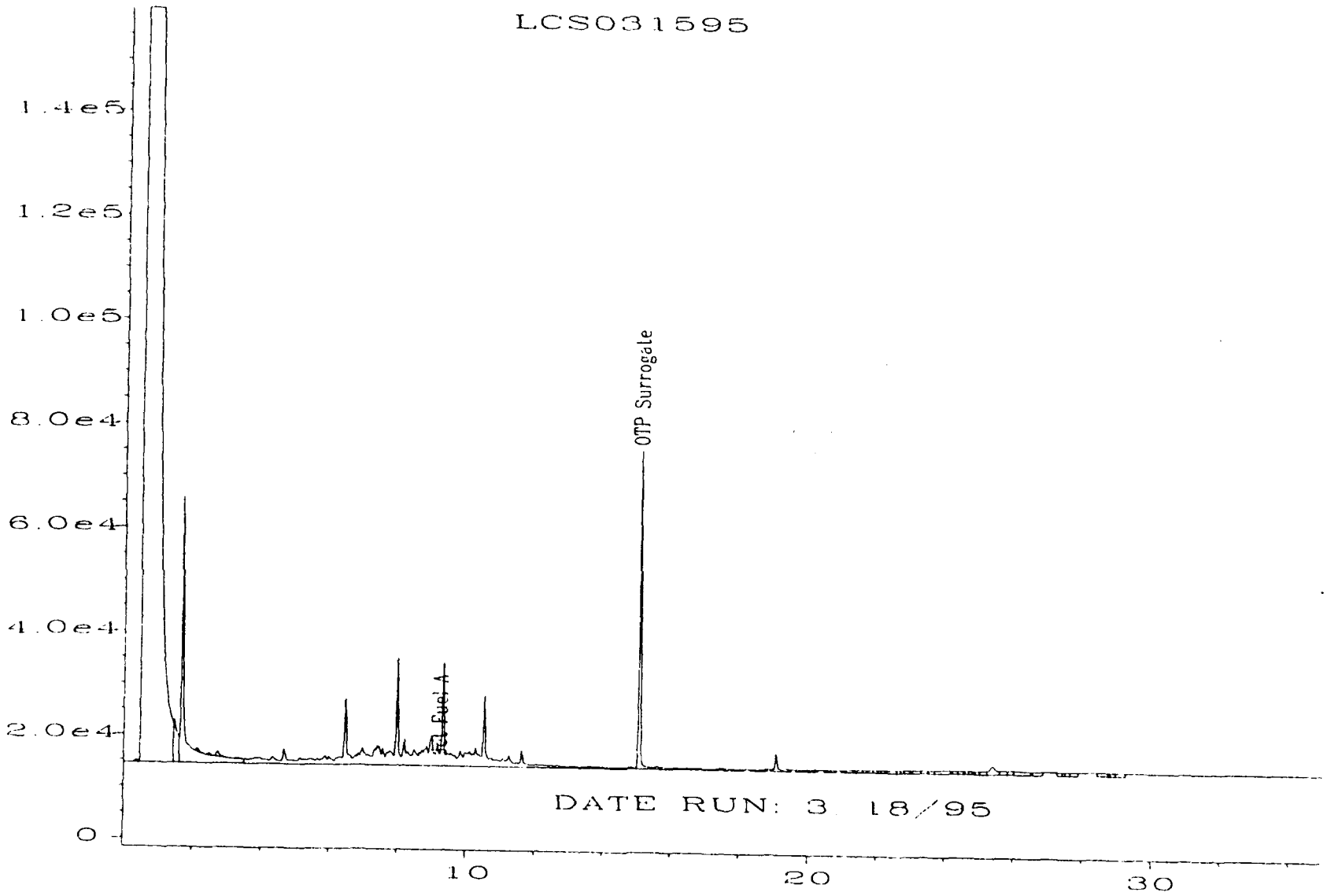
LCS Number	: LCS031595	Client Project Number	: 722450.21020/MAC DILL
Date Prepared	: 3/15/95	Lab Project Number	: 95-0820
Date Analyzed	: 3/18/95	Matrix	: SOIL
Sequence Number	: TEH21	Method Number	: 3500/Mod. 8015

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/Kg	QC Limit mg/Kg
JET FUEL	1000	960	750-1750

QUALIFIERS
U = TEH analyzed for but not detected.
B = TEH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

Analyst

Approved



Sig. 2 in C:\HPCHEM\2\DATA\TEH0317\021R0101.D

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

Date Sampled	: 3/8-13/95	Client Project ID.	: 722450.21020
Date Received	: 3/14/95	Lab Project No.	: 95-0820
Date Prepared	: 3/15/95	Matrix	: Soil
Date Analyzed	: 3/15/95	Method	: EPA 160.3

Evergreen Sample #	Client Sample ID	Moisture (%)
X04173	24MP-1A (3'-4')	10.1
X04174	24MP-1B (8'-9')	16.8
X04175	24MP-2 (3'-4')	16.1
X04176	24MP-3 (3-5)	14.6
X04177	24MP-4 (3-5)	14.8
X04178	24MP-5 (3-5)	17.5
X04179	24MP-6 (4-6)	17.6
X04181	24SS-1 (4-6)	16.0
X04182	24SS-2 (4-6)	13.7
X04183	75SS-1 (3-5)	16.7
X04185	75SS-2 (3-5)	11.3
X04186	75SS-2 (9-11)	18.0

Analyst

Approved

0420tm 4

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street - Golden, CO 80403

NON-CLP ANALYSIS RESULTS

Date: 03/24/95
Lab Name: Huffman Labs — Client: Evergreen Analytical
Contact: Sue Zeller — Contact: Patty McClellan
Sample Matrix: soil — Huffman Lab #: 143595

Client Smp#	Lab ID #	Element/ Compound	Dilution Factor	Results	Units	Prep Date	Analysis Date	Sample Size (g)	Method #	Instrument ID
75SS-4 (3-4)	14359501	TC	NA	<0.05	%	NA	03/23/95	2.195	Leco CR12	#7
75SS-4 (3-4)	14359501	TC	NA	<0.05	%	NA	03/23/95	2.067	Leco CR12	#7
75SS-6 (3-5)	14359502	TC	NA	<0.05	%	NA	03/23/95	2.154	Leco CR12	#7
75MP-7 (4-6)	14359503	TC	NA	<0.05	%	NA	03/23/95	3.332	Leco CR12	#7
75MP-17 (4-6)	14359504	TC	NA	<0.05	%	NA	03/23/95	2.889	Leco CR12	#7
24MP-7 (2-4)	14359505	TC	NA	<0.05	%	NA	03/23/95	3.555	Leco CR12	#7
24MP-3 (3-5)	14359506	TC	NA	0.21	%	NA	03/23/95	3.331	Leco CR12	#7
24MP-4 (3-5)	14359507	TC	NA	0.13	%	NA	03/23/95	2.908	Leco CR12	#7
24MP-6 (4-6)	14359508	TC	NA	2.21	%	NA	03/23/95	3.093	Leco CR12	#7
24MP-16 (4-6)	14359509	TC	NA	0.73	%	NA	03/23/95	3.394	Leco CR12	#7
75SS-4 (3-4)	14359501	CC	NA	<0.02	%	NA	03/21/95	0.111	COU-02	"tower"
75SS-4 (3-4)	14359501	CC	NA	<0.02	%	NA	03/21/95	0.259	COU-02	"tower"
75SS-6 (3-5)	14359502	CC	NA	<0.02	%	NA	03/21/95	0.185	COU-02	"tower"
75MP-7 (4-6)	14359503	CC	NA	<0.02	%	NA	03/21/95	0.248	COU-02	"tow
75MP-17 (4-6)	14359504	CC	NA	<0.02	%	NA	03/21/95	0.221	COU-02	"tower
24MP-7 (2-4)	14359505	CC	NA	<0.02	%	NA	03/21/95	0.127	COU-02	"tower"
24MP-3 (3-5)	14359506	CC	NA	<0.02	%	NA	03/21/95	0.130	COU-02	"tower"
24MP-4 (3-5)	14359507	CC	NA	<0.02	%	NA	03/21/95	0.128	COU-02	"tower"
24MP-6 (4-6)	14359508	CC	NA	<0.02	%	NA	03/21/95	0.138	COU-02	"tower"
24MP-16 (4-6)	14359509	CC	NA	<0.02	%	NA	03/21/95	0.165	COU-02	"tower"
		% moisture			result					
75SS-4 (3-4)	14359501	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
75SS-4 (3-4)	14359501	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
)871 75SS-6 (3-5)	14359502	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
75MP-7 (4-6)	14359503	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
75MP-17 (4-6)	14359504	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
)819 24MP-7 (2-4)	14359505	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
24MP-3 (3-5)	14359506	TOC	NA	0.21 0.35	%	NA	NA	NA	by calc	NA
)820 24MP-4 (3-5)	14359507	TOC	NA	0.13 0.15	%	NA	NA	NA	by calc	NA
24MP-6 (4-6)	14359508	TOC	NA	2.21 2.68	%	NA	NA	NA	by calc	NA
24MP-16 (4-6)	14359509	TOC	NA	0.73 0.87	%	NA	NA	NA	by calc	NA

Samples analyzed and results reported on an as received basis.
Soil samples are not homogeneous.
Values reported below Detection Limits are for reference only.
TC detection limit = 0.05%
CC detection limit = 0.02%
TOC detection limit = 0.05%

e numbers to the left above represent the last four digits of the EAL project
nber under which the samples were analyzed.
e original report and quality control results are filed with EAL project 95-08

Evergreen

CASE NARRATIVE

Evergreen Analytical Project (EAL) #: 95-0819

Parsons Engineering Science, Inc. (PES) Project: MacDill AFB (722450.21020)

Sample Receipt
On March 13, 1995, eight soil samples and one Rinseate Blank were received in good condition at Evergreen Analytical Laboratory. Refer to the EAL Sample Log Sheet for specific log-in information and cross-reference of EAL and PES sample identifications.

BTEX, Chlorobenzene, 1,3,5-trimethylbenzene (TMB), 1,2,4-TMB, 1,2,3-TMB, and 1,2,3,4-Tetramethylbenzene (TEMB), hereafter referred to as BTEX.

BTEX, Soil Matrix, Method SW8020
There were no quality control anomalies to report.

PES sample number 24MP-8(2-4) and 24MW-6(2-4) were analyzed at a dilution due to the inability to purge at DF=1. The reporting limits were raised accordingly.

Total Volatile Hydrocarbon (TVH), Soil Matrix, Method 8015M
There were no quality control anomalies to report.

Total Extractable Hydrocarbons, (TEH), Soil Matrix, Method 8015M, JET-A.
There were no laboratory duplicates, matrix spike or matrix spike duplicate samples analyzed with this batch due to insufficient sample volume. There were no other quality control anomalies to report.

Total Organic Carbon in Soil
Total Organic Carbon (TOC) in Soil was analyzed by Huffman Research, Inc. of Golden, Colorado. TOC was determined by analyzing for total carbon (TC) and inorganic (carbonate) carbon (CC), then calculating the difference as TOC. The report from Huffman is included.

Patricia A. McClellan, Project Manager

Evergreen Analytical Sample Log Sheet

Project # 95-0819

Date(s) Sampled: 03/10,11/95 COC

Date Due: 03/17/95

Date Received: 03/14/95 1000

Holding Time(s): 03/24,25-BTEX,TVH,T

Client Project I.D. 722450.21020/MAC DILL

Rush STANDARD

Client: Parsons Engineering Science, Inc.

Address: 1700 Broadway Suite 900
Denver, CO 80290

Contact: TODD WIEDEMEIER

Client P.O. _____

Phone #831-8100 **Fax #**831-8208

Shipping Charges N/A

E.A. Cooler # 422

Airbill # 9581826225 FEDEX

Custody Seal Intact? Y
Cooler X Bottles ___
COC Present Y
Sample Tags Present? Y
Sample Tags Listed? Y
Sample(s) Sealed? Y

Special Invoicing/Billing _____

Special Instructions **REPORT SOILS ON A DRY WEIGHT BASIS. $PLUS TMB, TEMB AND CHLOROBENZENE.** ANALYZE AN MS/MSD AND LAB DUPLICATE ON THIS CLIENT'S SAMPLES

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
X04163A/B	24MP-7(2-4)	$BTEX 8020	S	2WM	2
X04164A/B	24MP-8(2-4)	$BTEX 8020	S	2WM	2
X04165A/B	24MP-9(3-5)	$BTEX 8020	S	2WM	2
X04166A/B	24MP-9(9-11)	$BTEX 8020	S	2WM	2
X04167A/B	24MP-10(2-4)	$BTEX 8020	S	2WM	2
X04168A/B	24MW-6(2-4)	$BTEX 8020	S	2WM	2
X04169A/B	24MW-6(9-11)	$BTEX 8020	S	2WM	2
X04170A/B	175MP-1(3-5)	$BTEX 8020	S	2WM	2
X04171A/B	RINSATE BLANK	$BTEX 8020	W	40V	2
X04172A/B	TRIP BLANK	$BTEX 8020	W	40V	2
X04163C	24MP-7(2-4)	TVH	S	2WM	2
X04164C	24MP-8(2-4)	TVH	S	2WM	2
X04165C	24MP-9(3-5)	TVH	S	2WM	2
X04166C	24MP-9(9-11)	TVH	S	2WM	2
X04167C	24MP-10(2-4)	TVH	S	2WM	2
X04168C	24MW-6(2-4)	TVH	S	2WM	2
X04169C	24MW-6(9-11)	TVH	S	2WM	2
X04170C	175MP-1(3-5)	TVH	S	2WM	2

R=Sample to be returned

Route To: GC/MS ___ GC 4 Metals ___ Wet Chem 1 SxPrep 1 Acctg ___
SxRec C QA/QC C Sales C File Orig

Custodian/Date: 3/15/95

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
X04163D	24MP-7(2-4)	TEH	S	2WM	B2
X04164D	24MP-8(2-4)	TEH	S	2WM	B2
X04165D	24MP-9(3-5)	TEH	S	2WM	B2
X04166D	24MP-9(9-11)	TEH	S	2WM	B2
X04167D	24MP-10(2-4)	TEH	S	2WM	B2
X04168D	24MW-6(2-4)	TEH	S	2WM	B2
X04169D	24MW-6(9-11)	TEH	S	2WM	B2
X04170D	175MP-1(3-5)	TEH	S	2WM	B2
X04163F	24MP-7(2-4)	% MOISTURE	S	4WM	B2
X04164E	24MP-8(2-4)	% MOISTURE	S	4WM	B2
X04165E	24MP-9(3-5)	% MOISTURE	S	4WM	B2
X04166E	24MP-9(9-11)	% MOISTURE	S	4WM	B2
X04167E	24MP-10(2-4)	% MOISTURE	S	4WM	B2
X04168E	24MW-6(2-4)	% MOISTURE	S	4WM	B2
X04169E	24MW-6(9-11)	% MOISTURE	S	4WM	B2
X04170E	175MP-1(3-5)	% MOISTURE	S	4WM	B2
X04163E	24MP-7(2-4)	TOC	S	2WM	OUT

Project # 95-0819

R=Sample to be returned

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons ES
ADDRESS 1700 Broadway Ste 900
CITY Denver STATE CO ZIP 80290
PHONE # 831-3100 FAX # FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Wiedemeier
PROJECT I.D. 722410.21020 / NAVOILCO AFB
EAL. QUOTE # P.O. #
TURNAROUND REQUIRED*
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Kyle L Cannon
(print) Kyle L. Cannon
Evergreen Analytical Cooler No. 422
Cooler Received

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water/Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	ANALYSIS REQUESTED: TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle)	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline) C	TEPH 8015mod. (Diesel) D	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Lead	Moisture							EAL Sample No.
24MP-7 (2-4)	3-10-95	0915	6		X									X	X	X	X		Ag,Cr	X	X	F						X04163
24MP-8 (2-4)	3-10-95	1400	5		X									X		X	X				X	E						64
24MP-9 (3-5)	3-10-95	1600	5		X									X		X	X				X							65
24MP-9 (9-11)	3-10-95	1700	5		X									X		X	X				X							66
24MP-10 (2-4)	3-11-95	0900	5		X									X		X	X				X							67
24MW-6 (2-4)	3-11-95	0930	5		X									X		X	X				X							68
24MW-6 (9-11)	3-11-95	1030	5		X									X		X	X				X							69
25MP-1 (3-5)	3-11-95	1415	5		X								Ag,Cr	X	Ag,Cr	X	X	Ag,Cr		Ag,Cr	X								70
Rinsate Blank	3-11-95	1400	1	X										X	40													71
Trip Blank															40													72
HT:																												Location 2, B2
DD:																												Container Size

EAL use only
Do not write in shaded area

EAL Project # 0819
Custodian

Instructions:

Relinquished by (Signature) | Date/Time | Received by (Signature) | Date/Time

Evergreen Analytical Sample Receipt/Check-in Record

Date & Time Rec'd: 3/14/95 10:00 Shipped Via: FedEx 952182602
(Airbill # if applicable)

Client : PARSONS.ES

Client Project ID(s): 722450.21020 | MAC Dill AFB

EAL Project #(s): 95- 0819 EAL Cooler(s): Y N

Cooler#	1&2								
Ice packs	(Y)	N	Y	N	Y	N	Y	N	Y	N
Temperature °C	10								

	Y	N	N/A
1. Custody seal(s) present:	✓	✓	✓
Seals on cooler intact	✓		
Seals on bottle intact			✓
2. Chain of Custody present:	✓		
3. Containers broken or leaking: (Comment on COC if Y)		✓	
4. Containers labeled:	✓		
5. COC agrees w/ bottles received: (Comment on COC if N)	✓		
6. COC agrees w/ labels: (Comment on COC if N)	✓		
7. Headspace in VOA vials-waters only (comment on COC if Y)			✓
8. VOA samples preserved:			✓
9. pH measured on metals, cyanide or phenolics*:			✓
List discrepancies			
*Non-EAL provided containers only, water samples only.			
10. Metal samples present:			✓
Total _____ , Dissolved _____			
D or PD to be filtered:			
T,TR,D,PD to be Preserved:			
11. Short holding times:		✓	
Specify parameters			
12. Multi-phase sample(s) present:		✓	
13. COC signed w/ date/time:	✓		

Comments: _____

(Additional comments on back)
Custodian Signature/Date: [signature] 3/14/95

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.

4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425 6854
(800) 845-7400

Page 1 of 1

COMPANY Parsons ES
ADDRESS 1700 Broadway Ste 700
CITY Denver STATE CO ZIP 80290
PHONE# 831-3100 FAX # FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Weidemeier
PROJECT I D 722450.21020 / MACDILL AFB
EAL QUOTE # P.O #
TURNAROUND REQUIRED*
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Kyle L Cann
(print) Kyle L. Cannon
Evergreen Analytical Cooler No. 422
Cooler Received

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water (Drinking/Discharge/Ground) (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	BTEX 8020/602 (circle)/MTBE (circle)	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	TOC	Moisture	EAL Sample No.
24MP-7 (2-4)	3-10-95	0915	6		X		X	X	X		X	X	
24MP-8 (2-4)	3-10-95	1400	5		X		X		X	X		X	
24MP-9 (3-5)	3-10-95	1600	5		X		X		X	X		X	
24MP-9 (9-11)	3-10-95	1700	5		X		X		X	X		X	
24MP-10 (2-4)	3-11-95	0900	5		X		X		X	X		X	
24MW-6 (2-4)	3-11-95	0930	5		X		X		X	X		X	
24MW-6 (9-11)	3-11-95	1030	5		X		X		X	X		X	
175MP-1 (3-5)	3-11-95	1415	5		X		X		X	X		X	
Kingscote Blank	3-11-95	1400	1	X			X						
HT:													Location
DD:													Container Size

EAL use only
Do not write in shaded area

EAL
Project #
Custodian

Instructions:

Relinquished by (Signature) | Date/Time | Received by (Signature) | Date/Time | Relinquished by (Signature) | Date/Time | Received by (Signature)

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

		Client Project No.	: 722450.21020 MacDill
Client Sample Number	: 175MP-1(3-5)		
Lab Sample Number	: X04170	Lab Project No.	: 95-0819
Date Sampled	: 3/11/95	Dilution Factor	: 1.00
Date Received	: 3/14/95	Method	: 8020
Date Extracted/Prepared	: 3/16/95	Matrix	: Soil
Date Analyzed	: 3/17/95	Lab File No.	: BX2031627
Methanol Extract?	: No	Method Blank No.	: MB031695

Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	U	4.7
Toluene	108-88-3	U	4.7
Ethyl Benzene	100-41-4	U	4.7
Total Xylene	1330-20-7	U	4.7
Chlorobenzene	108-90-7	U	4.7
1,3,5-trimethylbenzene	108-67-8	U	4.7
1,2,4-trimethylbenzene	95-63-6	U	4.7
1,2,3-trimethylbenzene	526-73-8	U	4.7
1,2,3,4-tetramethylbenzene	488-23-3	U	4.7

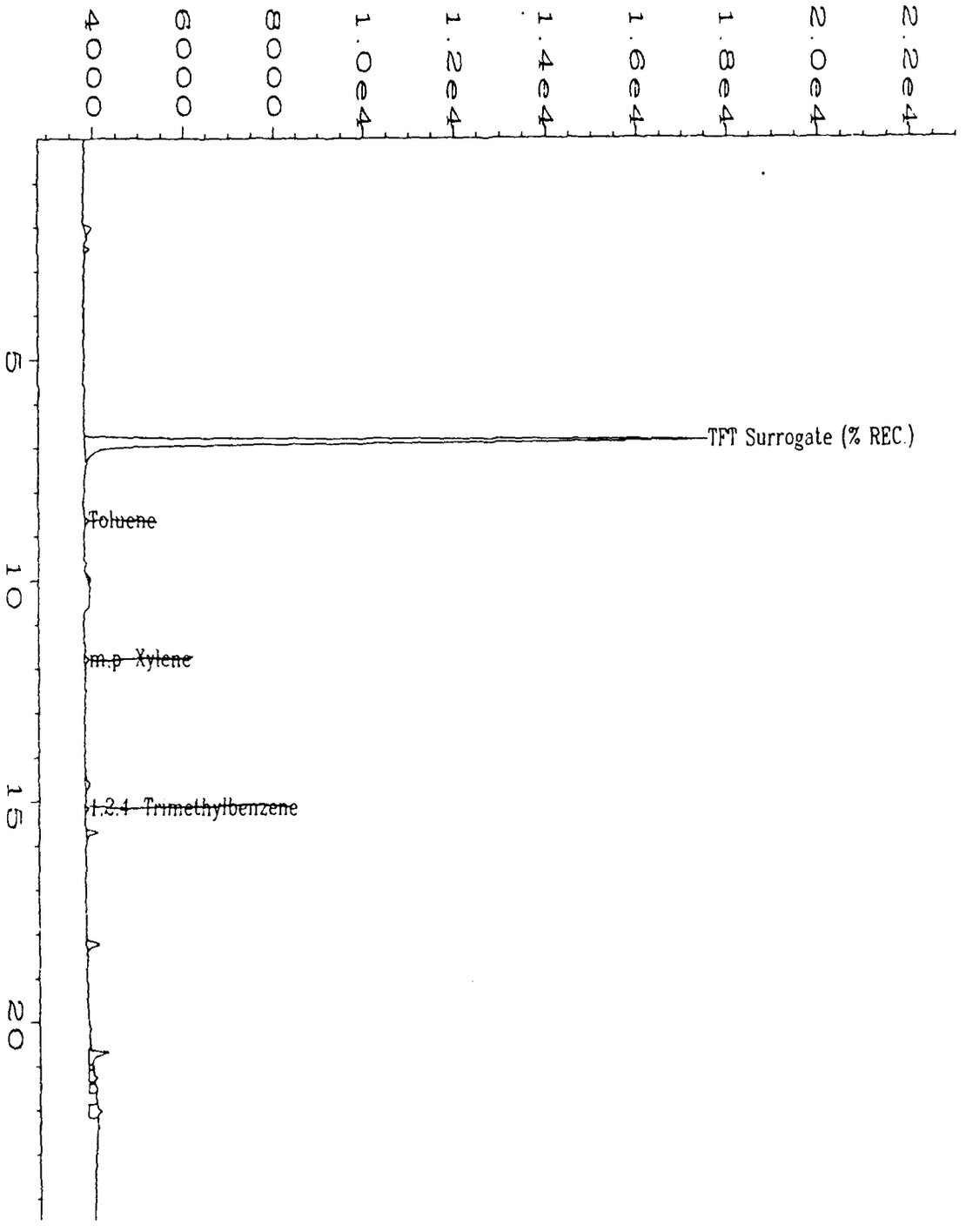
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Sample reported on a dry weight basis.
Surrogate Recovery:
a,a,a,-Trifluorotoluene : 73%
QC Reporting Limits : 64%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

K. Cone
Approved

175MP-1(3-5)



Data File Name : C:\HPCHEM\2\DATA\BX20316\027R0401.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04170 DF=1
Run Time Bar Code:
Acquired on : 17 Mar 95 04:59 AM
Report Created on: 17 Mar 95 11:58 AM
Last Recalib on : 17 MAR 95 10:55 AM
Multiplier : 1

Page Number : 1
Vial Number : 27
Injection Number : 1
Sequence Line : 4
Instrument Method: BX20316
Analysis Method : BX20316.MTH
Sample Amount : 0
ISTD Amount :
Client # 175MP-1(3-5)

fm 3/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

		Client Project No.	: 722450.21020 MacDill
Client Sample Number	: 175MP-1(3-5)		
Lab Sample Number	: X04170DUP	Lab Project No.	: 95-0819
Date Sampled	: 3/11/95	Dilution Factor	: 1.00
Date Received	: 3/14/95	Method	: 8020
Date Extracted/Prepared	: 3/16/95	Matrix	: Soil
Date Analyzed	: 3/17/95	Lab File No.	: BX2031628
Methanol Extract?	: No	Method Blank No.	: MB031695

Compound Name	Cas Number	Sample Concentration* ug/kg	PQL* ug/kg
Benzene	71-43-2	U	4.7
Toluene	108-88-3	U	4.7
Ethyl Benzene	100-41-4	U	4.7
Total Xylene	1330-20-7	U	4.7
Chlorobenzene	108-90-7	U	4.7
1,3,5-trimethylbenzene	108-67-8	U	4.7
1,2,4-trimethylbenzene	95-63-6	U	4.7
1,2,3-trimethylbenzene	526-73-8	U	4.7
1,2,3,4-tetramethylbenzene	488-23-3	U	4.7

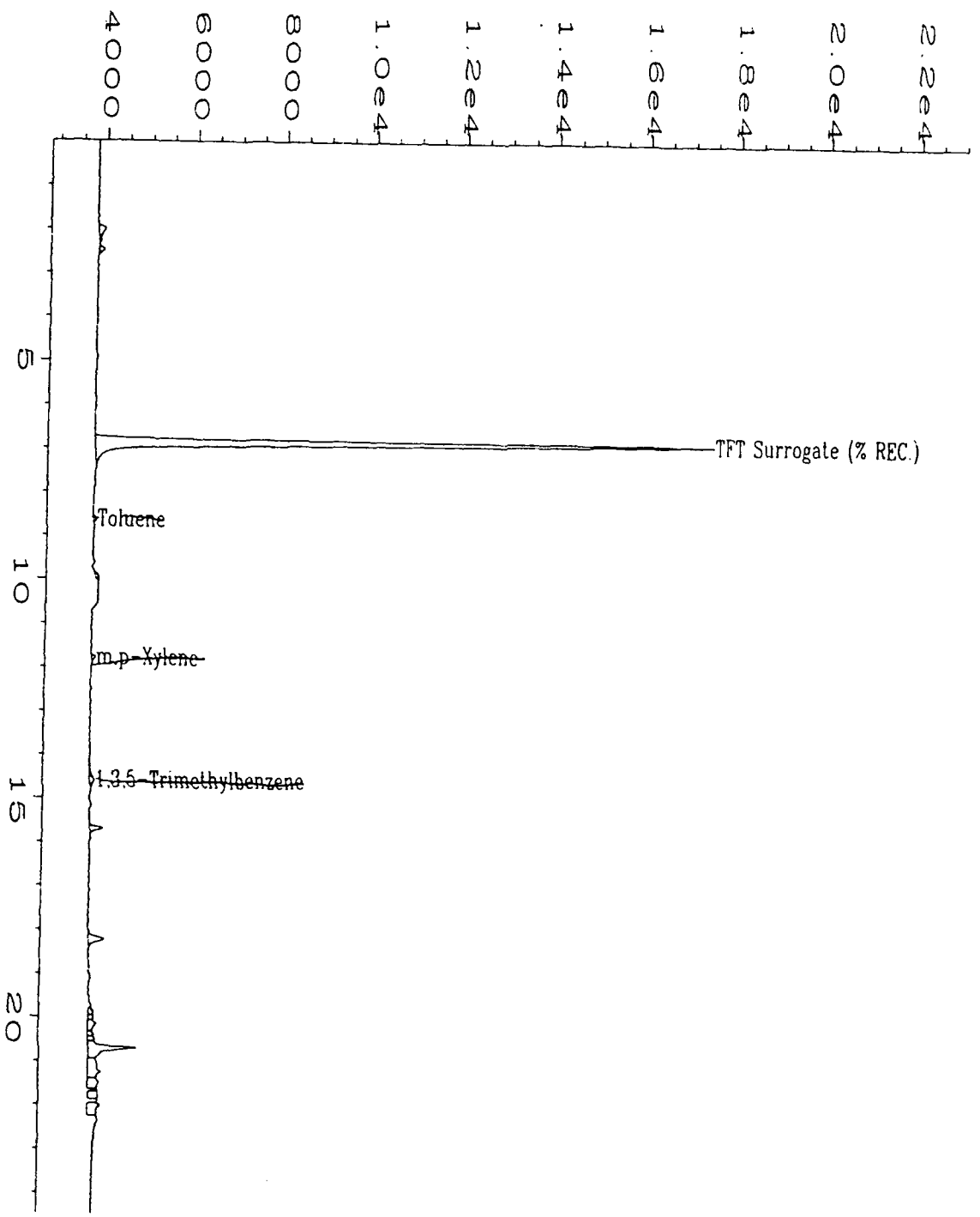
Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.
* = Sample reported on a dry weight basis.
Surrogate Recovery:
a,a,a,-Trifluorotoluene : 72%
QC Reporting Limits : 64%-130%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved

175MP-1(3-5)DUP



Data File Name : C:\HPCHEM\2\DATA\BX20316\028R0401.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04170DUP DF=1
Run Time Bar Code:
Acquired on : 17 Mar 95 05:44 AM
Report Created on: 17 Mar 95 11:58 AM
Last Recalib on : 17 MAR 95 10:55 AM
Multiplier : 1

Page Number : 1
Vial Number : 28
Injection Number : 1
Sequence Line : 4
Instrument Method: BX20316
Analysis Method : BX20316.MT
Sample Amount : 0
ISTD Amount :

pm 3/28/95

Evergreen Analytical, Inc.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL EXTRACTABLE HYDROCARBONS

TEH Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: 24MP-7(2-4)	Client Project No.	: 722450.21020/MAC DI
Lab Sample No.	: X04163	Lab Project No.	: 95-0819
Date Sampled	: 3/10/95	EPA Method No.	: 3500/MOD.8015
Date Received	: 3/14/95	Matrix	: SOIL
Date Prepared	: 3/17/95	Method Blank	: SB031795
Date Analyzed	: 3/18/95		

Compound	Spike Added (ug/mL)	Sample Concentration (ug/mL)	MS Concentration (ug/L)	MS %REC	QC Limits %REC
Jet Fuel	1000	0	910	91	60-140

Compound	Spike Added (ug/mL)	MSD Concentration (ug/mL)	MS %REC	RPD	QC Limits RPD	QC Limits %REC
Jet Fuel	1000	930	93	2.2	50	60-140

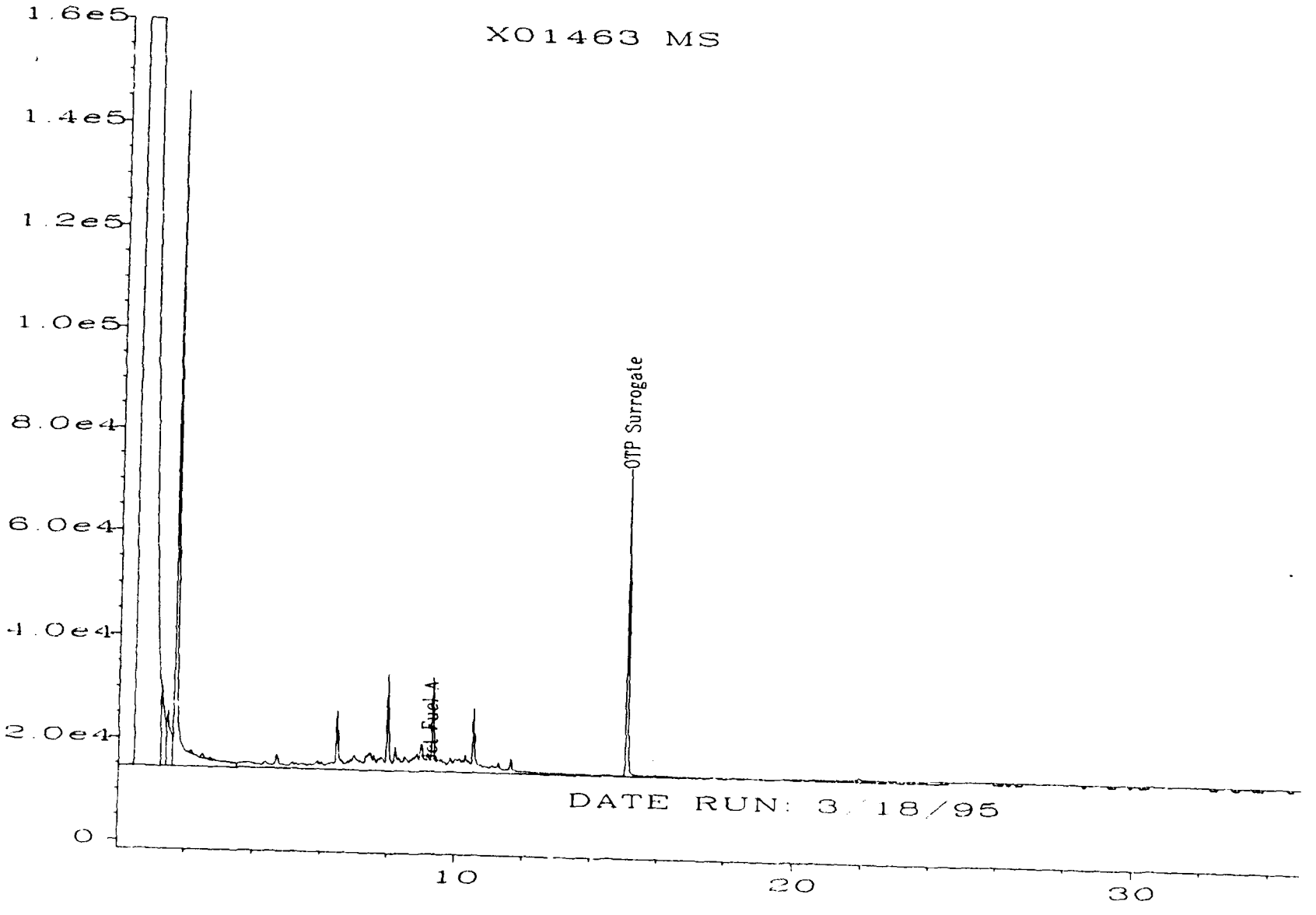
* = Values outside of QC limits.

RPD: 0 out of (1) outside limits.

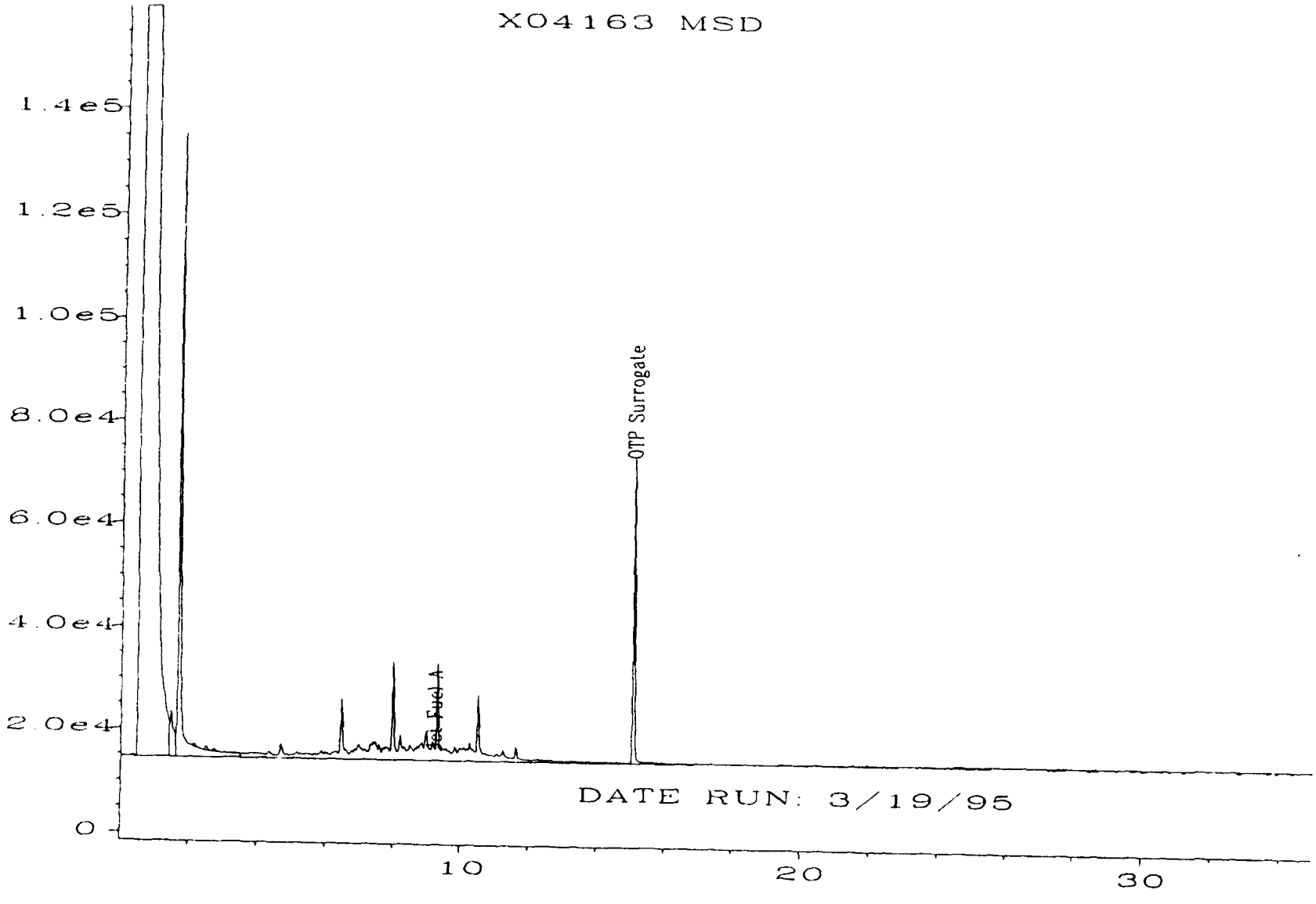
Spike Recovery: 0 out of (1) outside limits.

Comments: NA = Not analyzed/not applicable.

Values reported in ug/mL in the liquid extract.



Sig. 2 in C:\HPCHEM\2\DATA\TEH0317\042R0101.D



Sig 2 in C:\HPCHEM\2\DATA\TEH0317\043R0101.D

Evergreen Analytical, Inc.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS
TVH Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: 24MP-7(2-4)	Client Project No.	: 722450.21020/Mac [
Lab Sample No.	: X04163	Lab Project No.	: 95-0819
Date Sampled	: 3/10/95-3/11/95	EPA Method No.	: 5030/8015 Mod
Date Received	: 3/14/95	Matrix	: Soil
Date Prepared	: 3/15/95	Method Blank	: MB031595
Date Analyzed	: 3/15/95-3/16/95		

Compound	Spike Added (mg/Kg)	Sample Concentration (mg/Kg)	MS Concentration (mg/Kg)	MS %REC	QC Limits %REC
Gasoline	5.00	0.00	5.33	107	60-140

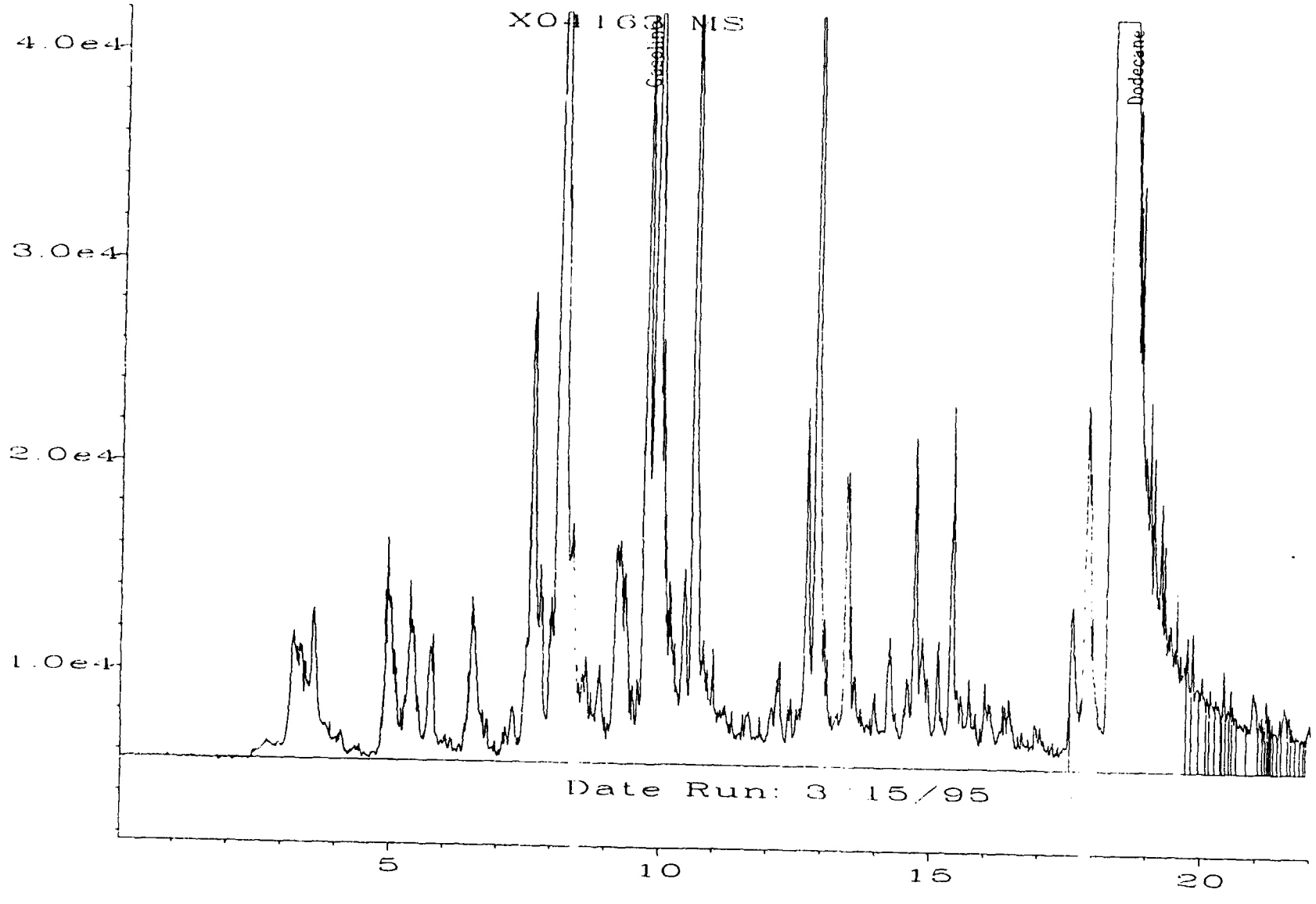
Compound	Spike Added (mg/L)	MSD Concentration (mg/L)	MS %REC	RPD	QC Limits RPD	QC Limits %REC
Gasoline	5.00	4.97	99	7.0	30	60-140

* = Values outside of QC limits.

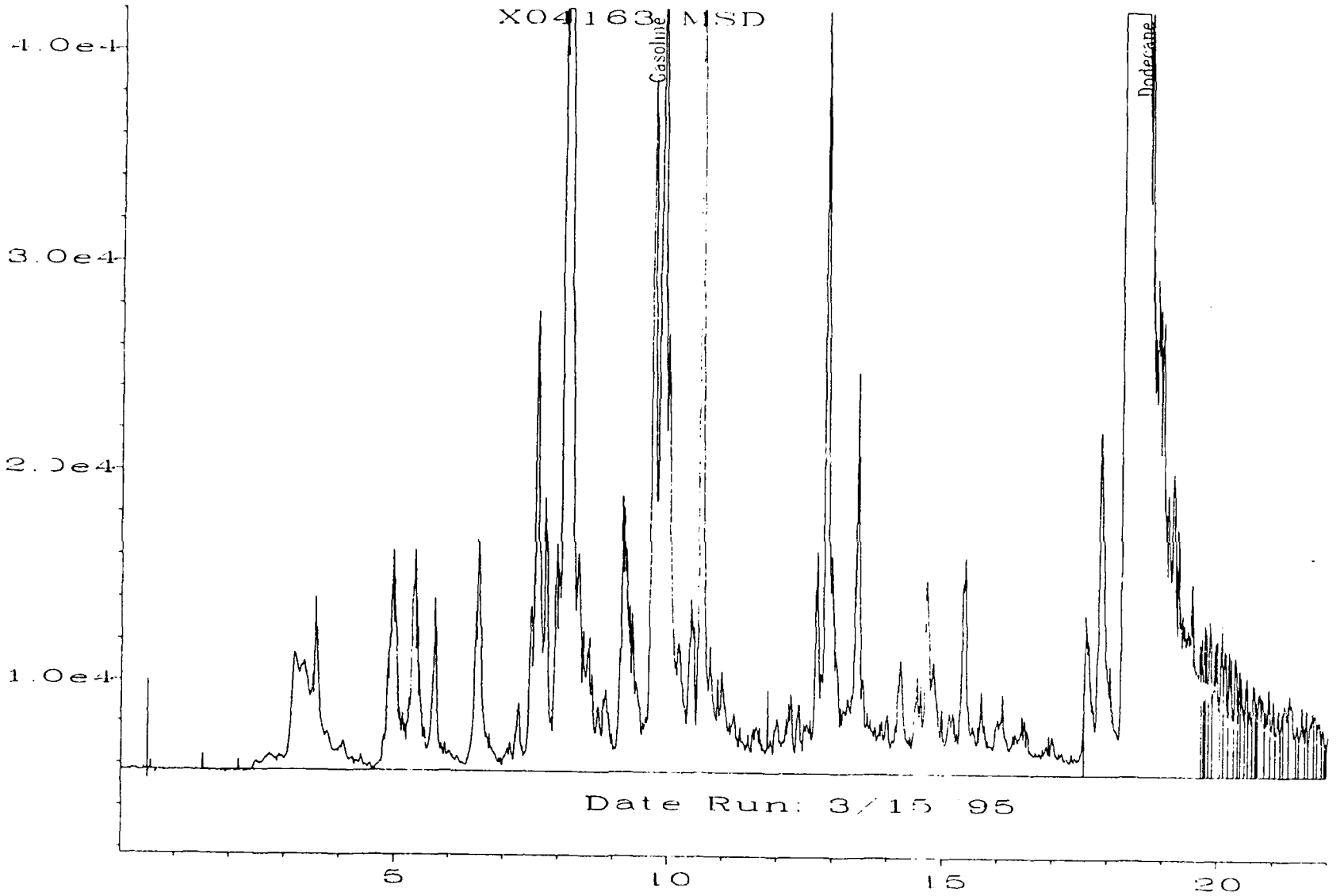
RPD: 0 out of (1) outside limits.

Spike Recovery: 0 out of (2) outside limits.

Comments: NA = Not analyzed/not applicable.



Sig. 1 in C:\HPCHEM\1\DATA\TVH0315\018F0101.D



Sig. 1 in C:\HPCHEM\1\DATA\TVH0315 019F0101.D

Evergreen Analytical, Inc.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

BTEX Soil Matrix Spike/Matrix Spike Duplicate Data Report

		Client Project No.	: 722450.21020 MacDill
Client Sample No.	: 24MP-7(2-4)		
Lab Sample No.	: X04163	Lab Project No.	: 95-0819
Date Sampled	: 3/10/95	EPA Method No.	: 8020
Date Received	: 3/14/95	Matrix	: Soil
Date Prepared	: 3/16/95	Lab File Number(s)	: BX2031615
Date Analyzed	: 3/16/95	Method Blank	: MB031695

Compound	Spike Added (ug/L)	Sample Concentration (ug/L)	MS Concentration (ug/L)	MS %REC	QC Limits %REC
Benzene	20	0.0	18.4	92	65-121
Toluene	20	0.0	18.7	94	69-117
Ethyl Benzene	20	0.0	18.8	94	68-118
m/p-Xylene	40	0.0	41.3	103	66-116
o-Xylene	20	0.0	18.8	94	73-117
Chlorobenzene	20	0.0	18.2	91	65-121
1,3,5-TMB	20	0.0	18.9	95	65-121
1,2,4-TMB	40	0.0	36.3	91	65-121
1,2,3-TMB	40	0.0	33.4	84	65-121
1,2,3,4-TeMB	20	0.0	17.3	87	65-121

Compound	Spike Added (ug/L)	MSD Concentration (ug/L)	MS %REC	RPD	QC Limits RPD	QC Limits %REC
Benzene	20	17.7	89	3.9	17.4	65-121
Toluene	20	18.0	90	3.8	15.8	69-117
Ethyl Benzene	20	18.2	91	3.2	11.9	68-118
m/p-Xylene	40	39.8	100	3.7	15.4	66-116
o-Xylene	20	17.9	90	4.9	13.2	73-117
Chlorobenzene	20	17.5	88	3.9	17.4	65-121
1,3,5-TMB	20	18.1	91	4.3	17.4	65-121
1,2,4-TMB	40	33.9	85	6.8	17.4	65-121
1,2,3-TMB	40	32.8	82	1.8	17.4	65-121
1,2,3,4-TeMB	20	15.4	77	12	17.4	65-121

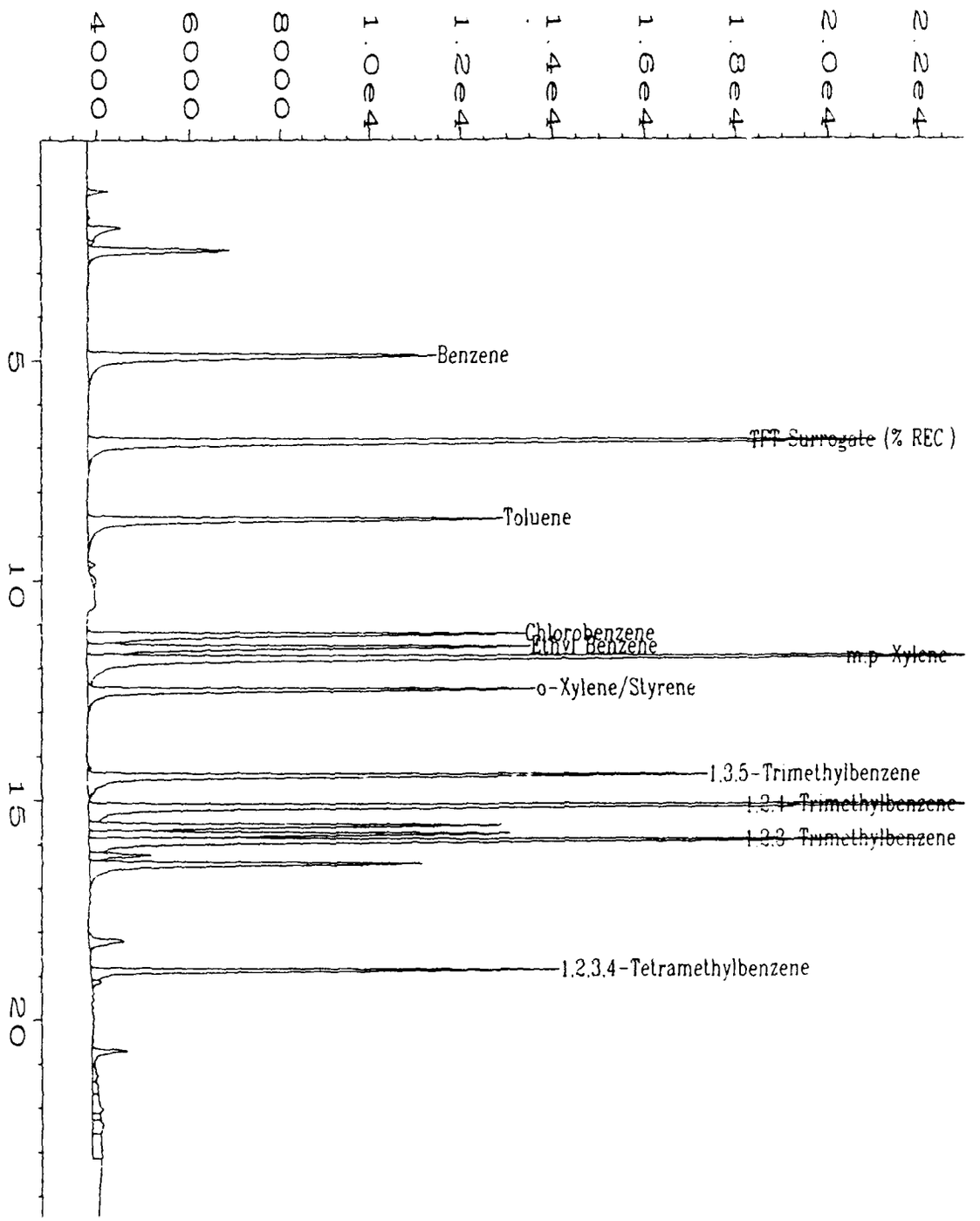
* = Values outside of QC limits.

RPD: 0 out of (10) outside limits.

Spike Recovery: 0 out of (20) outside limits.

Comments: CJC

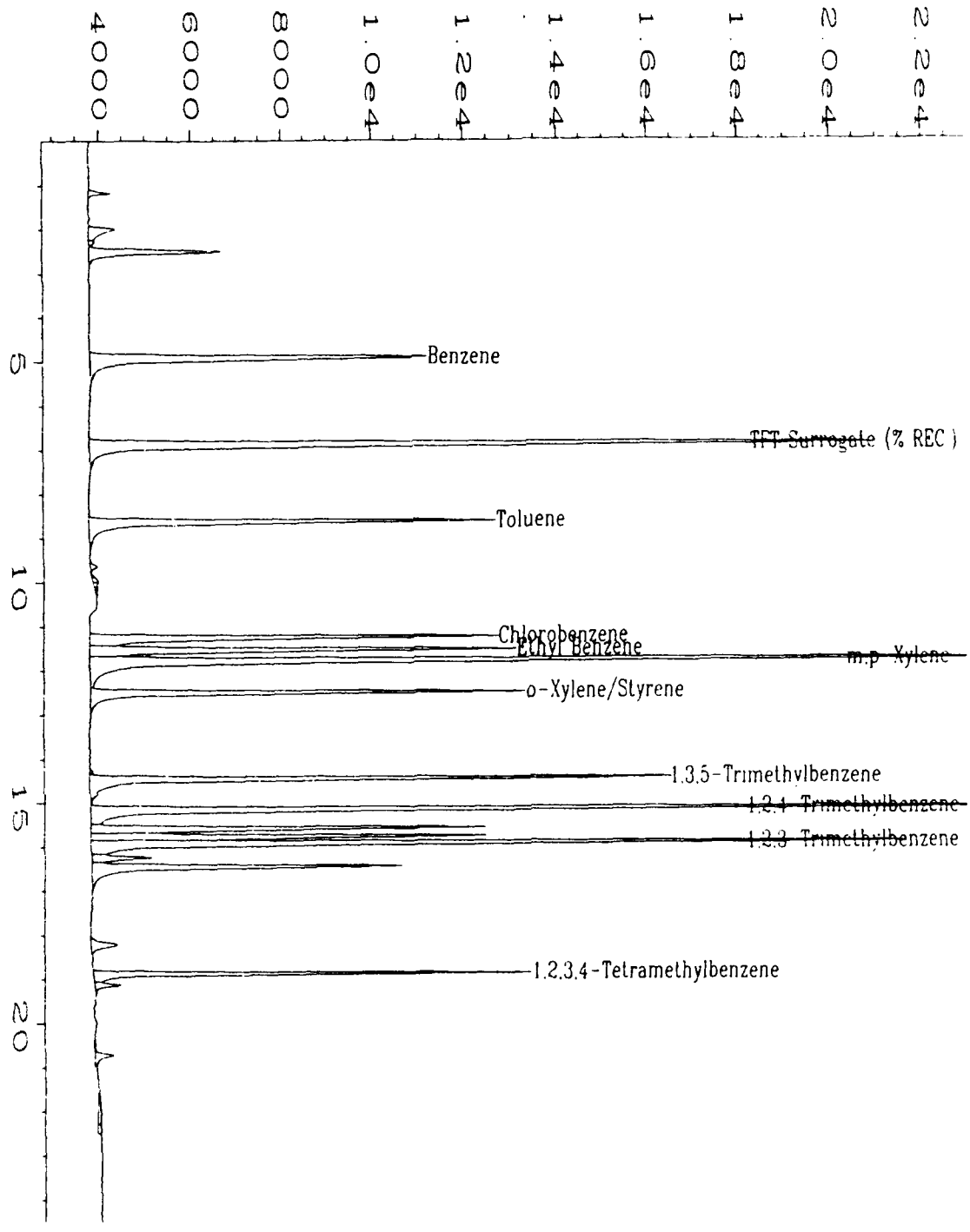
24MP-7(2-4) MS



Data File Name : C:\HPCHEM\2\DATA\BX20316\015R0401.D
Operator : C.J. Cook
Instrument : BTEX2
Sample Name : X04163MS DF=1
Run Time Bar Code:
Acquired on : 16 Mar 95 08:11 PM
Report Created on: 17 Mar 95 11:31 AM
Last Recalib on : 17 MAR 95 10:55 AM
Multiplier : 1

Page Number : 1
Vial Number : 15
Injection Number : 1
Sequence Line : 4
Instrument Method: BX20316
Analysis Method : BX20316.MTH
Sample Amount : 0
ISTD Amount :

24MP-7(2-4) MSD



Data File Name	: C:\HPCHEM\2\DATA\BX20316\016R0401.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 16
Sample Name	: X04163MSD DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 4
Acquired on	: 16 Mar 95 08:54 PM	Instrument Method	: BX20316.MTH
Report Created on	: 17 Mar 95 11:32 AM	Analysis Method	: BX20316.MTH
Last Recalib on	: 17 MAR 95 10:55 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

		Client Project No.	: 722450.21020 MacDill
Client Sample Number	: Rinsate Blank		
Lab Sample Number	: X04171	Lab Project No.	: 95-0819
Date Sampled	: 3/11/95	Dilution Factor	: 1.00
Date Received	: 3/14/95	Method	: 8020
Date Extracted/Prepared	: 3/16/95	Matrix	: Water
Date Analyzed	: 3/16/95	Lab File No.	: BX2031620
Methanol Extract?	: No	Method Blank No.	: MB031695

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4
Toluene	108-88-3	U	4
Ethyl Benzene	100-41-4	U	4
Total Xylene	1330-20-7	U	4
Chlorobenzene	108-90-7	U	4
1,3,5-trimethylbenzene	108-67-8	U	4
1,2,4-trimethylbenzene	95-63-6	U	4
1,2,3-trimethylbenzene	526-73-8	U	4
1,2,3,4-tetramethylbenzene	488-23-3	U	4

Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

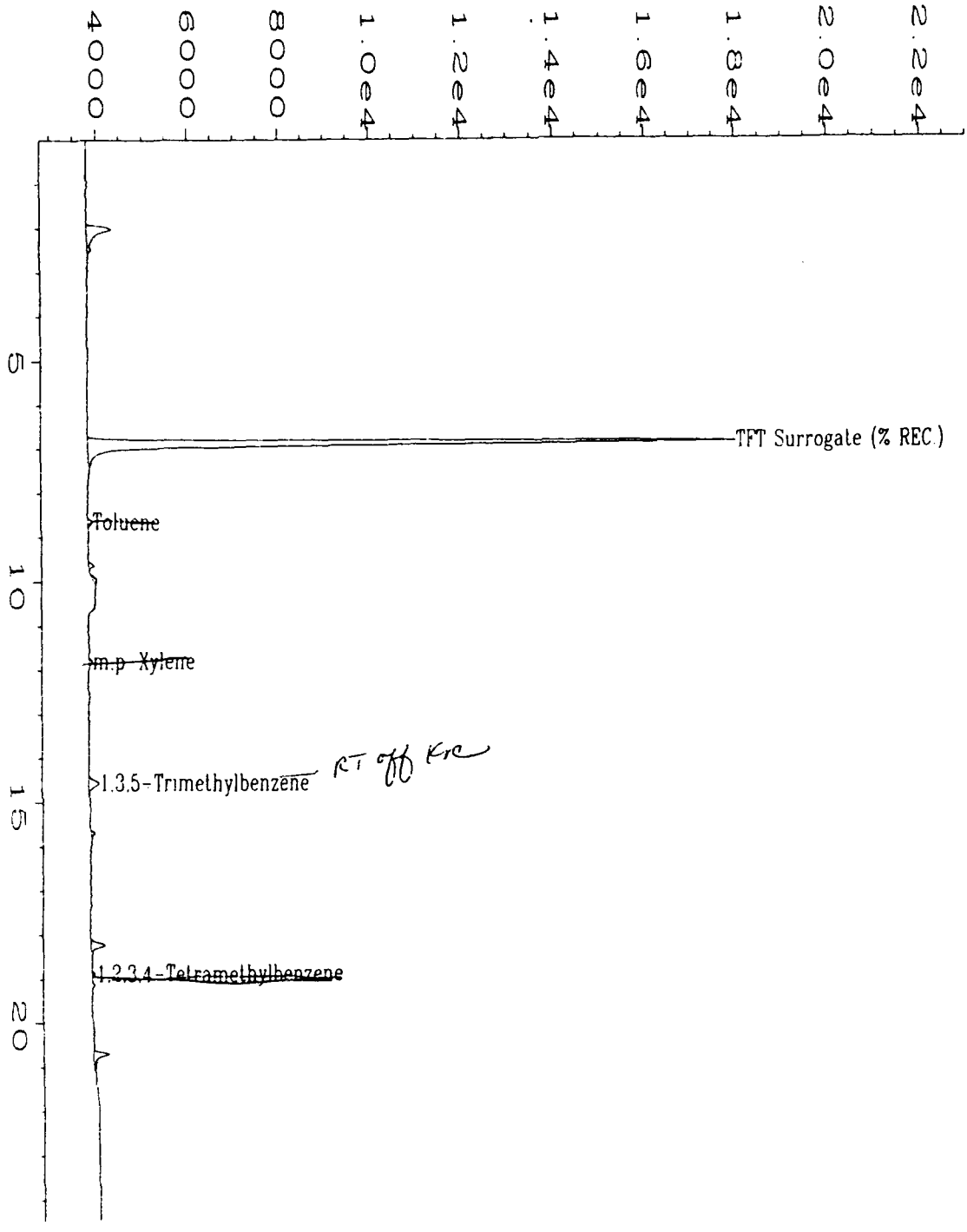
Surrogate Recovery:
a,a,a,-Trifluorotoluene : 75%
QC Reporting Limits : 70%-131%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved

Rinsate Blank



Data File Name	: C:\HPCHEM\2\DATA\BX20316\020R0401.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 20
Sample Name	: X04171 DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 4
Acquired on	: 16 Mar 95 11:50 PM	Instrument Method	: BX20316.MTH
Report Created on	: 17 Mar 95 11:33 AM	Analysis Method	: BX20316.MTH
Last Recalib on	: 17 MAR 95 10:55 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

pm 3/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report

		Client Project No.	: 722450.21020 MacDill
Client Sample Number	: Trip Blank		
Lab Sample Number	: X04172	Lab Project No.	: 95-0819
Date Sampled	: 3/11/95	Dilution Factor	: 1.00
Date Received	: 3/14/95	Method	: 8020
Date Extracted/Prepared	: 3/16/95	Matrix	: Water
Date Analyzed	: 3/17/95	Lab File No.	: BX2031621
Methanol Extract?	: No	Method Blank No.	: MB031695

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4
Toluene	108-88-3	U	4
Ethyl Benzene	100-41-4	U	4
Total Xylene	1330-20-7	U	4
Chlorobenzene	108-90-7	U	4
1,3,5-trimethylbenzene	108-67-8	U	4
1,2,4-trimethylbenzene	95-63-6	U	4
1,2,3-trimethylbenzene	526-73-8	U	4
1,2,3,4-tetramethylbenzene	488-23-3	U	4

Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene I QL is for a single peak.

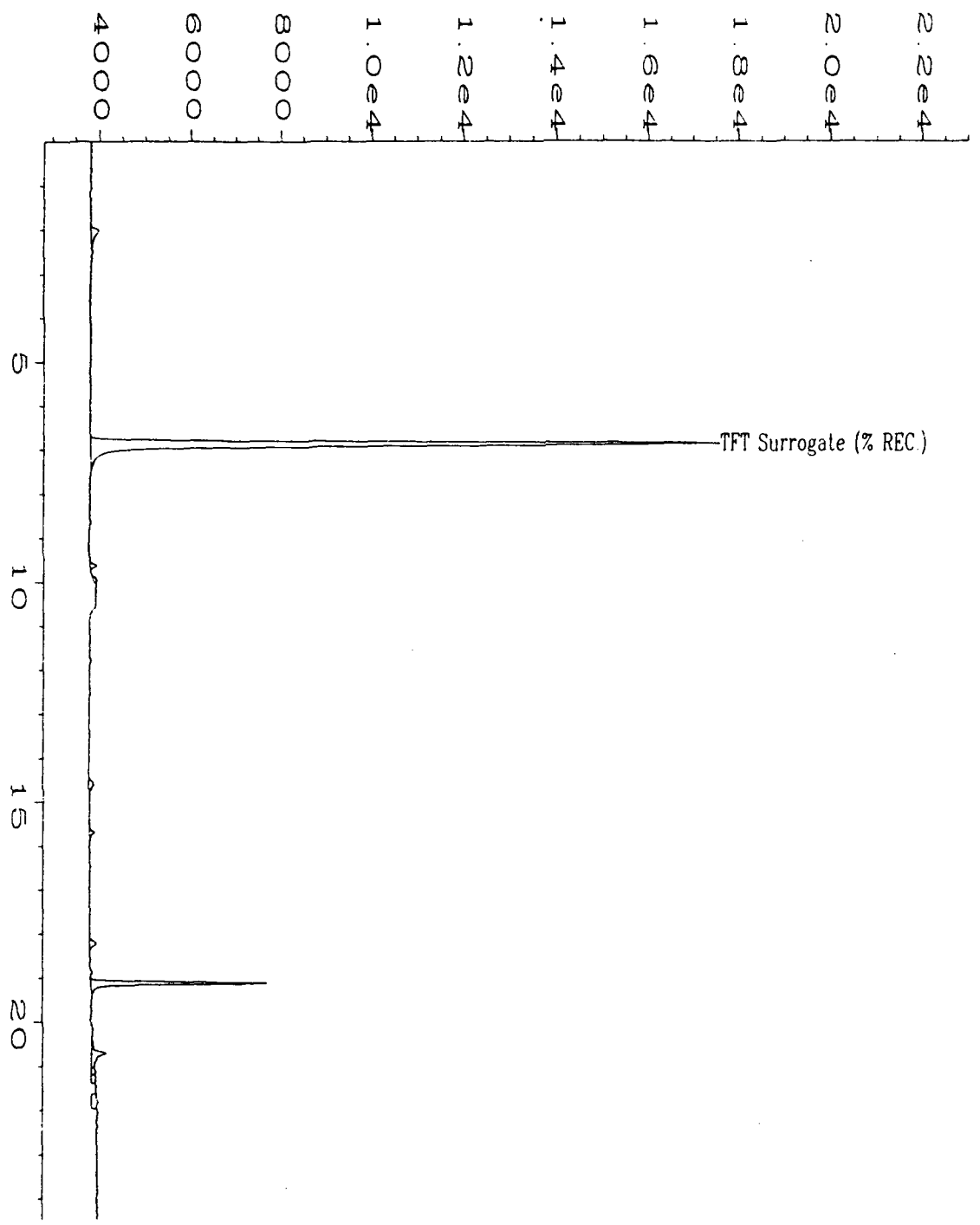
Surrogate Recovery:
a,a,a,-Trifluorotoluene : 74%
QC Reporting Limits : 70%-131%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

Approved

Trip Blank



Data File Name	: C:\HPCHEM\2\DATA\BX20316\021R0401.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 21
Sample Name	: X04172 DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 4
Acquired on	: 17 Mar 95 00:35 AM	Instrument Method	: BX20316.MTH
Report Created on	: 17 Mar 95 11:34 AM	Analysis Method	: BX20316.MTH
Last Recalib on	: 17 MAR 95 10:55 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Method Blank Report

		Client Project No.	: 722450.21020
			MacDill
Method Blank Number	: MB031695		
Date Extracted/Prepared	: 3/16/95	Lab Project No.	: 95-0819
Date Analyzed	: 3/16/95	Dilution Factor	: 1.00
		Method	: 8020
		Matrix	: Water
		Lab File No.	: BX2031609

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4
Toluene	108-88-3	U	4
Ethyl Benzene	100-41-4	U	4
Total Xylene	1330-20-7	U	4
Chlorobenzene	108-90-7	U	4
1,3,5-trimethylbenzene	108-67-8	U	4
1,2,4-trimethylbenzene	95-63-6	U	4
1,2,3-trimethylbenzene	526-73-8	U	4
1,2,3,4-tetramethylbenzene	488-23-3	U	4

Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

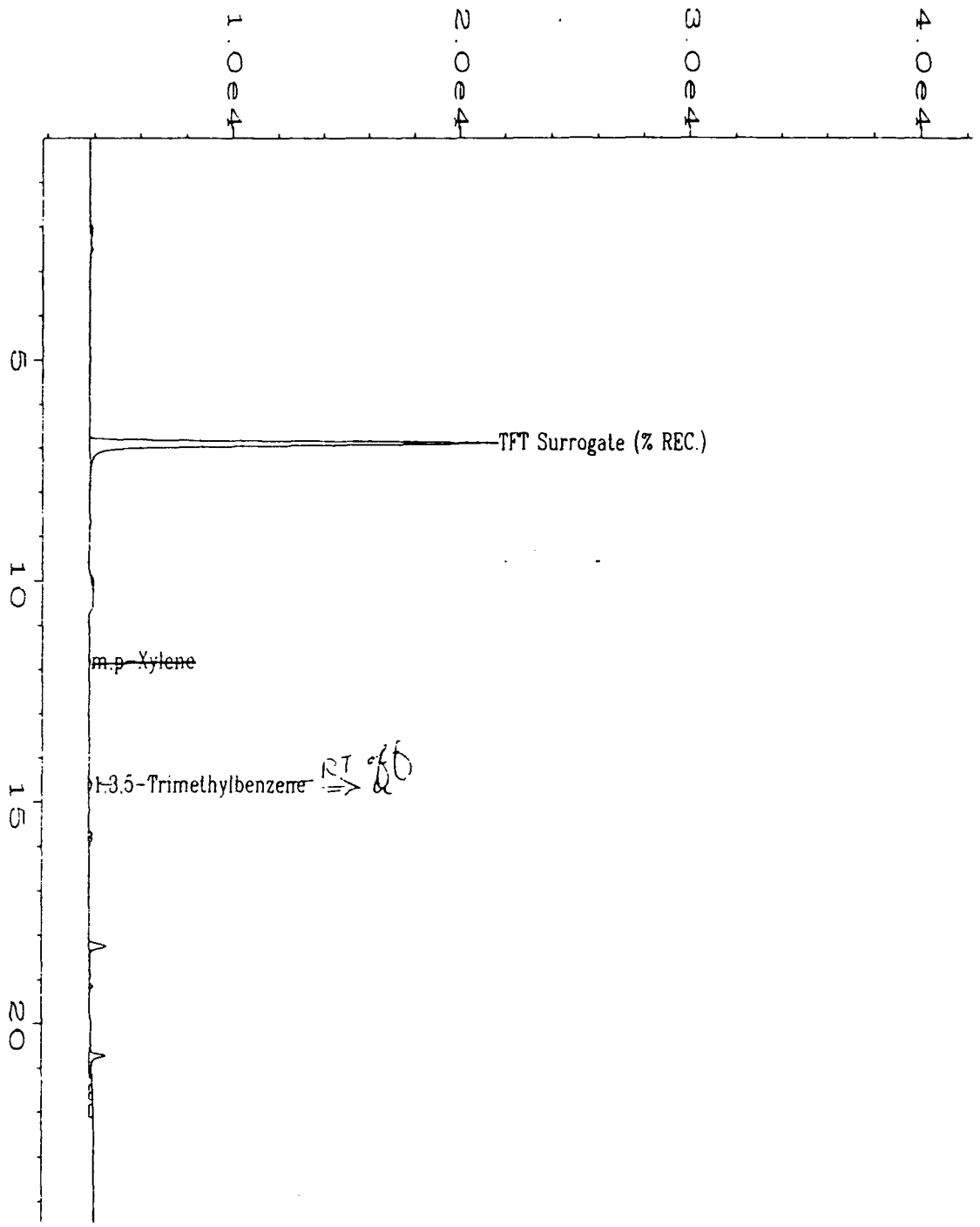
Surrogate Recovery:
a,a,a,-Trifluorotoluene : 97%
QC Reporting Limits : 70%-131%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available

Analyst

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Method Blank



ata File Name	: C:\HPCHEM\2\DATA\BX20316\009R0401.D		
perator	: C.J. Cook	Page Number	: 1
nstrument	: BTEX2	Vial Number	: 9
ample Name	: MB031695-WATER	Injection Number	: 1
in Time Bar Code:		Sequence Line	: 4
ired on	: 16 Mar 95 03:41 PM	Instrument Method	: BX20316.MTH
rt Created on	: 17 Mar 95 11:29 AM	Analysis Method	: BX20316.MTH
ast Recalib on	: 17 MAR 95 10:55 AM	Sample Amount	: 0
ultiplier	: 1	ISTD Amount	:

pm 3/23/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Method Blank Report

Method Blank Number	: MB031795	Client Project No.	: 722450.21020 MacDill
Date Extracted/Prepared	: 3/17/95	Lab Project No.	: 95-0819
Date Analyzed	: 3/17/95	Dilution Factor	: 1.00
		Method	: 8020
		Matrix	: Water
		Lab File No.	: BX2031709

Compound Name	Cas Number	Sample Concentration ug/L	PQL ug/L
Benzene	71-43-2	U	4
Toluene	108-88-3	U	4
Ethyl Benzene	100-41-4	U	4
Total Xylene	1330-20-7	U	4
Chlorobenzene	108-90-7	U	4
1,3,5-trimethylbenzene	108-67-8	U	4
1,2,4-trimethylbenzene	95-63-6	U	4
1,2,3-trimethylbenzene	526-73-8	U	4
1,2,3,4-tetramethylbenzene	488-23-3	U	4

Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

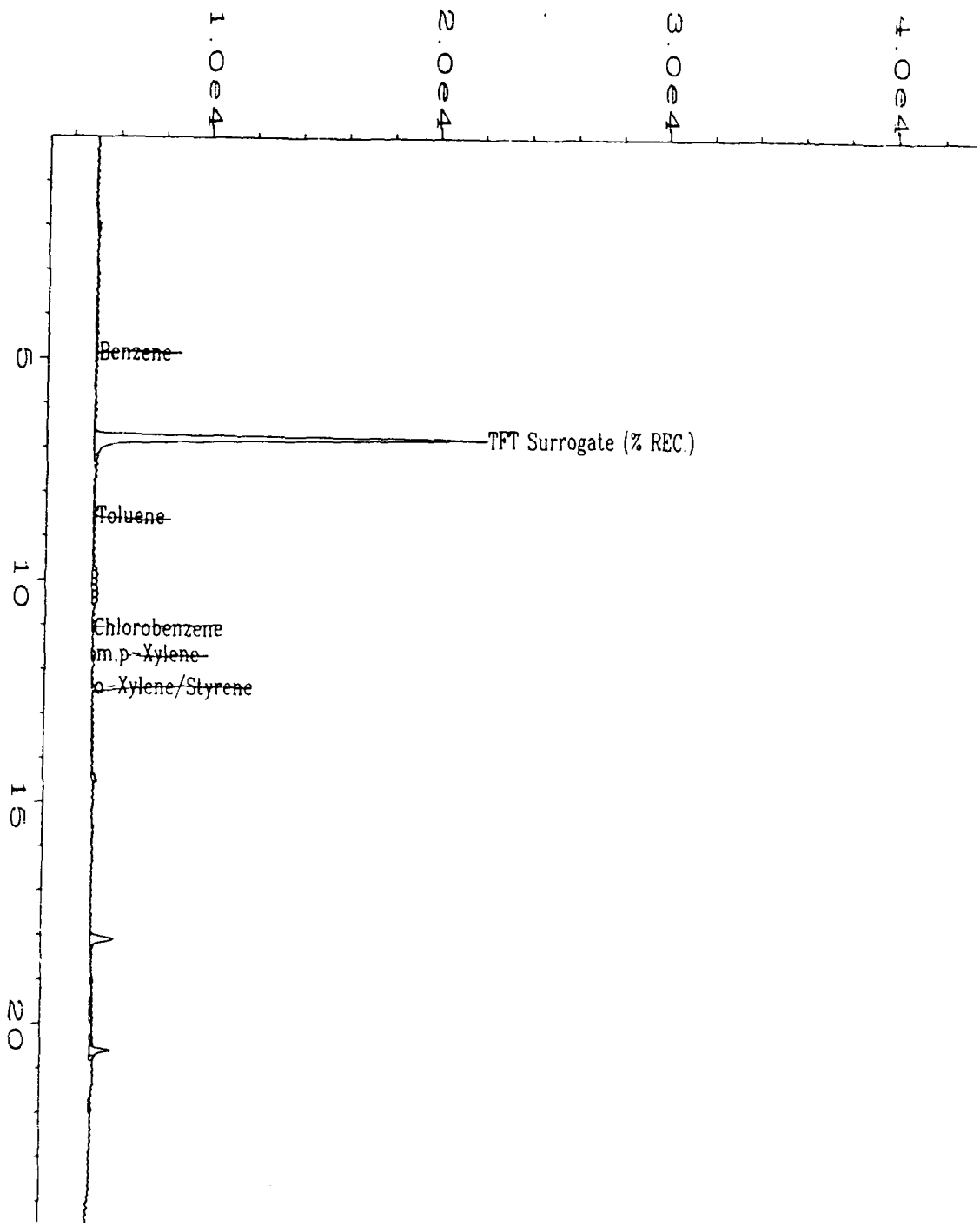
Surrogate Recovery:
a,a,a,-Trifluorotoluene : 90%
QC Reporting Limits : 70%-131%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

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Method Blank



)ata File Name	: C:\HPCHEM\2\DATA\BX20317\009R0801.D		
)perator	: C.J. Cook	Page Number	: 1
nstrument	: BTEX2	Vial Number	: 9
ample Name	: MB031795-WATER	Injection Number	: 1
un Time Bar Code:		Sequence Line	: 8
quired on	: 17 Mar 95 05:27 PM	Instrument Method	: BX20317.MTH
eport Created on	: 17 Mar 95 05:52 PM	Analysis Method	: BX20317.MTH
ast Recalib on	: 17 Mar 95 04:23 PM	Sample Amount	: 0
ultiplier	: 1	ISTD Amount	:

pm 3/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Laboratory Control Sample (LCS)

		Client Project No.	: 722450.21020
			MacDill
LCS Number	: LCS031795		
Date Extracted/Prepared	: 3/17/95	Lab Project No.	: 95-0819
Date Analyzed	: 3/17/95	Dilution Factor	: 1.00
		Method	: 602
		Matrix	: Water
		Lab File No.	: BX2031710

Compound Name	Cas Number	LCS Concentration ug/L	QC Limit ug/L
Benzene	71-43-2	17.3	12-24
Toluene	108-88-3	16.3	13-22
Ethyl Benzene	100-41-4	16.0	13-24
m,p-Xylene	NA	16.2	13-24
o-Xylene	95-47-6	15.9	13-24
Chlorobenzene	108-90-7	16.1	14-23
1,3,5-trimethylbenzene	108-67-8	16.2	12-24
1,2,4-trimethylbenzene	95-63-6	12.7	12-23
1,2,3-trimethylbenzene	526-73-8	14.0	15-25
1,2,3,4-tetramethylbenzene	488-23-3	15.4	NA

Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

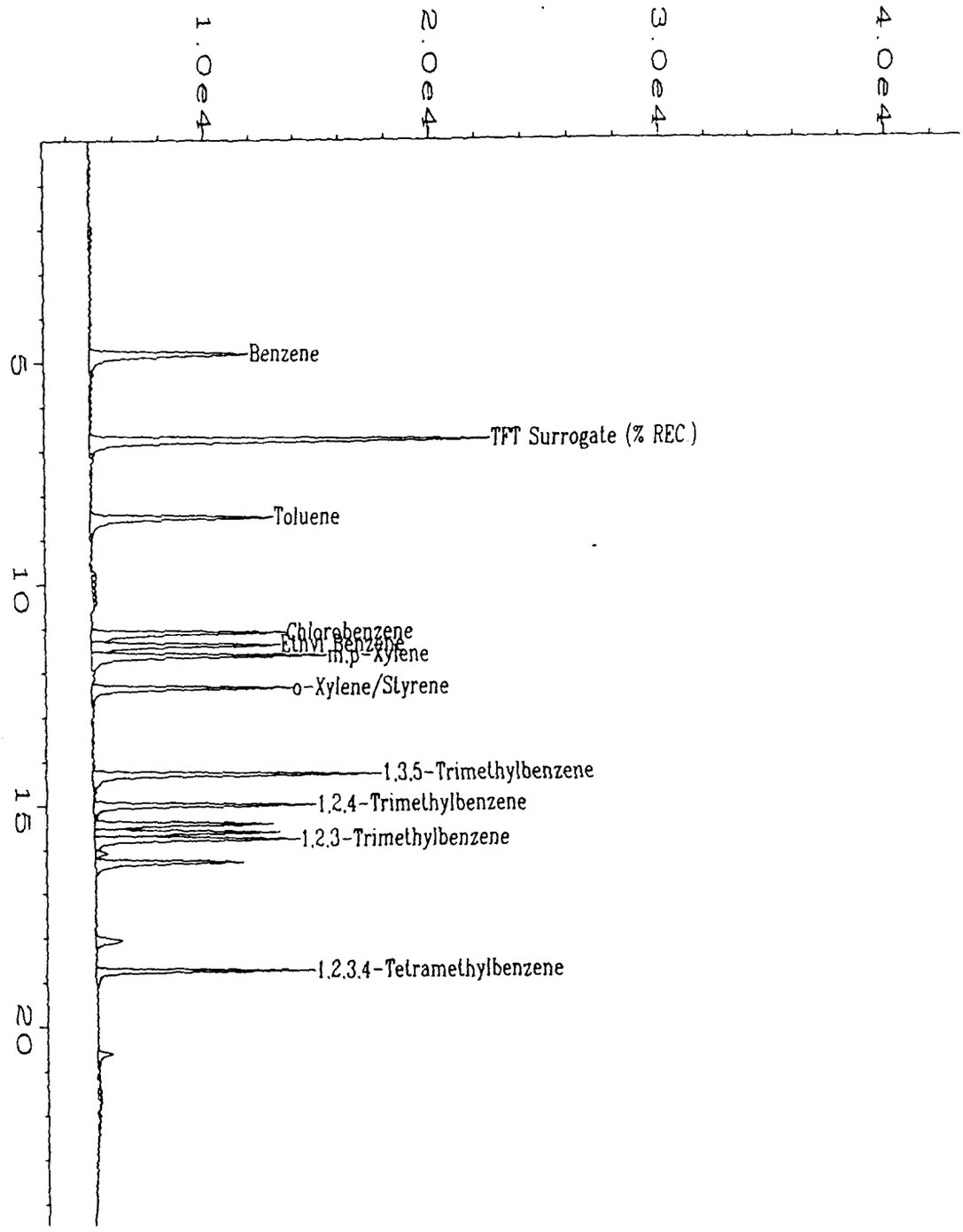
Surrogate Recovery:
a,a,a,-Trifluorotoluene : 90%
QC Reporting Limits : 69%-131%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

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LCS



ta File Name	: C:\HPCHEM\2\DATA\BX20317\010R0801.D		
erator	: C.J. Cook	Page Number	: 1
strument	: BTEX2	Vial Number	: 10
mple Name	: LCS031795	Injection Number	: 1
Time Bar Code:		Sequence Line	: 8
ired on	: 17 Mar 95 06:11 PM	Instrument Method	: BX20317.MTH
port Created on	: 17 Mar 95 06:36 PM	Analysis Method	: BX20317.MTH
st Recalib on	: 17 Mar 95 04:23 PM	Sample Amount	: 0
ltiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Laboratory Control Sample (LCS)

		Client Project No.	: 722450.21020
LCS Number	: LCS031695		MacDill
Date Extracted/Prepared	: 3/16/95	Lab Project No.	: 95-0819
Date Analyzed	: 3/16/95	Dilution Factor	: 1.00
		Method	: 602
		Matrix	: Water
		Lab File No.	: BX2031610

Compound Name	Cas Number	LCS Concentration ug/L	QC Limit ug/L
Benzene	71-43-2	18.4	12-24
Toluene	108-88-3	17.8	13-22
Ethyl Benzene	100-41-4	18.0	13-24
m,p-Xylene	NA	16.7	13-24
o-Xylene	95-47-6	17.4	13-24
Chlorobenzene	108-90-7	17.9	14-2
1,3,5-trimethylbenzene	108-67-8	18.8	12-24
1,2,4-trimethylbenzene	95-63-6	14.2	12-23
1,2,3-trimethylbenzene	526-73-8	16.2	15-25
1,2,3,4-tetramethylbenzene	488-23-3	17.8	NA

Note: Total Xylene consist of three isomers, two of which co-elute.
The Xylene PQL is for a single peak.

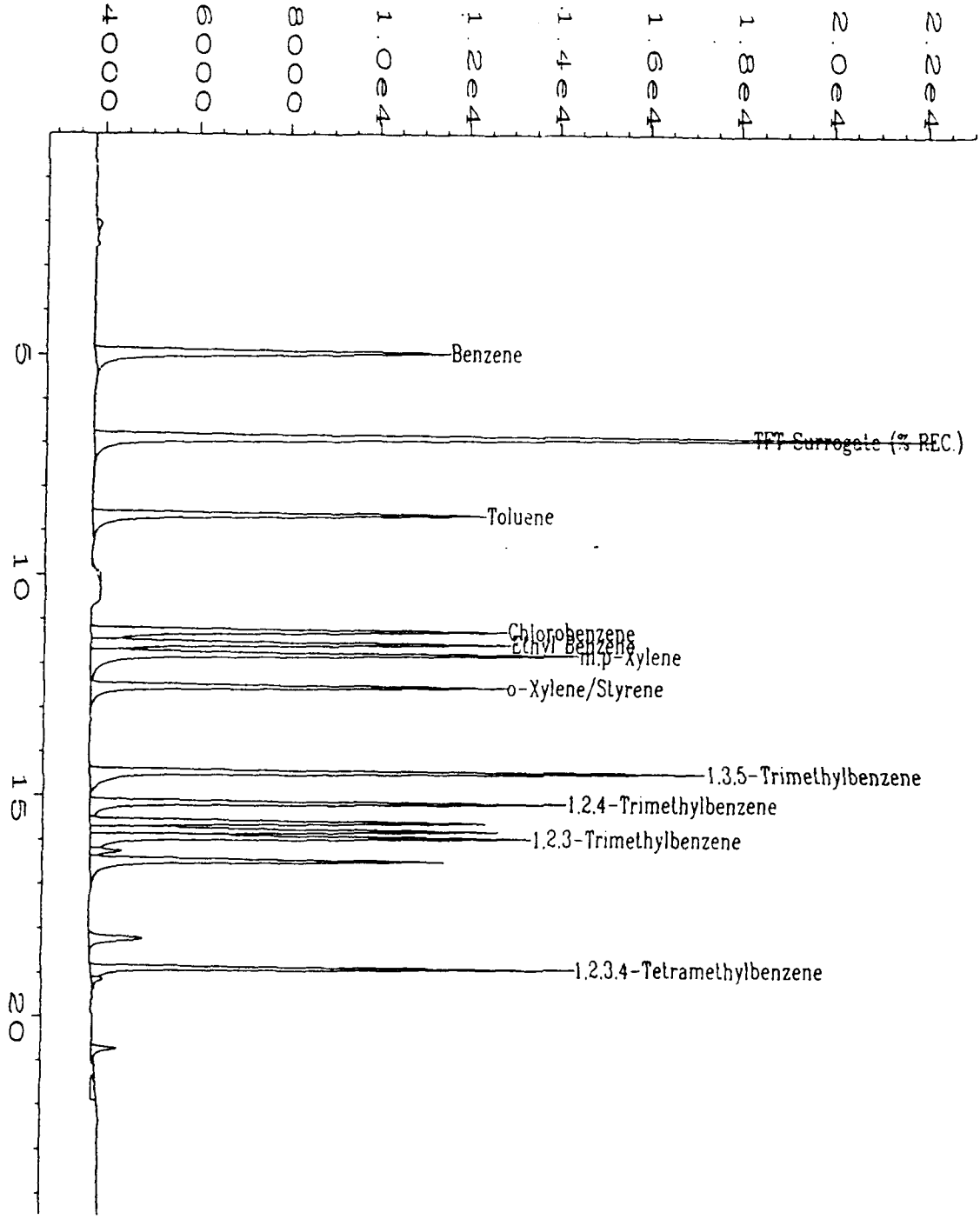
Surrogate Recovery:
a,a,a,-Trifluorotoluene : 96%
QC Reporting Limits : 69%-131%

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Practical Quantitation Limit (PQL).
PQL = Practical Quantitation Limit. The PQL is equal to the dilution factor multiplied by ten times the Method Detection Limit as determined by EPA SW846, Vol. 1B, Part II, pa. 8000-14.
NA = Not available.

Analyst

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LCS



Data File Name	: C:\HPCHEM\2\DATA\BX20316\010R0401.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 10
Sample Name	: LCS031695	Injection Number	: 1
Run Time Bar Code	:	Sequence Line	: 4
Acquired on	: 16 Mar 95 04:26 PM	Instrument Method	: BX20316.MTH
Report Created on	: 17 Mar 95 11:29 AM	Analysis Method	: BX20316.MTH
Last Recalib on	: 17 MAR 95 10:55 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
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TOTAL VOLATILE HYDROCARBONS (TVH)

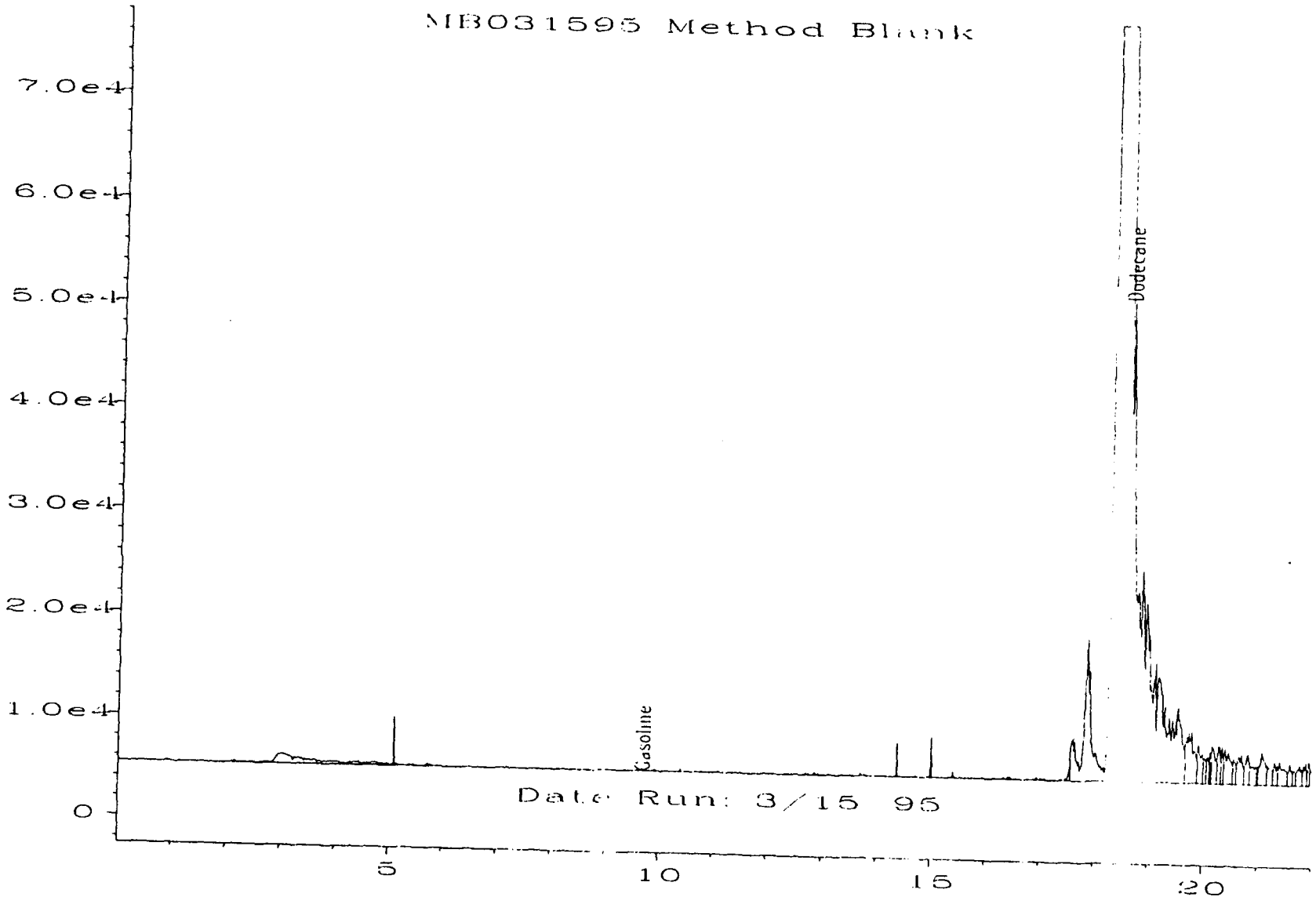
Date Sampled	: 3/10/95-3/11/95	Client Project Number	: 722450.21020/Mac Dill
Date Received	: 3/14/95	Lab Project Number	: 95-0819
Date Prepared	: 3/15/95	Matrix	: Soil
Date Analyzed	: 3/15/95-3/16/95	Method Number	: 5030/Mod.8015

Evergreen Sample #	Client Sample #	Surrogate Recovery	TVH** mg/Kg	MDL** mg/Kg
MB031595	Method Blank	100%	U	0.1
X04163	24MP-7(2-4)	115%	U	0.12
X04164	24MP-8(2-4)	116%	U	0.1[illegible]
X04165	24MP-9(3-5)	132%	0.17	0.12
X04166	24MP-9(9-11)	124%	U	0.12
X04167	24MP-10(2-4)	126%	U	0.12
X04168	24MW-6(2-4)	127%	U	0.13
X04169	24MW-6(9-11)	122%	U	0.12
X04170	175MP-1(3-5)	130%	U	0.12
X04170 DUP	175MP-1(3-5)	119%	U	0.12

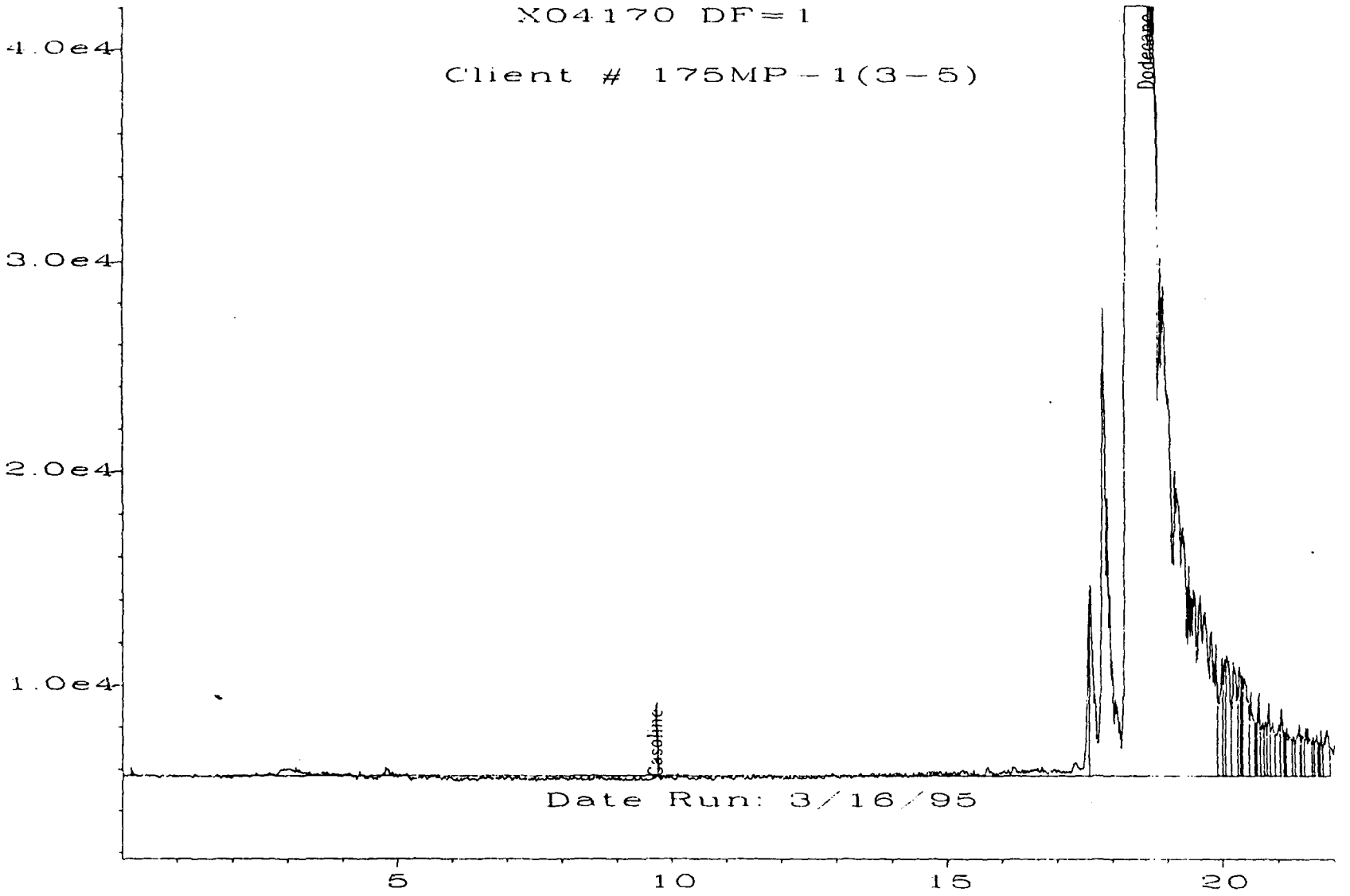
QUALIFIERS
U = TVH analyzed for but not detected.
B = TVH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
MDL = Method Detection Limit
** = All sample results and MDLs are reported on a dry weight basis.

Analyst

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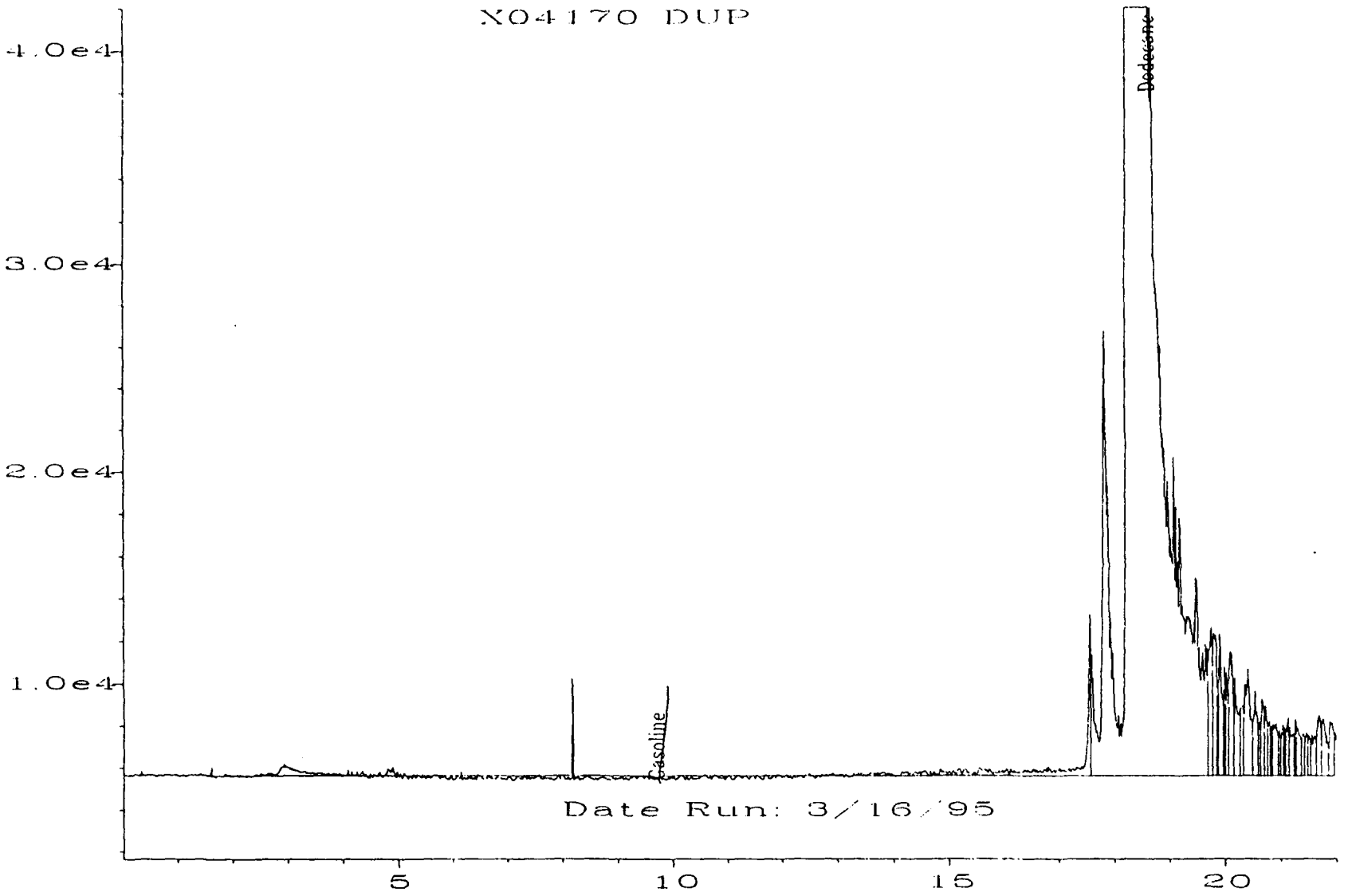


Sig. 1 in C:\HPCHEM 1\DATA\TVH0315 001F0101.D



Sig. 1 in C:\HPCHEM\1\DATA\VH0315\026F0101.D

3/16/95



Sig. 1 in C:\HPCHEM\1\DATA\TVH0315\027F0101.D

3/16/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL EXTRACTABLE HYDROCARBONS (TEH)
Jet Fuel Boiling Range

Date Sampled	: 3/10/95,3/11/95	Client Project Number	722450.21020/MAC DILL
Date Received	: 3/14/95		
Date Prepared	: 3/15,17/95	Lab Project Number	: 95-0819
Date Analyzed	: 3/18,19,22/95	Matrix	: SOIL
		Method Number	: 3500/8015M

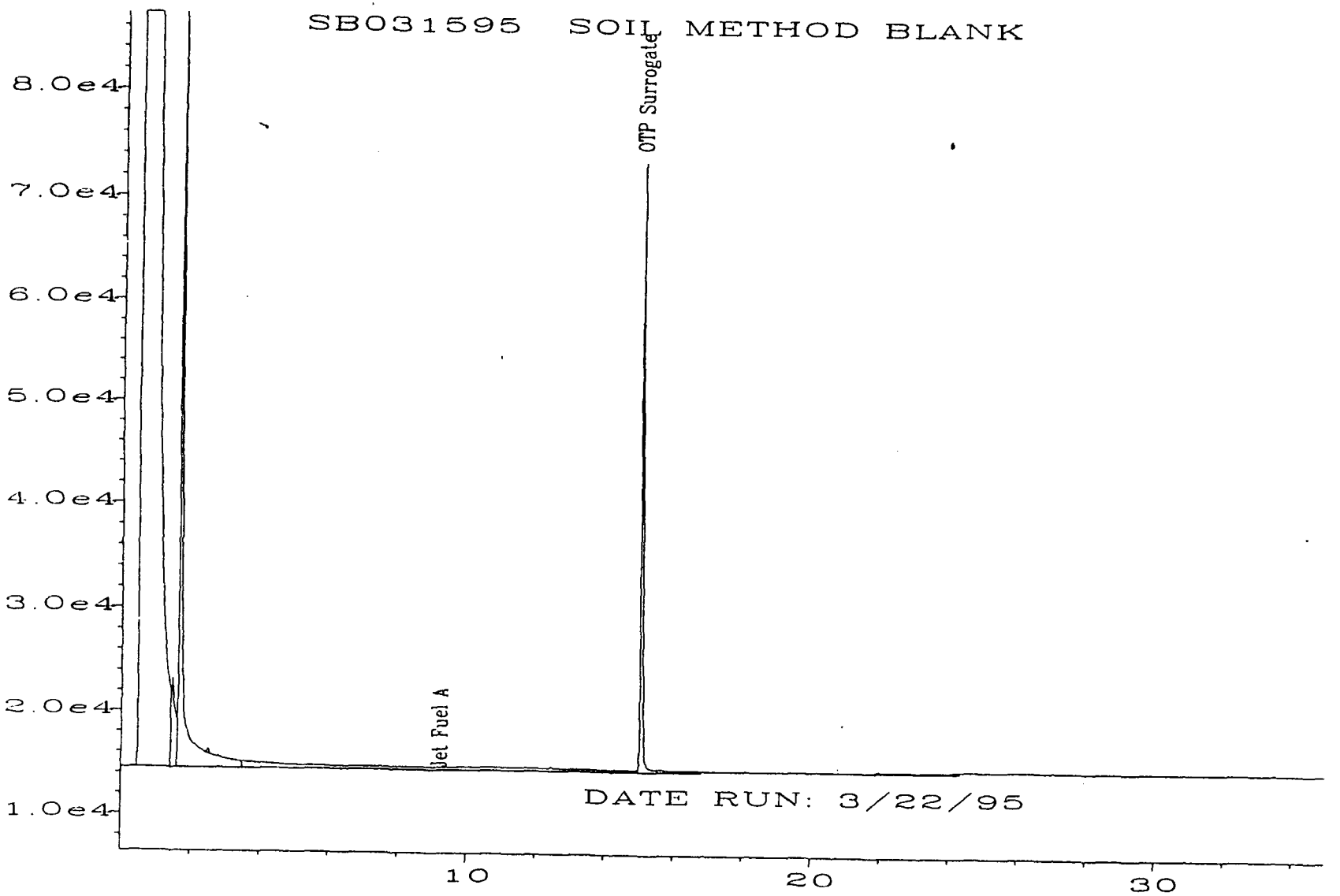
Evergreen Sample #	Client Sample #	Surrogate Recovery	TEH * mg/Kg	RL* mg/Kg
SB031595	SOIL METHOD BLANK	81%	U	10
SB031795	SOIL METHOD BLANK	77%	U	10
X04163	24MP-7(2-4)	73%	U	12
X04164	24MP-8(2-4)	76%	U	12
X04165	24MP-9(3-5)	77%	U	12
X04166	24MP-9(9-11)	78%	U	12
X04167	24MP-10(2-4)	77%	U	12
X04168	24MW-6(2-4)	84%	U	13
X04169	24MW-6(9-11)	81%	U	12
X04170	175MP-1(3-5)	81%	U	12

QUALIFIERS
U = TEH analyzed for but not detected.
B = TEH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
RL = Reporting Limit

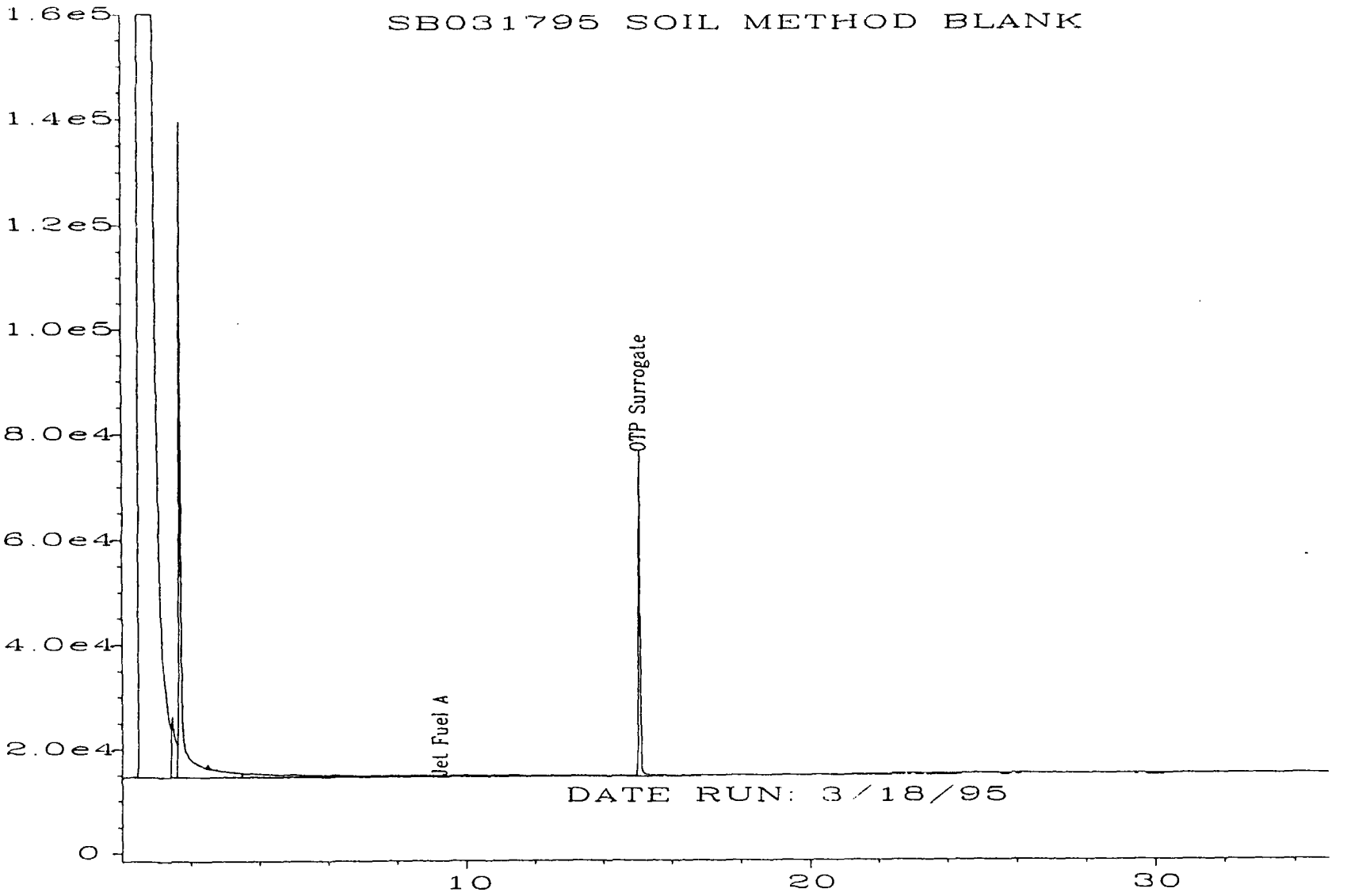
* = Based on dry weight

K. Cone
Analyst

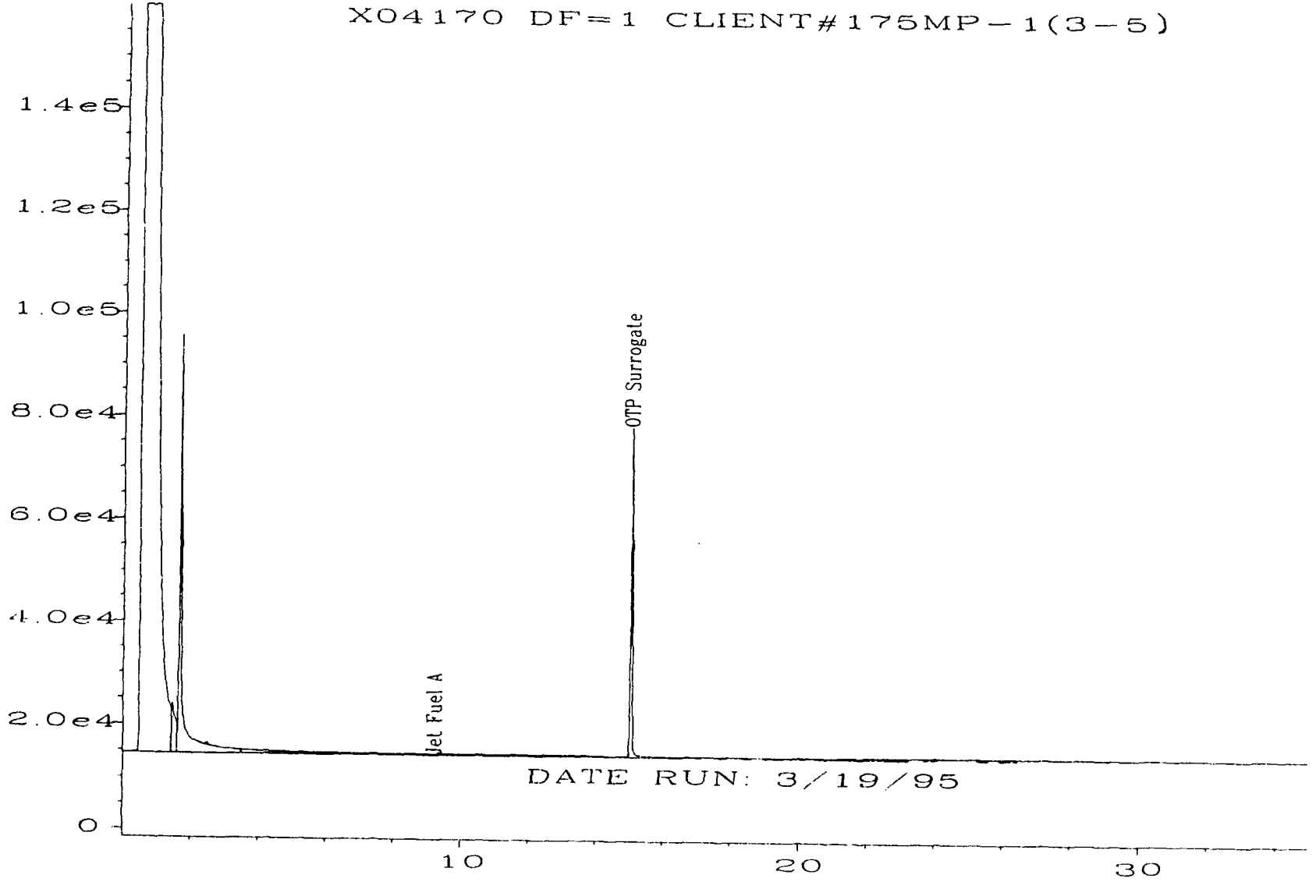
Approved



Sig. 2 in C:\HPCHEM\2\DATA\TEH0321\024R0101.D



Sig. 2 in C:\HPCHEM\2\DATA\TEH0317\040R0101.D



Sig. 2 in C:\HPCHEM\2\DATA\TEH0317\052R0101.D

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(303) 425-6021

TOTAL EXTRACTABLE HYDROCARBONS (TEH)
Laboratory Control Sample (LCS)

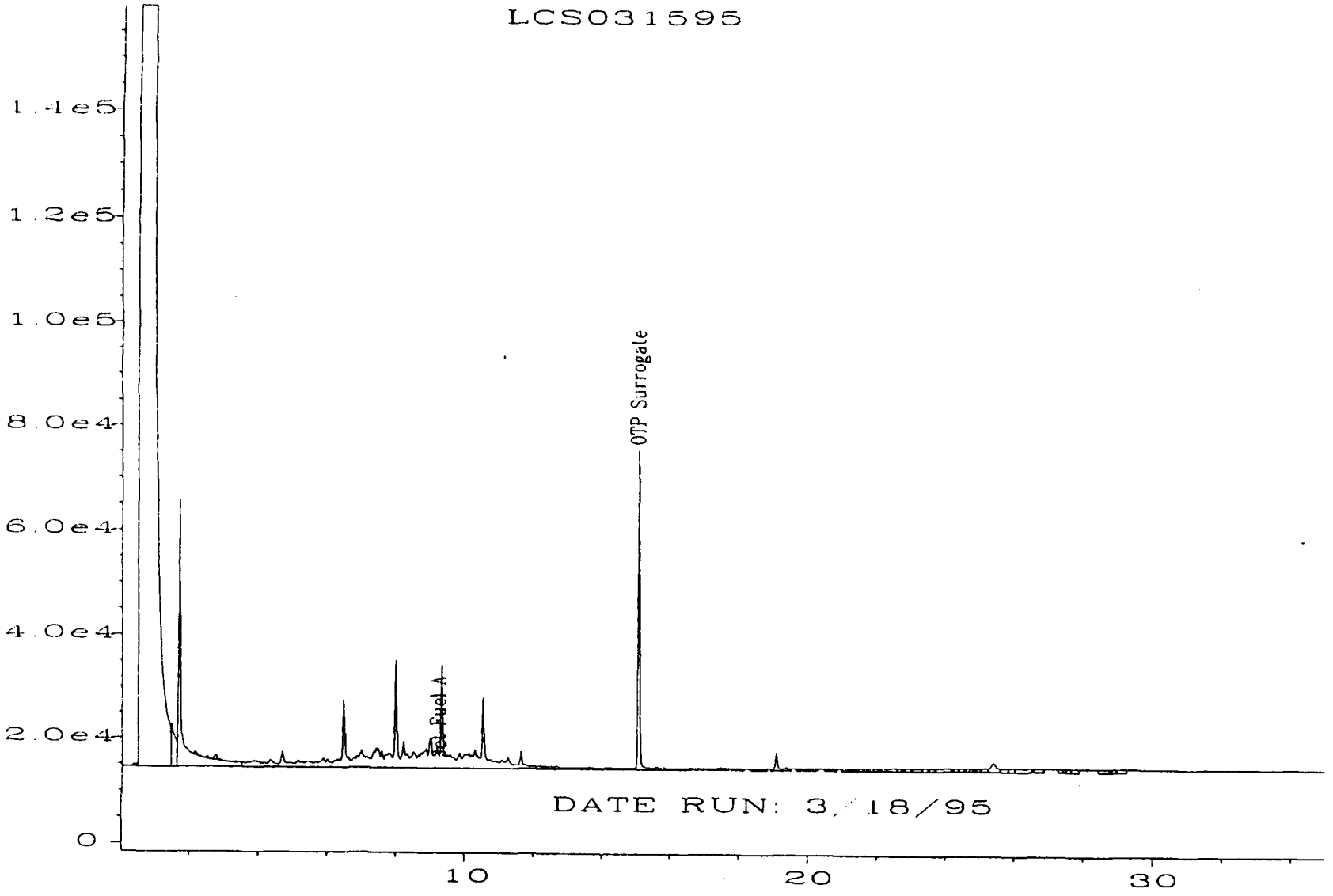
LCS Number	: LCS031595	Client Project Number	: 722450.21020/MAC DILL
Date Prepared	: 3/15/95	Lab Project Number	: 95-0819
Date Analyzed	: 3/18/95	Matrix	: SOIL
Sequence Number	: TEH0317021	Method Number	: 3500/Mod. 8015

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/Kg	QC Limit mg/Kg
JET FUEL	1000	960	750-1750

QUALIFIERS
U = TEH analyzed for but not detected.
B = TEH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

K. Cone
Analyst

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Sig. 2 in C:\HPCHEM\2\DATA\TEH0317\021R0101.D

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

Date Sampled	: 3/10,11/95	Client Project ID.	: 722450.21020
Date Received	: 3/14/95	Lab Project No.	: 95-0819
Date Prepared	: 3/15/95	Matrix	: Soil
Date Analyzed	: 3/15/95	Method	: EPA 160.3

Evergreen Sample #	Client Sample ID	Moisture (%)
X04163	24MP-7 (2-4)	17.2
X04164	24MP-8 (2-4)	18.7
X04165	24MP-9 (3-5)	18.6
X04166	24MP-9 (9-11)	18.3
X04167	24MP-10 (2-4)	16.7
X04168	24MW-6 (2-4)	20.8
X04169	24MW-6 (9-11)	18.0
X04170	175MP-1 (3-5)	14.4

Analyst

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0819tm.4

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1956
4630 Indiana Street - Golden, CO 80403

NON-CLP ANALYSIS RESULTS

Date: 03/24/95
Lab Name: Huffman Labs — Client: Evergreen Analytical
Contact: Sue Zeller — Contact: Patty McClellan
Sample Matrix: soil — Huffman Lab #: 143595

Client Smp#	Lab ID #	Element/ Compound	Dilution Factor	Results	Units	Prep Date	Analysis Date	Sample Size (g)	Method #	Instrument ID
75SS-4 (3-4)	14359501	TC	NA	<0.05	%	NA	03/23/95	2.195	Leco CR12	#7
75SS-4 (3-4)	14359501	TC	NA	<0.05	%	NA	03/23/95	2.067	Leco CR12	#7
75SS-6 (3-5)	14359502	TC	NA	<0.05	%	NA	03/23/95	2.154	Leco CR12	#7
75MP-7 (4-6)	14359503	TC	NA	<0.05	%	NA	^3/23/95	3.332	Leco CR12	#7
75MP-17 (4-6)	14359504	TC	NA	<0.05	%	NA	03/23/95	2.888	Leco CR12	#7
24MP-7 (2-4)	14359505	TC	NA	<0.05	%	NA	03/23/95	3.555	Leco CR12	#7
24MP-3 (3-5)	14359506	TC	NA	0.21	%	NA	03/23/95	3.331	Leco CR12	#7
24MP-4 (3-5)	14359507	TC	NA	0.13	%	NA	03/23/95	2.908	Leco CR12	#7
24MP-6 (4-6)	14359508	TC	NA	2.21	%	NA	03/23/95	3.093	Leco CR12	#7
24MP-16 (4-6)	14359509	TC	NA	0.73	%	NA	03/23/95	3.394	Leco CR12	#7
75SS-4 (3-4)	14359501	CC	NA	<0.02	%	NA	03/21/95	0.111	COU-02	"tower"
75SS-4 (3-4)	14359501	CC	NA	<0.02	%	NA	03/21/95	0.259	COU-02	"tower"
75SS-6 (3-5)	14359502	CC	NA	<0.02	%	NA	03/21/95	0.185	COU-02	"tower"
75MP-7 (4-6)	14359503	CC	NA	<0.02	%	NA	03/21/95	0.248	COU-02	"tower"
75MP-17 (4-6)	14359504	CC	NA	<0.02	%	NA	03/21/95	0.221	COU-02	"tower"
24MP-7 (2-4)	14359505	CC	NA	<0.02	%	NA	03/21/95	0.127	COU-02	"tower"
24MP-3 (3-5)	14359506	CC	NA	<0.02	%	NA	03/21/95	0.130	COU-02	"tower"
24MP-4 (3-5)	14359507	CC	NA	<0.02	%	NA	03/21/95	0.128	COU-02	"tower"
24MP-6 (4-6)	14359508	CC	NA	<0.02	%	NA	03/21/95	0.138	COU-02	"tower"
24MP-16 (4-6)	14359509	CC	NA	<0.02	%	NA	03/21/95	0.165	COU-02	"tower"
		% moisture			result					
75SS-4 (3-4)	14359501	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
75SS-4 (3-4)	14359501	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
)871 75SS-6 (3-5)	14359502	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
75MP-7 (4-6)	14359503	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
75MP-17 (4-6)	14359504	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
)819 24MP-7 (2-4)	14359505	17.24 TOC	NA	<0.05	0.06 %	NA	NA	NA	by calc	NA
24MP-3 (3-5)	14359506	TOC	NA	0.21	%	NA	NA	NA	by calc	NA
)820 24MP-4 (3-5)	14359507	TOC	NA	0.13	%	NA	NA	NA	by calc	NA
24MP-6 (4-6)	14359508	TOC	NA	2.21	%	NA	NA	NA	by calc	NA
24MP-16 (4-6)	14359509	TOC	NA	0.73	%	NA	NA	NA	by calc	NA

Samples analyzed and results reported on an as received basis.
Soil samples are not homogeneous.
Values reported below Detection Limits are for reference only.
TC detection limit = 0.05%
CC detection limit = 0.02%
TOC detection limit = 0.05%

- numbers to the left above represent the last four digits of the EAL project
mber under which the samples were analyzed.
e original report and quality control results are filed with EAL project 95-081

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403

NON-CLP ANALYSIS RESULTS

Date: 03/24/95
Lab Name: Huffman Labs
Contact: Sue Zeller
Sample Matrix: soil
Client: Evergreen Analytical
Contact: Patty McClellan
Huffman Lab #: 143595

Client Smp#	Lab ID #	Element/ Compound	Dilution Factor	Results	Units	Prep Date	Analysis Date	Sample Size (g)	Method #	Instrument ID
75SS-4 (3-4)	14359501	TC	NA	<0.05	%	NA	03/23/95	2.195	Leco CR12	#7
75SS-4 (3-4)	14359501	TC	NA	<0.05	%	NA	03/23/95	2.067	Leco CR12	#7
75SS-6 (3-5)	14359502	TC	NA	<0.05	%	NA	03/23/95	2.154	Leco CR12	#7
75MP-7 (4-6)	14359503	TC	NA	<0.05	%	NA	03/23/95	3.332	Leco CR12	#7
75MP-17 (4-6)	14359504	TC	NA	<0.05	%	NA	03/23/95	2.888	Leco CR12	#7
24MP-7 (2-4)	14359505	TC	NA	<0.05	%	NA	03/23/95	3.555	Leco CR12	#7
24MP-3 (3-5)	14359506	TC	NA	0.21	%	NA	03/23/95	3.331	Leco CR12	#7
24MP-4 (3-5)	14359507	TC	NA	0.13	%	NA	03/23/95	2.908	Leco CR12	#7
24MP-6 (4-6)	14359508	TC	NA	2.21	%	NA	03/23/95	3.093	Leco CR12	#7
24MP-18 (4-6)	14359509	TC	NA	0.73	%	NA	03/23/95	3.394	Leco CR12	#7
75SS-4 (3-4)	14359501	CC	NA	<0.02	%	NA	03/21/95	0.111	COU-02	"tower"
75SS-4 (3-4)	14359501	CC	NA	<0.02	%	NA	03/21/95	0.259	COU-02	"tower"
75SS-6 (3-5)	14359502	CC	NA	<0.02	%	NA	03/21/95	0.185	COU-02	"tower"
75MP-7 (4-6)	14359503	CC	NA	<0.02	%	NA	03/21/95	0.248	COU-02	"t
75MP-17 (4-6)	14359504	CC	NA	<0.02	%	NA	03/21/95	0.221	COU-02	"t
24MP-7 (2-4)	14359505	CC	NA	<0.02	%	NA	03/21/95	0.127	COU-02	"tower"
24MP-3 (3-5)	14359506	CC	NA	<0.02	%	NA	03/21/95	0.130	COU-02	"tower"
24MP-4 (3-5)	14359507	CC	NA	<0.02	%	NA	03/21/95	0.128	COU-02	"tower"
24MP-6 (4-6)	14359508	CC	NA	<0.02	%	NA	03/21/95	0.138	COU-02	"tower"
24MP-18 (4-6)	14359509	CC	NA	<0.02	%	NA	03/21/95	0.165	COU-02	"tower"
75SS-4 (3-4)	14359501	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
75SS-4 (3-4)	14359501	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
75SS-6 (3-5)	14359502	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
75MP-7 (4-6)	14359503	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
75MP-17 (4-6)	14359504	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
24MP-7 (2-4)	14359505	TOC	NA	<0.05	%	NA	NA	NA	by calc	NA
24MP-3 (3-5)	14359506	TOC	NA	0.21	%	NA	NA	NA	by calc	NA
24MP-4 (3-5)	14359507	TOC	NA	0.13	%	NA	NA	NA	by calc	NA
24MP-6 (4-6)	14359508	TOC	NA	2.21	%	NA	NA	NA	by calc	NA
24MP-18 (4-6)	14359509	TOC	NA	0.73	%	NA	NA	NA	by calc	NA

Samples analyzed and results reported on an as received basis.
Soil samples are not homogeneous.

Values reported below Detection Limits are for reference only.

TC detection limit = 0.05%
CC detection limit = 0.02%
TOC detection limit = 0.05%

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NON-CLP ANALYSIS RESULTS
LABORATORY CONTROL STANDARD

Date: 03/24/95 Client: Evergreen Analytical
Lab Name: Huffman Labs Contact: Patty McClellan
Contact: Sue Zeller Huffman Lab #: 143595

LABORATORY CONTROL STANDARD

Lab ID #	Source	Element/ Compound	True Value	Found Value	% R	Units	Date	Method #	Instrument ID
LCS	BN 4851	TC	3.35	3.41	102	%	03/23/95	Leco CR12	#7
LCS	BN 4056	CC	11.33	11.32	100	%	03/21/95	COU-02	"tower"

SPIKE RECOVERY

Lab ID #	Source	Element/ Compound	True Value	Found Value	% R	Units	Date	Method #	Instrument ID
SPIKE	BN 4712	TC	12960	14089	109	ug C	03/23/95	Leco CR12	#7
SPIKE DUP	BN 4712	TC	14520	15357	106	ug C	03/23/95	Leco CR12	#7
SPIKE	BN 4712	CC	1080	1086	101	ug C	03/21/95	COU-02	"tower"
SPIKE DUP	BN 4712	CC	1167	1168	100	ug C	03/21/95	COU-02	"tower"

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Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403

NON-CLP QA/QC ANALYSIS RESULTS
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Date: 03/24/95 Client: Evergreen Analytical
Lab Name: Huffman Labs Contact: Patty McClellan
Contact: Sue Zeller Huffman Lab #: 143595

INITIAL CALIBRATION

Lab ID #	Source	Element/ Compound	True Value	Found Value	% R	Units	Date	Method #	Instrument ID
ICS	BN 4712	TC	12.00	11.92	99	%	03/23/95	Leco CR12	#7
ICS	BN 4712	CC	12.00	11.96	100	%	03/21/95	COU-02	"tower"

Slope = NA
Intercept = NA Single point calibrations for this test.
95% Correlation Coefficient = NA

CONTINUING CALIBRATION VERIFICATION

Lab ID #	Source	Element/ Compound	True Value	Found Value	% R	Units	Date	Method #	Instrument ID
CCS	BN 4712	TC	12.00	12.19	102	%	03/23/95	Leco CR12	#7
CCS	BN 4712	TC	12.00	12.07	101	%	03/23/95	Leco CR12	#7
CCS	BN 4712	TC	12.00	11.81	98	%	03/23/95	Leco CR12	#7
CCS	BN 4712	CC	12.00	11.96	100	%	03/21/95	COU-02	"tower"
CCS	BN 4712	CC	12.00	11.92	99	%	03/21/95	COU-02	"tower"
CCS	BN 4712	CC	12.00	11.93	99	%	03/21/95	COU-02	"tower"
CCS	BN 4712	CC	12.00	11.97	100	%	03/21/95	COU-02	"tower"

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Quality Analytical Services Since 1936
4[illegible] Indiana Street • Golden, CO 80403

ANALYSIS : TOTAL CARBON	METHOD : HIGH TEMP COMB. - INFRARED DET.
INSTRUMENT : LECO CR12	ANALYZER # 7
BALANCE # 19	

C.C. CALCIUM CARBONATE	STD. N.I.S.T. BUFFALO RIVER SEDIMENT (BRS)
12.00 %C (theory) BN 4712	3.348 %C (theory) BN 4851

SAMPLE #	SAMPLE WT G			% CARBON PRE-CALIB	% CARBON POST-CALIB		QC	% REC.
[redacted]								
$CaCO_3$	0.103			11.88	11.92		ICS	
$CaCO_3$	0.115			11.95			CCS	99.6
$CaCO_3$	0.123			12.09			CCS	100.8
BL	1.0000			.608			MB	
"	1.0000			0.001			IB	
BRS	0.271			3.411			LCS	101.9
[redacted]								

ANALYST	DATE 3-23-95	REVIEWED	DATE 3/24/95	PAGE 1 OF 3

[illegible] (BLANK SAMPLE + CHECK FOR LEAKS/CONTAMINATION)

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Quality Analytical Services Since 1956
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ANALYSIS : TOTAL CARBON	METHOD : HIGH TEMP COMB. - INFRARED DET.
INSTRUMENT : LECO CR12	ANALYZER # 7
BALANCE # 19	

STD. CALCIUM CARBONATE	STD. N.I.S.T. BUFFALO RIVER SEDIMENT (BRS)
12.00 %C (theory) BN 4712	3.348 %C (theory) BN 4851

SAMPLE #	SAMPLE WT G			% CARBON PRE-CALIB	% CARBON POST-CALIB		QC	% REC.
[redacted]								
4343 BL	1.0000				0.002		IB	
BRS	0.310				3.429		CCS	102.4
CaCO3	0.116				12.19		CCS	101.6
SUCROSE	0.088				42.56		CCS	101.1
SUCROSE	0.091				42.70		CCS	101.4

ANALYST	DATE 3-23-95	REVIEWED	DATE 3/24/95	PAGE 2 OF 3

7/27/93

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LABORATORIES, INC.
Quality Analytical Services Since 1936
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ANALYSIS : TOTAL CARBON	METHOD : HIGH TEMP COMB. - INFRARED DET.
INSTRUMENT : LECO CR12	ANALYZER # 7
BALANCE # 19	

STD. CALCIUM CARBONATE	STD. N.I.S.T. BUFFALO RIVER SEDIMENT (BRS)
12.00 %C (theory) BN 4712	3.348 %C (theory) BN 4851

SAMPLE #	SAMPLE WT G			% CARBON PRE-CALIB	% CARBON POST-CALIB		QC	% REC.
1435 cfs 3/23 BL	1.000				0.001		IB	
143501	2.195				0.041		Dup ±2.5% of Mean	
143501	2.067				0.039			
143501	2.138				(0.659)			
+SPIKE CaCO3	0.108				—			
143501	2.026				(0.758)			
+SPIKE CaCO3	0.121				—			
143502	2.154				0.045			
503	3.3320				0.043			
143504	2.888				0.036			
143505	3.555				0.043			
143506	3.331				0.213			
BRS	0.316				3.436		CCS	102.6
CaCO3	0.115				12.07		CCS	100.5
BL	1.000				0.004		IB	
143507	2.908		(NH)		0.126			
143508	3.093				2.213			
143509	3.394				0.727			
BRS	0.249				3.437		CCS	102.7
CaCO3	0.134				11.81		CCS	98.4

ANALYST	DATE	REVIEWED	DATE	PAGE	OF
[illegible]	5-23-95	[illegible]	3/24/95	3	3

7/27/93

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ANALYSIS	CARBONATE CARBON	METHOD	SOP COU-02
ANALYZER #	6	COULOMETER #	Tower
BALANCE #	10		

CALCIUM CARBONATE (STD # 333) CaCO3	BOTTLE # 4712	% C THEORY = 12.00%	SODIUM CARBONATE Na2CO3	BOTTLE # 4056	%C THEORY = 11.3

SAMPLE NO.	TARE WT. GRAMS	TARE + SAMPLE WT.	SAMPLE WT. GRAMS	NOTES	COUNTS µGRAMS	LESS BLANK 6	% CARBON AS CARBONATE CARBON		% RECOVERY
Blank			—		6.2			IB	
Bot Bl			—		6.4			MB	
[redacted]									
#CaCO3	0.602084	0.611777	0.009693		1164.8	1158.8	11.96	ICS	99.63% rec
#Na2CO3	0.601000	0.611682	0.010682		1215.4	1209.4	11.32	LCS	99.93% rec
[redacted]									
#CaCO3	0.549270	0.560589	0.011319		1360.3	1354.3	11.96	CCS	99.71% rec
[redacted]									
1435-01	0.543314	0.654615	0.111301		7.1 21+	1.1	0.001		
1435-01	0.567537	0.824429	0.256892		3.5	2.5	0.001	dup	
#CaCO3	0.595053	0.599070	0.014017		1676.7	1670.7	11.92	CCS	99.33% rec
went to lunch	—	—	—		—	—	—		
#CaCO3	0.625218	0.636989	0.011771		1410.2	1404.2	11.93	CCS	99.41% rec
(+ #CaCO3)	0.673700	0.682700	0.009000		1092.0	1086.0	100.45% rec		
1435-01	0.556872	0.737x	0.114329						

ANALYST Tom Herman | DATE 3-21-95 | REVIEWED [signature] | DATE 3/22/95 | PAGE 1 OF 2

REVISED 1/30/97

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ANALYSIS	CARBONATE CARBON	METHOD	SOP COU-02
ANALYZER #	6	COULOMETER #	Tower
BALANCE #	10		

CALCIUM CARBONATE (STD # 333) CaCO3	BOTTLE # 4712	% C THEORY = 12.00%	SODIUM CARBONATE Na2CO3	BOTTLE # 4056	%C THEORY = 11.33 %

SAMPLE NO.	TARE WT. GRAMS	TARE + SAMPLE WT.	SAMPLE WT. GRAMS	NOTES	COUNTS µ GRAMS	LESS BLANK 6	% CARBON AS CARBONATE CARBON		% RECOVERY
(+#CaCO3)	0.535211	0.544936	0.009725						
1435-01	0.544936	0.710449	0.165513		1174.4	1168.4	99.98% rec	spike dup	see spike sheet
[redacted]									
1435-02	0.618251	0.803001	0.184750		7.8	1.8	0.001		
1435-03	0.615765	0.864216	0.248451		8.4	2.4	0.001		
1435-04	0.544141	0.764840	0.220699		8.2	2.2	0.001		
1435-05	0.564375	0.690941	0.126566		7.3	1.3	0.001		
1435-06	0.552620	0.712407	0.129787		6.8	0.8	0.001		
1435-07	0.557046	0.684879	0.127833		7.2	1.2	0.001		
[redacted]									
#CaCO3	0.659855	0.670446	0.010591		1269.4	1263.4	11.93	CCS	99.41 % rec
1435-08	0.506013	0.644224	0.138211		8.5	2.5	0.002		
1435-09	0.543937	0.709064	0.165127		7.5	1.5	0.001		
[redacted]									
#CaCO3	0.670032	0.681088	0.011056		1329.0	1323.0	11.97	CCS	99.72 % rec

ANALYST	DATE	REVIEWED	DATE	PAGE
Tom Herman	3-21-95	[illegible]	3/22/95	PAGE 2 OF 2

REVISED 11/30/93

Evergreen

CASE NARRATIVE

Evergreen Analytical Laboratory (EAL) Project #: 95-1073

Parsons Engineering Science, Inc. (PES) Project: MacDill AFB (722450.21020)

Sample Receipt
On April 4, 1995, eight soil samples and one trip blank were received in good condition at EAL. Upon sample receipt confirmation, John Hicks of PES instructed the laboratory to perform MS/MSD analysis on a sample submitted for BTEX. On April 5, 1995, John Hicks requested that MS/MSD analysis for TVH be performed on sample 75MP-7D. Refer to the EAL Sample Log Sheet for specific log-in information and cross-reference of EAL and PES sample identifications.

BTEX, Water Matrix, Method 602
Method Blank contamination was reported for MB041595 for total xylenes at 0.6 UG/L and 1,2,3,4-tetramethylbenzene at 0.5 UG/L. All effected data are flagged "B".

1,2,4-trimethylbenzene was outside the EAL percent recovery control limits for MS/MSD 75MP-7S, due to the concentration of contaminant in the sample. There were no other quality control anomalies to report.

Total Volatile Hydrocarbons (TVH), Water Matrix, Method 8015M
There were no quality control anomalies to report.

General Chemistry
There were no quality control anomalies to report.

Patricia A. McClellan, Project Manager

Evergreen Analytical Sample Log Sheet

Project # 95-1073

te(s) Sampled: 4/02/95

Date Due: 4/07/95-UST
4/18/95-OTHERS

Received: 4/04/95 0850

Holding Time(s): 4/16-BTEX,4/04-NO2- & NO3-

ient Project I.D. 722450.21020/MAC DILL

Rush STANDARD

ient: PARSONS ENGINEERING SCIENCE

Shipping Charges N/A

dress: 1700 BROADWAY, SUITE #900

E.A. Cooler # 419

DENVER, CO. 80290

Airbill # FEDEX-9581826461

ntact: TODD WIEDEMEIER

Custody Seal Intact? Y
Cooler Y Bottles N/A
COC Present Y
Sample Tags Present? Y
Sample Tags Listed? Y
Sample(s) Sealed? Y

ient P.O. _____

one #831-8100 Fax #831-8208

ecial Instructions ★ ALL BTEX SAMPLES ARE TO INCLUDE CHLOROBENZENE, TMB AND MB, AN MS/MSD AND LAB DUPLICATE ARE TO BE ANALYZED.

b #	Client ID#	Analysis	Mtx	Btl	Loc	*
5202A/B	MD75-MW15	★ BTEX 602	W	40V	2	
5203A/B	75MP-3D	★ BTEX 602	W	40V	2	
4A/B	MD75-MW7	★ BTEX 602	W	40V	2	
5205A/B	75MP-7D	★ BTEX 602	W	40V	2	
5206A/B	75MP-7S	★ BTEX 602	W	40V	2	
5207A/B	TRIP BLANK	★ BTEX 602	W	40V	2	
5202C/D	MD75-MW15	TVPH	W	40V	2	
5203C/D	75MP-3D	TVPH	W	40V	2	
5204C/D	MD75-MW7	TVPH	W	40V	2	
5205C/D	75MP-7D,MS/MSD	TVPH	W	40V	2	
5206C/D	75MP-7S	TVPH	W	40V	2	
5202E	MD75-MW15	ALKALINITY	W	250P	C4	
5204E	MD75-MW7	ALKALINITY	W	250P	C4	
5205E	75MP-7D	Cl-,NO3-,NO4-,SO4-	W	125P	C4	
5206E	75MP-7S	Cl-,NO3-,NO4-,SO4-	W	125P	C4	
5202E	MD75-MW15	Cl-,NO3-,NO4-,SO4-	W	125P	C4	
5203E	75MP-3D	Cl-,NO3-,NO4-,SO4-	W	125P	C4	
5204E	MD75-MW7	Cl-,NO3-,NO4-,SO4-	W	125P	C4	

mples to be returned

GC/MS __ GC 2 Metals __ Gen Chem 2 SxPrep __ SxRec 2

Acctg X Adm1 X Adm2 X QA/QC X Sales X File X

e 1 of 1 Page(s)

Custodian/Date: TC 4/4/95

Dm 4/6/95

Evergreen Analytical Inc.

4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons Engineering Science
ADDRESS 100 Broadway, Suite 900
CITY Denver STATE CO ZIP 80290
PHONE # 303-831-8100 FAX # _____ FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Wiedemeier
PROJECT I.D. 722450.21020
EAL QUOTE # _____ PO # _____
TURNAROUND REQUIRED* 30 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Mark Vessely
(print) MARK VESSELY
Evergreen Analytical Cooler No 419
Cooler Received _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	ANALYSIS REQUESTED: TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE 8260 ATM'S 1,2,4 TMB	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline) SGV	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Alkalinity 250P	Anions (Cl, NO3, SO4) 125P	EAL Sample No.
MD75-MW15	4/2/95	11:15	5	X									X	X		X				X		X05202
75MP-3D	4/2/95	12:00	4	X									X	X		X						03
MD75-MW7	4/2/95	12:45	5	X									X	X		X				X		04
75MP-7D	4/2/95	14:10	5	X									X	X		X				X		05
75MP-7S	4/2/95	14:50	5	X									X	X		X				X		06
Trip Blank			1										X									07
MD75-MW15	4/2/95	16:00	1	X																X		08
75MP-3D	4/2/95	16:10	1	X																X		09
MD75-MW7	4/2/95	16:20	1	X																X		10
HT:																						Location 2,C4
DD:																						Container Size

EAL use only
Do not write in shaded area

EAL Project # 1073
Custodian _____

Instructions: Samples packed in Ice

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
[signature]	4/3/95	[signature]		Fedex		[signature]	4/4/95

95-1073

PROJECT SPECIAL INSTRUCTIONS ~~94~~

Date: 4/5 EAL Contact: Patty Client Contact: John Hicks
Parsons ES.

INSTRUCTIONS:

Please assign sample 75MP-7D (X05205) an MS / MSD for TVPH analysis.

Evergreen Analytical Sample Receipt/Check-in Record 9581826AL

Date & Time Rec'd: 4/4/95 Shipped Via: Fed Ex
(Airbill # if applicable)

Client : Parsons

Client Project ID(s): 722450.21020

EAL Project #(s): 95-1073 EAL Cooler(s): (Y) N

Cooler#	419								
Ice packs	(Y)	N	Y	N	Y	N	Y	N	Y	N
Temperature °C	cold								

	Y	N	N/A
1. Custody seal(s) present:	✓		
Seals on cooler intact	✓		
Seals on bottle intact			✓
2. Chain of Custody present:	✓		
3. Containers broken or leaking: (Comment on COC if Y)		✓	
4. Containers labeled:	✓		
5. COC agrees w/ bottles received: (Comment on COC if N)	✓		
6. COC agrees w/ labels: (Comment on COC if N)	✓		
7. Headspace in VOA vials-waters only (comment on COC if Y)		✓	
8. VOA samples preserved:		✓	
9. pH measured on metals, cyanide or phenolics*:			✓
List discrepancies			
*Non-EAL provided containers only, water samples only.			
10. Metal samples present:			✓
Total _____ , Dissolved _____			
D or PD to be filtered:			
T,TR,D,PD to be Preserved:			
11. Short holding times:		✓	
Specify parameters			
12. Multi-phase sample(s) present:		✓	
13. COC signed w/ date/time:	✓		

Comments: _____

(Additional comments on back)
Custodian Signature/Date: Lee Connor 4/4/95

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Rizzo Engineering Science
ADDRESS 700 Broadway, Suite 200
CITY Denver STATE CO ZIP 80290
PHONE # 303-831-8100 FAX # _____ FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Wiedemeier
PROJECT I.D 722450.21020
EAL QUOTE # _____ PO # _____
TURNAROUND REQUIRED* 30 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Mark Vessely
(print) MARK VESSELY

Evergreen Analytical Cooler No 419
Cooler Received _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle) + TPH 8015 (GRO and DRO)	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Alkalinity	Anions (Cl, NO3, SO4)	EAL Sample No.
MD75-MW15	4/2/95	11:15	5	X										X		X				X		
75MP-3D	4/2/95	12:00	4	X										X		X						
MD75-MW7	4/2/95	12:45	5	X										X		X				X		
75MP-7D	4/2/95	14:10	5	X										X		X					X	
75MP-7S	4/2/95	14:50	5	X										X		X					X	
TRIP BLANK			1											X								
MD75-MW15	4/2/95	16:00	1	X																	X	
75MP-3D	4/2/95	16:10	1	X																	X	
MD75-MW7	4/2/95	16:20	1	X																	X	
HT:																						Location
DD:																						Container Size

EAL use only
Do not write in shaded area

EAL
Project # _____
Custodian _____

Instructions: Samples packed in Ice

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Mark Vessely	4/3/95 12:00	Fedex		Fedex		Lee Counts	4/4/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW7	Client Project No.	: 722450.21020/MacDil
Lab Sample Number	: X05204	Lab Project No.	: 95-1073
Date Sampled	: 4/2/95	Dilution Factor	: 1.00
Date Received	: 4/4/95	Method	: 602
Date Prepared	: 4/16/95	Matrix	: Water
Date Analyzed	: 4/16/95	Lab File No.	: BX2041613
		Method Blank No.	: MB041695

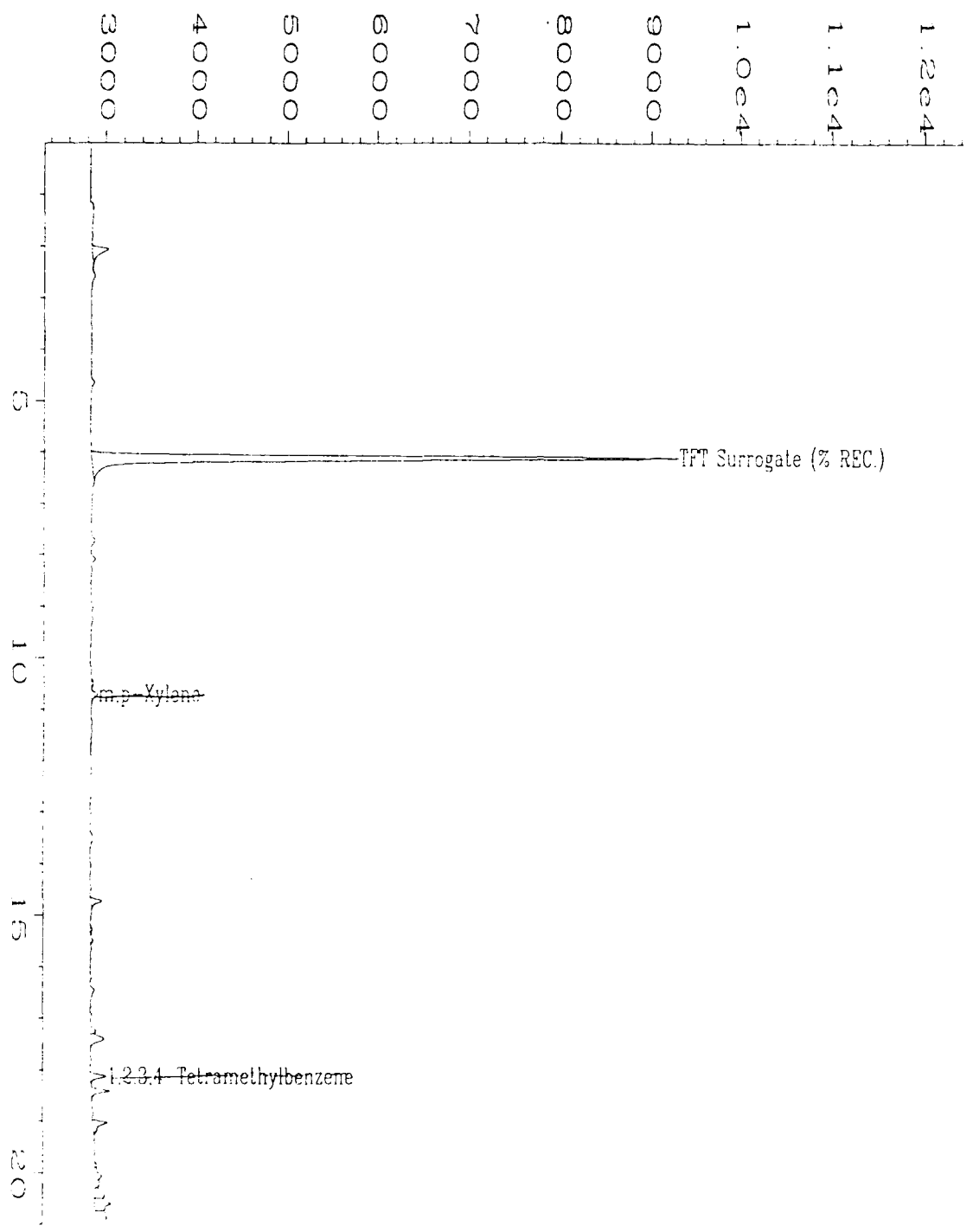
Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6		U	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		85%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

K. Cone
Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20416\013R1001.D		
Operator	: T. Lockwood	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 13
Sample Name	: X05204;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 10
Acquired on	: 16 Apr 95 09:03 PM	Instrument Method	: BX20416A.MTH
Report Created on	: 16 Apr 95 09:25 PM	Analysis Method	: BX20416A.MTH
Last Recalib on	: 16 APR 95 06:25 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1073 Client#: MD75-MW7 Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW15	Client Project No.	: 722450.21020/MacD
Lab Sample Number	: X05202	Lab Project No.	: 95-1073
Date Sampled	: 4/2/95	Dilution Factor	: 1.00
Date Received	: 4/4/95	Method	: 602
Date Prepared	: 4/15/95	Matrix	: Water
Date Analyzed	: 4/15/95	Lab File No.	: BX2041517
		Method Blank No.	: MB041595

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	0.6	B	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	0.4	B	0.4

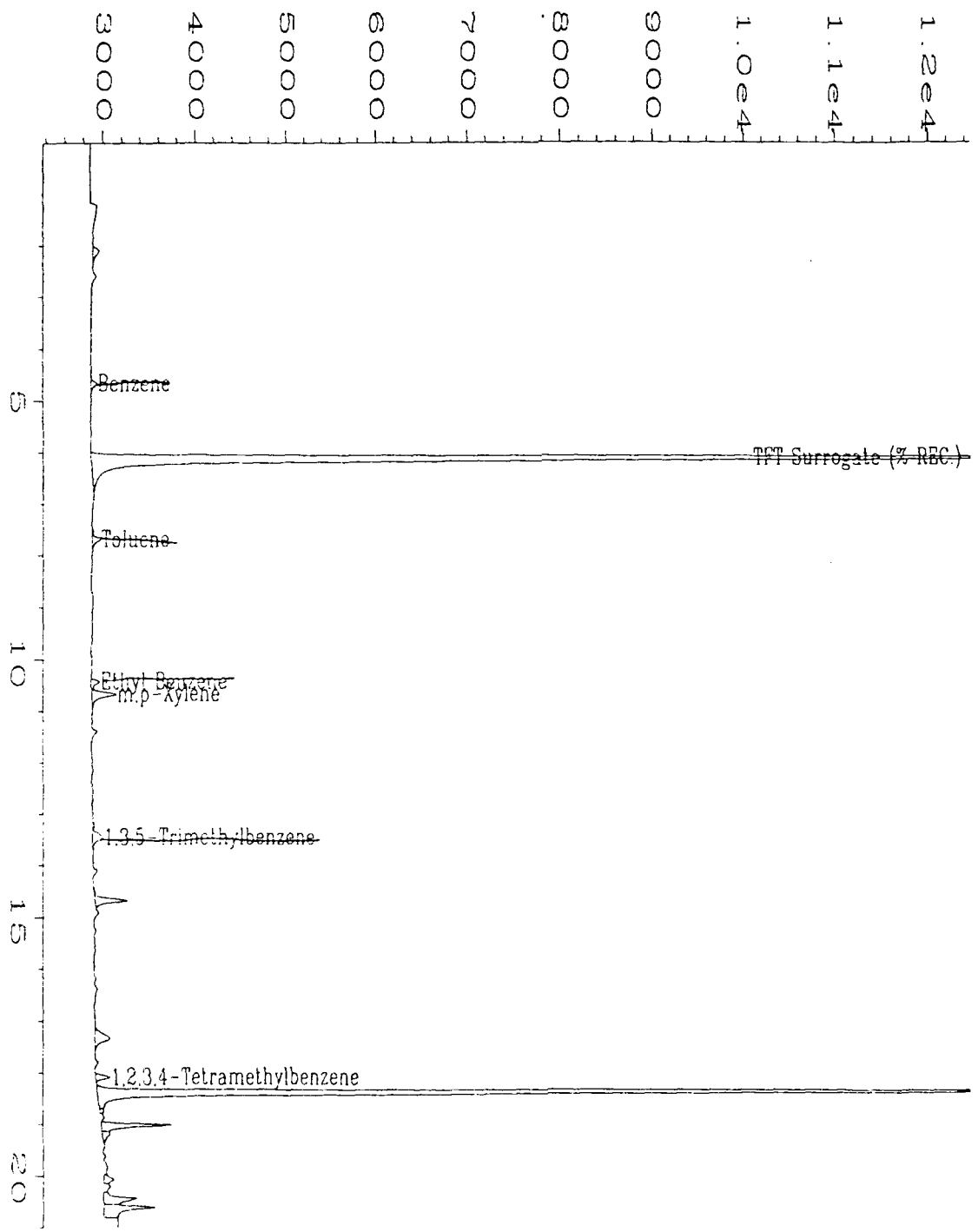
Surrogate Recovery (α,α,α-Trifluorotoluene):	71%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20415\017R0101.D
Operator : T. Lockwood
Instrument : BTEX2
Sample Name : X05202;1;5
Run Time Bar Code:
Acquired on : 15 Apr 95 10:48 PM
Report Created on: 16 Apr 95 04:44 PM
Last Recalib on : 16 Apr 95 03:38 PM
Multiplier : 1

Page Number : 1
Vial Number : 17
Injection Number : 1
Sequence Line : 1
Instrument Method: BX20415.MTH
Analysis Method : BX20415A.MTH
Sample Amount : 0
ISTD Amount :

MD75-MW15

jm 4/27/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: 75MP-3D	Client Project No.	: 722450.21020/MacDill
Lab Sample Number	: X05203	Lab Project No.	: 95-1073
Date Sampled	: 4/2/95	Dilution Factor	: 1.00
Date Received	: 4/4/95	Method	: 602
Date Prepared	: 4/16/95	Matrix	: Water
Date Analyzed	: 4/16/95	Lab File No.	: BX2041612
		Method Blank No.	: MB041695

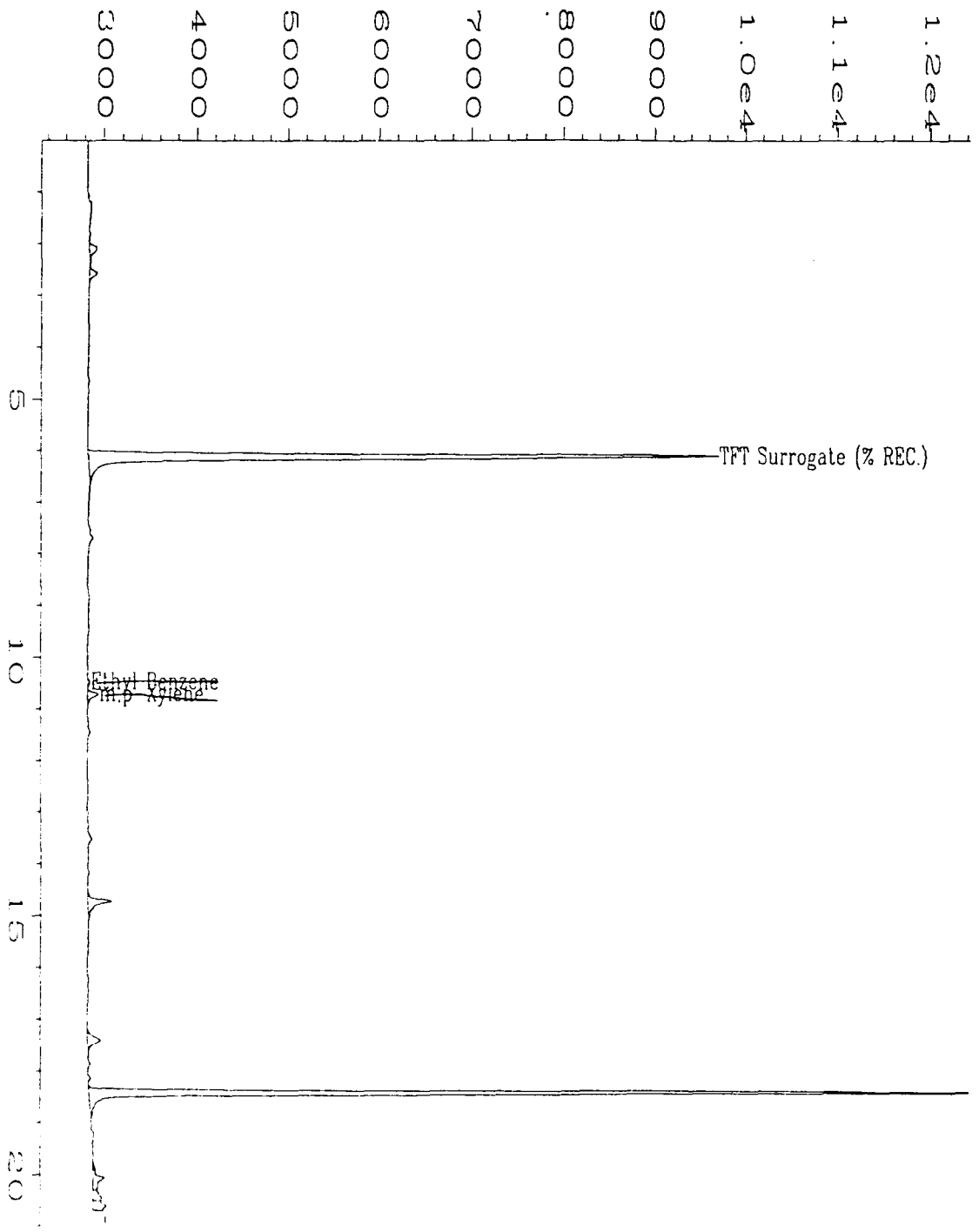
Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	U	0.4
Toluene	108-88-3	U	0.4
Chlorobenzene	108-90-7	U	0.4
Ethyl Benzene	100-41-4	U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	U	0.4
1,2,3-Trimethylbenzene	526-73-8	U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		91%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

K. Cone
Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20416\012R1001.D		
Operator	: T. Lockwood	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 12
Sample Name	: X05203;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 10
Acquired on	: 16 Apr 95 08:19 PM	Instrument Method	: BX20416A.MTH
Report Created on	: 16 Apr 95 08:40 PM	Analysis Method	: BX20416A.MTH
Last Recalib on	: 16 APR 95 06:25 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1073 Client#: 75MP-3D Water		

qm 4/18/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: 75MP-7S	Client Project No.	: 722450.21020/MacD
Lab Sample Number	: X05206	Lab Project No.	: 95-1073
Date Sampled	: 4/2/95	Dilution Factor	: 1.00
Date Received	: 4/4/95	Method	: 602
Date Prepared	: 4/16/95	Matrix	: Water
Date Analyzed	: 4/16/95	Lab File No.	: BX2041615
		Method Blank No.	: MB041695

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3	3.3		0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4	4.0		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	11		0.4
1,3,5-Trimethylbenzene	108-67-8	25		0.4
1,2,4-Trimethylbenzene	95-63-6	50		0.4
1,2,3-Trimethylbenzene	526-73-8	22		0.4
1,2,3,4-Tetramethylbenzene	488-23-3	12		0.4

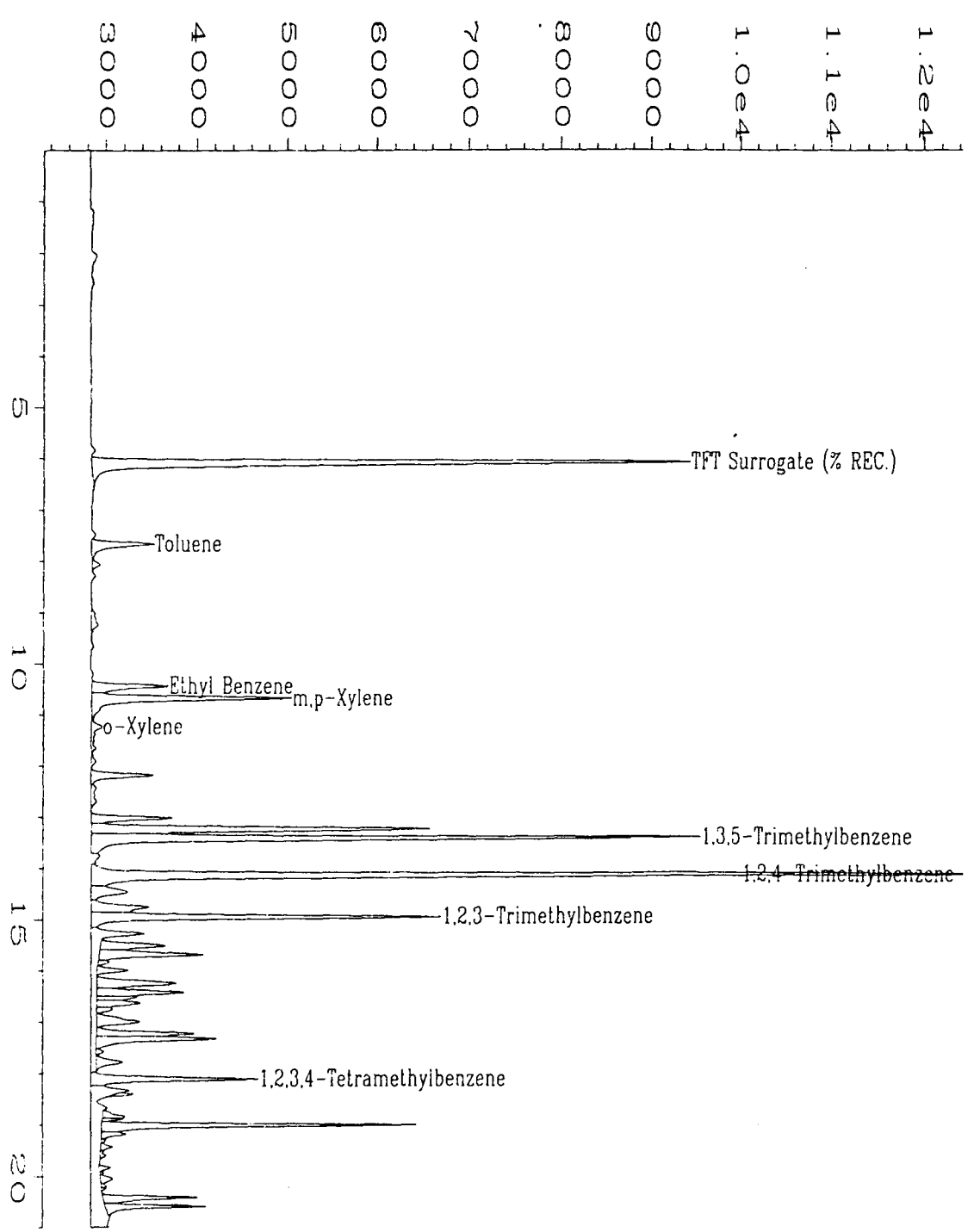
Surrogate Recovery (α,α,α-Trifluorotoluene):	85%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20416\015R1001.D
Operator : T. Lockwood
Instrument : BTEX2
Sample Name : X05206;1;5
Run Time Bar Code:
Acquired on : 16 Apr 95 10:31 PM
Report Created on: 18 Apr 95 12:57 PM
Last Recalib on : 16 APR 95 06:25 PM
Multiplier : 1

Page Number : 1
Vial Number : 15
Injection Number : 1
Sequence Line : 10
Instrument Method: BX20416A.MTH
Analysis Method : BX20416A.MTH
Sample Amount : 0
ISTD Amount :

75MP-7S

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: 75MP-7S	Client Project No.	: 722450.21020/MacDi
Lab Sample Number	: X05206DUP	Lab Project No.	: 95-1073
Date Sampled	: 4/2/95	Dilution Factor	: 1.00
Date Received	: 4/4/95	Method	: 602
Date Prepared	: 4/16/95	Matrix	: Water
Date Analyzed	: 4/16/95	Lab File No.	: BX2041616
		Method Blank No.	: MB041695

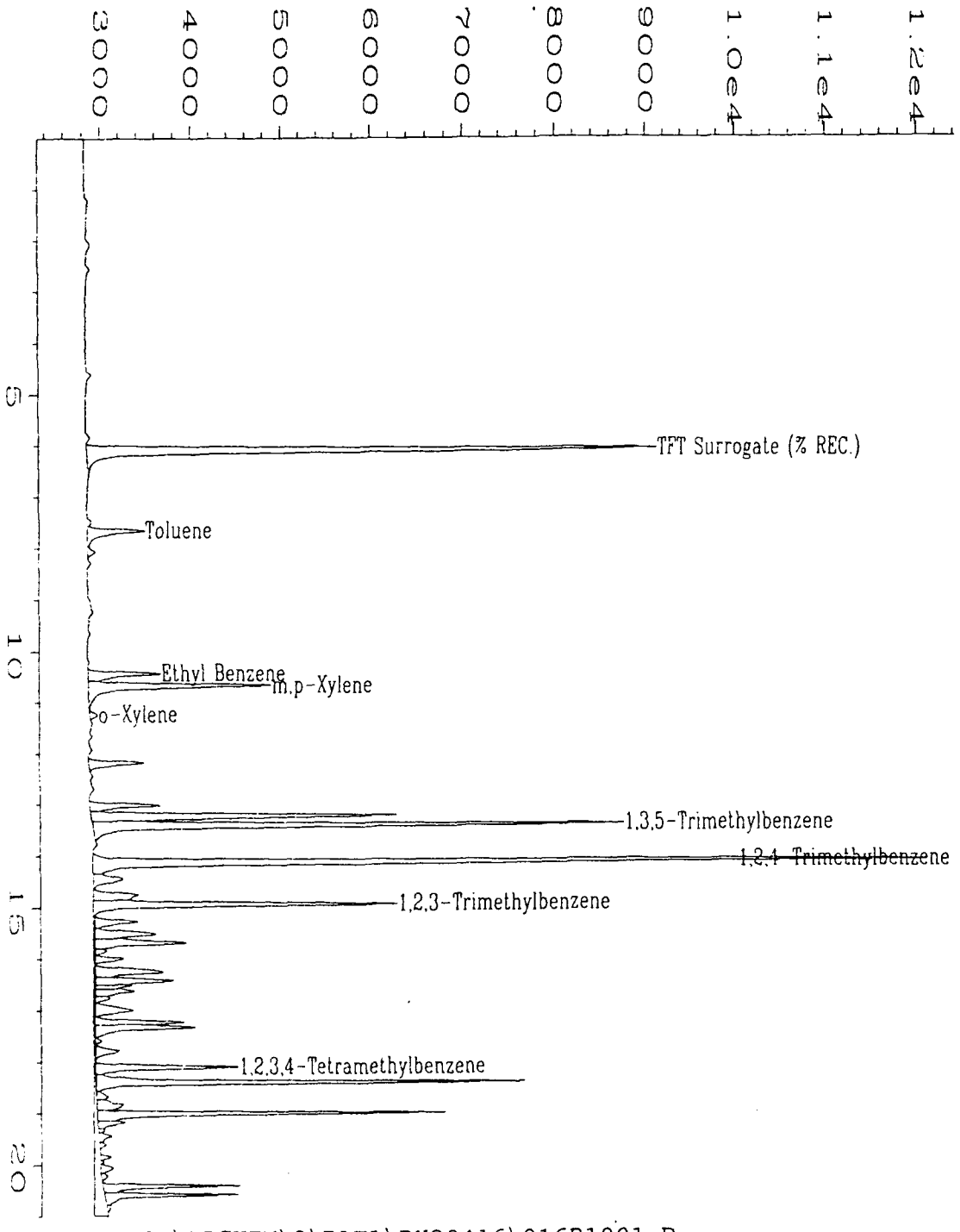
Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3	3.1		0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4	3.9		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	7.6		0.4
1,3,5-Trimethylbenzene	108-67-8	21		0.4
1,2,4-Trimethylbenzene	95-63-6	43		0.4
1,2,3-Trimethylbenzene	526-73-8	34		0.4
1,2,3,4-Tetramethylbenzene	488-23-3	9.6		0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		80%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved



ata File Name	: C:\HPCHEM\2\DATA\BX20416\016R1001.D		
perator	: T. Lockwood	Page Number	: 1
nstrument	: BTEX2	Vial Number	: 16
ample Name	: X05206DUP;1;5	Injection Number	: 1
n Time Bar Code:		Sequence Line	: 10
ired on	: 16 Apr 95 11:15 PM	Instrument Method	: BX20416A.MTH
eport Created on	: 16 Apr 95 11:36 PM	Analysis Method	: BX20416A.MTH
ast Recalib on	: 16 APR 95 06:25 PM	Sample Amount	: 0
ultiplier	: 1	ISTD Amount	:
ample Info	: Project#: 95-1073 Client#: 75MP-7S Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: 75MP-7D	Client Project No.	: 722450.21020/MacDil
Lab Sample Number	: X05205	Lab Project No.	: 95-1073
Date Sampled	: 4/2/95	Dilution Factor	: 1.00
Date Received	: 4/4/95	Method	: 602
Date Prepared	: 4/16/95	Matrix	: Water
Date Analyzed	: 4/16/95	Lab File No.	: BX2041614
		Method Blank No.	: MB041695

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	U		0.4
Toluene	108-88-3	U		0.4
Chlorobenzene	108-90-7	U		0.4
Ethyl Benzene	100-41-4	U		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U		0.4
1,3,5-Trimethylbenzene	108-67-8	U		0.4
1,2,4-Trimethylbenzene	95-63-6	U		0.4
1,2,3-Trimethylbenzene	526-73-8	U		0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U		0.4

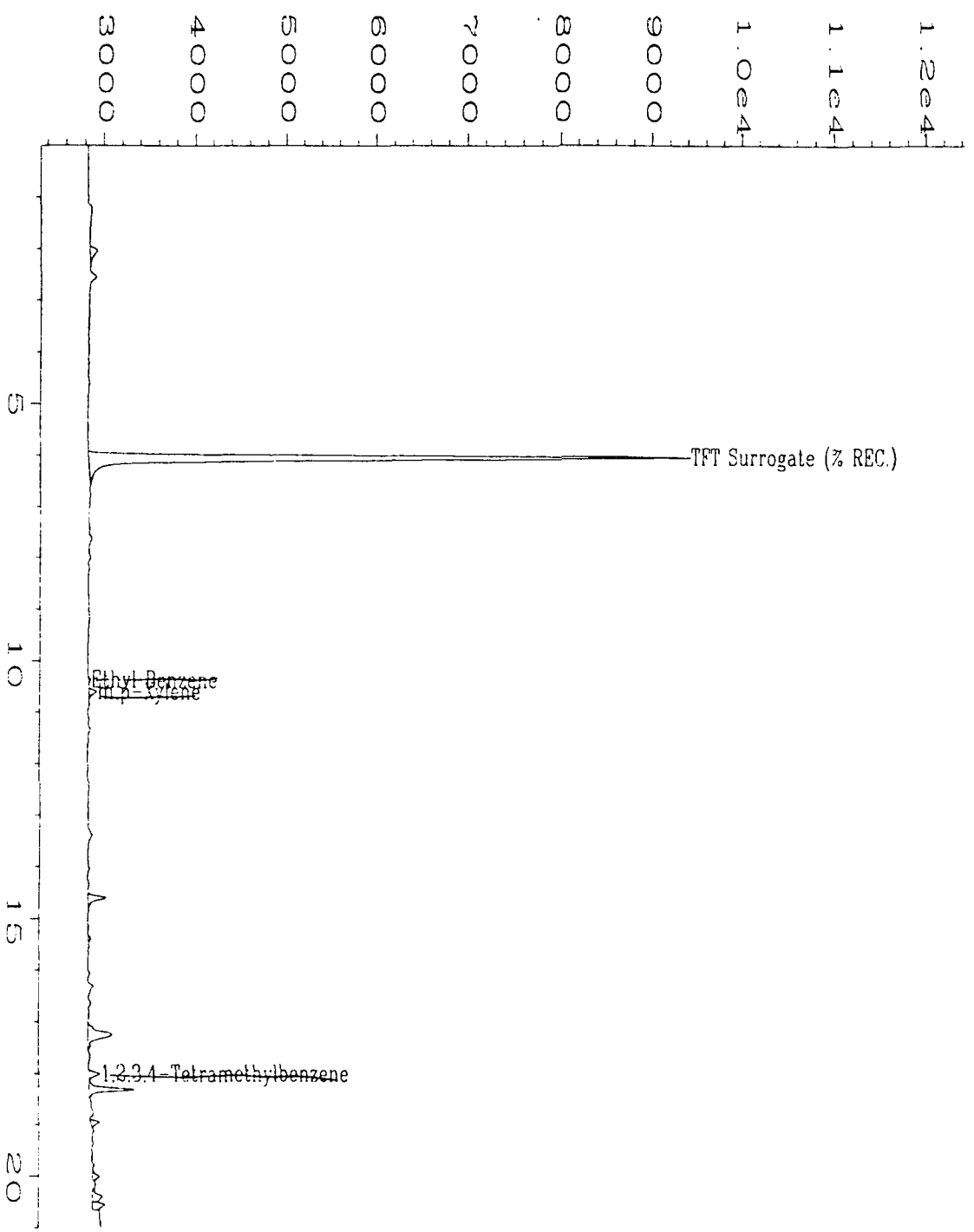
Surrogate Recovery (α,α,α-Trifluorotoluene):	85%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved



ata File Name	: C:\HPCHEM\2\DATA\BX20416\014R1001.D		
perator	: T. Lockwood	Page Number	: 1
nstrument	: BTEX2	Vial Number	: 14
ample Name	: X05205;1;5	Injection Number	: 1
n Time Bar Code:		Sequence Line	: 10
uired on	: 16 Apr 95 09:47 PM	Instrument Method	: BX20416A.MTH
eport Created on:	16 Apr 95 10:08 PM	Analysis Method	: BX20416A.MTH
ast Recalib on	: 16 APR 95 06:25 PM	Sample Amount	: 0
ultiplier	: 1	ISTD Amount	.
ample Info	: Project#: 95-1073 Client#: 75MP-7D Water		

4/27/95

Evergreen Analytical, Inc.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS
TVH Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: 75MP-7D	**Client Project No.**	: 722450.21020
Lab Sample No.	: X05205	**Lab Project No.**	: 95-1073
Date Sampled	: 4/2/95	**EPA Method No.**	: 5030/8015 Mod.
Date Received	: 4/3/95	**Matrix**	: Water
Date Prepared	: 4/16/95	**Method Blank**	: MB041495
Date Analyzed	: 4/16/95		

Compound	Spike Added (mg/L)	Sample Concentration (mg/L)	MS Concentration (mg/L)	MS %REC	QC Limits %REC
Gasoline	2.00	0.00	1.96	98%	60-140

Compound	Spike Added (mg/L)	MSD Concentration (mg/L)	MS %REC	RPD	QC Limits RPD	QC Limits %REC
Gasoline	2.00	2.62	131%	29	50	60-140

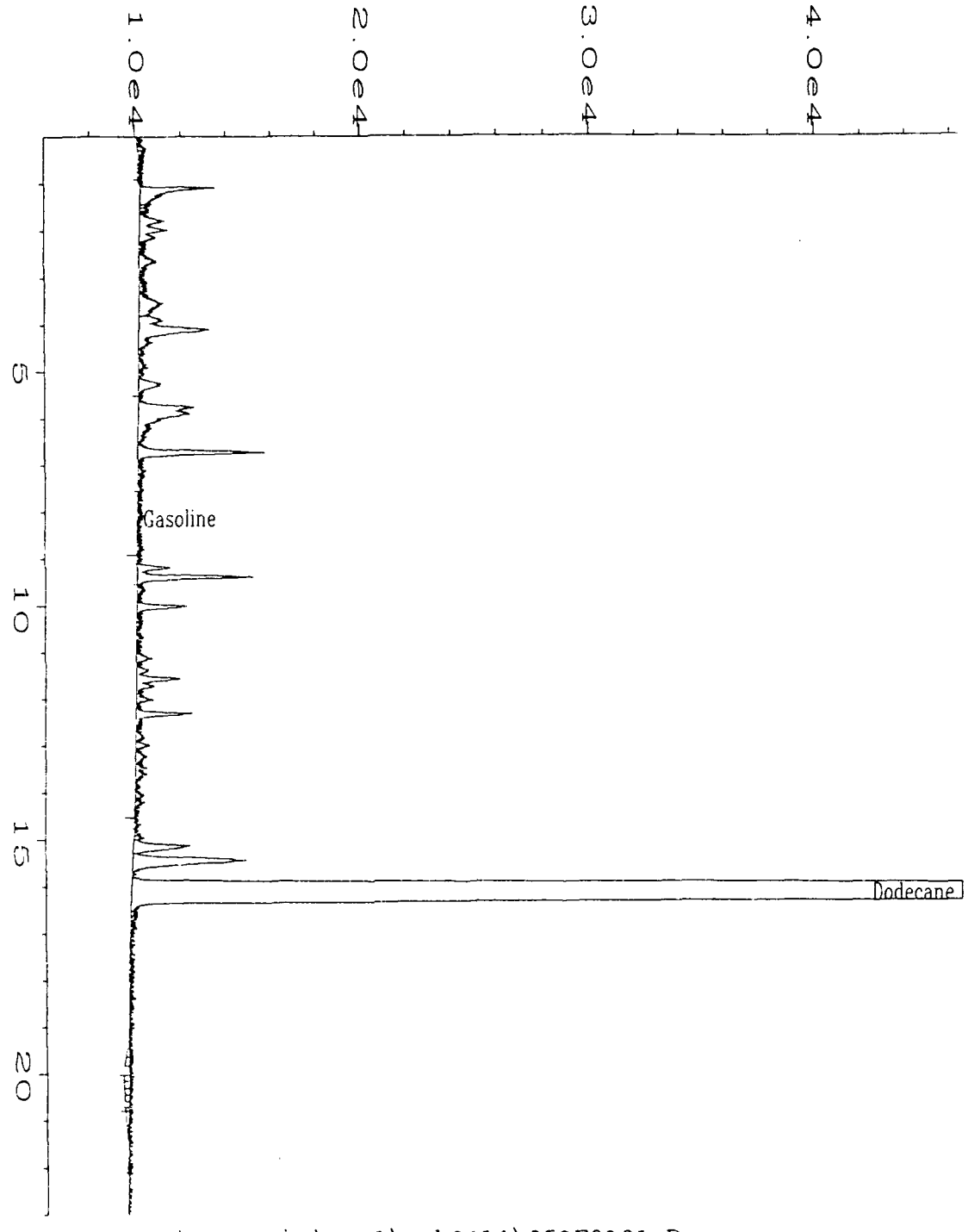
* = Values outside of QC limits.

RPD: 0 out of (1) outside limits.

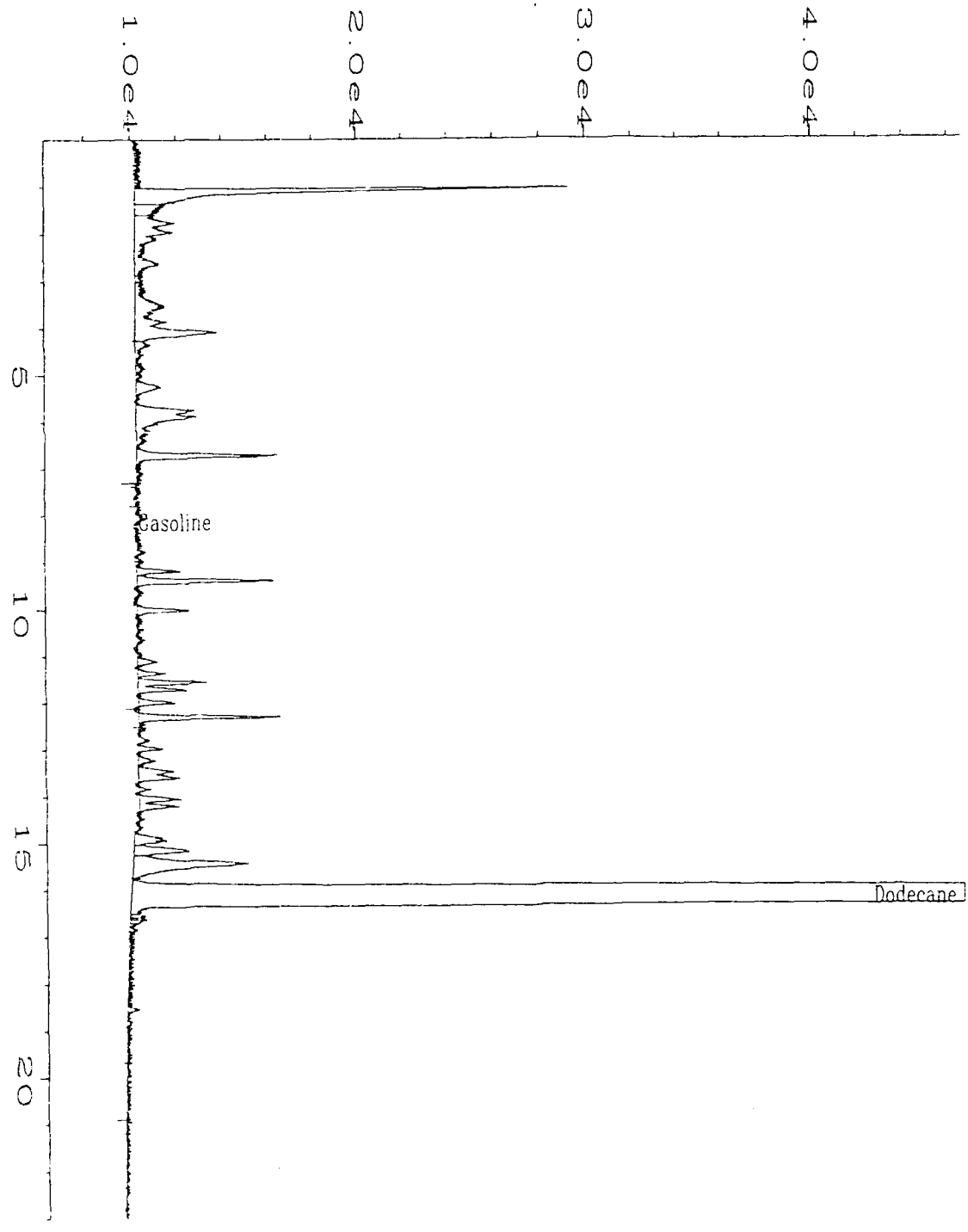
Spike Recovery: 0 out of (2) outside limits.

Comments: NA = Not analyzed/not applicable.

4/25/95



ata File Name	: C:\HPCHEM\1\DATA\tvh0414\053F0101.D		
perator	: Dawn N. Guildner	Page Number	: 1
nstrument	: TVH	Vial Number	: 53
ample Name	: X05205 MS	Injection Number	: 1
: Time Bar Code:		Sequence Line	: 1
quired on	: 16 Apr 95 06:20 PM	Instrument Method	: TVH1BASE.MTH
eport Created on:	16 Apr 95 09:55 PM	Analysis Method	: TVH0415.MTH
ast Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
ultiplier	: 1	ISTD Amount	:



Data File Name	: C:\HPCHEM\1\DATA\tvh0414\054F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 54
Sample Name	: X05205 MSD	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Apr 95 06:56 PM	Instrument Method	: TVH1BAS.
Report Created on	: 16 Apr 95 09:55 PM	Analysis Method	: TVH0415.MT
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Evergreen Analytical, Inc.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

BTEX Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: 75MP-7S	Client Project No.	: 722450.21020/MacDill
Lab Sample No.	: X05206	Lab Project No.	: 95-1073
Date Sampled	: 4/2/95	EPA Method No.	: 602
Date Received	: 4/4/95	Matrix	: Water
Date Prepared	: 4/16/95	Lab File Number(s)	: BX2041617,18
Date Analyzed	: 4/16/95	Method Blank	: MB041695

Compound	Spike Added (ug/L)	Sample Concentration (ug/L)	MS Concentration (ug/L)	MS %REC	QC Limits %REC
Benzene	20.0	0.0	14.0	70	50-150
Toluene	20.0	3.3	18.5	76	50-148
Ethyl Benzene	20.0	4.0	20.9	85	50-150
m,p-Xylene	40.0	8.9	42.6	84	50-150
o-Xylene	20.0	2.4	15.3	65	50-150
Chlorobenzene	20.0	0.0	14.0	70	55-135
1,3,5-TMB	20.0	24.8	51.1	132	50-150
1,2,4-TMB	20.0	49.7	87.9	191 *	50-150
1,2,3-TMB	20.0	21.8	47.4	128	50-150
1,2,3,4-TeMB	20.0	11.9	36.7	124	50-150

Compound	Spike Added (ug/L)	MSD Concentration (ug/L)	MSD %REC	RPD	QC Limits RPD	QC Limits %REC
Benzene	20.0	13.7	69	2.2	25	50-150
Toluene	20.0	18.0	74	3.3	25	50-148
Ethyl Benzene	20.0	19.9	80	6.1	25	50-150
m,p-Xylene	40.0	42.6	84	0.0	25	50-150
o-Xylene	20.0	14.8	62	4.0	25	50-150
Chlorobenzene	20.0	12.9	65	8.2	25	55-135
1,3,5-TMB	20.0	49.6	124	5.9	25	50-150
1,2,4-TMB	20.0	84.0	172 *	10.8	25	50-150
1,2,3-TMB	20.0	44.6	114	11.6	25	50-150
1,2,3,4-TeMB	20.0	34.7	114	8.4	25	50-150

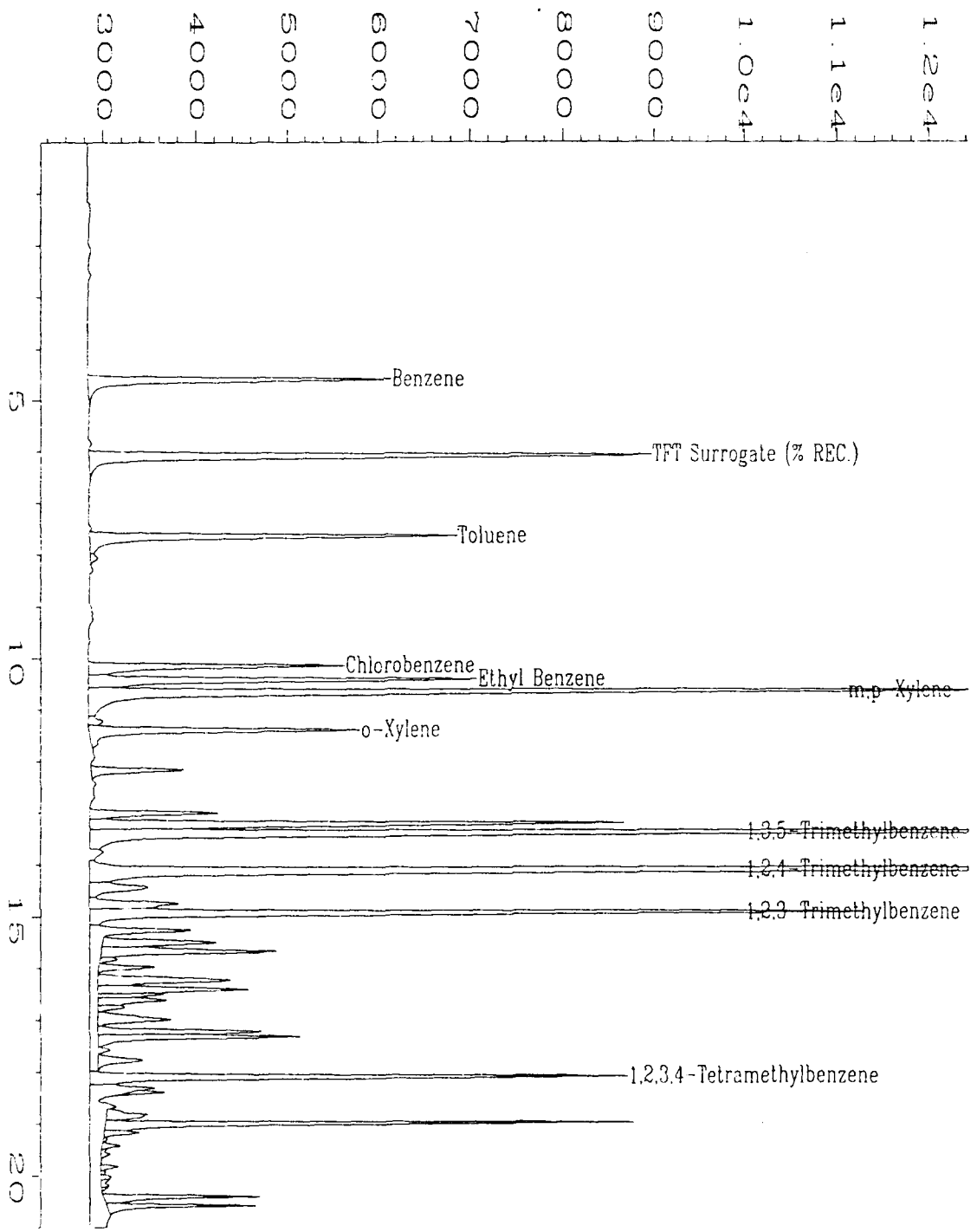
* = Values outside of QC limits. See LCS041695.

RPD: 0 out of (10) outside limits.
Spike Recovery: 2 out of (20) outside limits.

Comments:

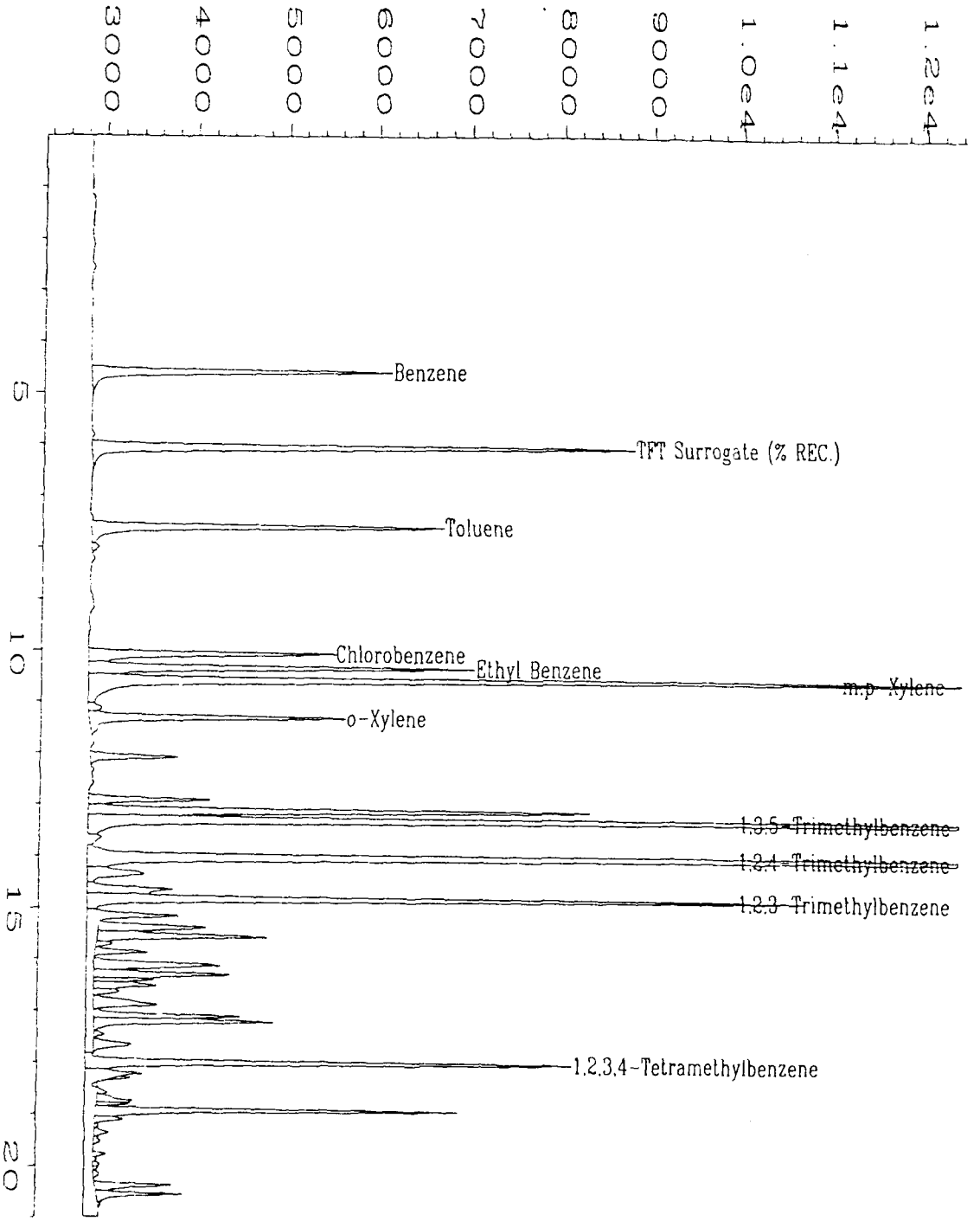
Analyst K. Cone

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20416\017R1001.D
Operator : T. Lockwood
Instrument : BTEX2
Sample Name : X05206MS;1;5
Run Time Bar Code:
Acquired on : 16 Apr 95 11:58 PM
Report Created on: 18 Apr 95 12:51 PM
Last Recalib on : 16 APR 95 06:25 PM
Multiplier : 1

Page Number : 1
Vial Number : 17
Injection Number : 1
Sequence Line : 10
Instrument Method: BX20416A
Analysis Method : BX20416A.MT
Sample Amount : 0
ISTD Amount :



Data File Name	: C:\HPCHEM\2\DATA\BX20416\018R1001.D		
Operator	: T. Lockwood	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 18
Sample Name	: X05206MSD;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 10
Acquired on	: 17 Apr 95 00:42 AM	Instrument Method	: BX20416A.MTH
Report Created on	: 18 Apr 95 12:51 PM	Analysis Method	: BX20416A.MTH
Last Recalib on	: 16 APR 95 06:25 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: Trip Blank	Client Project No.	: 722450.21020/MacD
Lab Sample Number	: X05207	Lab Project No.	: 95-1073
Date Sampled	: NA	Dilution Factor	: 1.00
Date Received	: 4/4/95	Method	: 602
Date Prepared	: 4/17/95	Matrix	: Water
Date Analyzed	: 4/17/95	Lab File No.	: BX1041710
		Method Blank No.	: MB041795

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	1.3	B	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4

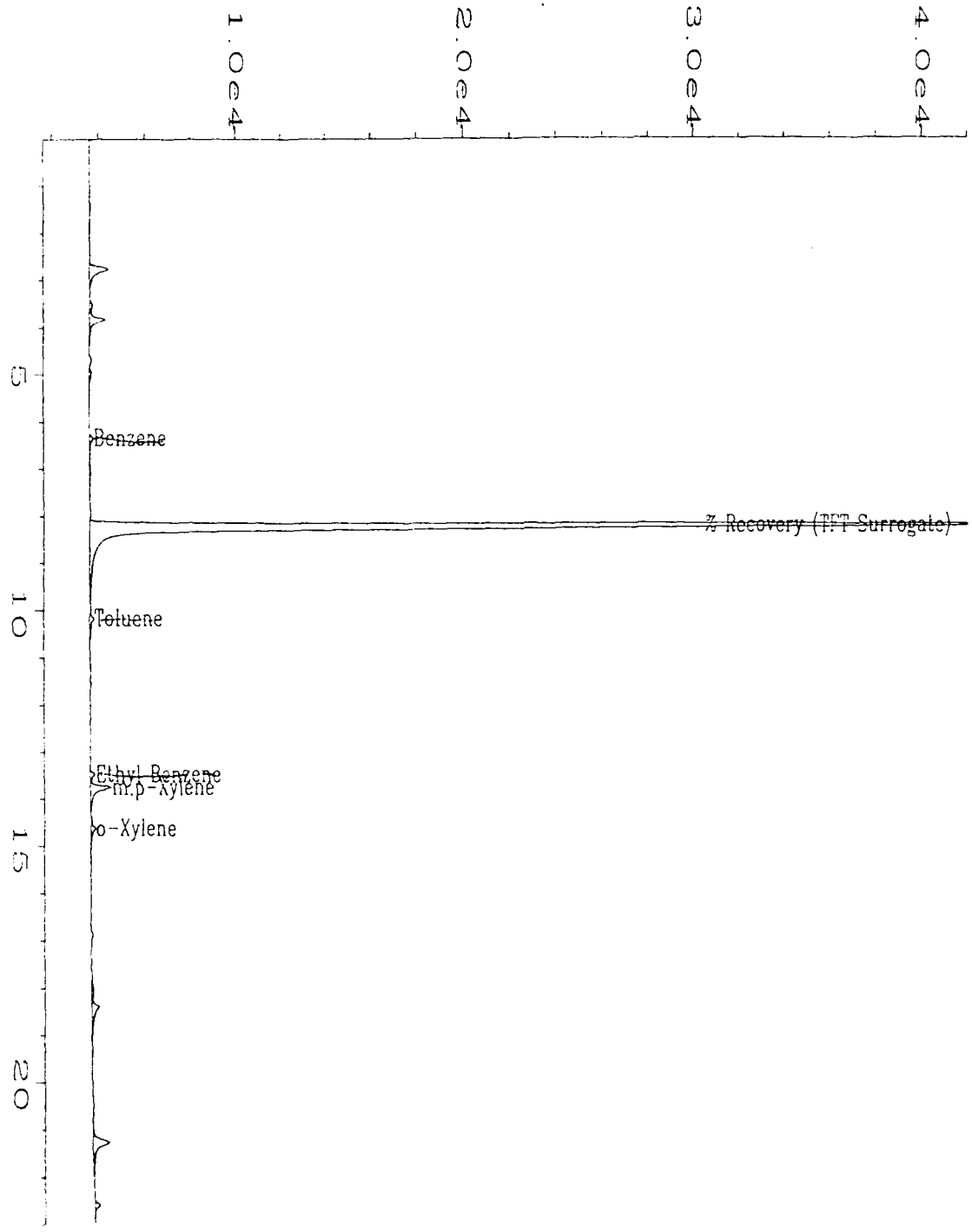
Surrogate Recovery (α,α,α-Trifluorotoluene):	102%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cole
Analyst

Approved



ata File Name	: C:\HPCHEM\1\DATA\BX10417\010F1001.D		
perator	: C.J. Cook	Page Number	: 1
nstrument	: BTEX1	Vial Number	: 10
ample Name	: X05207;1;5	Injection Number	: 1
ur Time Bar Code:		Sequence Line	: 10
ired on	: 17 Apr 95 11:54 AM	Instrument Method	: BX10417A.MTH
ort Created on	: 17 Apr 95 07:25 PM	Analysis Method	: BX10417B.MTH
ast Recalib on	: 17 APR 95 07:07 PM	Sample Amount	: 0
ltiplier	: 1	ISTD Amount	:
ample Info	: Project#: 95-1073 Client#: Trip Blank Water		

fm dptas

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report
Method Blank Report

Method Blank Number	: MB041595	Client Project No.	: 722450.21020/MacD
Date Prepared	: 4/15/95	Lab Project No.	: 95-1073
Date Analyzed	: 4/15/95	Dilution Factor	: 1.00
		Method	: 602/8020
		Matrix	: Water
		Lab File No.	: BX2041510

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	0.6		0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	0.5		0.4

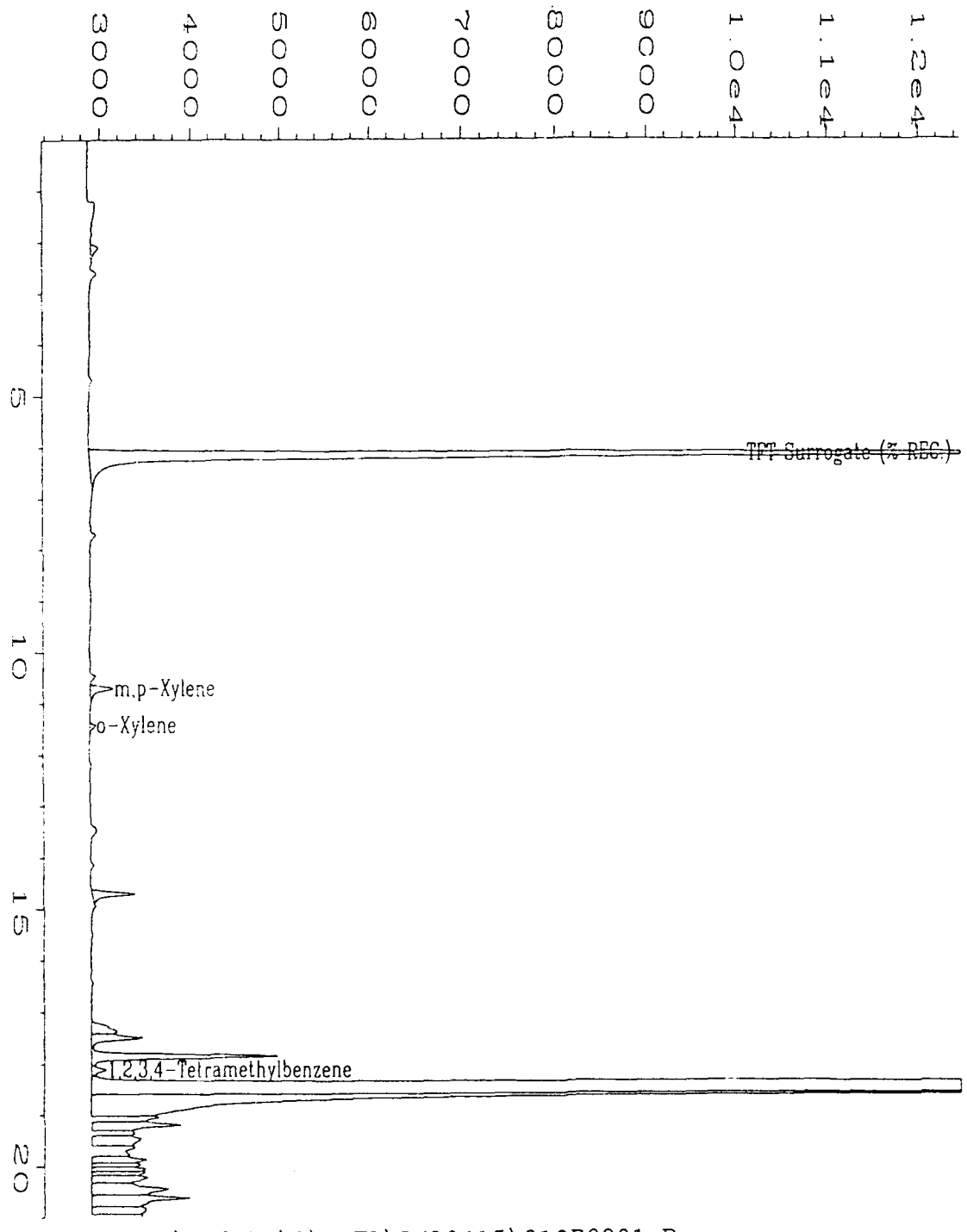
Surrogate Recovery (α,α,α-Trifluorotoluene):	91%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved



ata File Name	: C:\HPCHEM\2\DATA\BX20415\010R0901.D		
perator	: T. Lockwood	Page Number	: 1
nstrument	: BTEX2	Vial Number	: 10
ample Name	: MB041595	Injection Number	: 1
Time Bar Code:		Sequence Line	: 9
.ired on	: 15 Apr 95 05:39 PM	Instrument Method	: BX20415.MTH
eport Created on	: 16 Apr 95 04:37 PM	Analysis Method	: BX20415A.MTH
ast Recalib on	: 16 Apr 95 03:38 PM	Sample Amount	: 0
ultiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report
Method Blank Report

Method Blank Number	: MB041695	Client Project No.	: 722450.21020/MacDill
Date Prepared	: 4/16/95	Lab Project No.	: 95-1073
Date Analyzed	: 4/16/95	Dilution Factor	: 1.00
		Method	: 602/8020
		Matrix	: Water
		Lab File No.	: BX2041610

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6		U	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4

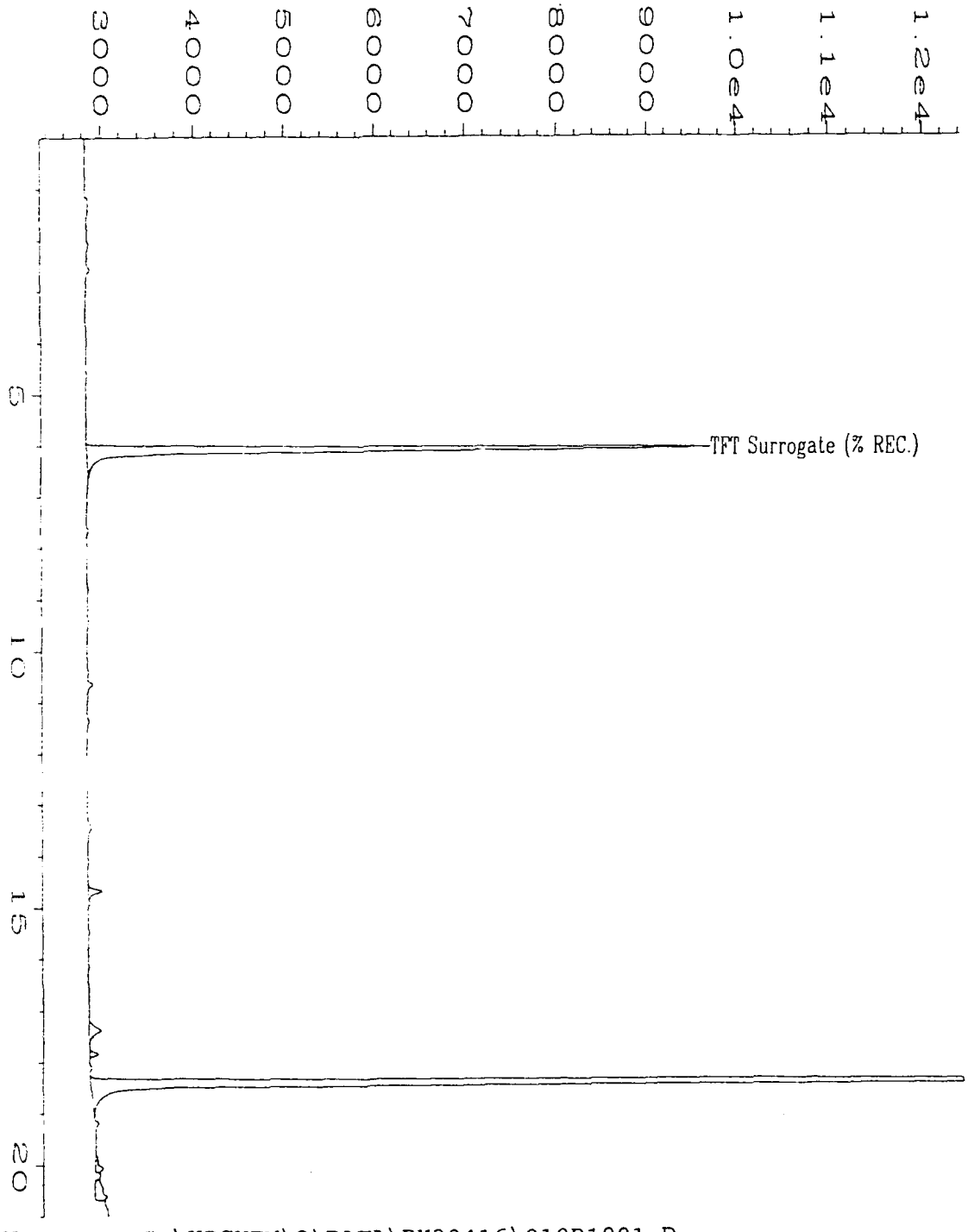
Surrogate Recovery (α,α,α-Trifluorotoluene):	89%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved



.a File Name	: C:\HPCHEM\2\DATA\BX20416\010R1001.D		
:rator	: T. Lockwood	Page Number	: 1
:trument	: BTEX2	Vial Number	: 10
ıple Name	: MB041695	Injection Number	: 1
Time Bar Code:		Sequence Line	: 10
red on	: 16 Apr 95 06:50 PM	Instrument Method	: BX20416A.MTH
ort Created on	: 16 Apr 95 09:03 PM	Analysis Method	: BX20416A.MTH
t Recalib on	: 16 Apr 95 06:25 PM	Sample Amount	: 0
tiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report
Method Blank Report

Method Blank Number	: MB041795	Client Project No.	: 722450.21020/MacDi
Date Prepared	: 4/17/95	Lab Project No.	: 95-1073
Date Analyzed	: 4/17/95	Dilution Factor	: 1.00
		Method	: 602/8020
		Matrix	: Water
		Lab File No.	: BX1041709

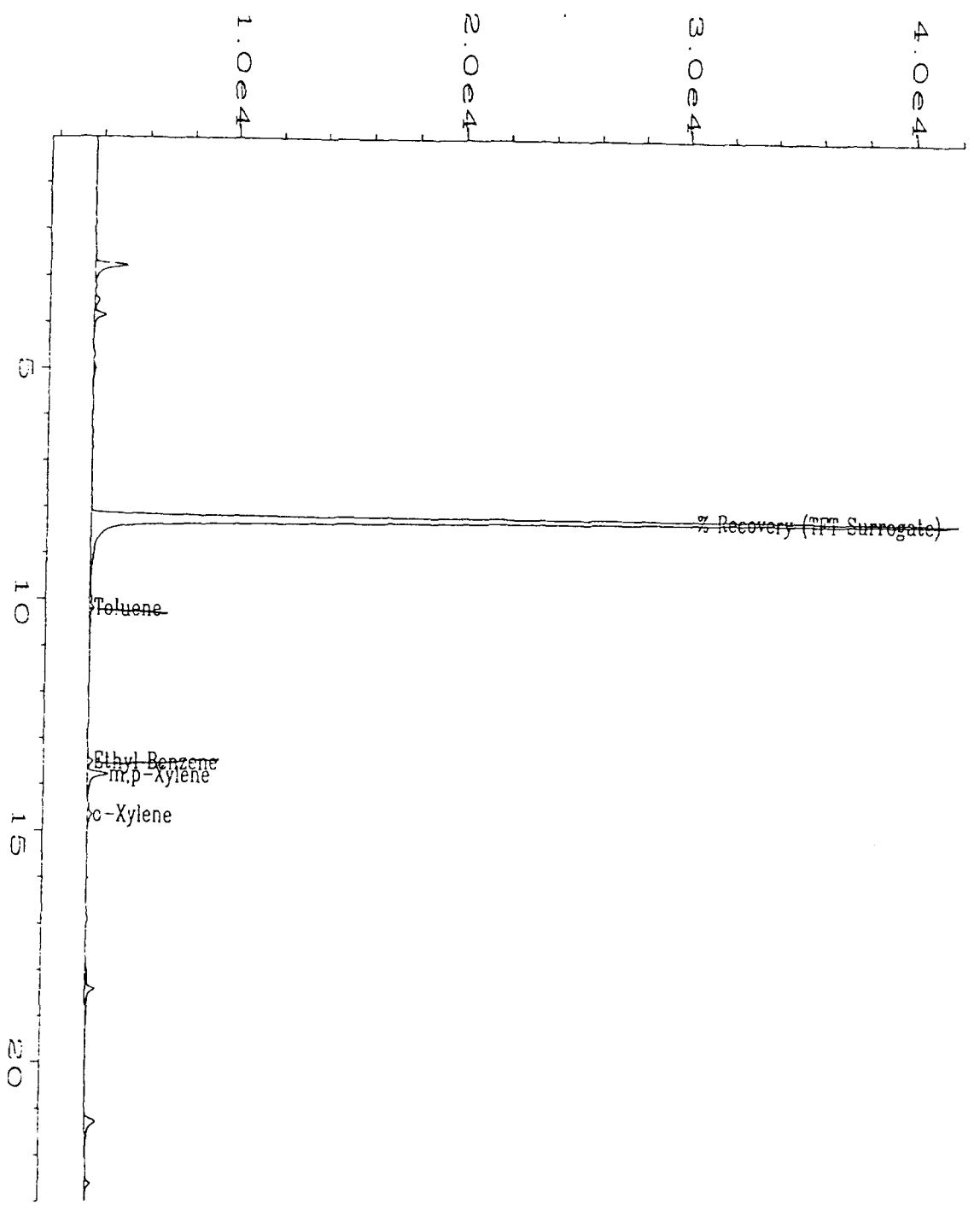
Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	0.9		0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		94%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved



a File Name : C:\HPCHEM\1\DATA\BX10417\009F0901.D
rator : C.J. Cook
trument : BTEX1
ple Name : MB041795
Time Bar Code:
red on : 17 Apr 95 11:15 AM
ort Created on: 17 Apr 95 07:25 PM
Recalib on : 17 APR 95 07:07 PM
iplier : 1

Page Number : 1
Vial Number : 9
Injection Number : 1
Sequence Line : 9
Instrument Method: BX10417.MTH
Analysis Method : BX10417B.MTH
Sample Amount : 0
ISTD Amount :

4/27/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Laboratory Control Sample (LCS)

LCS Number	: LCS041595	Dilution Factor	: 1.00
Date Extracted/Prepared	: 4/15/95	Method	: 602
Date Analyzed	: 4/15/95	Matrix	: Water
Spike Amount (ug/L)	: 20.0	Lab File No.	: BX2041509

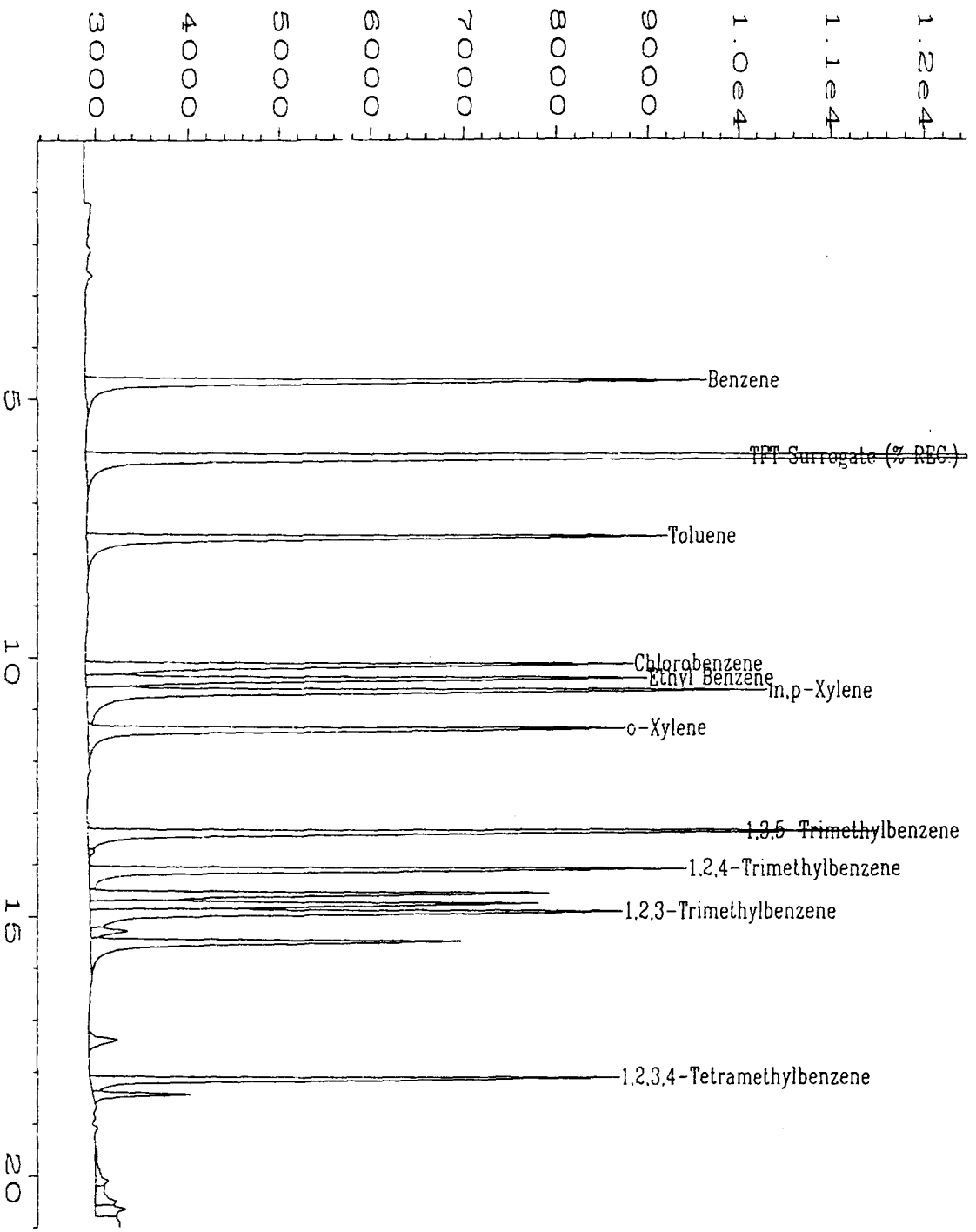
Compound Name	Cas Number	LCS Concentration ug/L	LCS % Recovery	QC Limit* % Recovery
Benzene	71-43-2	14.2	71.0%	71.0%-119.0%
Toluene	108-88-3	14.7	73.5%	73.0%-111.0%
Chlorobenzene	108-90-7	16.0	80.0%	64.0%-119.0%
Ethyl Benzene	100-41-4	15.5	77.5%	75.0%-114.0%
m,p-Xylene	108-38-3	16.3	81.5%	75.0%-114.0%
o-Xylene	106-42-3 95-47-6	15.3	76.5%	64.0%-11
1,3,5-Trimethylbenzene	108-67-8	14.6	73.0%	68.0%-101.0%
1,2,4-Trimethylbenzene	95-63-6	16.2	81.0%	61.0%-88.0%
1,2,3-Trimethylbenzene	526-73-8	18.0	90.0%	63.0%-101.0%
1,2,3,4-Tetramethylbenzene	488-23-3	14.7	73.5%	58.0%-102.0%
Surrogate Recovery (α,α,α-Trifluorotoluene):		92%	70%-130% (QC limits)	

* = Limits established 4/3/95 KSC

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
NA = Not available/Not analyzed.

Analyst

Approved



a File Name : C:\HPCHEM\2\DATA\BX20415\009R0901.D
rator : T. Lockwood
trument : BTEX2
ple Name : LCS041595
Time Bar Code:
red on : 15 Apr 95 04:54 PM
t Created on: 16 Apr 95 04:37 PM
t Recalib on : 16 Apr 95 03:38 PM
tiplier : 1

Page Number : 1
Vial Number : 9
Injection Number : 1
Sequence Line : 9
Instrument Method: BX20415.MTH
Analysis Method : BX20415A.MTH
Sample Amount : 0
ISTD Amount :

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Laboratory Control Sample (LCS)

LCS Number	: LCS041695	Dilution Factor	: 1.00
Date Extracted/Prepared	: 4/16/95	Method	: 602
Date Analyzed	: 4/16/95	Matrix	: Water
Spike Amount (ug/L)	: 20.0	Lab File No.	: BX2041609

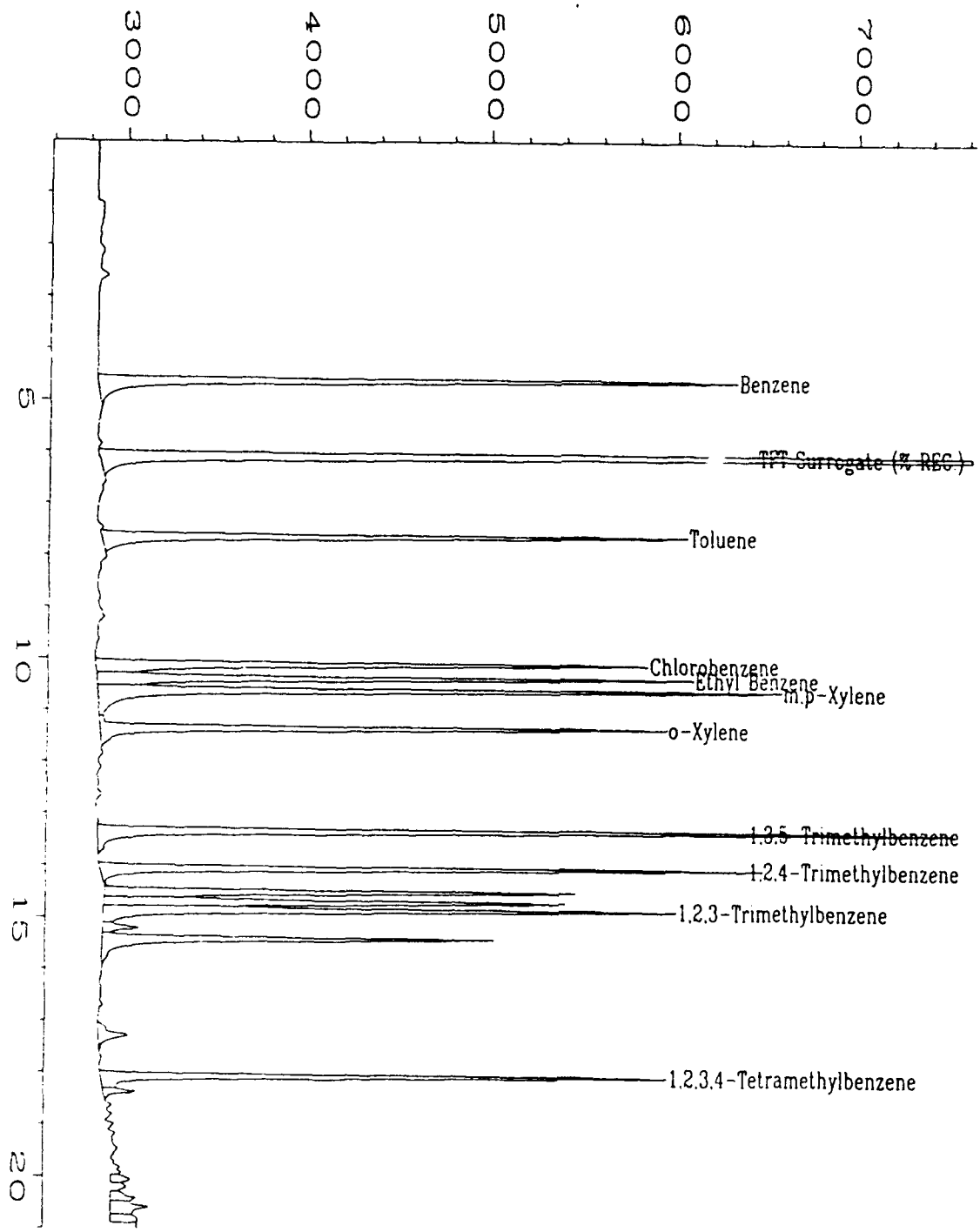
Compound Name	Cas Number	LCS Concentration ug/L	LCS % Recovery	QC Limit* % Recovery
Benzene	71-43-2	14.9	74.5%	71.0%-119.0%
Toluene	108-88-3	14.6	73.0%	73.0%-111.0%
Chlorobenzene	108-90-7	15.2	76.0%	64.0%-119.0%
Ethyl Benzene	100-41-4	15.6	78.0%	75.0%-114.0%
m,p-Xylene	108-38-3	15.5	77.5%	75.0%-114.0%
o-Xylene	106-42-3 95-47-6	15.2	76.0%	64.0%-11
1,3,5-Trimethylbenzene	108-67-8	15.9	79.5%	68.0%-101.0%
1,2,4-Trimethylbenzene	95-63-6	16.0	80.0%	61.0%-88.0%
1,2,3-Trimethylbenzene	526-73-8	18.4	92.0%	63.0%-101.0%
1,2,3,4-Tetramethylbenzene	488-23-3	17.9	89.5%	58.0%-102.0%
Surrogate Recovery (α,α,α-Trifluorotoluene):		95%	70%-130% (QC limits)	

* = Limits established 4/3/95 KSC

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
NA = Not available/Not analyzed.

Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20416\009R0901.D		
Operator	: T. Lockwood	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 9
Sample Name	: LCS041695	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 9
Acquired on	: 16 Apr 95 06:06 PM	Instrument Method	: BX20414.MTH
Report Created on	: 16 Apr 95 09:02 PM	Analysis Method	: BX20416A.MTH
Last Recalib on	: 16 Apr 95 06:25 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Laboratory Control Sample (LCS)

LCS Number	: LCS041795	**Dilution Factor**	: 1.00
Date Extracted/Prepared	: 4/17/95	**Method**	: 602
Date Analyzed	: 4/17/95	**Matrix**	: Water
Spike Amount (ug/L)	: 20.0	**Lab File No.**	: BX10417008

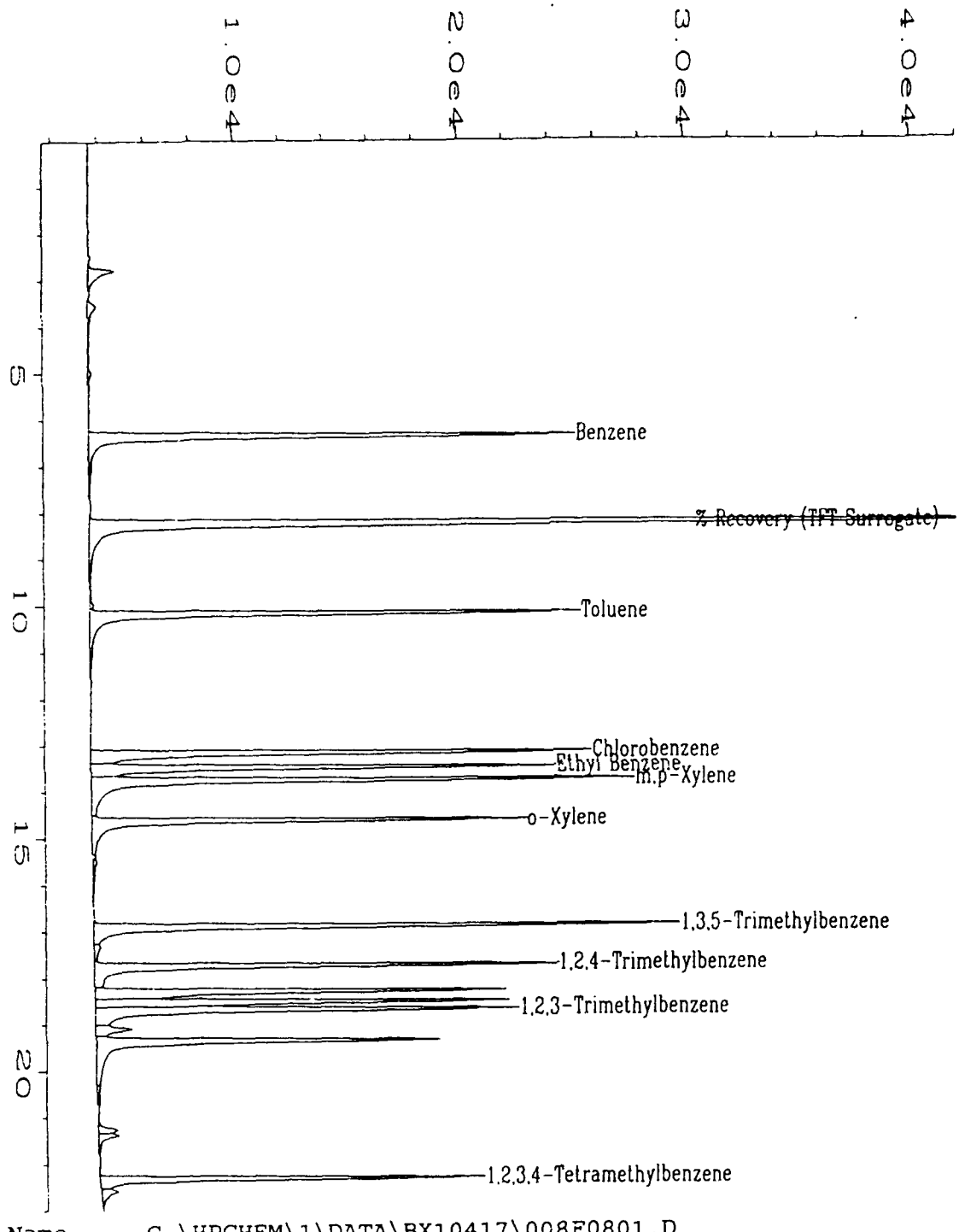
Compound Name	Cas Number	LCS Concentration ug/L	LCS % Recovery	QC Limit % Recovery
Benzene	71-43-2	15.8	79.0	71.0-119.0*
Toluene	108-88-3	16.3	81.5	73.0-111.0*
Chlorobenzene	108-90-7	18.1	90.5	64.0-119.0*
Ethyl Benzene	100-41-4	17.2	86.0	75.0-114.0*
m,p-Xylene	108-38-3	17.7	88.5	75.0-114.0*
o-Xylene	106-42-3 95-47-6	15.7	78.5	64.0-119
1,3,5-Trimethylbenzene	108-67-8	17.0	85.0	50.0-150.0
1,2,4-Trimethylbenzene	95-63-6	18.8	94.0	50.0-150.0
1,2,3-Trimethylbenzene	526-73-8	19.1	95.5	50.0-150.0
1,2,3,4-Tetramethylbenzene	488-23-3	18.7	93.5	50.0-150.0
Surrogate Recovery (α,α,α-Trifluorotoluene):		100%	70%-130% (QC limits)	

* = *Limits established 4/3/95 KSC*

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
NA = Not available/Not analyzed.

K. Cone
Analyst

Approved



ata File Name : C:\HPCHEM\1\DATA\BX10417\008F0801.D
perator : C.J. Cook
nstrument : BTEX1
ample Name : LCS041795
un Time Bar Code:
c red on : 17 Apr 95 10:35 AM
eport Created on: 17 Apr 95 07:25 PM
ast Recalib on : 17 APR 95 07:07 PM
ultiplier : 1

Page Number : 1
Vial Number : 8
Injection Number : 1
Sequence Line : 8
Instrument Method: BX10417.MTH
Analysis Method : BX10417B.MTH
Sample Amount : 0
ISTD Amount :

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS (TVH-GASOLINE)

Date Sampled	: 4/2/95	Client Project Number	: 722450.21020
Date Received	: 4/4/95	Lab Project Number	: 95-1073
Date Prepared	: 4/16/95	Matrix	: Water
Date Analyzed	: 4/16/95	Method Number	: 5030/Mod.8015

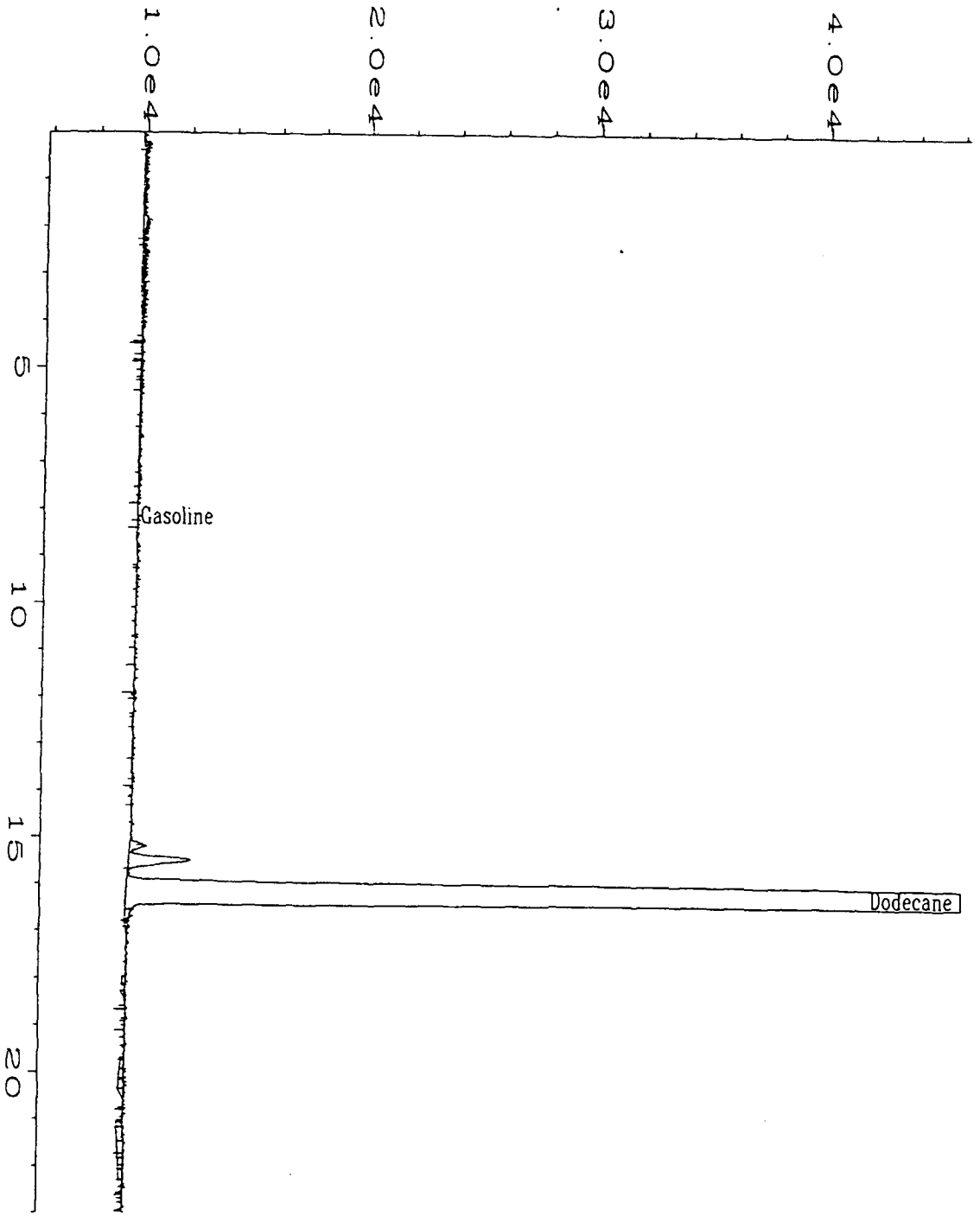
Evergreen Sample #	Client Sample #	Surrogate Recovery	TVH mg/L	RL mg/L
MB041495	METHOD BLANK	100%	U	0.1
X05202	MD75-MW15	102%	U	0.1
X05203	75MP-3D	100%	0.2	0.1
X05204	MD75-MW7	96%	U	0.1
X05205	75MP-7D	95%	0.1	0.1
X05206	75MP-7S	94%	0.1	0.1
X05206 DUP	75MP-7S	101%	0.3	0.1

QUALIFIERS
U = TVH analyzed for but not detected.
B = TVH found in blank.
E = Extrapolated value.
RL = Reporting Limit.

Analyst

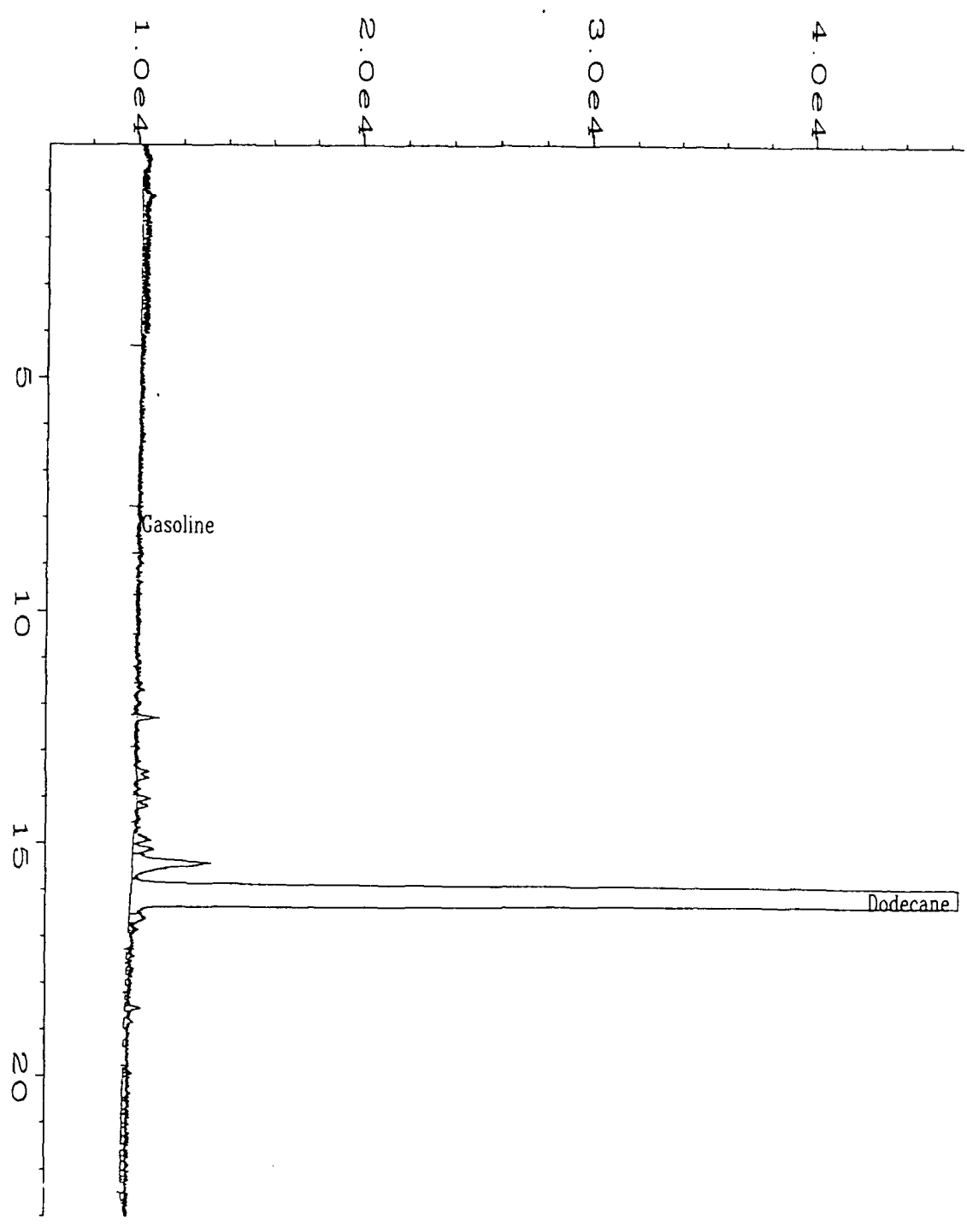
Approved

TVH1073.XLS

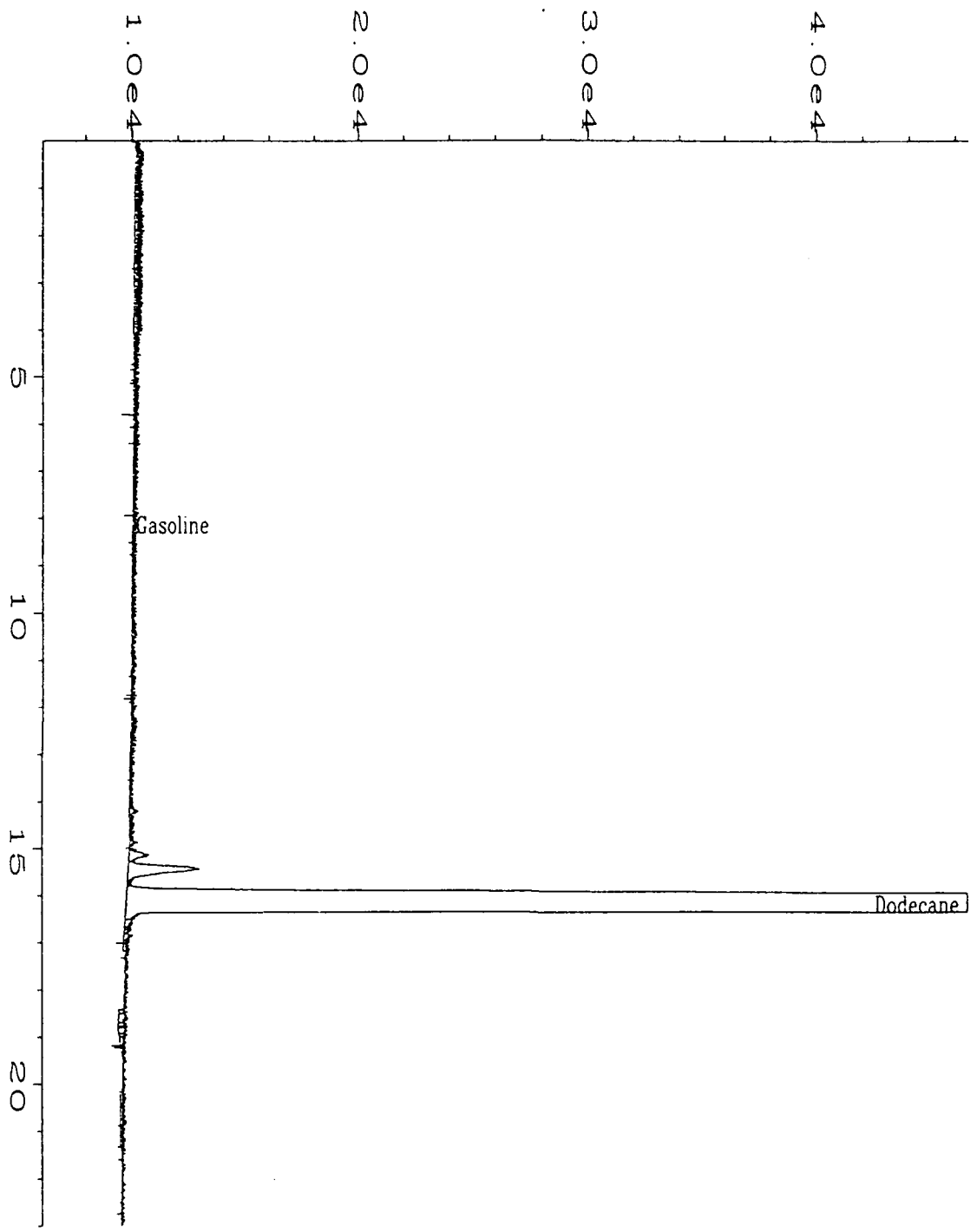


Data File Name : C:\HPCHEM\1\DATA\tvh0414\008F0101.D
Operator : Dawn N. Guildner
Instrument : TVH
Sample Name : MB041495
Run Time Bar Code:
Acquired on : 14 Apr 95 03:35 PM
Report Created on: 16 Apr 95 02:37 PM
Last Recalib on : 16 APR 95 02:01 PM
Multiplier : 1

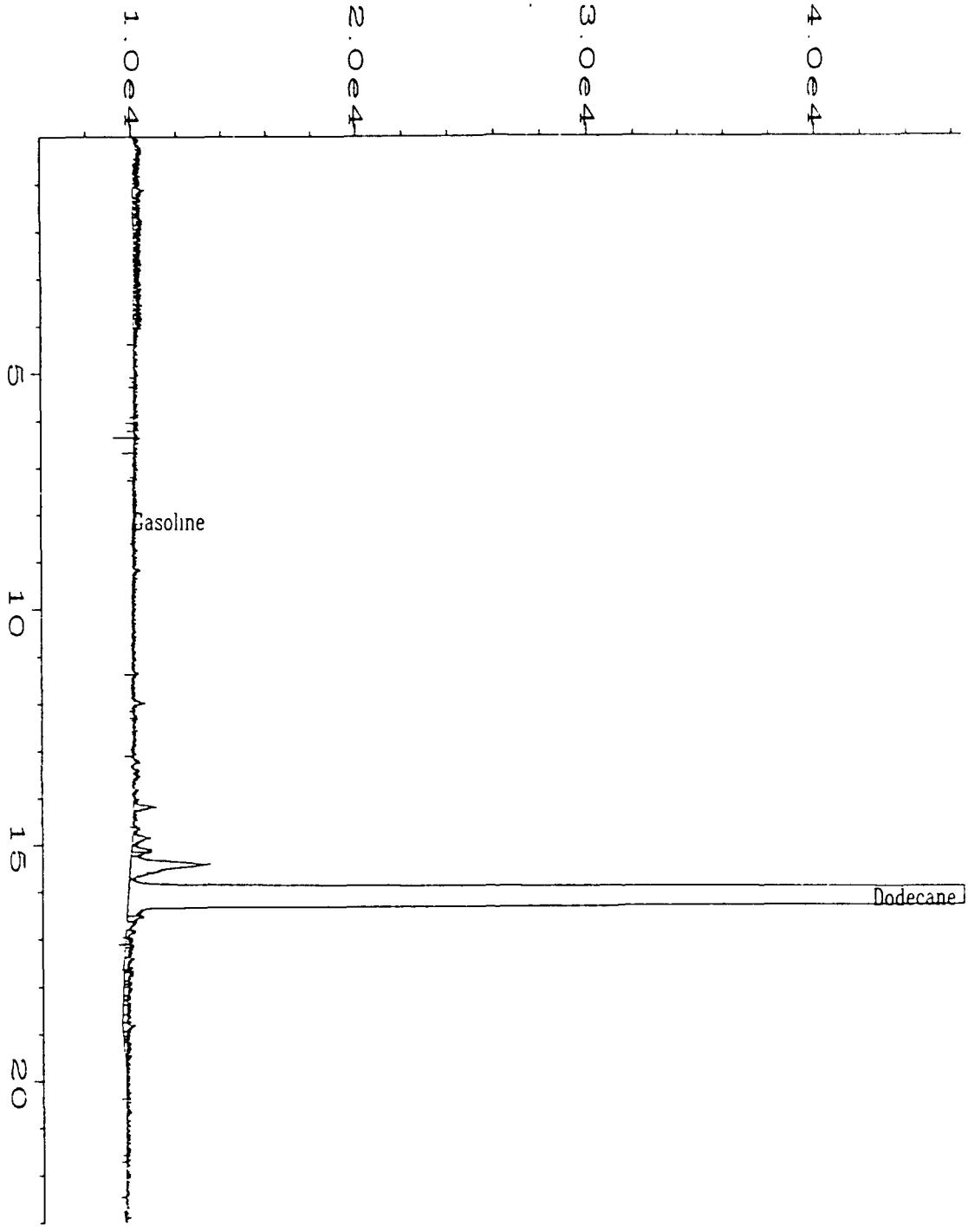
Page Number : 1
Vial Number : 8
Injection Number : 1
Sequence Line : 1
Instrument Method: TVH1BASE.MTH
Analysis Method : TVH0415.MTH
Sample Amount : 0
ISTD Amount :



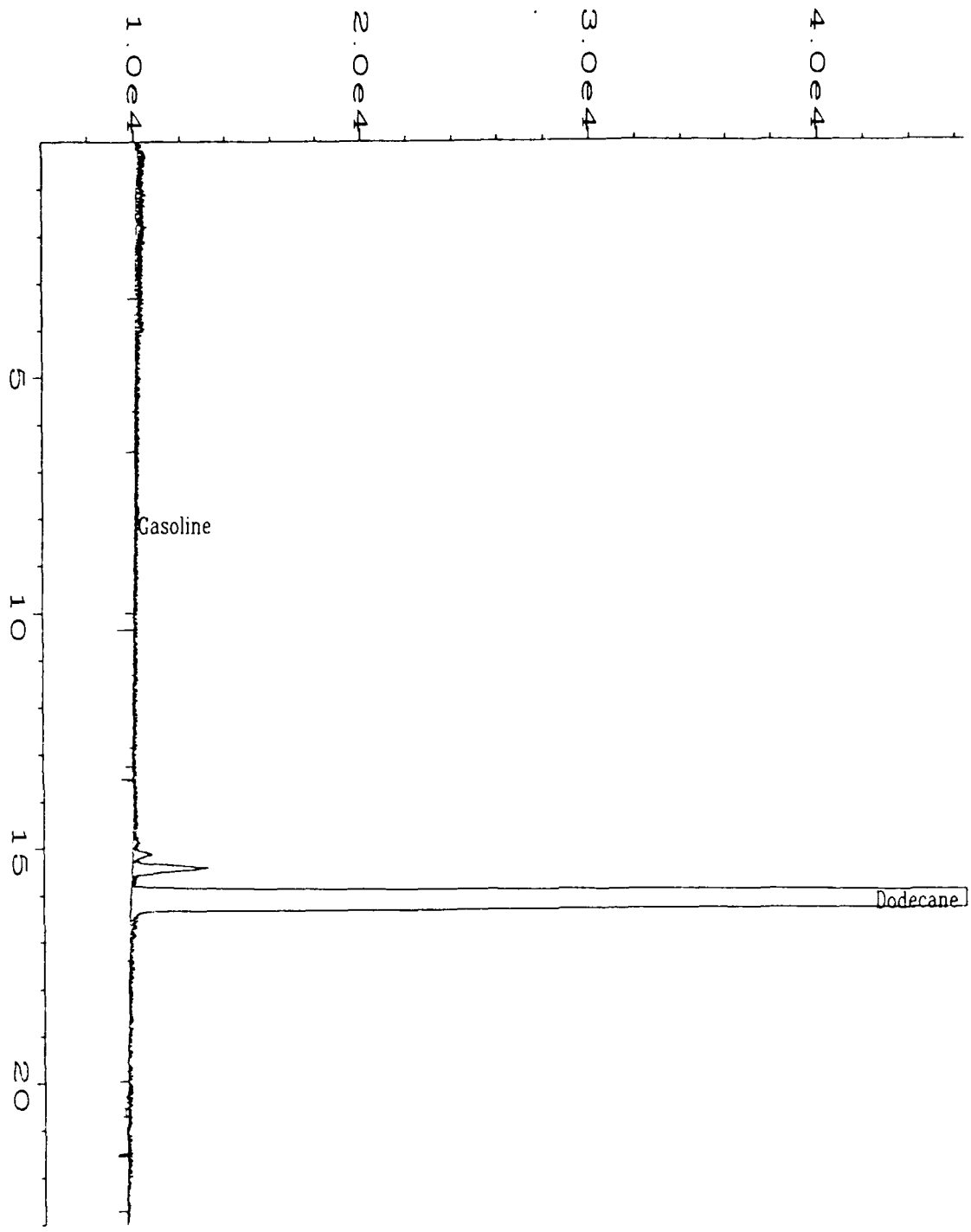
Data File Name	: C:\HPCHEM\1\DATA\tvh0414\048F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 48
Sample Name	: X05202;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Apr 95 03:20 PM	Instrument Method	: TVH1BAS. M
Report Created on	: 16 Apr 95 09:55 PM	Analysis Method	: TVH0415.MT
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1073 CLIENT # MD75-MW15 WATER		



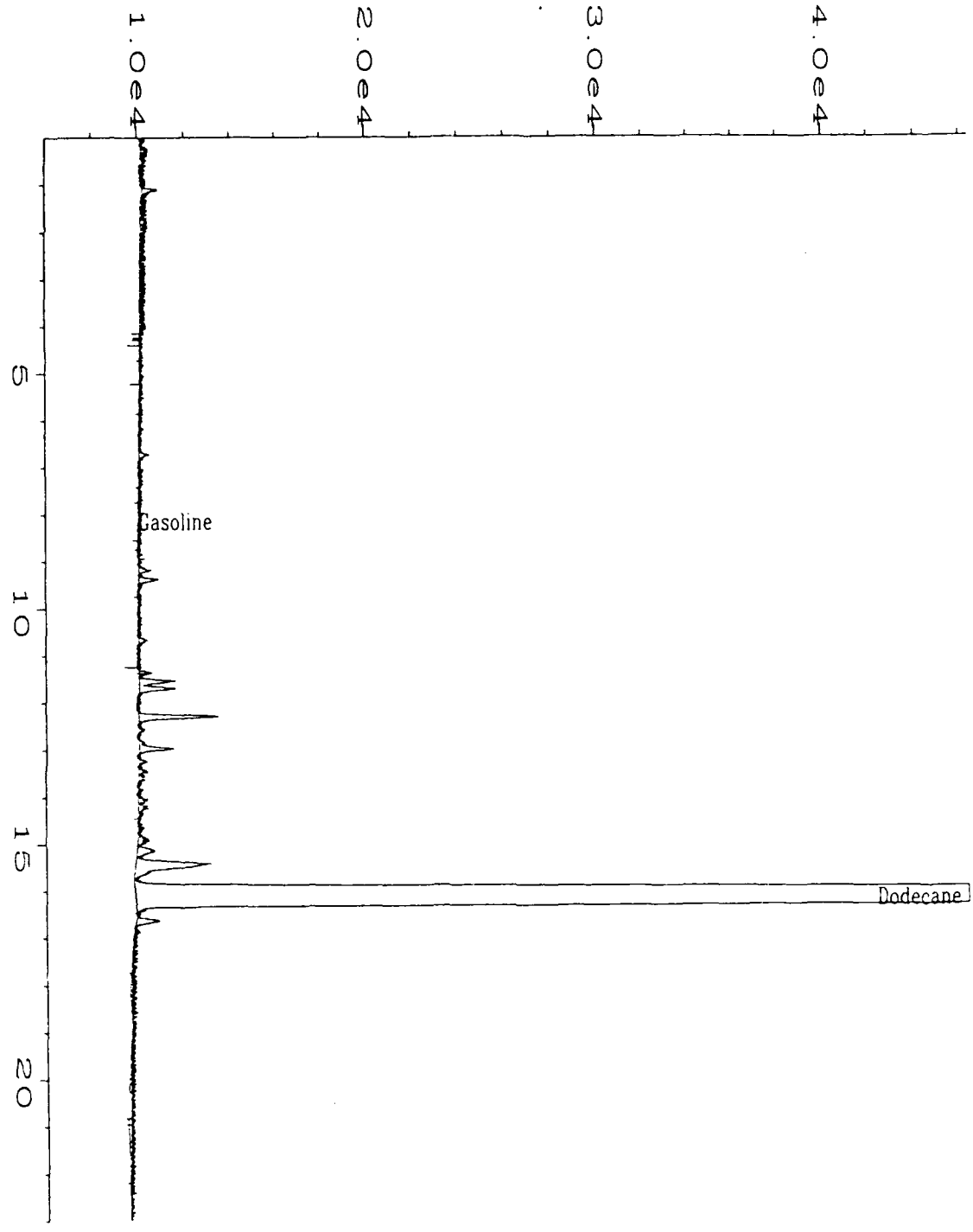
Data File Name	: C:\HPCHEM\1\DATA\tvh0414\049F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 49
Sample Name	: X05203;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Apr 95 03:56 PM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 16 Apr 95 09:55 PM	Analysis Method	: TVH0415.MTH
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1073 CLIENT # 75MP-3D WATER		



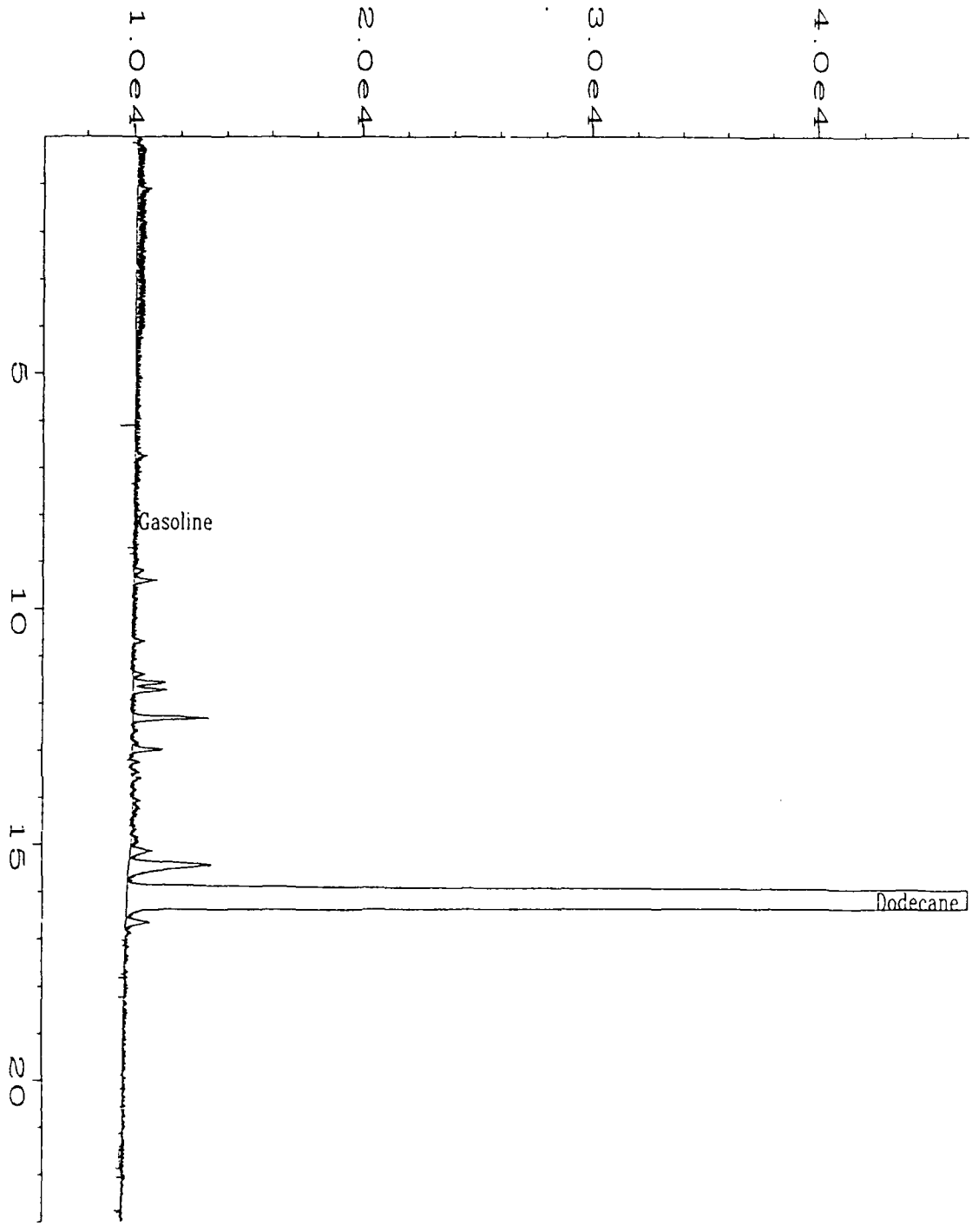
Data File Name	: C:\HPCHEM\1\DATA\tvh0414\050F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 50
Sample Name	: X05204;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Apr 95 04:32 PM	Instrument Method	: TVH1BA.
Report Created on	: 16 Apr 95 09:55 PM	Analysis Method	: TVH0415.M
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1073 CLIENT # MD75-MW7 WATER		



Data File Name	: C:\HPCHEM\1\DATA\tvh0414\051F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 51
Sample Name	: X05205;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Apr 95 05:08 PM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 16 Apr 95 09:55 PM	Analysis Method	: TVH0415.MTH
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1073 CLIENT # 75MP-7D WATER		



Data File Name	: C:\HPCHEM\1\DATA\tvh0414\052F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 52
Sample Name	: X05206;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Apr 95 05:44 PM	Instrument Method	: TVH1BAS
Report Created on	: 16 Apr 95 09:55 PM	Analysis Method	: TVH0415.MT
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1073 CLIENT # 75MP-7S WATER		



Data File Name : C:\HPCHEM\1\DATA\tvh0414\055F0101.D
Operator : Dawn N. Guildner
Instrument : TVH
Sample Name : X05206 DUP
Run Time Bar Code:
Acquired on : 16 Apr 95 07:32 PM
Report Created on: 16 Apr 95 09:56 PM
Last Recalib on : 16 APR 95 02:01 PM
Multiplier : 1

Page Number : 1
Vial Number : 55
Injection Number : 1
Sequence Line : 1
Instrument Method: TVH1BASE.MTH
Analysis Method : TVH0415.MTH
Sample Amount : 0
ISTD Amount :

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS (TVH)
Laboratory Control Sample (LCS)

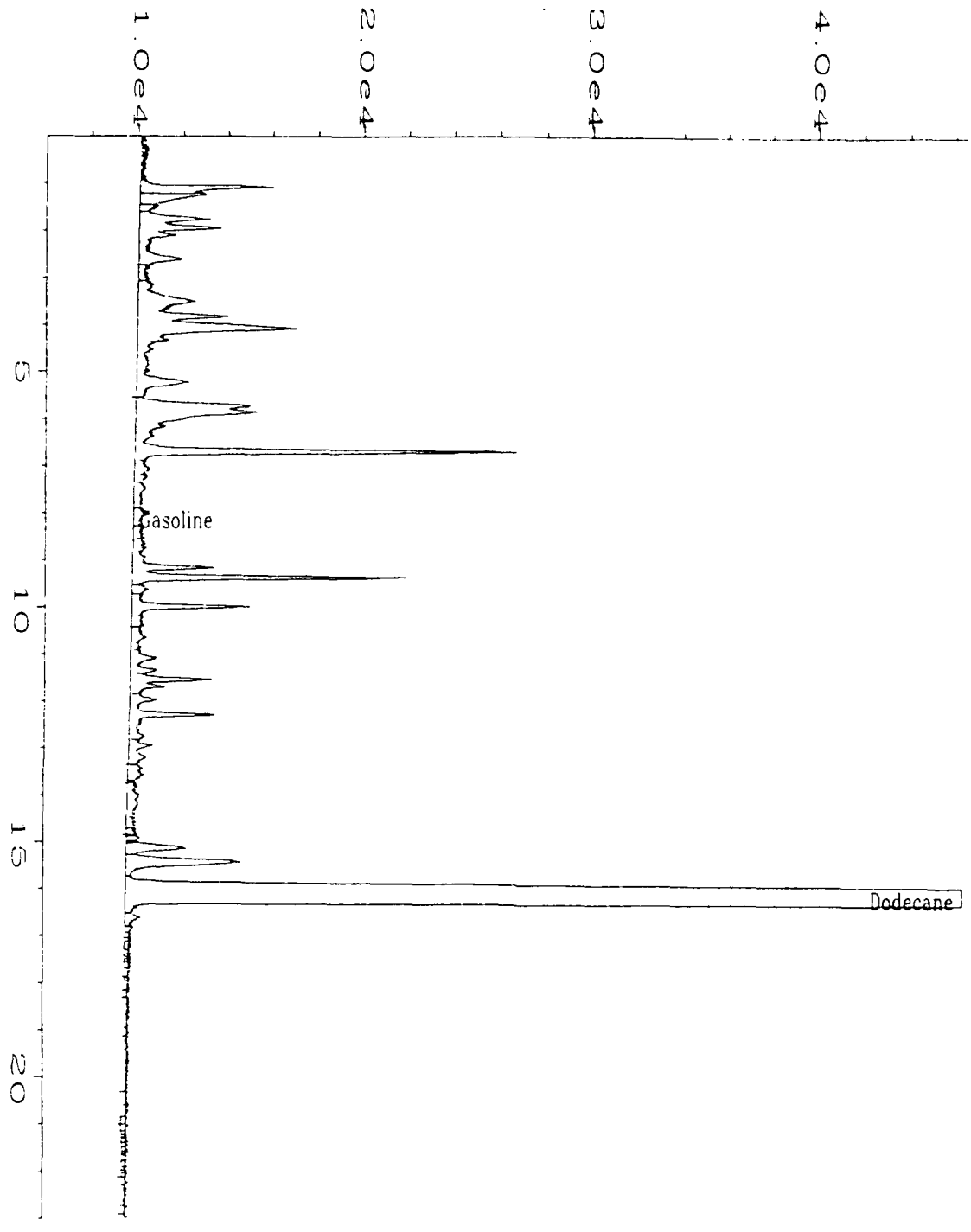
LCS Number	: LCS041595	Matrix	: WATER
Date Prepared	: 4/14/95	Method Number	: 5030/MOD.8015
Date Analyzed	: 4/15/95		
Sequence Number	: TVH31		

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/ L	LCS % Recovery	QC Limit % Recovery
Gasoline	5.00	6.02	120%	70%-130%

QUALIFIERS
U = TVH analyzed for but not detected.
B = TVH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

Analyst

Approved



Data File Name	: C:\HPCHEM\1\DATA\TVH0414\031F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 31
Sample Name	: LCS041595	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 15 Apr 95 05:23 AM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 25 Apr 95 01:42 PM	Analysis Method	: TVH0415.MTH
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

Date Sampled	: 4/2/95	Client Project ID.	: 722450.21020/ MacDill AFB
Date Received	: 4/4/95	Lab Project No.	: 95-1073
Date Prepared	: 4/4/95	Detection Limit	: 0.250 mg/L
Date Analyzed	: 4/4/95	Method	: EPA 300.0

Evergreen Sample #	Client Sample ID	Matrix	Chloride (mg/L)
X05205	75MP-7D	Water	28.4
X05205 Dup	75MP-7D dup	Water	28.8
X05206	75MP-7S	Water	16.0
X05208	MD75-MW15	Water	15.6
X05209	75MP-3D	Water	5.70
X05210	MD75-MW7	Water	22.2
Method blank (4/4/95)			<0.250

Quality Assurance

	True Value (mg/L)	Result (mg/L)	% Recovery
Alltech Anion Mixture A Lot #J-IONO1134	20.0	19.5	97.5

Deborah L. Byrne
Analyst

Approved

1073tm 4

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

Date Sampled	: 4/2/95	Client Project ID.	: 722450.21020/ MacDill AFB
Date Received	: 4/4/95	Lab Project No.	: 95-1073
Date Prepared	: 4/4/95	Detection Limit	: 0.076 mg/L
Date Analyzed	: 4/4/95	Method	: EPA 300.0

Evergreen Sample #	Client Sample ID	Matrix	Nitrite-N (mg/L)
X05205	75MP-7D	Water	<0.076
X05205 Dup	75MP-7D dup	Water	<0.076
X05206	75MP-7S	Water	<0.076
X05208	MD75-MW15	Water	<0.076
X05209	75MP-3D	Water	<0.076
X05210	MD75-MW7	Water	<0.076
Method blank (4/4/95)			<0.076

Quality Assurance**

	True Value (mg/L)	Result (mg/L)	% Recovery
Alltech Anion Mixture A Lot #J-IONO1134	21.0	21.1	100

** = Quality assurance results reported as Nitrite (NO_2)

Analyst

Approved

1073tm 4

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

Date Sampled	: 4/2/95	Client Project ID.	: 722450.21020/ MacDill AFB
Date Received	: 4/4/95	Lab Project No.	: 95-1073
Date Prepared	: 4/4/95	Detection Limit	: 0.056 mg/L
Date Analyzed	: 4/4/95	Method	: EPA 300.0

Evergreen Sample #	Client Sample ID	Matrix	Nitrate-N (mg/L)
X05205	75MP-7D	Water	<0.056
X05205 Dup	75MP-7D dup	Water	<0.056
X05206	75MP-7S	Water	<0.056
X05208	MD75-MW15	Water	<0.056
X05209	75MP-3D	Water	<0.056
X05210	MD75-MW7	Water	<0.056
Method blank (4/4/95)			<0.056

Quality Assurance**

	True Value (mg/L)	Result (mg/L)	% Recovery
Alltech Anion Mixture A Lot #J-IONO1134	20.0	18.2	91.0

** = Quality assurance results reported as Nitrate (NO_3)

Analyst

Approved

1073tm.4

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

Date Sampled	: 4/2/95	Client Project ID.	: 722450.21020/ MacDill AFB
Date Received	: 4/4/95	Lab Project No.	: 95-1073
Date Prepared	: 4/4/95	Detection Limit	: 0.250 mg/L
Date Analyzed	: 4/4/95	Method	: EPA 300.0

Evergreen Sample #	Client Sample ID	Matrix	Sulfate (mg/L)
X05205	75MP-7D	Water	46.2
X05205 Dup	75MP-7D dup	Water	46.5
X05206	75MP-7S	Water	23.4
X05208	MD75-MW15	Water	40.2
X05209	75MP-3D	Water	11.5
X05210	MD75-MW7	Water	49.6
Method blank (4/4/95)			<0.250

Quality Assurance

	True Value (mg/L)	Result (mg/L)	% Recovery
Alltech Anion Mixture A Lot #J-IONO1134	30.0	29.5	98.3

Analyst

Approved

1073tm 4

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

Date Sampled	: 4/2/95	Client Project ID.	: 722450-21020/ MacDill AFB
Date Received	: 4/4/95	Lab Project No.	: 95-1073
Date Prepared	: 4/5/95	Detection Limit	: 5.00 $mgCaCO_3/L$
Date Analyzed	: 4/5/95	Method	: EPA 310.1

Evergreen Sample #	Client Sample ID	Matrix	Total Alkalinity ($mgCaCO_3/L$)
X05202	MD75-MW15	Water	93.8
X05202 Dup	MD75-MW15 Dup	Water	96.1
X05204	MD75-MW7	Water	167
Method Blank (4/5/95)			<5.00

Quality Assurance

	True Value ($mgCaCO_3/L$)	Result ($mgCaCO_3/L$)	% Recovery
APG Minerals Reference Lot # 13862	11.8	10.8	91.5

Analyst

Approved

1073tm.4

Evergreen

CASE NARRATIVE

Evergreen Analytical Laboratory (EAL) Project #: 95-1063

Parsons Engineering Science, Inc. (PES) Project: MacDill AFB (722450.21020)

Sample Receipt

On April 1, 1995, twenty water samples and one trip blank were received in good condition at EAL with the following discrepancies: the samples arrived without a chain of custody. A copy of the chain of custody was faxed to EAL on April 3. Samples were received but not listed on the c.o.c. for MD24-26 TEPH, MD24-MW10A BTEX, MD24-MW10 BTEX, MD24-MW2 MS/MSD TEPH. These samples were analyzed as listed on the bottles per instruction from John Hicks of PES.

Refer to the EAL Sample Log Sheet for specific log-in information and cross-reference of EAL and PES sample identifications.

BTEX, Water Matrix, Method E602

Samples MD75-MW3, MD75-MW14 and MD75-MW4 were analyzed within holding time with low surrogate recovery. The samples were re-run outside holding time with surrogate recoveries within EAL control limits. The original data are reported.

Samples MD75-MW8, MD75-MW14, 75MP-4S, MD75-MW4 and MD75-MW24 were also analyzed within holding times, but due to the presence of target compounds beyond linear range, required dilutions. These dilutions were performed outside of holding times. The original data are reported with extrapolated values for compounds out of the linear range of the instrument. The external standard reports and chromatograms for the diluted analyses are included.

Total Volatile Hydrocarbons (TVH), Water Matrix, Method 8015M

The relative percent difference (RPD) for the MS/MSD percent recoveries was outside the EAL control criteria. Please refer to the Laboratory Control Sample for acceptable spike recovery data. There were no other quality control anomalies to report.

Total Extractable Hydrocarbons (TEH), Water Matrix, Method 8015M

One sample was submitted labeled MS/MSD for TEH analysis and was not associated with a normal sample. Due to a laboratory error, the sample was prepped without spiking. The MS/MSD sample was analyzed as a normal sample. John Hicks of PES was notified on April 4, 1995.

Samples 24MP-2S, MS24-MW6, MD24-MW2, MD24-MW26 and MS/MSD exhibited surrogate recoveries below the EAL control limits. The samples were injected a second time with similar recoveries, verifying that the results are not an instrument problem. The re-injected results are reported with an "R" qualifier. Samples should have been re-extracted but were not due to insufficient sample volume.

General Chemistry
There were no quality control anomalies to report.

Patricia A. McClellan, Project Manager

Evergreen Analytical Sample Log Sheet

Project # 95-1063

Date(s) Sampled: 3/31/95 COC

Date Due: 4/06/95-UST
4/17/95-OTHERS

Date Received: 4/01/95

Holding Time(s): 4/02-NO2, NO3
4/14-BTEX,TVH

Client Project I.D. 722450.21020/MAC DILL

Rush STANDARD

Client: PARSONS ENGINEERING SCIENCE

Shipping Charges N/A

Address: 1700 BROADWAY, SUITE 900

E.A. Cooler # 501

DENVER, CO. 80210

Airbill # H/D

Contact: TODD WIEDEMEIER

Custody Seal Intact? N
Cooler N/A Bottles N/A

Client P.O. _____

COC Present Y
Sample Tags Present? Y
Sample Tags Listed? Y
Sample(s) Sealed? Y

Phone #831-8100 Fax #831-8208

Special Instructions ALL BTEX AND VOA SAMPLES ARE TO INCLUDE CHLOROBENZENE, TMB AND TEMB UNLESS OTHERWISE NOTED. AN MS/MSD AND LAB DUPLICATE IS TO BE ANALYZED ON THIS CLIENT'S PROJECT. MS/MSD WILL BE REQUIRED FOR BTEX ONLY ON THIS PROJECT.

Lab #	Client ID#	Analysis	Mtx	Btl	Loc
X05167A/B	MD75-MW16	BTEX	W	40V	2
X05168A/B	75MP-2S	BTEX	W	40V	2
X05169A/B	MD75-MW12	BTEX	W	40V	2
X05170A	TRIP BLANK	BTEX	W	40V	2
X05171A/B	MD75-MW3	BTEX	W	40V	2
X05172A/B	MD75-MW8	BTEX	W	40V	2
X05173A/B	MD75-MW14	BTEX	W	40V	2
X05174A/B	75MP-4S	BTEX	W	40V	2
X05175A/B	MD75-MW4	BTEX	W	40V	2
X05176A/B	MD75-MW24	BTEX	W	40V	2
X05177A/B	MD75-MW6	BTEX	W	40V	2
X05179A/B	MD24-MW6	BTEX	W	40V	2
X05180A/B	MD24-MW6A	BTEX	W	40V	2
X05181A	FIELD BLANK	BTEX	W	40V	2

*Samples to be returned

Route GC/MS __ GC 2 Metals __ Wet Chem 2 SxPrep 1 SxRec 2

Acctg X Adm1 X Adm2 X QA/QC X Sales X File X

Page 1 of 3 Page(s)

Custodian/Date: [illegible] 4/4/95

[illegible] 4/5/95

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
X05182A	RINSEATE BLANK	BTEX	W	40V	2
X05186A/B	MD24-MW10A	BTEX	W	40V	2
X05187A/B	MD24-MW10	BTEX	W	40V	2
X05167C/D	MD75-MW16	TVPH	W	40V	2
X05168C/D	75MP-2S	TVPH	W	40V	2
X05169C/D	MD75-MW12	TVPH	W	40V	2
X05171C/D	MD75-MW3	TVPH	W	40V	2
X05172C/D	MD75-MW8	TVPH	W	40V	2
X05173C/D	MD75-MW14	TVPH	W	40V	2
X05174C/D	75MP-4S	TVPH	W	40V	2
X05175C/D	MD75-MW4	TVPH	W	40V	2
X05176C/D	MD75-MW24	TVPH	W	40V	2
X05177C/D	MD75-MW6	TVPH	W	40V	2
X05169E	MD75-MW12	TEPH	W	1LA	C2
X05172E	MD75-MW8	TEPH	W	1LA	C2
X05175E	MD75-MW4	TEPH	W	1LA	C2
X05178E	24MP-2S	TEPH	W	1LA	C2
X05179E	MD24-MW6	TEPH	W	1LA	C2
X05183E	MD24-MW2	TEPH	W	1LA	C2
X05184E	MD24-26	TEPH	W	1LA	C2
X05185E	MD24-MW2 MS/MSD	TEPH	W	1LA	C2
X05167E	MD75-MW16	ANIONS	W	125P	C2
X05168E	75MP-2S	ANIONS	W	125P	C2
X05169F	MD75-MW12	ANIONS	W	125P	C2
X05171E	MD75-MW3	ANIONS	W	125P	C2
X05172F	MD75-MW8	ANIONS	W	125P	C2
X05173E	MD75-MW14	ANIONS	W	125P	C2
X05174E	75MP-4S	ANIONS	W	125P	C2
X05175F	MD75-MW4	ANIONS	W	125P	C2
X05176E	MD75-MW24	ANIONS	W	125P	C2
X05177E	MD75-MW6	ANIONS	W	125P	C2
X05169G	MD75-MW12	ALKALINITY	W	250P	C2
X05171F	MD75-MW3	ALKALINITY	W	250P	C2

PROJECT #1063

Lab ID	Client ID	ANALYSIS	MATRIX	BOTTLE	LOC
5172G	MD75-MW-8	ALKALINITY	W	250P	C2
X05175G	MD75-MW-4	ALKALINITY	W	250P	C2
X05176F	MD75-MW-24	ALKALINITY	W	250P	C2

PROJECT #1063

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Jacobs Engineering Service
ADDRESS 730 Broadway, Suite 800
CITY Denver STATE CO ZIP 80203
PHONE # 303-931-6600 FAX #
FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Wiedemeier
PROJECT ID 722450-21020
EAL QUOTE # PO #
TURNAROUND REQUIRED 30 days
*expedited turnaround subject to additional fee

Sampler Name
Signature
PRINT Name
Evergreen Analytical Cooler No 501
Cooler Received

Please **PRINT** all information.

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water (Drinking/Discharge/Ground) (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	EAL Sample No.
MP 25-MW 10	3/3/95	8:15	5	X			X051667
MP-25	3/3/95	8:50	5	X			68
MP25-MW12	3/3/95	9:30	7	X			69
Trip Blank			1				70
MP-25-MW3	3/3/95	10:00	6	X			71
MP 25-MW8	3/3/95	11:15	7	X			72
MP 25-MW14	3/3/95	12:10	5	X			73
MP25MP-4 DS	3/3/95	13:00	5	X			74
MP25-MW 4	3/3/95	13:45	7	X			75
MP 25-MW 24	3/3/95	1345	6	X			76
HT							
DD							

ANALYSIS REQUESTED

TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen 40V	BTEX 8020/602 (circle)/MTBE (circle) 1 and 2 Tetra DCE	TPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod (Gasoline) 40V	TEPH 8015mod (Diesel) ILA	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	8307K Ammonia 125P	Alkalinity 125P	EAL use only Do not write in shaded area
						X	X	X				X	X		
						X		X				X	X		
						X		X	X			X	X		
						X		X							
						X		X				X	X		
						X		X	X			X	X		
						X		X				X			
						X		X	X			X	X		
						X		X				X	X		

EAL Project # 1063
Custodian

Location 2, C2
Container Size

Instructions Samples packed in ICE
11-2-95 [illegible]

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.

4036 Youngfield St
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Pacific Engineering Science
ADDRESS 180 Broadway, Suite 700
CITY Denver STATE CO ZIP 80210
PHONE # 303-831-8100 FAX # _____ FAX RESULTS Y / N

CLIENT CONTACT (print) _____
PROJECT I.D. 722-
EAL. QUOTE # _____
TURNAROUND REQUIRED* _____
*expedited turnaround subject to

Sample Name: _____
Signature: _____
Print Name: Mark Vesely

Evergreen Analytical Cooler No: _____
Cooler Received: _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen 40V	BTEX 8020/602 (circle) MTBE (circle) + Total Lead 7420	TPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline) 40V	EPH 8015mod. (Diesel) ILA	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Arsenic 1850			
MD24-mw6	3/31/95	1430	5	X									X	X	X	X				X	X05177		
MD24-mw5	3/31/95	1515	1	X												X						78	
MD24-mw6	3/31/95	1530	5	X									X			X						79	
MD24-mw6A	3/31/95	1545	2	X									X									80	
Field Blank	3/31/95	1595	1	X									X									81	
Trip Blank	3/31/95	1595	1	X									X									82	
MD24-mw2	3/31/95	1500	1	X												X						83	
MD24-mw26	3/31/95	1530	1	X												X						84	
MS/MSD	3/31/95	1600	1	X												X						85	
MD24-mw10A	3/31/95	1610	2	X									X									86	
MD24-mw10	3/31/95	1620	2	X									X									87	

SPECIAL INSTRUCTIONS: Samples Packed in Ice

4-3-95 1000

Evergreen Analytical Sample Receipt/Check-in Record

Date & Time Rec'd: 4/1/95 1000 Shipped Via: HD
(Airbill # if applicable)

Client : PARSONS

Client Project ID(s): ~~PARSONS~~ 722450-21020

EAL Project #(s): 95-1063 EAL Cooler(s): (Y) N

Cooler#	501								
Ice packs	Y	N	Y	N	Y	N	Y	N	Y	N
Temperature °C									

	Y	N	N/A
1. Custody seal(s) present:		✓	✓
Seals on cooler intact			
Seals on bottle intact			
2. Chain of Custody present: send once later	X		
3. Containers broken or leaking: (Comment on COC if Y)		✓	
4. Containers labeled: 4/3 1000 AM	✓		
5. COC agrees w/ bottles received: (Comment on COC if N)		✓	
6. COC agrees w/ labels: (Comment on COC if N)		✓	
7. Headspace in VOA vials-waters only (comment on COC if Y)		✓	
8. VOA samples preserved:		✓	
9. pH measured on metals, cyanide or phenolics*:			✓
List discrepancies			
*Non-EAL provided containers only, water samples only.			✓
10. Metal samples present:			
Total _____ , Dissolved _____			
D or PD to be filtered:			
T,TR,D,PD to be Preserved:			
11. Short holding times:		✓	
Specify parameters			
12. Multi-phase sample(s) present:		✓	
13. COC signed w/ date/time:	✓		

Comments: _____

(Additional comments on back)
Custodian Signature/Date: Lee Connor 4/3/95

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Rocky Engineering Science
ADDRESS 1720 Broadway, Suite 900
CITY Denver STATE CO ZIP 80290
PHONE# 303-831-8100 FAX # FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Wiedemeier
PROJECT I.D. 722450-21020
EAL QUOTE # PO #
TURNAROUND REQUIRED* 30 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Mark Vessely
(print) MARK VESSELY
Evergreen Analytical Cooler No. 501
Cooler Received

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	ANALYSIS REQUESTED: TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle) & Trmb & Tetra MB	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	EPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Anions (Cl, NO3, SO4)	Alkalinity	EAL Sample No.
MD75-MW16	3/31/95	8:15	5	X									X		X				X		
75MP-25	3/31/95	8:50	5	X									X		X				X		
MD75-MW12	3/31/95	9:30	7	X									X		X	X			X	X	
Trip Blank			1										X								
MD75-MW3	3/31/95	10:20	6	X									X		X				X	X	
MD75-MW8	3/31/95	11:15	7	X									X		X	X			X	X	
MD75-MW14	3/31/95	12:15	5	X									X		X				X		
75MP-4DS	3/31/95	13:00	5	X									X		X				X		
MD75-MW4	3/31/95	13:45	7	X									X		X	X			X	X	
MD75-MW24	3/31/95	1345	6	X									X		X				X	X	
HT:																					Location
DD:																					Container Size

EAL use only
Do not write in shaded area

EAL
Project #
Custodian

Instructions Samples packed in ICE

Samples Received 4-1-95 1030

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Mark Vessely	3/31/95	Fedex		Fedex			

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Fusion Engineering Science
ADDRESS 1700 Broadway, Suite 900
CITY Denver STATE CO ZIP 80290
PHONE # 303-831-8100 FAX # _____ FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Wiedemeier
PROJECT I.D. 722450.21020
EAL. QUOTE # _____ PO # _____
TURNAROUND REQUIRED* 30 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) _____
(print) MARK VESSELY

Evergreen Analytical Cooler No _____
Cooler Received _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle) + TPH MO	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Anions	EAL Sample No.
MO75-MW C	3/31/95	14:30	5	X									X		X				X		
24MP-25	3/31/95	15:15	1	X												X					
MO24-MW C	3/31/95	1530	3	X									X			X					
MO24-MW CA	3/31/95	1545	2	X									X								
Field Blank	3/31/95	1595	1	X									X								
Rinsate Blank	3/31/95	1525	1	X									X								
HT:																					Location
DD:																					Container Size

EAL use only
Do not write in shaded area

EAL:
Project # _____
Custodian _____

Instructions: Samples Packed in Ice

Samples 4-1-95
Received 1030

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: 75MD-2S	**Client Project No.**	: 722450.21020/Mac Dill
Lab Sample Number	: X05168	**Lab Project No.**	: 95-1063
Date Sampled	: 3/31/95	**Dilution Factor**	: 1.00
Date Received	: 4/1/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/14/95	**Lab File No.**	: BX1041320
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	13		0.4
Toluene	108-88-3	**		**
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4	50		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	88		0.4
1,3,5-Trimethylbenzene	108-67-8	**		**
1,2,4-Trimethylbenzene	95-63-6	**		**
1,2,3-Trimethylbenzene	526-73-8	**		**
1,2,3,4-Tetramethylbenzene	488-23-3	**		**
Surrogate Recovery (α,α,α-Trifluorotoluene):		70%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

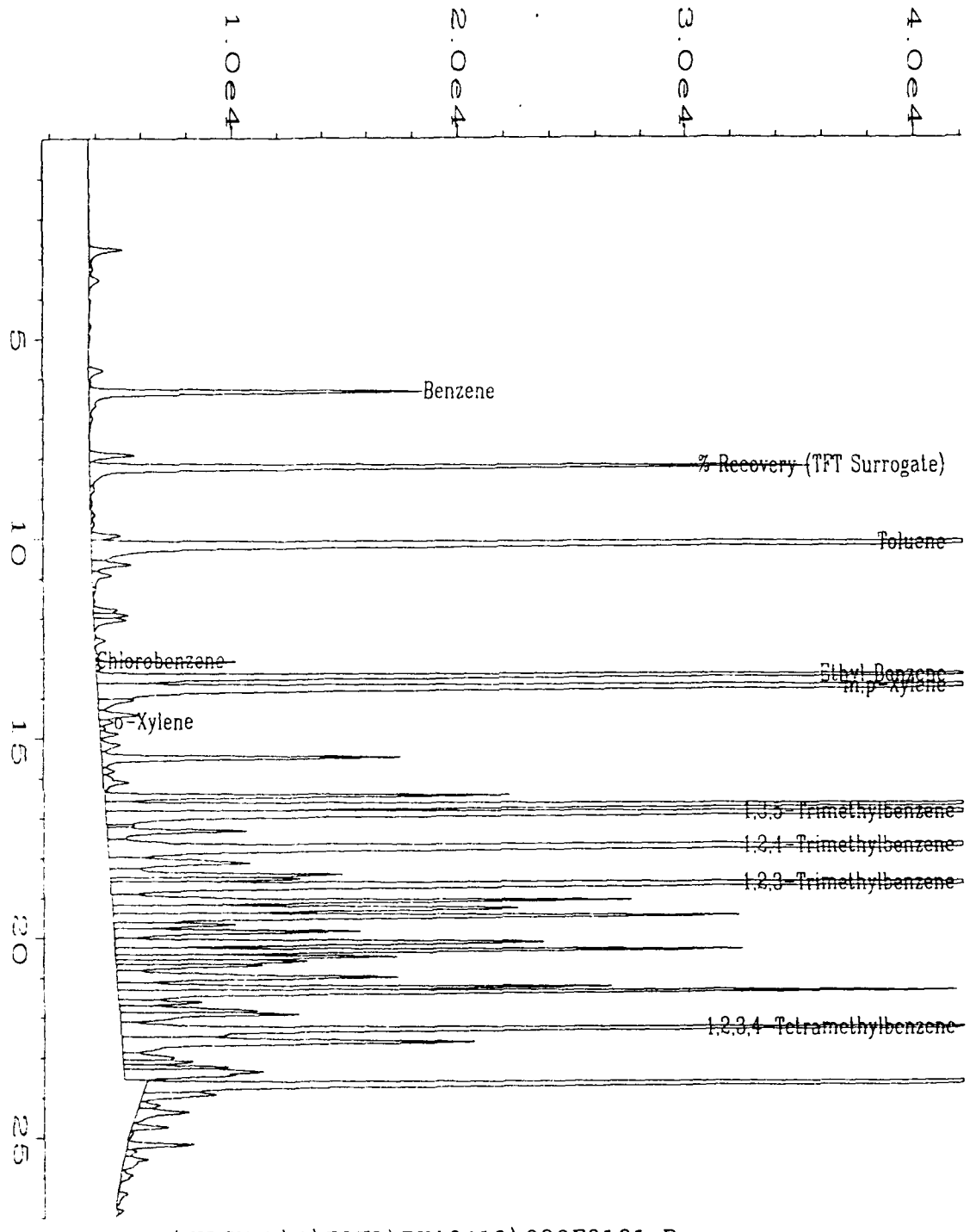
** = See BX1041356 (DF = 10).

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K Cone
Analyst

Approved

BTEX1063.XLS



Data File Name	: C:\HPCHEM\1\DATA\BX10413\020F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 20
Sample Name	: X05168;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 00:13 AM	Instrument Method	: BX10413A
Report Created on	: 14 Apr 95 00:40 AM	Analysis Method	: BX10413A.MT
Last Recalib on	: 13 APR 95 04:13 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: 75MD-2S Water		

PM 4/25/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: 75MD-2S	Client Project No.	: 722450.21020/Mac Dill
Lab Sample Number	: X05168	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 10.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/14/95	Matrix	: Water
Date Analyzed	: 4/14/95	Lab File No.	: BX1041356
		Method Blank No.	: MB041495

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	**	**
Toluene	108-88-3	82	4.0
Chlorobenzene	108-90-7	**	**
Ethyl Benzene	100-41-4	**	**
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	**	**
1,3,5-Trimethylbenzene	108-67-8	70	4.0
1,2,4-Trimethylbenzene	95-63-6	140	4.0
1,2,3-Trimethylbenzene	526-73-8	110	4.0
1,2,3,4-Tetramethylbenzene	488-23-3	66	**
Surrogate Recovery (α,α,α-Trifluorotoluene):		70%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

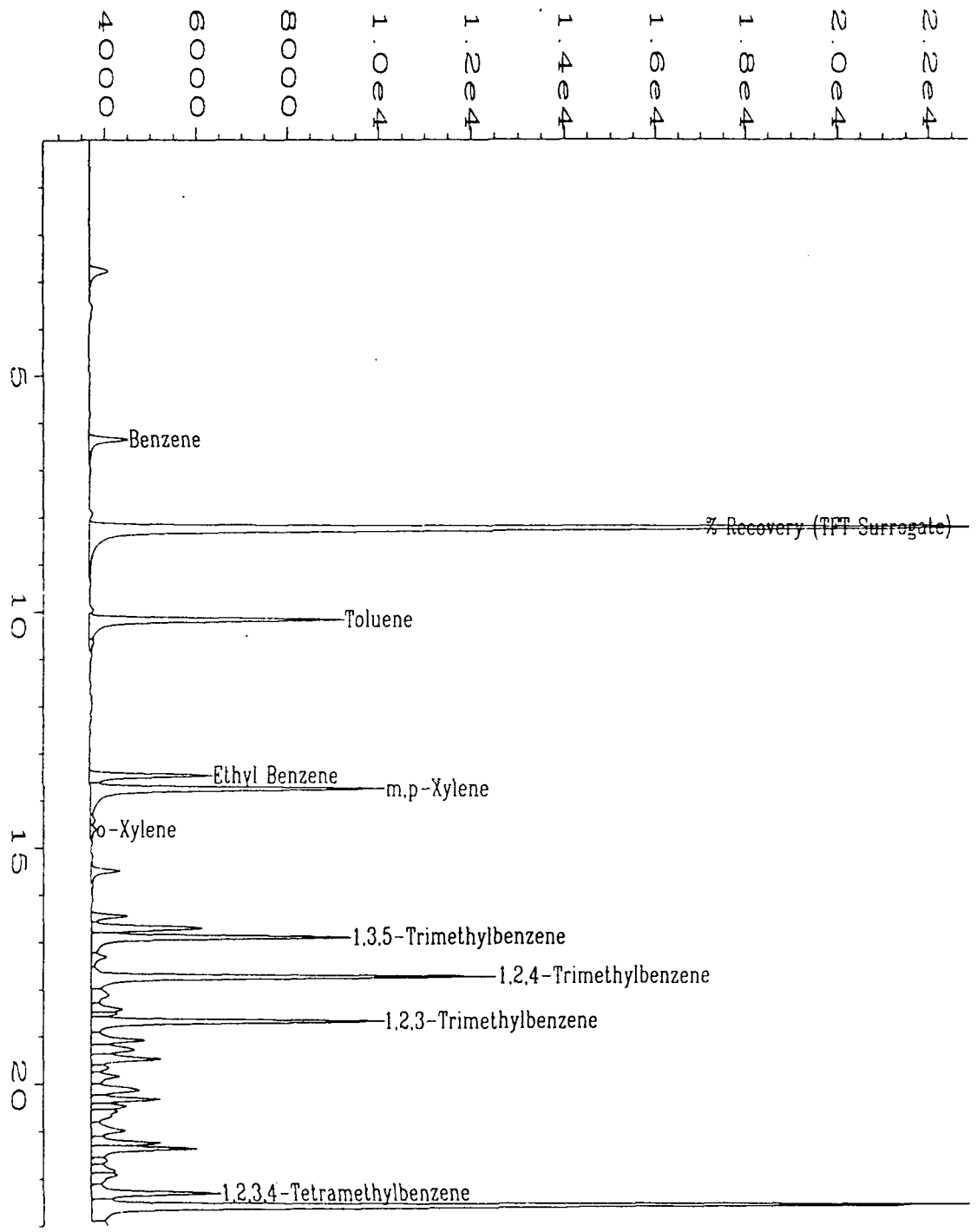
** = See BX1041320.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

McClellan
Approved

BTEX1063.XLS



Data File Name	: C:\HPCHEM\1\DATA\BX10413\056F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 56
Sample Name	: X05168;10;500ul	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 11:59 PM	Instrument Method	: BX10414
Report Created on	: 27 Apr 95 07:36 PM	Analysis Method	: BX10414B.M
Last Recalib on	: 15 APR 95 01:55 PM	Sample Amount	: 0
Multiplier	: 10	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: 75MD-2S Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: 75MP-4S	Client Project No.	: 722450.21020/Mac Dill
Lab Sample Number	: X05174	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 1.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/13/95	Matrix	: Water
Date Analyzed	: 4/14/95	Lab File No.	: BX1041326
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	50	0.4
Toluene	108-88-3	36	0.4
Chlorobenzene	108-90-7	3.5	0.4
Ethyl Benzene	100-41-4	>60 **	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	43	0.4
1,3,5-Trimethylbenzene	108-67-8	12	0.4
1,2,4-Trimethylbenzene	95-63-6	41	0.4
1,2,3-Trimethylbenzene	526-73-8	41	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	>60 **	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		71%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

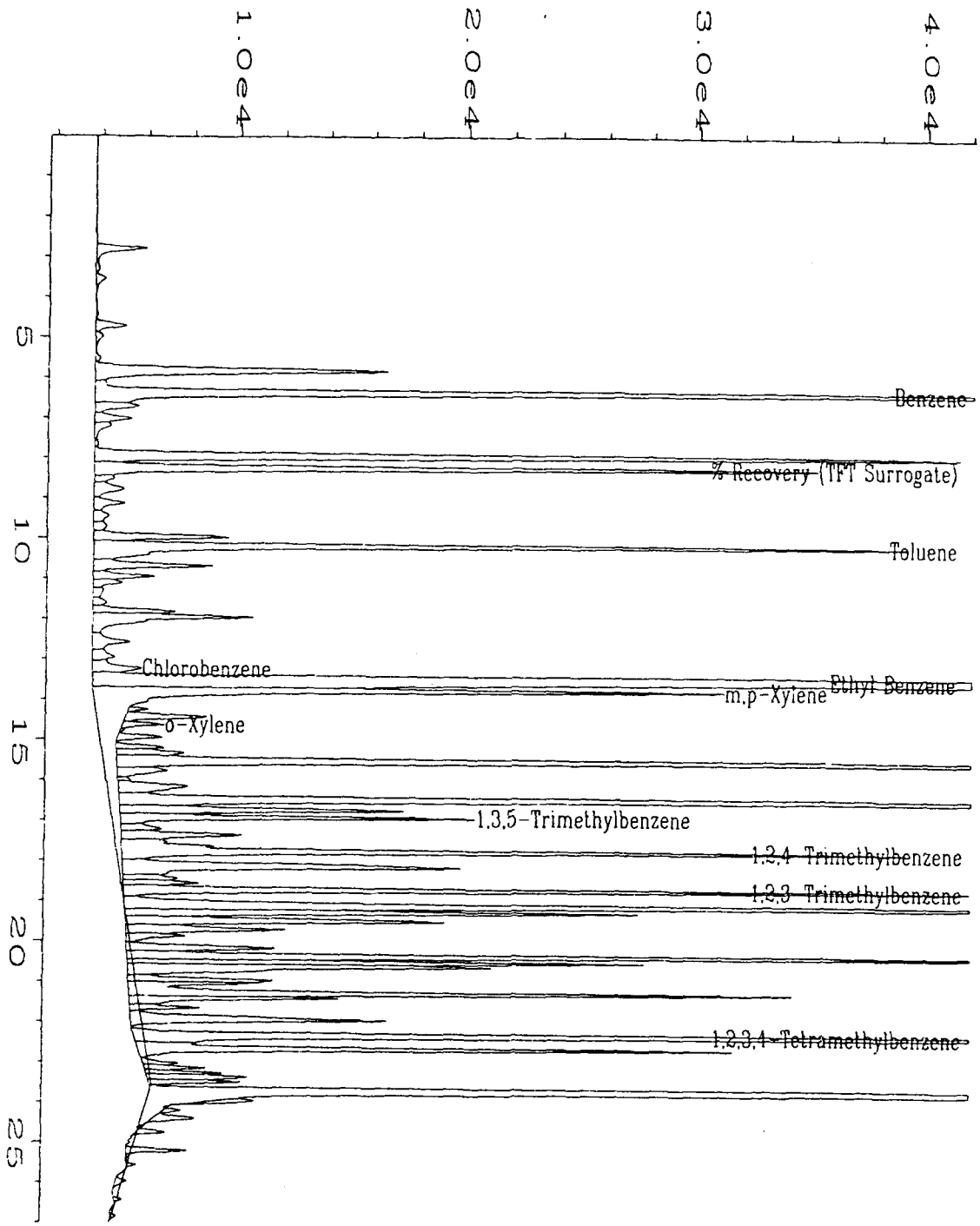
** = Greater than 10% of calibration range. See BX1041716 (DF = 20) run past holding time.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

P McClella
Approved

BTEX1063.XLS



Data File Name	: C:\HPCHEM\1\DATA\BX10413\026F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 26
Sample Name	: X05174;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 04:10 AM	Instrument Method	: BX10413A
Report Created on	: 14 Apr 95 04:37 AM	Analysis Method	: BX10413A.MT
Last Recalib on	: 13 APR 95 04:13 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: 75MP-4S Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: 75MP-45	Client Project No.	: 722450.21020/Mac Dill
Lab Sample Number	: X05174	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 20.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/17/95	Matrix	: Water
Date Analyzed	: 4/17/95	Lab File No.	: BX1041716
		Method Blank No.	: MB041795

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	**	8.0
Toluene	108-88-3	**	8.0
Chlorobenzene	108-90-7	**	8.0
Ethyl Benzene	100-41-4	460.0*	8.0
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	**	8.0
3,5-Trimethylbenzene	108-67-8	**	8.0
1,2,4-Trimethylbenzene	95-63-6	**	8.0
1,2,3-Trimethylbenzene	526-73-8	**	8.0
1,2,3,4-Tetramethylbenzene	488-23-3	78.0*	8.0
Surrogate Recovery (α,α,α-Trifluorotoluene):		82%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

* = Holding Time Surpassed.
** = See BX1041326.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved

BTEX1063.XLS

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\BX10417\016F1001.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05174;20;0.250
Run Time Bar Code:
Acquired on : 17 Apr 95 03:51 PM
Report Created on: 17 Apr 95 07:28 PM
Last Recalib on : 17 APR 95 07:07 PM
Multiplier : 20
Sample Info : Project#: 95-1063 Client#: 75MP-45 Water

Page Number : 1
Vial Number : 16
Injection Number : 1
Sequence Line : 10
Instrument Method: BX10417A.M
Analysis Method : BX10417B.M
Sample Amount : 0
ISTD Amount :

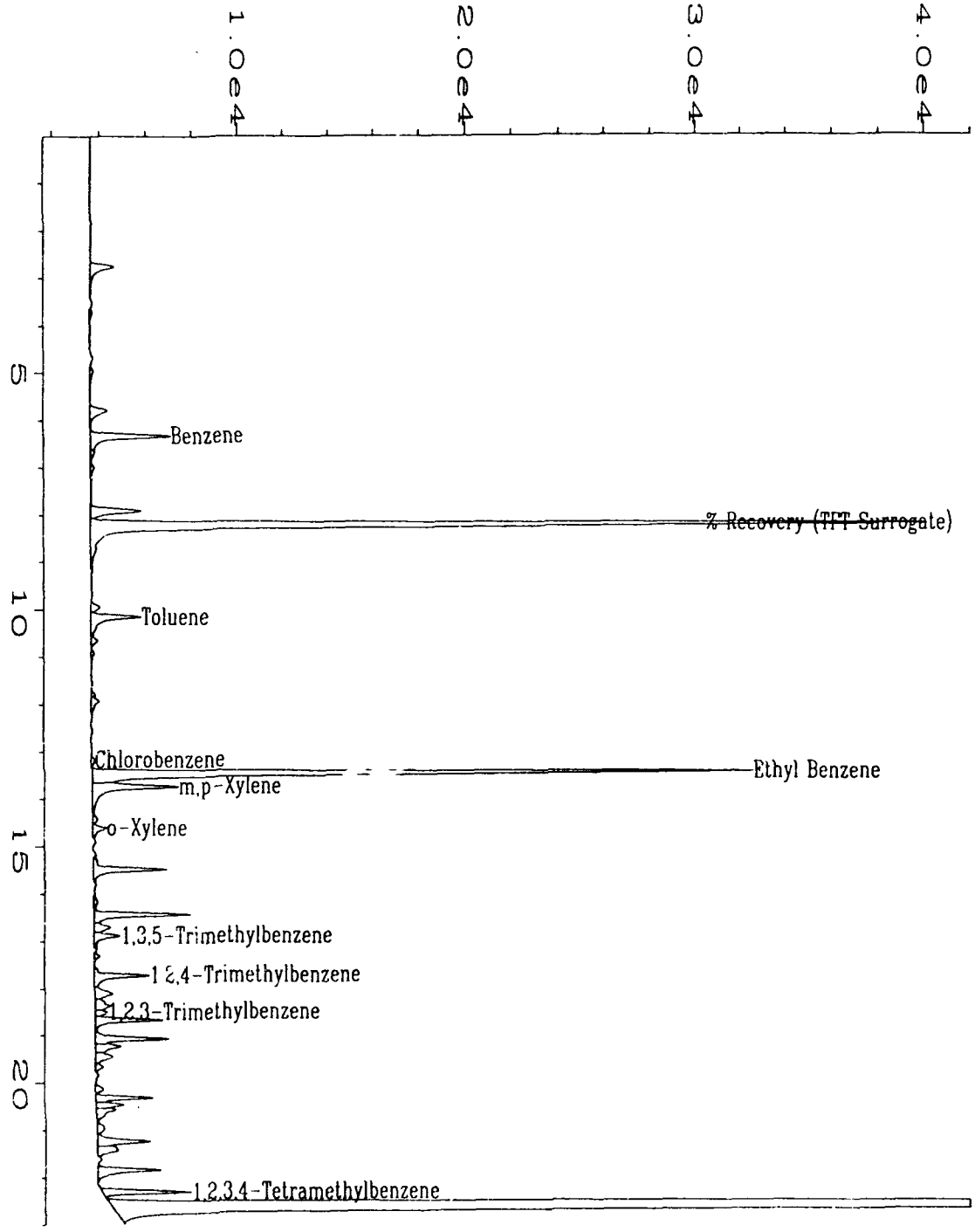
Sig. 1 in C:\HPCHEM\1\DATA\BX10417\016F1001.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
6.330	24882	VV	0.107	1	53.885	Benzene
8.213	252850	VV	0.106	1-R	1644.939	% Recovery (TFT Surrogate) 82
10.151	16893	VV	0.114	1	39.647	Toluene
13.169	1325	VV	0.151	1	3.616	Chlorobenzene
13.456	165067	VV	0.088	1	459.579	Ethyl Benzene
13.738	29452	VV	0.115	1	66.467	m,p-Xylene
14.606	4565	VV	0.114	1	11.847	o-Xylene
16.889	7670	VV	0.102	1	17.154	1,3,5-Trimethylbenzene
17.726	15398	VV	0.096	1	47.038	1,2,4-Trimethylbenzene
18.503	2959	VV	0.087	1	9.089	1,2,3-Trimethylbenzene
22.302	19127	PV	0.079	1	78.479	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
2	8.275	8.213	-0.062

Holding Time Up

Not used per



Data File Name	: C:\HPCHEM\1\DATA\BX10417\016F1001.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 16
Sample Name	: X05174;20;0.250	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 10
Acquired on	: 17 Apr 95 03:51 PM	Instrument Method	: BX10417A.MTH
Report Created on	: 17 Apr 95 07:29 PM	Analysis Method	: BX10417B.MTH
Last Recalib on	: 17 APR 95 07:07 PM	Sample Amount	: 0
Multiplier	: 20	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: 75MP-45 Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW3	**Client Project No.**	: 722450.21020/Mac D
Lab Sample Number	: X05171	**Lab Project No.**	: 95-1063
Date Sampled	: 3/31/95	**Dilution Factor**	: 1.00
Date Received	: 4/1/95	**Method**	: 602
Date Prepared	: 4/14/95	**Matrix**	: Water
Date Analyzed	: 4/14/95	**Lab File No.**	: BX1041323
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6		U	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		69% *		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

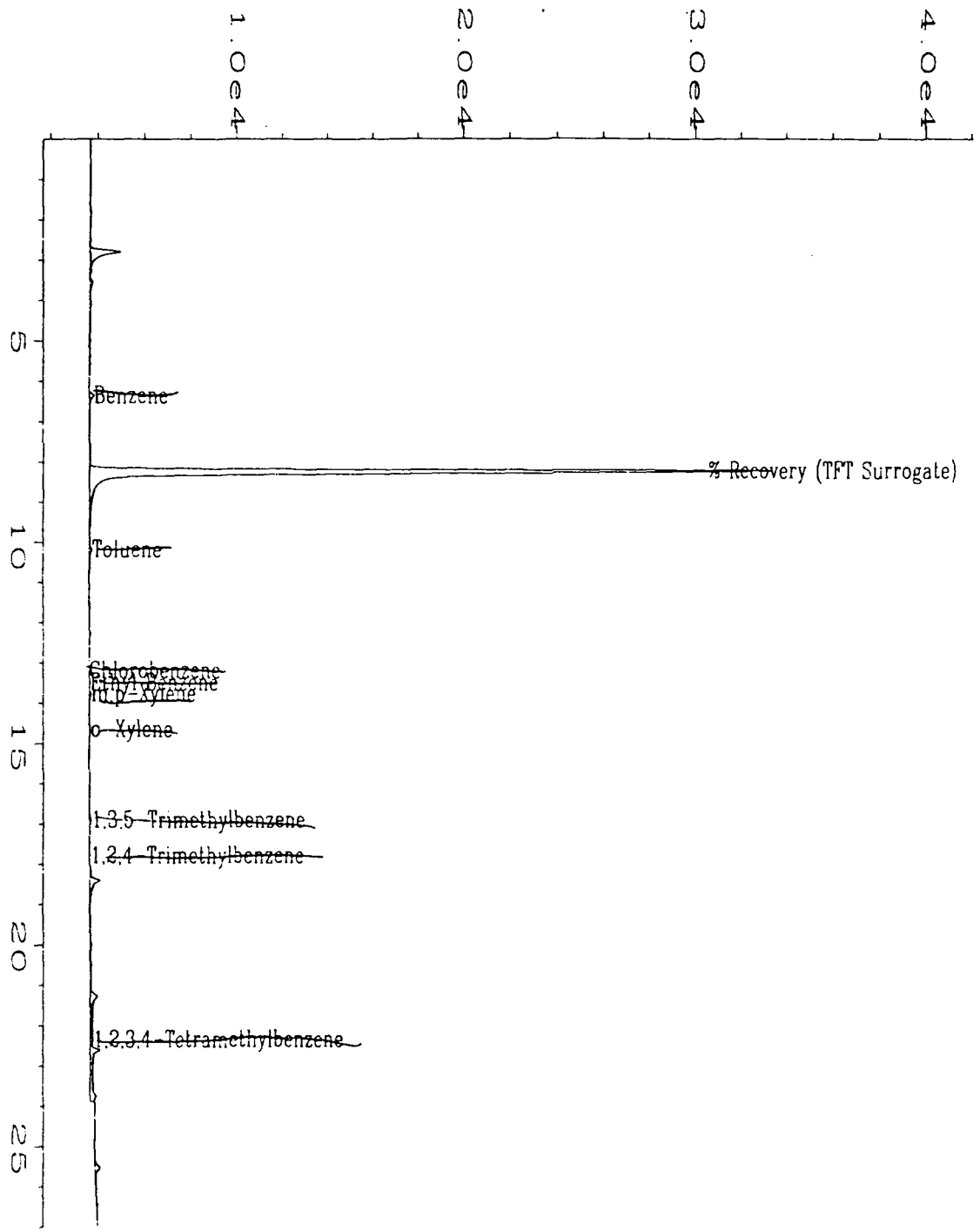
* = Out of limit. See BX1041358 (DF = 1) run past holding time.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

P McClelland
Approved

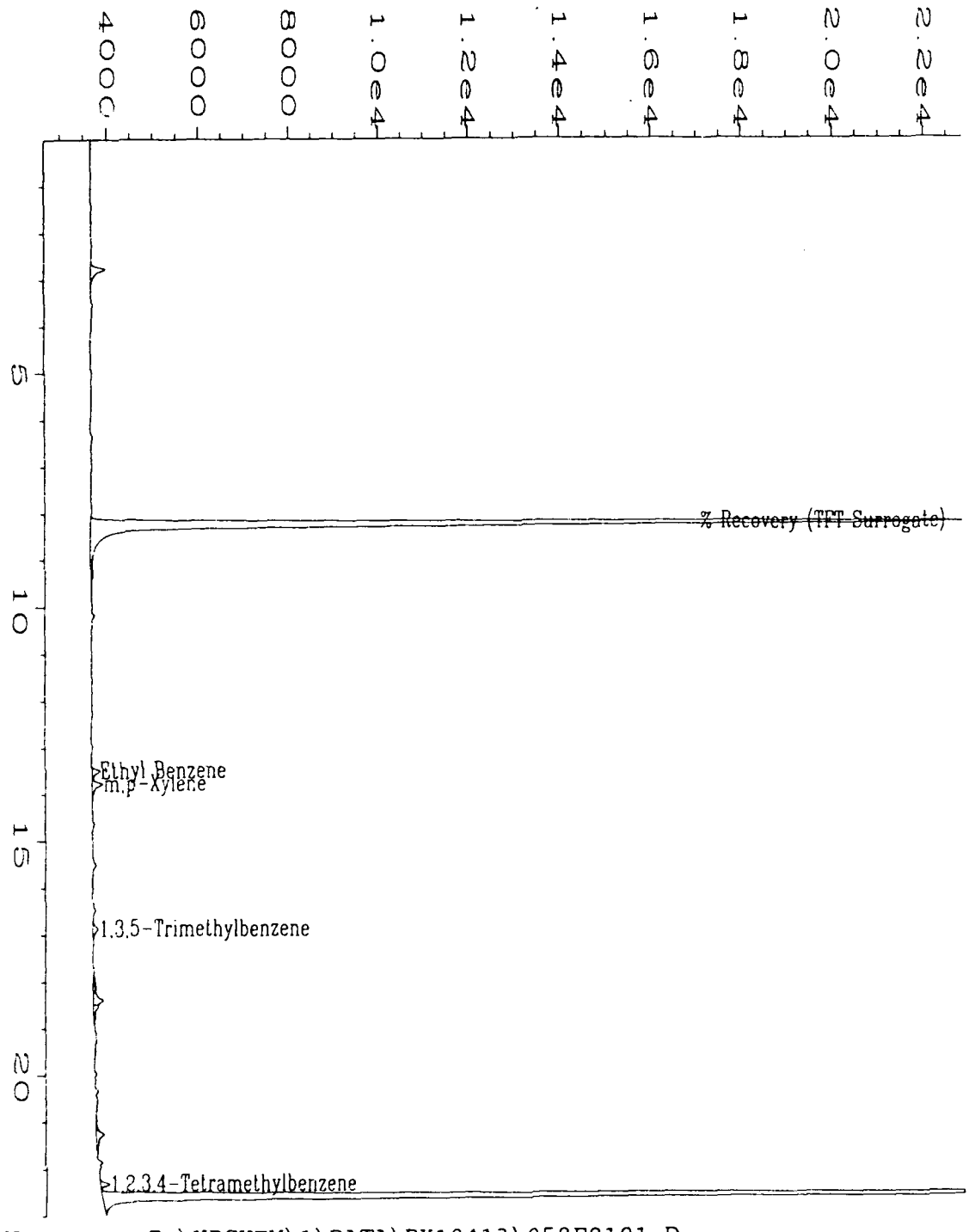
BTEX1063.XLS



Data File Name : C:\HPCHEM\1\DATA\BX10413\023F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05171;1;5
Run Time Bar Code:
Acquired on : 14 Apr 95 02:11 AM
Report Created on: 14 Apr 95 02:39 AM
Last Recalib on : 13 APR 95 04:13 PM
Multiplier : 1
Sample Info : Project#: 95-1063 Client#: MD75-MW3 Water

Page Number : 1
Vial Number : 23
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10413A.MTH
Analysis Method : BX10413A.MTH
Sample Amount : 0
ISTD Amount :

pm 4/28/95



Data File Name	: C:\HPCHEM\1\DATA\BX10413\058F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 58
Sample Name	: X05171;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 15 Apr 95 01:18 AM	Instrument Method	: BX10414.
Report Created on	: 27 Apr 95 08:06 PM	Analysis Method	: BX10414B.M
Last Recalib on	: 15 APR 95 01:55 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW3 Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW4	Client Project No.	: 722450.21020/Mac Dill
Lab Sample Number	: X05175	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 1.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/13/95	Matrix	: Water
Date Analyzed	: 4/14/95	Lab File No.	: BX1041327
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	>60 **	0.4
Toluene	108-88-3	2.2	0.4
Chlorobenzene	108-90-7	2.2	0.4
Ethyl Benzene	100-41-4	>60 **	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	2.1	0.4
1,2,3-Trimethylbenzene	526-73-8	0.8	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	>60 **	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		69%*	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

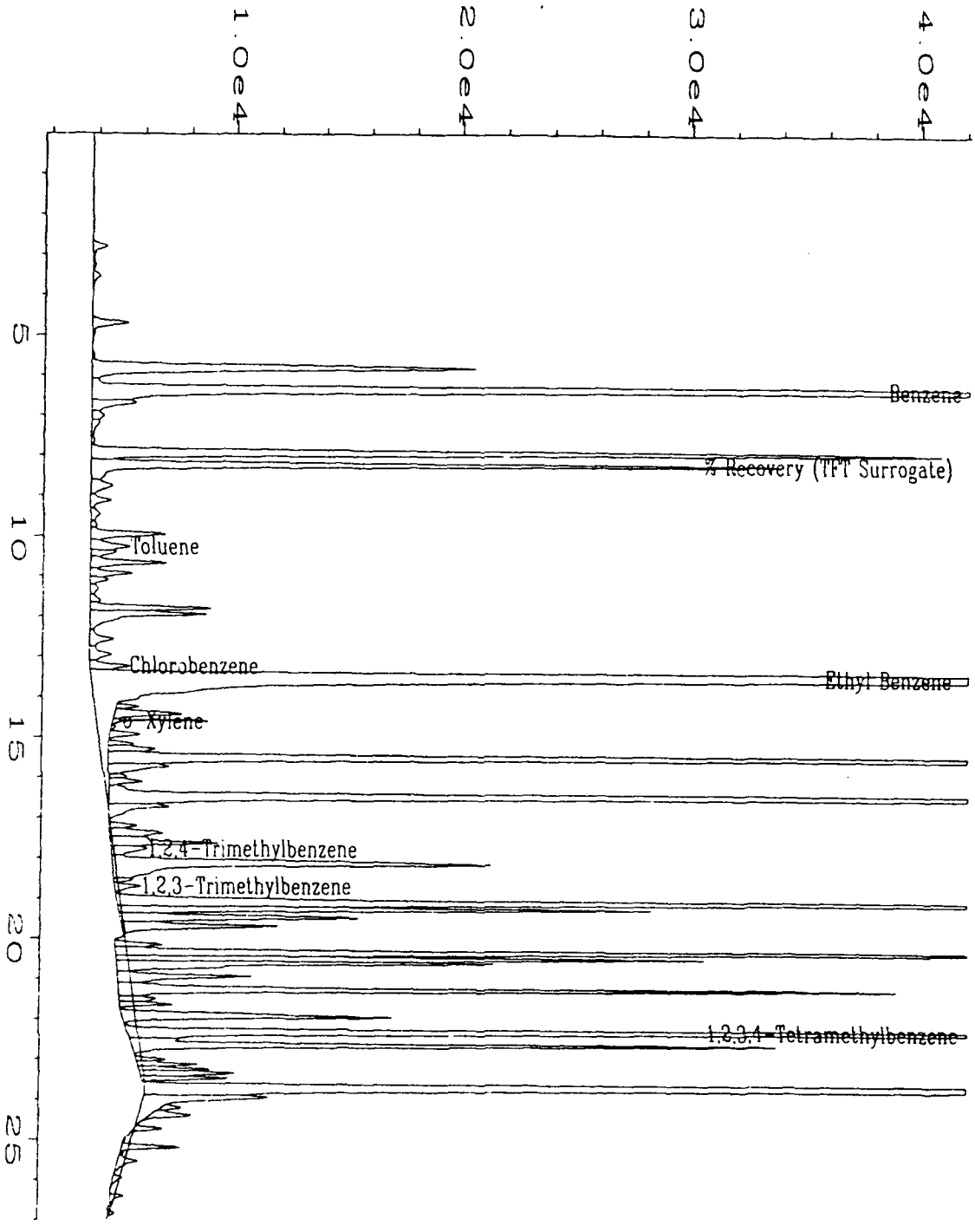
* = Out of limit.
** = Greater than 10% of the calibration range. See BX1041717 (DF = 20) run past holding time.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved

BTEX1063.XLS



Data File Name	: C:\HPCHEM\1\DATA\BX10413\027F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 27
Sample Name	: X05175;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 04:49 AM	Instrument Method	: BX10413A.MT
Report Created on	: 14 Apr 95 05:17 AM	Analysis Method	: BX10413A.MT
Last Recalib on	: 13 APR 95 04:13 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW4 Water		

fm 4/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW4	Client Project No.	: 722450.21020/Mac Dill
Lab Sample Number	: X05175Dup	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 5.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/13/95	Matrix	: Water
Date Analyzed	: 4/14/95	Lab File No.	: BX1041328
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	>60 **	0.4
Toluene	108-88-3	1.9	0.4
Chlorobenzene	108-90-7	2.0	0.4
Ethyl Benzene	100-41-4	>60 **	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	1.9	0.4
1,2,3-Trimethylbenzene	526-73-8	1.0	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	>60 **	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		63% *	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

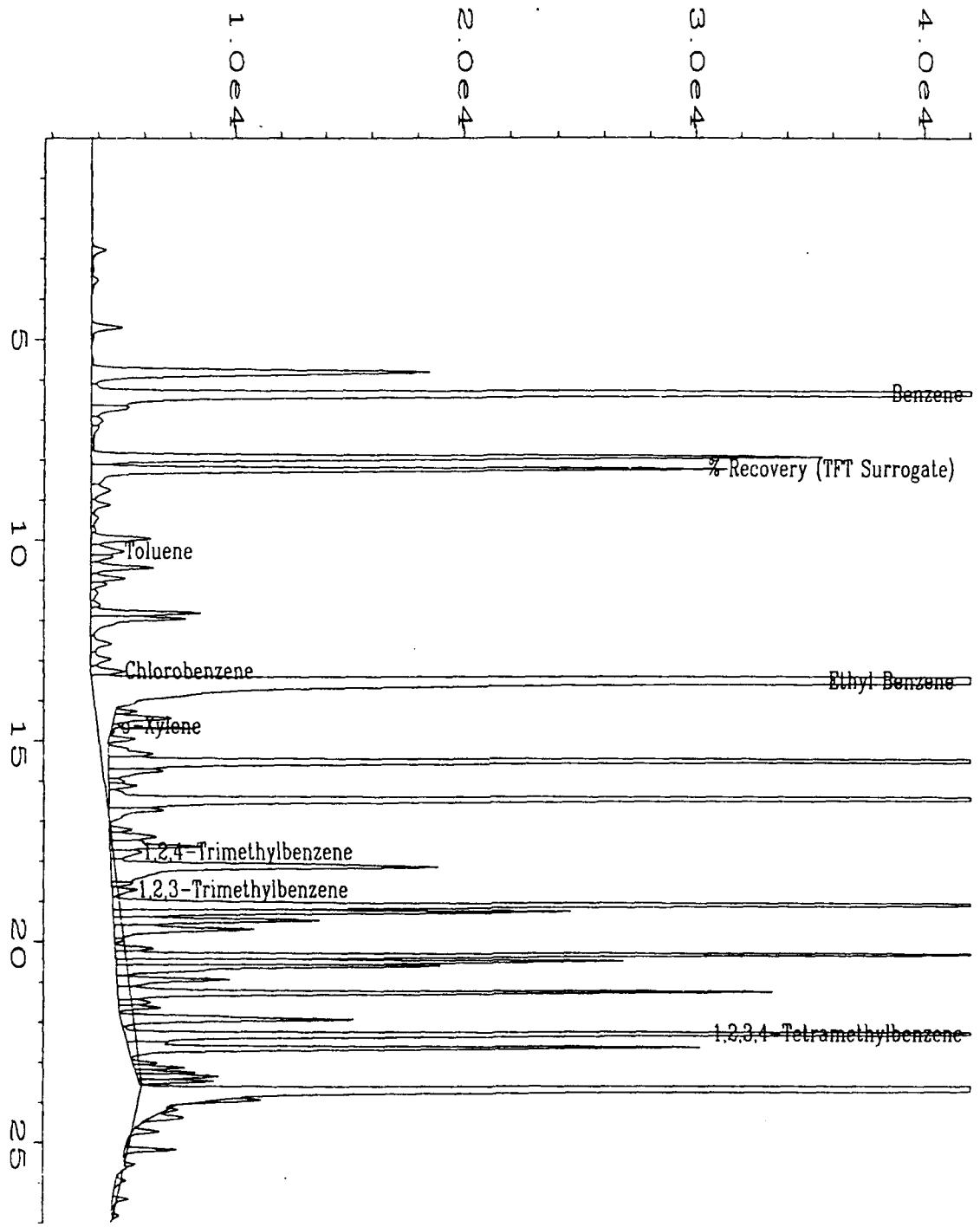
* = Out of limit.
** = Greater than 10% of calibration range.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

P. McClellan
Approved

BTEX1063.XLS



Data File Name	: C:\HPCHEM\1\DATA\BX10413\028F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 28
Sample Name	: X05175DUP;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 05:29 AM	Instrument Method	: BX10413A
Report Created on	: 14 Apr 95 05:56 AM	Analysis Method	: BX10413A.MT
Last Recalib on	: 13 APR 95 04:13 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW4 Water		

pm 4/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW4	Client Project No.	: 722450.21020/Mac Dill
Lab Sample Number	: X05175	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 20.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/17/95	Matrix	: Water
Date Analyzed	: 4/17/95	Lab File No.	: BX1041717
		Method Blank No.	: MB041795

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	94.0*	8.0
Toluene	108-88-3	**	8.0
Chlorobenzene	108-90-7	**	8.0
Ethyl Benzene	100-41-4	580.0*	8.0
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	**	8.0
3,5-Trimethylbenzene	108-67-8	**	8.0
1,2,4-Trimethylbenzene	95-63-6	**	8.0
1,2,3-Trimethylbenzene	526-73-8	**	8.0
1,2,3,4-Tetramethylbenzene	488-23-3	92.0*	8.0
Surrogate Recovery (α,α,α-Trifluorotoluene):		85%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

* = Holding Time Surpassed.
** = See BX1041327.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved

BTEX1063.XLS

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\BX10417\017F1001.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05175;20;0.250
Run Time Bar Code:
Acquired on : 17 Apr 95 04:31 PM
Report Created on: 17 Apr 95 07:29 PM
Last Recalib on : 17 APR 95 07:07 PM
Multiplier : 20
Page Number : 1
Vial Number : 17
Injection Number : 1
Sequence Line : 10
Instrument Method: BX10417A.I
Analysis Method : BX10417B.I
Sample Amount : 0
ISTD Amount :
Sample Info : Project#: 95-1063 Client#: MD75-MW4 Water

Sig. 1 in C:\HPCHEM\1\DATA\BX10417\017F1001.D

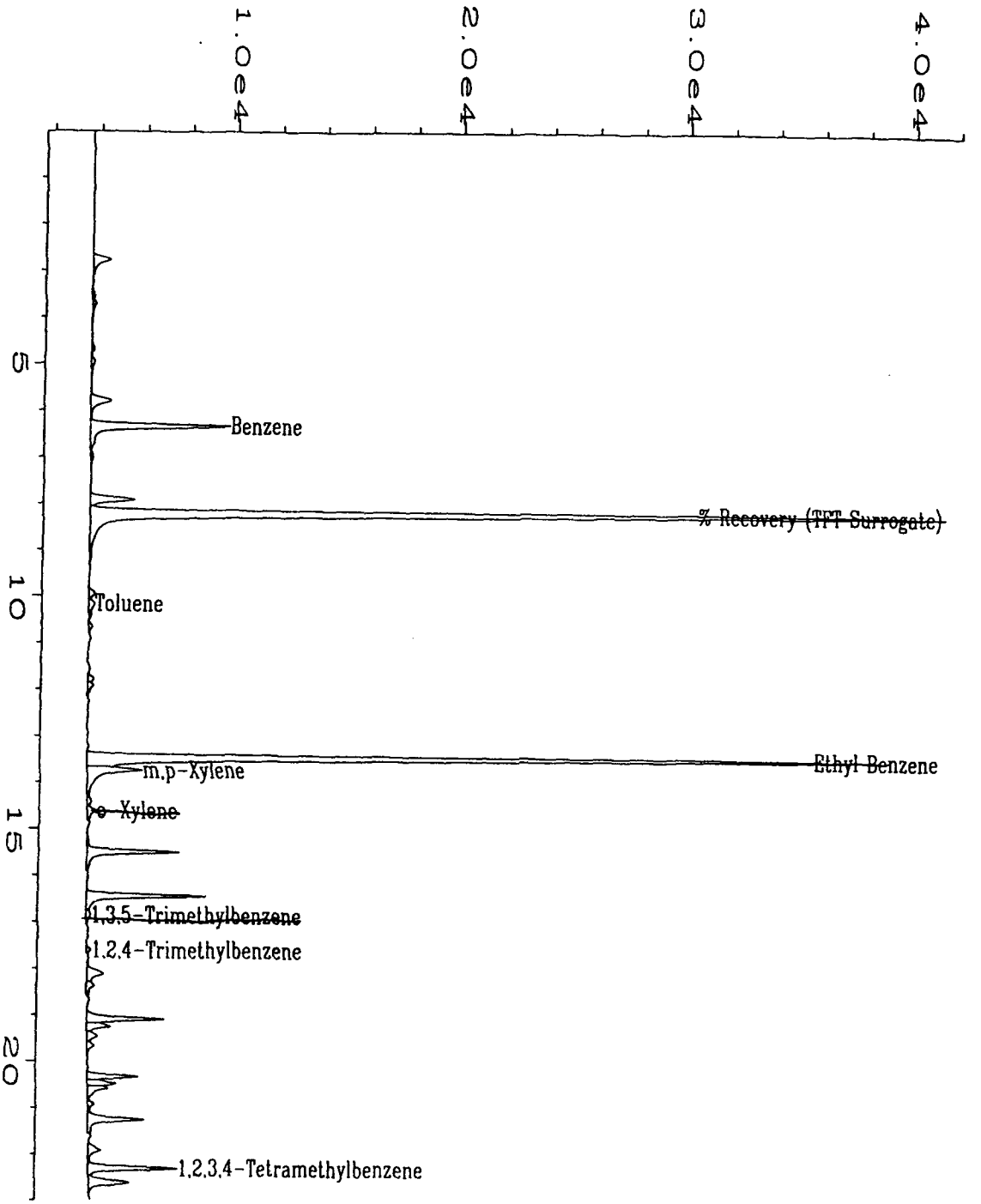
Ret Time	Area	Type	Width	Ref#	ug/L	Name
6.333	43572	VV	0.107	1	94.359	Benzene
8.218	261271	VV	0.106	1-R	1699.725	% Recovery (TFT Surrogate) 85
10.172	3841	VV	0.196	1	9.015	Toluene
13.196	* not found *			1		Chlorobenzene
13.464	209657	VV	0.091	1	583.727	Ethyl Benzene
13.741	23300	VV	0.134	1	52.583	m,p-Xylene
14.613	3728	VV	0.129	1	9.673	o-Xylene
16.871	1985	VV	0.165	1	4.440	1,3,5-Trimethylbenzene
17.610	1119	PV	0.094	1	3.417	1,2,4-Trimethylbenzene
18.722	* not found *			1		1,2,3-Trimethylbenzene
22.301	22466	VV	0.089	1	92.176	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
2	8.275	8.218	-0.057

Not all calibrated peaks were found

Holding Time up

not used for QC



Data File Name : C:\HPCHEM\1\DATA\BX10417\017F1001.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05175;20;0.250
Run Time Bar Code:
Acquired on : 17 Apr 95 04:31 PM
Report Created on: 17 Apr 95 07:30 PM
Last Recalib on : 17 APR 95 07:07 PM
Multiplier : 20
Sample Info : Project#: 95-1063 Client#: MD75-MW4 Water

Page Number : 1
Vial Number : 17
Injection Number : 1
Sequence Line : 10
Instrument Method: BX10417A.MTH
Analysis Method : BX10417B.MTH
Sample Amount : 0
ISTD Amount :

pm 4/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW6	Client Project No.	: 722450.21020/Mac D
Lab Sample Number	: X05177	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 1.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/14/95	Matrix	: Water
Date Analyzed	: 4/14/95	Lab File No.	: BX1041345
		Method Blank No.	: MB041495

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4	0.8		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6		U	0.4
1,3,5-Trimethylbenzene	108-67-8	0.5		0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	3.2		0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		95%		70%-130% (QC limits

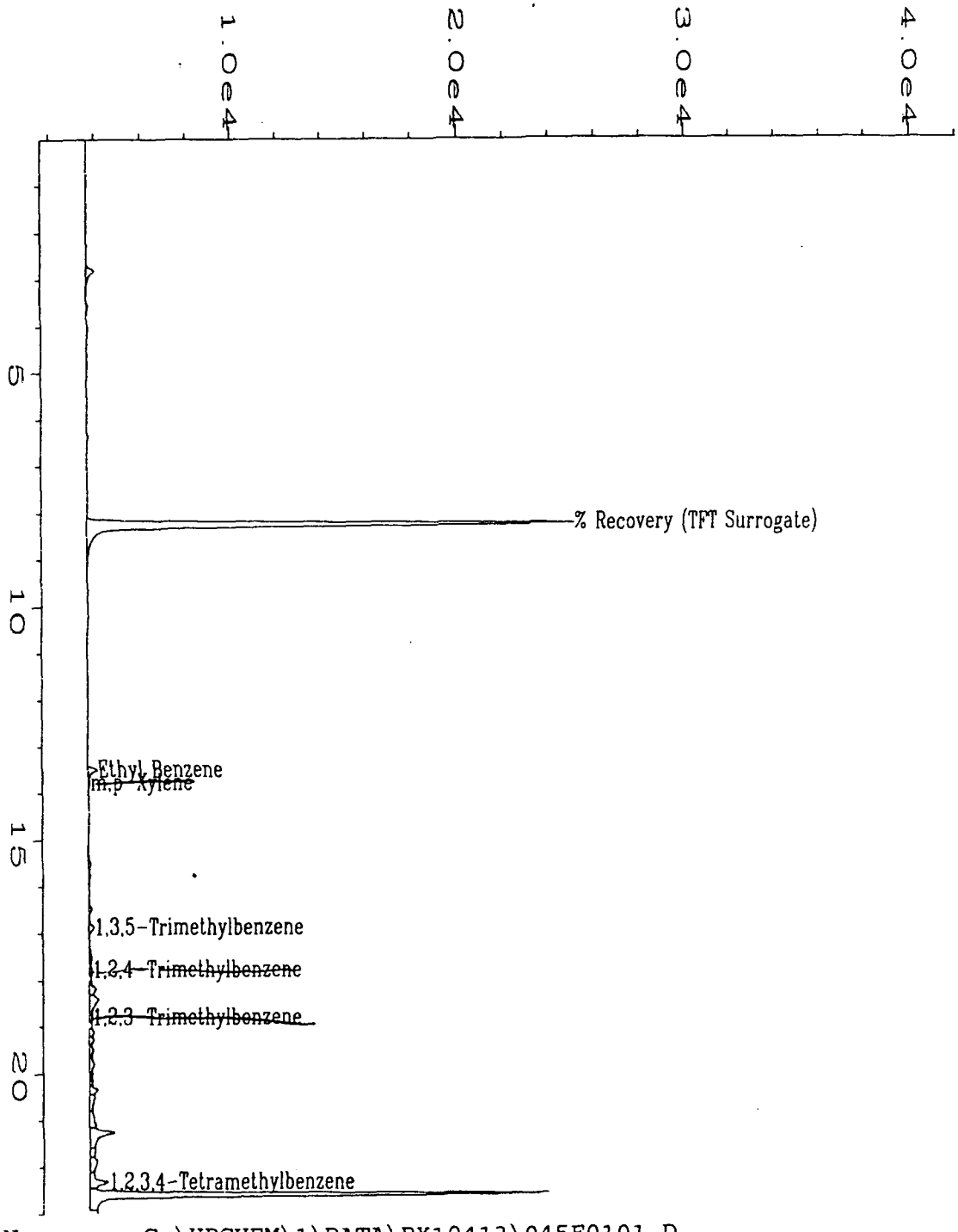
Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

P. McClellan
Approved

BTEX1063.XLS



Data File Name	: C:\HPCHEM\1\DATA\BX10413\045F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 45
Sample Name	: X05177;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 04:44 PM	Instrument Method	: BX10414.MTH
Report Created on	: 27 Apr 95 07:27 PM	Analysis Method	: BX10414B.MTH
Last Recalib on	: 15 APR 95 01:55 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW6 Water		

pm 4/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW6A	**Client Project No.**	: 722450.21020/Mac D
Lab Sample Number	: X05180	**Lab Project No.**	: 95-1063
Date Sampled	: 3/31/95	**Dilution Factor**	: 1.00
Date Received	: 4/1/95	**Method**	: 602
Date Prepared	: 4/14/95	**Matrix**	: Water
Date Analyzed	: 4/14/95	**Lab File No.**	: BX1041347
		Method Blank No.	: MB041495

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	3.2		0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7	1.2		0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6		U	0.4
1,3,5-Trimethylbenzene	108-67-8	0.5		0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	1.2		0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		90%		70%-130% (QC limits

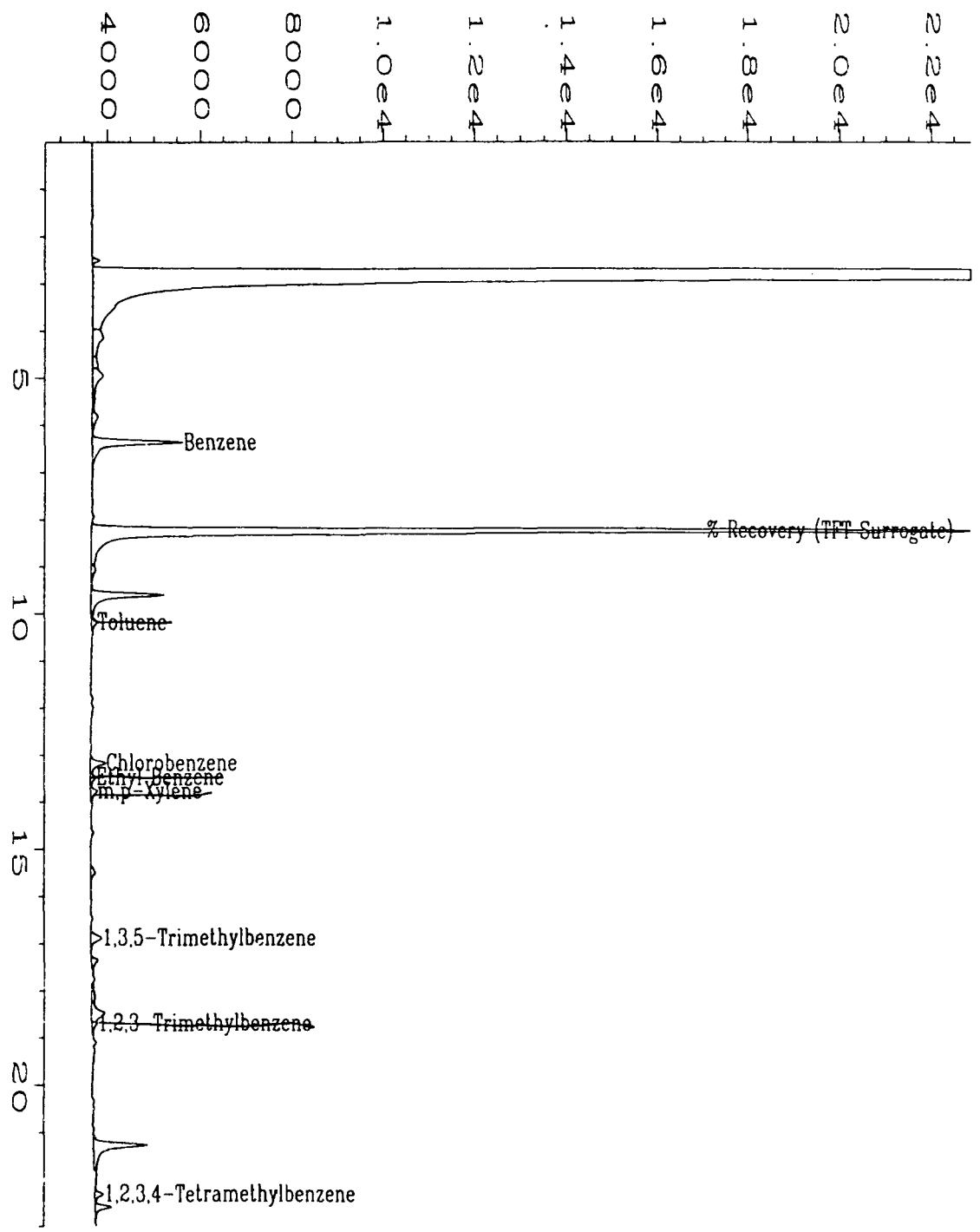
Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

P. McClellan
Approved

BTEX1063.XLS



Data File Name : C:\HPCHEM\1\DATA\BX10413\047F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05180;1;5
Run Time Bar Code:
Acquired on : 14 Apr 95 06:03 PM
Report Created on: 27 Apr 95 08:27 PM
Last Recalib on : 15 APR 95 01:55 PM
Multiplier : 1
Sample Info : Project#: 95-1063 Client#: MD24-MW6A Water

Page Number : 1
Vial Number : 47
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10414.MTH
Analysis Method : BX10414B.MTH
Sample Amount : 0
ISTD Amount :

DM 4/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW8	Client Project No.	: 722450.21020/Mac I
Lab Sample Number	: X0 *72	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 1.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/14/95	Matrix	: Water
Date Analyzed	: 4/14/95	Lab File No.	: BX1041324
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	>60 **	0.4
Toluene	108-88-3	17	0.4
Chlorobenzene	108-90-7	1.3	0.4
Ethyl Benzene	100-41-4	>60 **	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	110	0.4
1,3,5-Trimethylbenzene	108-67-8	33	0.4
1,2,4-Trimethylbenzene	95-63-6	45	0.4
1,2,3-Trimethylbenzene	526-73-8	40	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	61 E	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		75%	70%-130% (QC limits

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

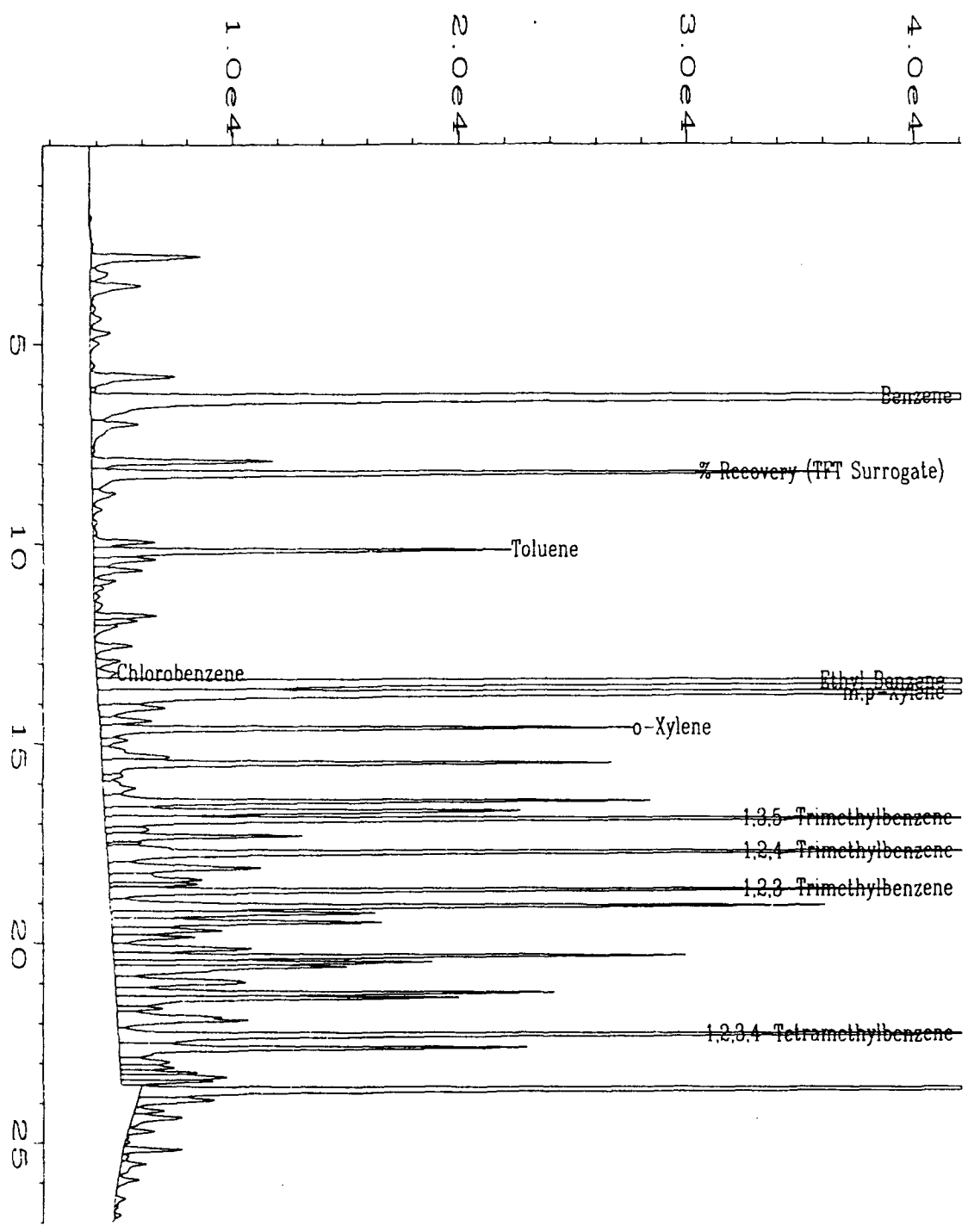
** = Greater than 10% of calibration range. See BX1041359 (DF=10) run past holding times.

QUALIFIERS:
E = Extrapolated value. Exceeds calibration range.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

P. McClellan
Approved

BTEX1063.XLS



Data File Name	: C:\HPCHEM\1\DATA\BX10413\024F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 24
Sample Name	: X05172;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
uired on	: 14 Apr 95 02:51 AM	Instrument Method	: BX10413A.MTH
ort Created on	: 14 Apr 95 03:18 AM	Analysis Method	: BX10413A.MTH
Last Recalib on	: 13 APR 95 04:13 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW8 Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW8	Client Project No.	: 722450.21020/Mac Dill
Lab Sample Number	: X05172	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 10.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/14/95	Matrix	: Water
Date Analyzed	: 4/15/95	Lab File No.	: BX1041359
		Method Blank No.	: MB041495

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	140.0*	B	4.0
Toluene	108-88-3	**		4.0
Chlorobenzene	108-90-7	**		4.0
Ethyl Benzene	100-41-4	110.0*	B	4.0
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	100.0*	B	4.0
1,3,5-Trimethylbenzene	108-67-8	**		4.0
1,2,4-Trimethylbenzene	95-63-6	**		4.0
1,2,3-Trimethylbenzene	526-73-8	**		4.0
1,2,3,4-Tetramethylbenzene	488-23-3	**		4.0
Surrogate Recovery (α,α,α-Trifluorotoluene):		80%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

* = Holding Time Surpassed.
** = See BX2041516.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved

BTEX1063.XLS

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\BX10413\059F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05172;10;500ul
Run Time Bar Code:
Acquired on : 15 Apr 95 01:57 AM
Report Created on: 27 Apr 95 07:38 PM
Last Recalib on : 15 APR 95 01:55 PM
Multiplier : ~~0.5~~ 10
Sample Info : Project#: 95-1063 Client#: MD75-MW8 Water

Page Number : 1
Vial Number : 59
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10414.MTH
Analysis Method : BX10414B.MTH
Sample Amount : 0
ISTD Amount :

$\left(\frac{10}{0.5}\right) = 20$

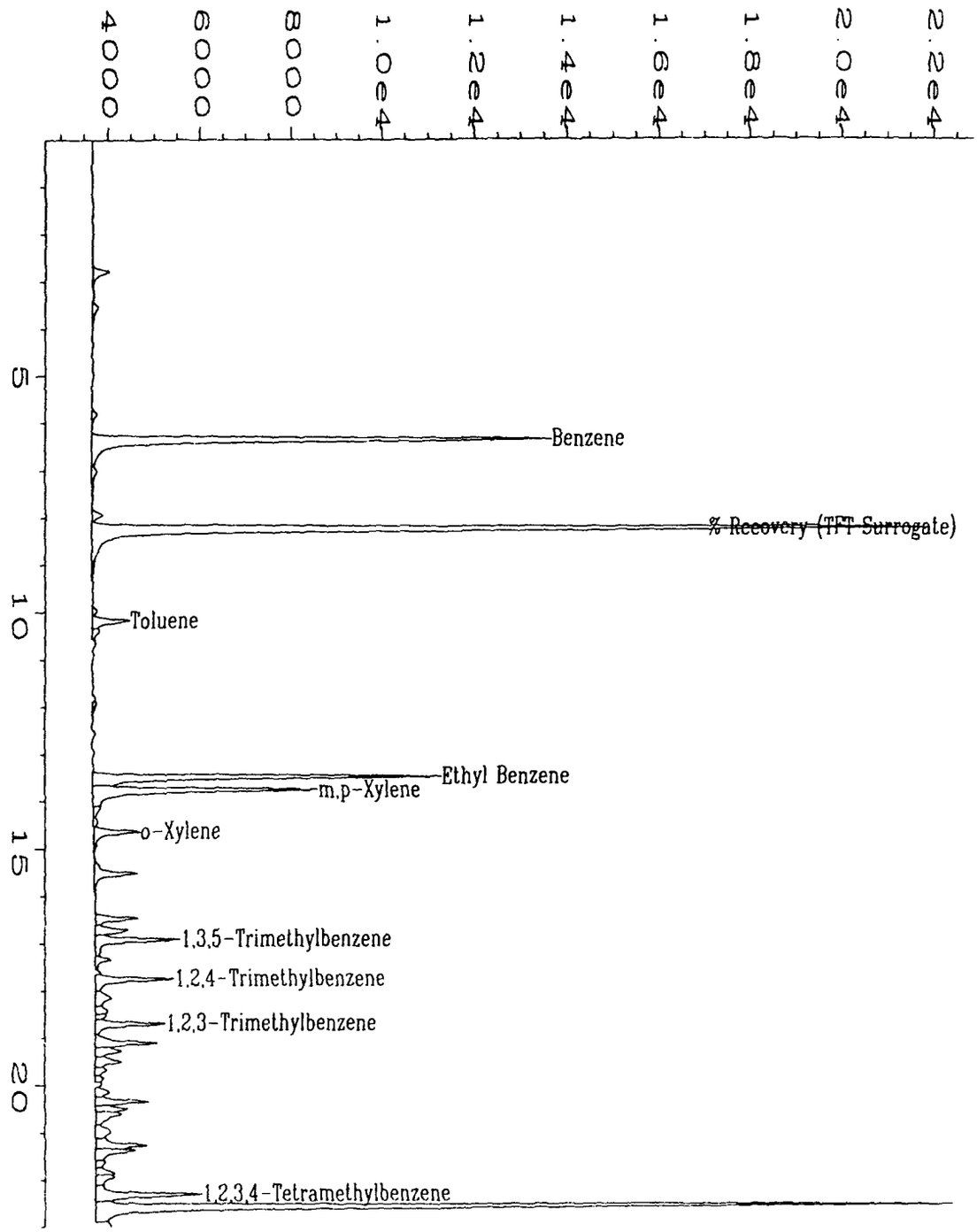
Sig. 1 in C:\HPCHEM\1\DATA\BX10413\059F0101.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
6.342	67582	VV	0.103	1	7.299	Benzene x 20
8.231	124091	VV	0.105	1-R	40.116	% Recovery (TFT Surrogate) 80%
10.170	5850	VV	0.105	1	0.675	Toluene
13.189	* not found *			1		Chlorobenzene
13.484	43118	VV	0.086	1	5.791	Ethyl Benzene
13.764	32604	VV	0.099	1	3.539	m,p-Xylene
14.632	7187	VV	0.106	1	0.906	o-Xylene
16.917	12049	VV	0.096	1	1.211	1,3,5-Trimethylbenzene
17.754	10787	VV	0.094	1	1.481	1,2,4-Trimethylbenzene
18.694	9541	VV	0.093	1	1.426	1,2,3-Trimethylbenzene
22.309	15804	HH	0.101	1	2.847	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
2	8.228	8.231	0.003

Not all calibrated peaks were found

Post Holding Time
Field Dup 1



Data File Name	: C:\HPCHEM\1\DATA\BX10413\059F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 59
Sample Name	: X05172;10;500ul	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 15 Apr 95 01:57 AM	Instrument Method	: BX10414
Report Created on	: 27 Apr 95 07:38 PM	Analysis Method	: BX10414B.M
Last Recalib on	: 15 APR 95 01:55 PM	Sample Amount	: 0
Multiplier	: 0.5	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW8 Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW12	**Client Project No.**	: 722450.21020/Mac Dill
Lab Sample Number	: X05169	**Lab Project No.**	: 95-1063
Date Sampled	: 3/31/95	**Dilution Factor**	: 1.00
Date Received	: 4/1/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/14/95	**Lab File No.**	: BX1041321
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	45	0.4
Toluene	108-88-3	1.5	0.4
Chlorobenzene	108-90-7	0.5	0.4
Ethyl Benzene	100-41-4	>60 **	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	7.5	0.4
1,3,5-Trimethylbenzene	108-67-8	6.2	0.4
1,2,4-Trimethylbenzene	95-63-6	20	0.4
1,2,3-Trimethylbenzene	526-73-8	3.2	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	41	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		75%	70%-130% (QC limits)

**Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.**

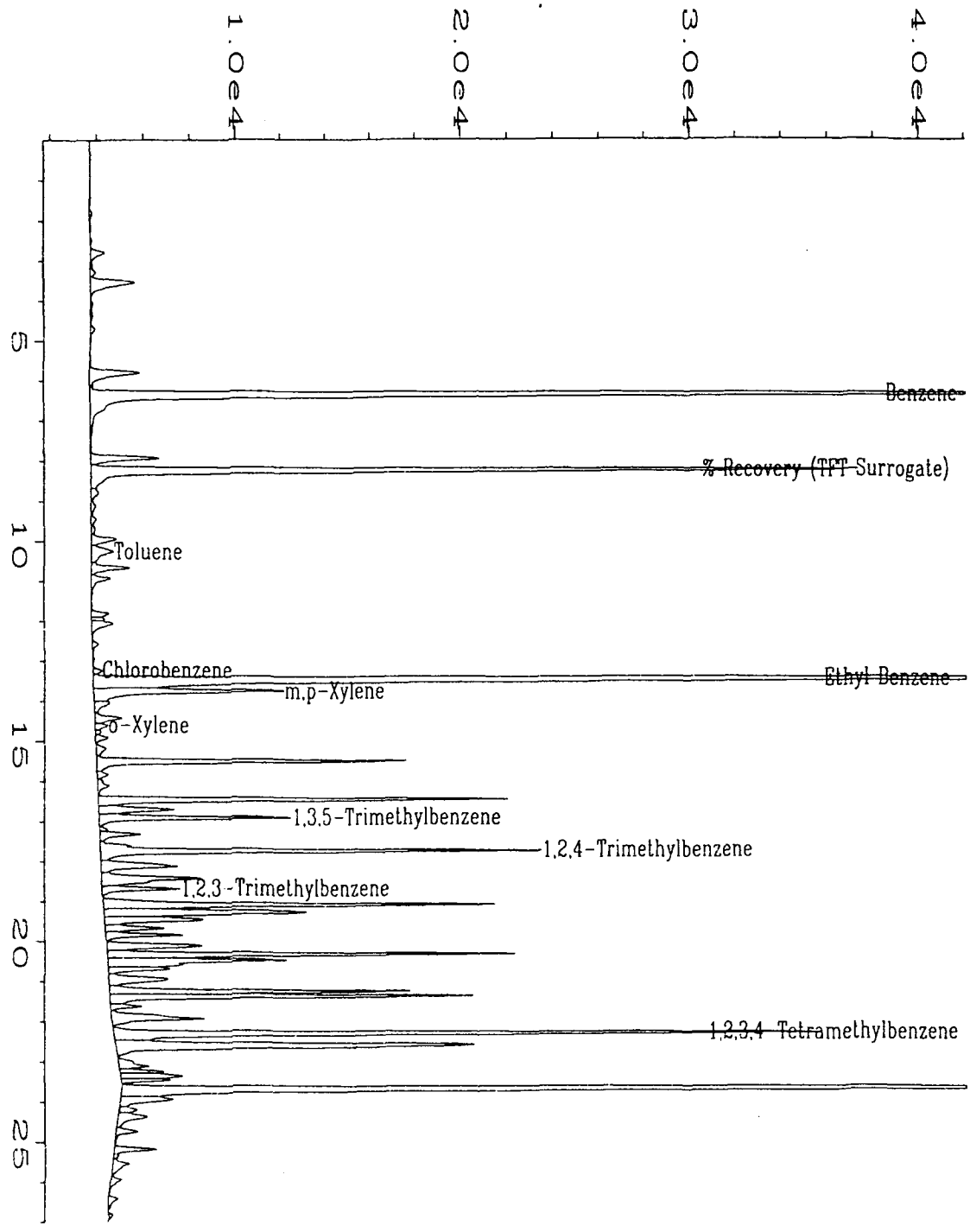
** = Greater than 10% of calibration range. See BX1041357 (DF=5) run past holding time.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

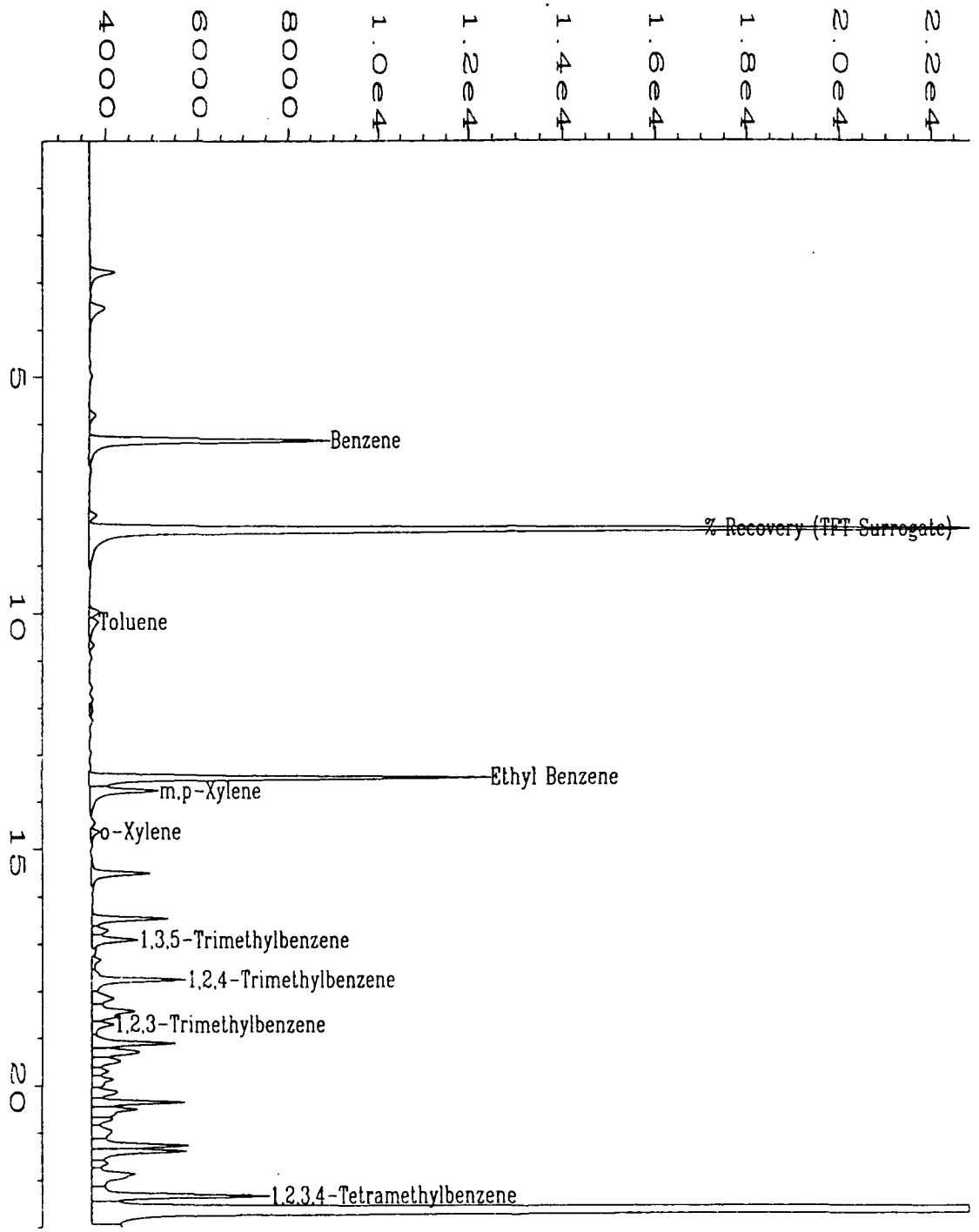
K. Cone
Analyst

Approved

BTEX1063.XLS



Data File Name	: C:\HPCHEM\1\DATA\BX10413\021F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 21
Sample Name	: X05169;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 00:52 AM	Instrument Method	: BX10413.
Report Created on	: 14 Apr 95 01:20 AM	Analysis Method	: BX10413A.M
Last Recalib on	: 13 APR 95 04:13 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW12 Water		



Data File Name	: C:\HPCHEM\1\DATA\BX10413\057F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 57
Sample Name	: X05169;5;1000ul	Injection Number	: 1
Time Bar Code	:	Sequence Line	: 1
Acquired on	: 15 Apr 95 00:38 AM	Instrument Method	: BX10414.MTH
Report Created on	: 27 Apr 95 07:37 PM	Analysis Method	: BX10414B.MTH
Last Recalib on	: 15 APR 95 01:55 PM	Sample Amount	: 0
Multiplier	: 5	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW12 Water		

EVERGREEN ANALYTICAL, INC.
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(303) 425-6021

Method 602/8020 Data Report

Client Sample Number	: MD75-MW12	Client Project No.	: 722450.21020/MacDill
Lab Sample Number	: X05169	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 5.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/14/95	Matrix	: Water
Date Analyzed	: 4/14/95	Lab File No.	: BX1041357
		Method Blank No.	: MB041495

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	**		**
Toluene	108-88-3	**		**
Chlorobenzene	108-90-7	**		**
Ethyl Benzene	100-41-4	67 *	B	2.0
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	**		**
1,3,5-Trimethylbenzene	108-67-8	**		**
1,2,4-Trimethylbenzene	95-63-6	**		**
1,2,3-Trimethylbenzene	526-73-8	**		**
1,2,3,4-Tetramethylbenzene	488-23-3	**		**
Surrogate Recovery (α,α,α-Trifluorotoluene):		90%		70%-130% (QC limits)

QUALIFIERS/NOTES:

E = Extrapolated value. Value exceeds calibration range.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.
Total xylenes consist of three isomers, two of which co-elute. The xylene RL is for a single peak.

* = Holding Time surpassed.
** = See BX1041321.

Analyst

Approved

602TMB.XLS; 9/21/95

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\BX10413\057F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05169;5;1000ul
Run Time Bar Code:
Acquired on : 15 Apr 95 00:38 AM
Report Created on: 27 Apr 95 07:36 PM
Last Recalib on : 15 APR 95 01:55 PM
Multiplier : 5
Sample Info : Project#: 95-1063 Client#: MD75-MW12 Water

Page Number : 1
Vial Number : 57
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10414.MTH
Analysis Method : BX10414B.MTH
Sample Amount : 0
ISTD Amount :

Sig. 1 in C:\HPCHEM\1\DATA\BX10413\057F0101.D

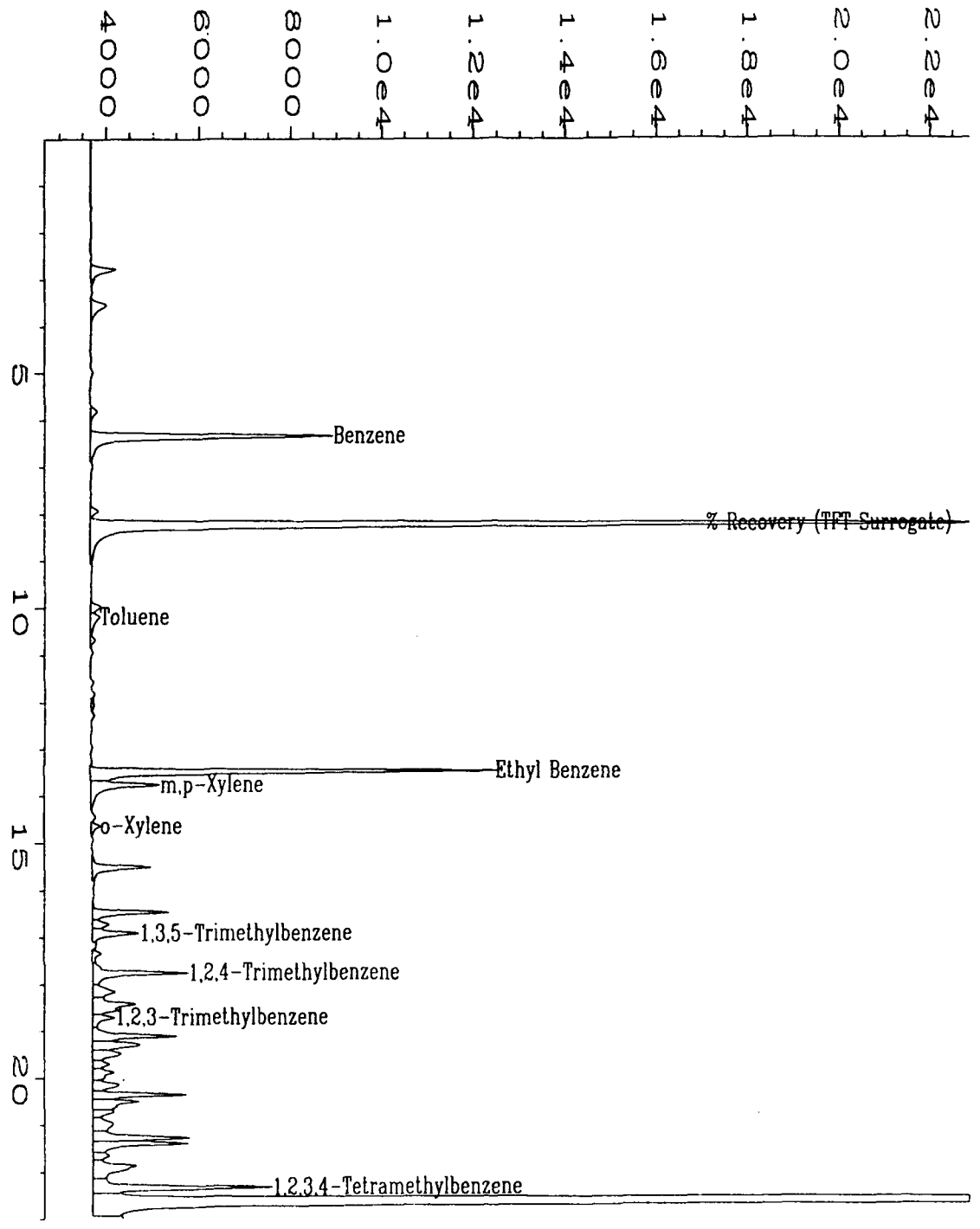
Ret Time	Area	Type	Width	Ref#	ug/L	Name
6.338	36129	VV	0.103	1	39.018	Benzene
8.225	139024	VV	0.105	1-R	449.437	% Recovery (TFT Surrogate) 90%
10.173	2639	VV	0.181	1	3.046	Toluene
13.189	* not found *			1		Chlorobenzene
13.475	49840	VV	0.086	1	66.932	Ethyl Benzene
13.754	12205	VV	0.118	1	13.249	m,p-Xylene
14.626	1649	VV	0.124	1	2.079	o-Xylene
16.912	6979	VV	0.104	1	7.012	1,3,5-Trimethylbenzene
17.754	13398	VV	0.096	1	18.399	1,2,4-Trimethylbenzene
18.703	3809	VV	0.115	1	5.695	1,2,3-Trimethylbenzene
22.326	24892	HH	0.096	1	42.634	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
2	8.228	8.225	-0.003

Not all calibrated peaks were found

not used past holding time

JCC



Data File Name	: C:\HPCHEM\1\DATA\BX10413\057F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 57
Sample Name	: X05169;5;1000ul	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 15 Apr 95 00:38 AM	Instrument Method	: BX10414
Report Created on	: 27 Apr 95 07:37 PM	Analysis Method	: BX10414B.M
Last Recalib on	: 15 APR 95 01:55 PM	Sample Amount	: 0
Multiplier	: 5	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW12 Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW14	**Client Project No.**	: 722450.21020/Mac Dill
Lab Sample Number	: X05173	**Lab Project No.**	: 95-1063
Date Sampled	: 3/31/95	**Dilution Factor**	: 1.00
Date Received	: 4/1/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/14/95	**Lab File No.**	: BX1041325
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	>60 **	0.4
Toluene	108-88-3	1.2	0.4
Chlorobenzene	108-90-7	1.5	0.4
Ethyl Benzene	100-41-4	>60 **	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	14	0.4
1,3,5-Trimethylbenzene	108-67-8	1.0	0.4
1,2,4-Trimethylbenzene	95-63-6	1.7	0.4
1,2,3-Trimethylbenzene	526-73-8	1.7	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	53	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		66%*	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

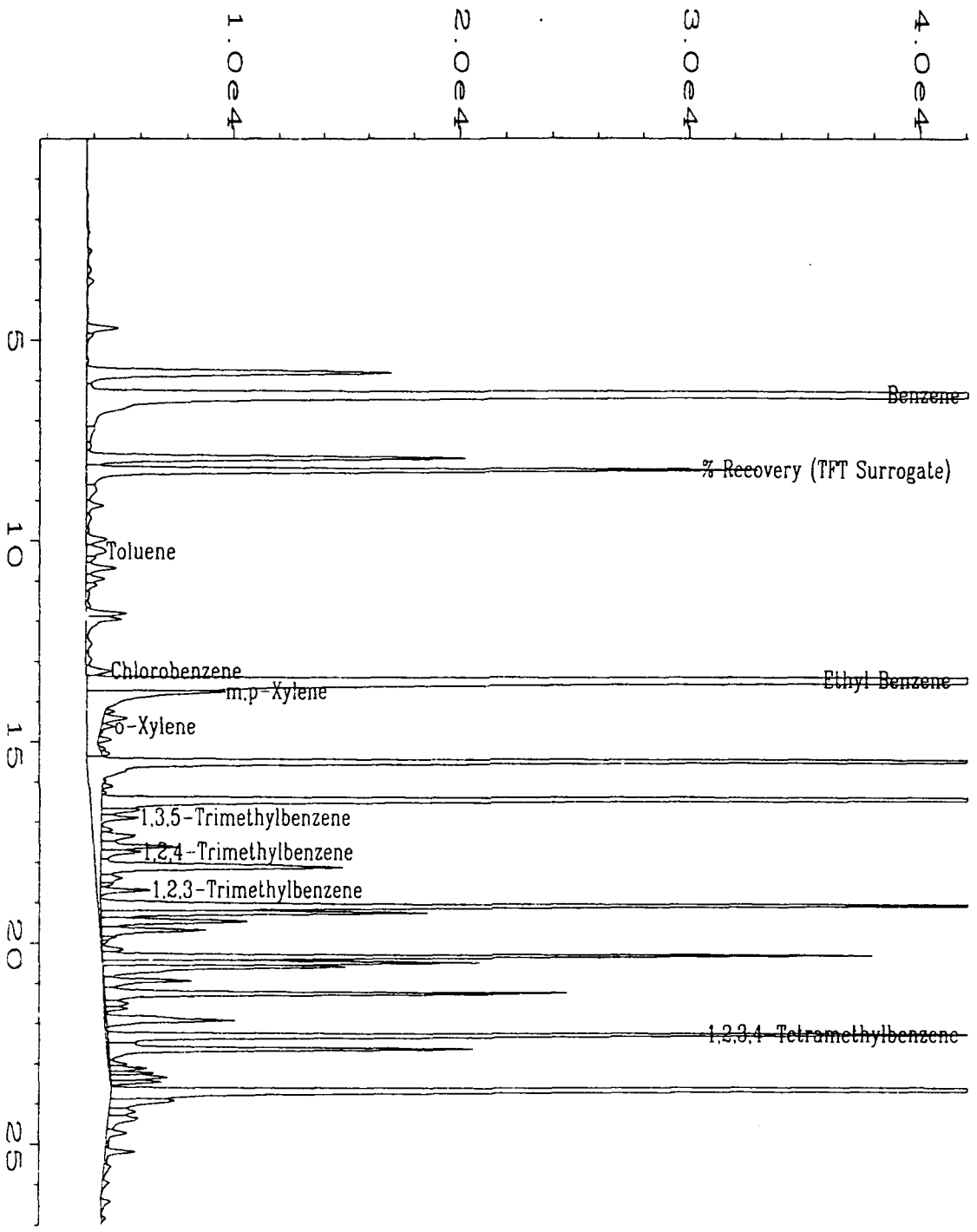
* = Out of limit.
** = Greater than 10% of calibration range. See BX1041715 (DF=20) run past holding time.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K Cone
Analyst

P McClella
Approved

BTEX1063.XLS



Data File Name	: C:\HPCHEM\1\DATA\BX10413\025F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 25
Sample Name	: X05173;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 03:30 AM	Instrument Method	: BX10413.
Report Created on	: 14 Apr 95 03:58 AM	Analysis Method	: BX10413A.MT
Last Recalib on	: 13 APR 95 04:13 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW14 Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW14	Client Project No.	: 722450.21020/Mac Dill
Lab Sample Number	: X05173	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 20.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/17/95	Matrix	: Water
Date Analyzed	: 4/17/95	Lab File No.	: BX1041715
		Method Blank No.	: MB041795

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	170.0*		8.0
Toluene	108-88-3	**		8.0
Chlorobenzene	108-90-7	**		8.0
Ethyl Benzene	100-41-4	330.0*		8.0
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	32.0*	B	8.0
3,5-Trimethylbenzene	108-67-8	**		8.0
1,2,4-Trimethylbenzene	95-63-6	**		8.0
1,2,3-Trimethylbenzene	526-73-8	**		8.0
1,2,3,4-Tetramethylbenzene	488-23-3	63.0*		8.0
Surrogate Recovery (α,α,α-Trifluorotoluene):		91%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

* = Holding Time Surpassed.
** = See BX1041325.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved

BTEX1063.XLS

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\BX10417\015F1001.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05173;20;0.250
Run Time Bar Code:
Acquired on : 17 Apr 95 03:12 PM
Report Created on: 17 Apr 95 07:28 PM
Last Recalib on : 17 APR 95 07:07 PM
Multiplier : 20
Page Number : 1
Vial Number : 15
Injection Number : 1
Sequence Line : 10
Instrument Method: BX10417A.
Analysis Method : BX10417B.
Sample Amount : 0
ISTD Amount :
Sample Info : Project#: 95-1063 Client#: MD75-MW14 Water

Sig. 1 in C:\HPCHEM\1\DATA\BX10417\015F1001.D

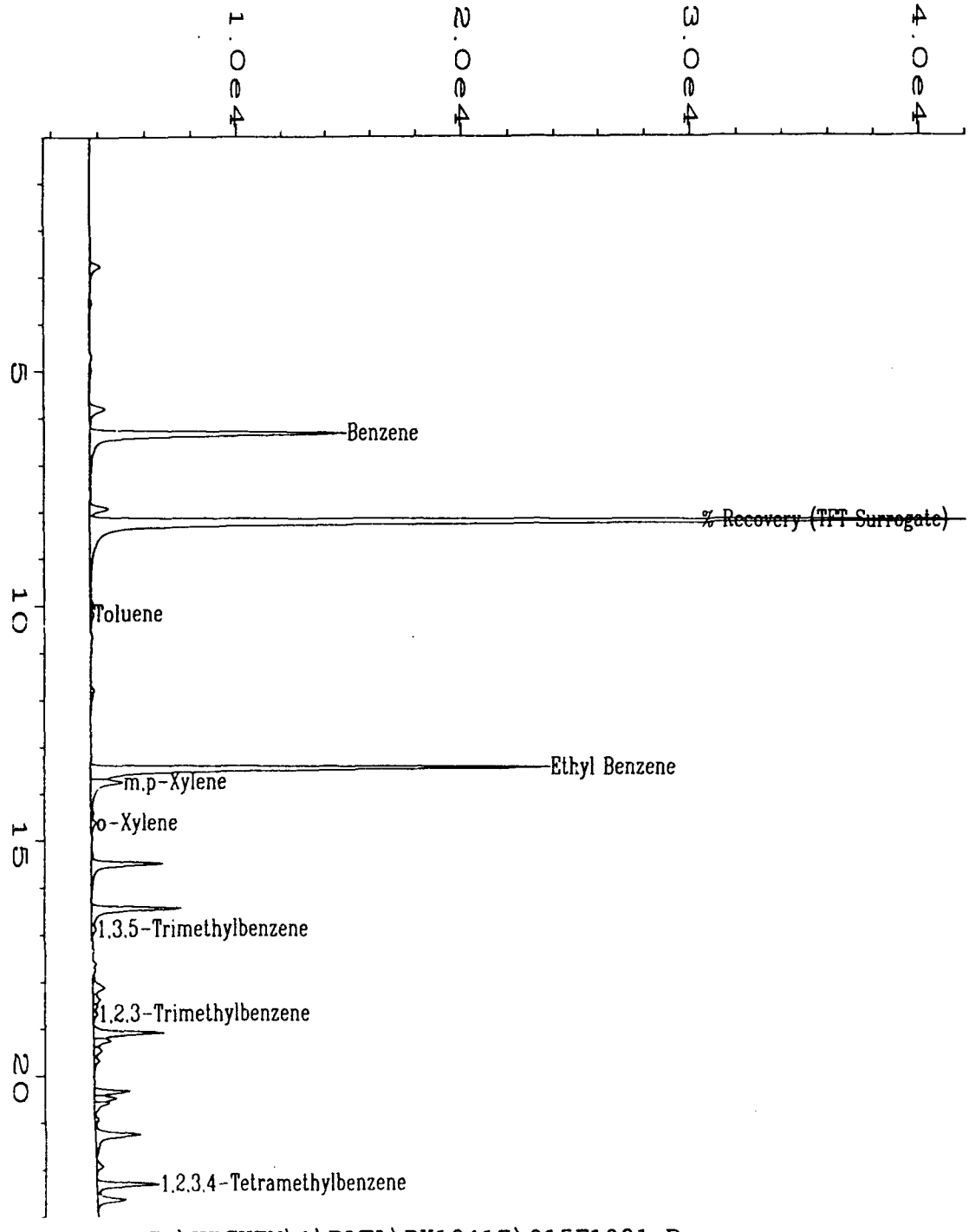
Ret Time	Area	Type	Width	Ref#	ug/L	Name
6.329	80094	VV	0.108	1	173.451	Benzene
8.214	279353	VV	0.107	1-R	1817.356	% Recovery (TFT Surrogate)
10.158	2133	VV	0.192	1	5.006	Toluene
13.196	* not found *			1		Chlorobenzene
13.453	118673	VV	0.090	1	330.408	Ethyl Benzene
13.732	14373	VV	0.144	1	32.436	m,p-Xylene
14.603	2380	VV	0.141	1	6.176	o-Xylene
16.876	2003	VV	0.149	1	4.479	1,3,5-Trimethylbenzene
17.775	* not found *			1		1,2,4-Trimethylbenzene
18.670	1658	VV	0.120	1	5.092	1,2,3-Trimethylbenzene
22.293	15313	PV	0.089	1	62.829	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
2	8.275	8.214	-0.061

Not all calibrated peaks were found

Holding Time up

not cond pc



Data File Name	: C:\HPCHEM\1\DATA\BX10417\015F1001.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 15
Sample Name	: X05173;20;0.250	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 10
Acquired on	: 17 Apr 95 03:12 PM	Instrument Method	: BX10417A.MTH
Report Created on	: 17 Apr 95 07:40 PM	Analysis Method	: BX10417B.MTH
Last Recalib on	: 17 APR 95 07:07 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW16	**Client Project No.**	: 722450.21020/Mac D
Lab Sample Number	: X05167	**Lab Project No.**	: 95-1063
Date Sampled	: 3/31/95	**Dilution Factor**	: 1.00
Date Received	: 4/1/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/13/95	**Lab File No.**	: BX1041314
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	45		0.4
Toluene	108-88-3	0.9		0.4
Chlorobenzene	108-90-7	0.7		0.4
Ethyl Benzene	100-41-4	**		**
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	2.7		0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6	1.4		0.4
1,2,3-Trimethylbenzene	526-73-8	0.9		0.4
1,2,3,4-Tetramethylbenzene	488-23-3	50		0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		87%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

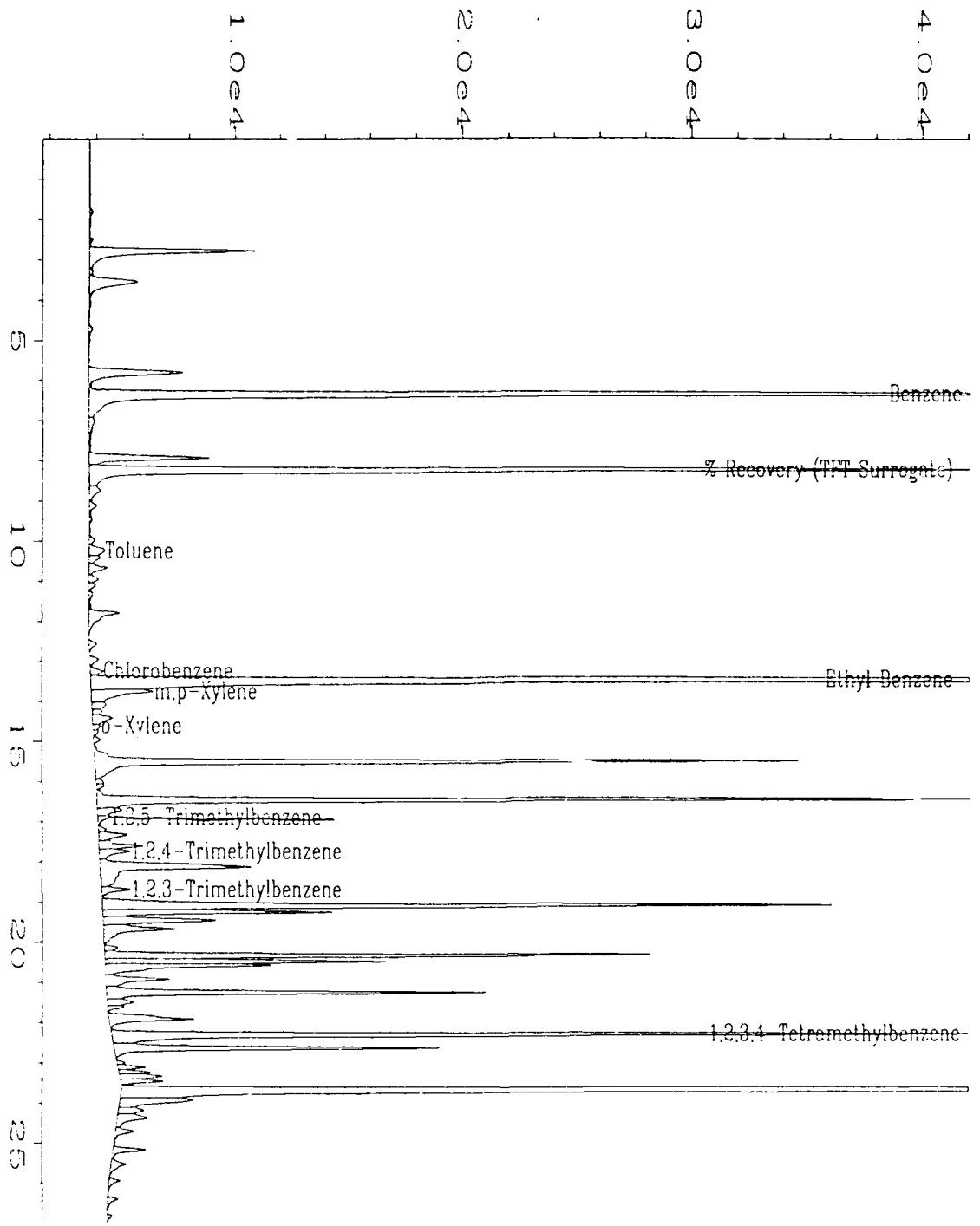
** = See BX1041355 (DF=10).

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

P. McClelland
Approved

BTEX1063.XLS



Data File Name : C:\HPCHEM\1\DATA\BX10413\014F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05167;1;5
Bin Time Bar Code:
Acquired on : 13 Apr 95 08:16 PM
Report Created on: 13 Apr 95 08:43 PM
Last Recalib on : 13 APR 95 04:13 PM
Multiplier : 1
Sample Info : Project#: 95-1063 Client#. MD75-MW16 Water

Page Number : 1
Vial Number : 14
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10413A.MTH
Analysis Method : BX10413A.MTH
Sample Amount : 0
ISTD Amount :

Lmm 4/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW16	Client Project No.	: 722450.21020/Mac [
Lab Sample Number	: X05167	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 10.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/14/95	Matrix	: Water
Date Analyzed	: 4/14/95	Lab File No.	: BX1041355
		Method Blank No.	: MB041495

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	**	**
Toluene	108-88-3	**	**
Chlorobenzene	108-90-7	**	**
Ethyl Benzene	100-41-4	79	40
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	**	**
1,3,5-Trimethylbenzene	108-67-8	**	**
1,2,4-Trimethylbenzene	95-63-6	**	**
1,2,3-Trimethylbenzene	526-73-8	**	**
1,2,3,4-Tetramethylbenzene	488-23-3	**	**
Surrogate Recovery (α,α,α-Trifluorotoluene):		94%	**

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

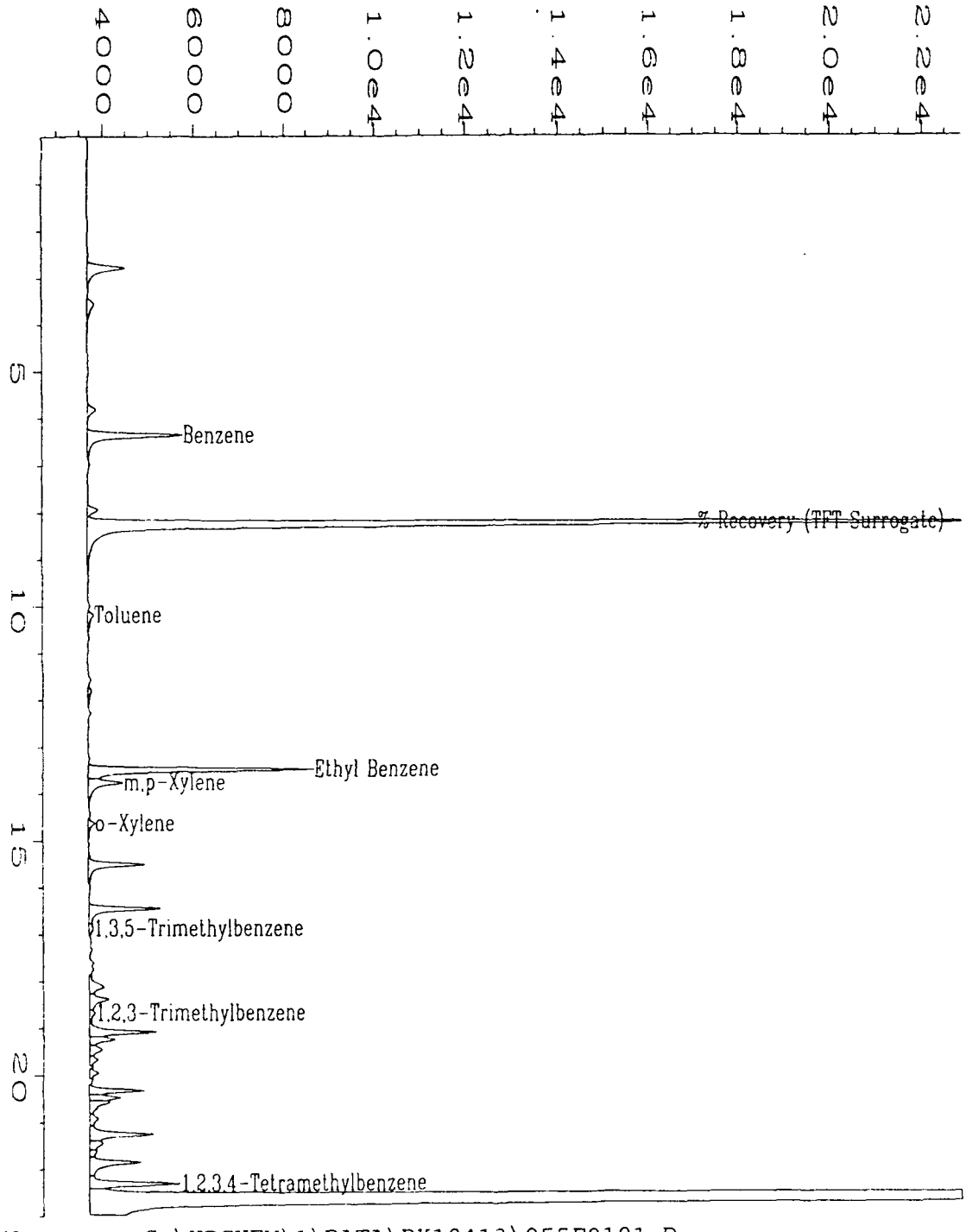
** = See BX1041314.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

McClelle
Approved

BTEX1063.XLS



Data File Name	: C:\HPCHEM\1\DATA\BX10413\055F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 55
Sample Name	: X05167;10;500ul	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 11:19 PM	Instrument Method	: BX10414.MTH
Report Created on	: 27 Apr 95 07:35 PM	Analysis Method	: BX10414B.MTH
Last Recalib on	: 15 APR 95 01:55 PM	Sample Amount	: 0
Multiplier	: 10	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW16 Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW16	**Client Project No.**	: 722450.21020/Mac D
Lab Sample Number	: X05167DUP	**Lab Project No.**	: 95-1063
Date Sampled	: 3/31/95	**Dilution Factor**	: 1.00
Date Received	: 4/1/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/13/95	**Lab File No.**	: BX1041315
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	43		0.4
Toluene	108-88-3	0.8		0.4
Chlorobenzene	108-90-7	0.7		0.4
Ethyl Benzene	100-41-4	>60 **		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	2.6		0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6	1.4		0.4
1,2,3-Trimethylbenzene	526-73-8	1.0		0.4
1,2,3,4-Tetramethylbenzene	488-23-3	50		0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		83%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

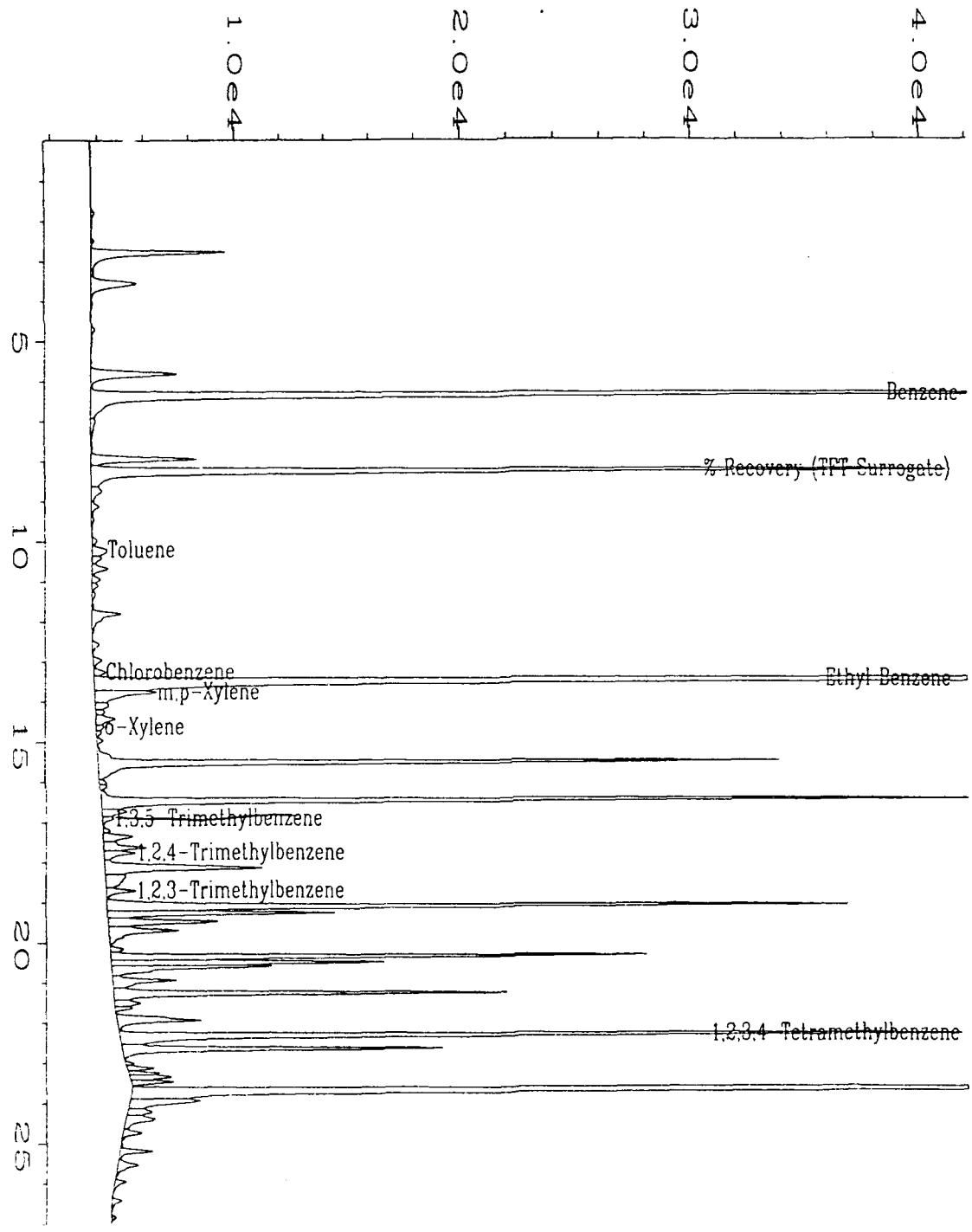
** = Greater than 10% of the calibration range.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved

BTEX1093.XLS



Data File Name : C:\HPCHEM\1\DATA\BX10413\015F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05167DUP;1;5
Run Time Bar Code:
Acquired on : 13 Apr 95 08:55 PM
Report Created on: 13 Apr 95 09:23 PM
Last Recalib on : 13 APR 95 04:13 PM
Multiplier : 1
Sample Info : Project#: 95-1063 Client#: MD75-MW16 Water

Page Number : 1
Vial Number : 15
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10413A.MTH
Analysis Method : BX10413A.MTH
Sample Amount : 0
ISTD Amount :

tm 4/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW24	**Client Project No.**	: 722450.21020/Mac E
Lab Sample Number	: X05176	**Lab Project No.**	: 95-1063
Date Sampled	: 3/31/95	**Dilution Factor**	: 1.00
Date Received	: 4/1/95	**Method**	: 602
Date Prepared	: 4/14/95	**Matrix**	: Water
Date Analyzed	: 4/14/95	**Lab File No.**	: BX1041341
		Method Blank No.	: MB041495

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	>80 **		0.4
Toluene	108-88-3	3.1		0.4
Chlorobenzene	108-90-7	2.9		0.4
Ethyl Benzene	100-41-4	>80 **		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	0.7		0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6	2.1		0.4
1,2,3-Trimethylbenzene	526-73-8	1.6		0.4
1,2,3,4-Tetramethylbenzene	488-23-3	83	E	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		102%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

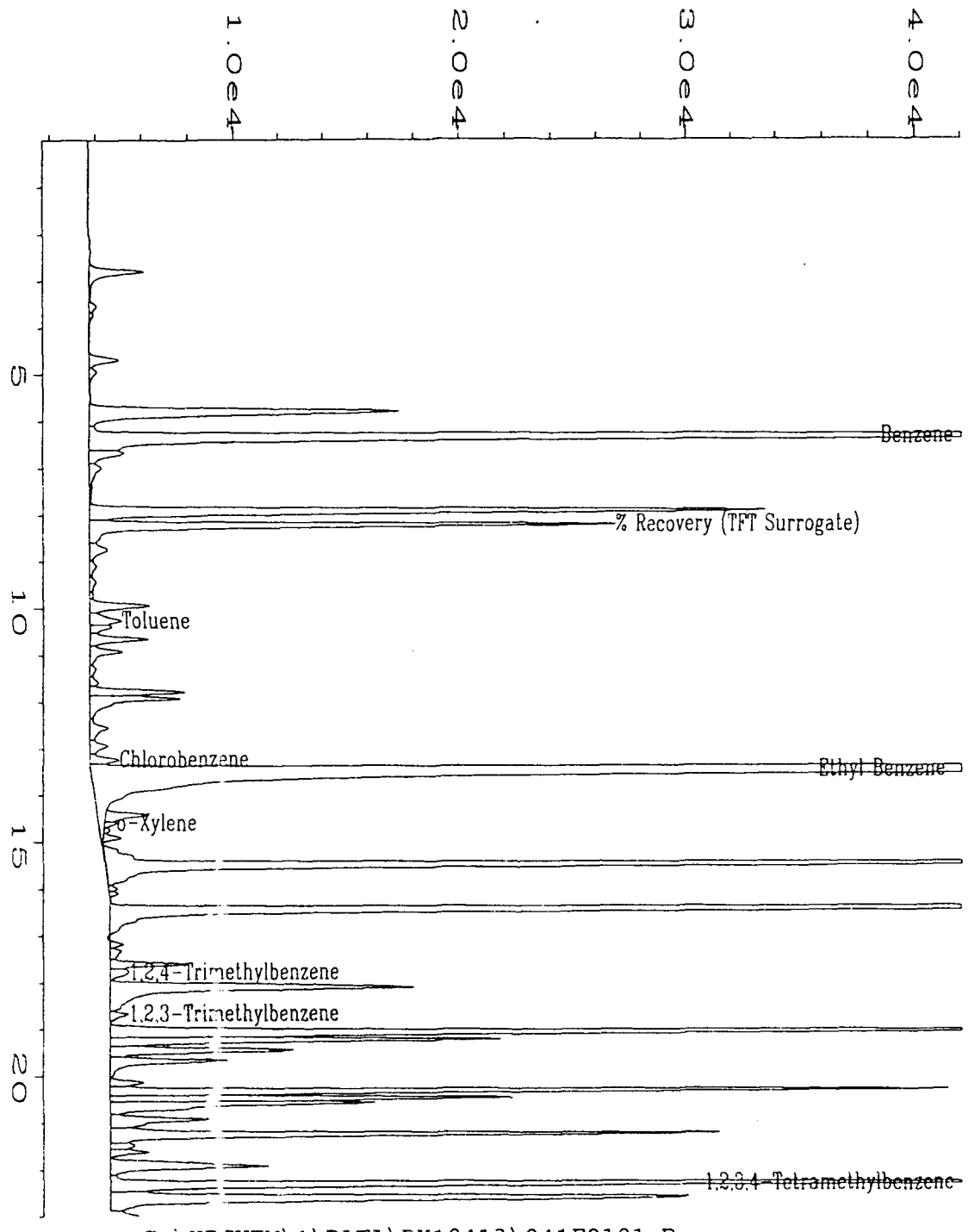
** = Greater than 10% of calibration range. See BX2041514 (DF=50) run past holding time.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved

BTEX1063.XLS



Data File Name : C:\HPCHEM\1\DATA\BX10413\041F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05176;1;5
Run Time Bar Code:
Acquired on : 14 Apr 95 02:06 PM
Report Created on: 27 Apr 95 07:25 PM
Last Recalib on : 15 APR 95 01:55 PM
Multiplier : 1
Sample Info : Project#: 95-1063 Client#: MD75-MW24 Water

Page Number : 1
Vial Number : 41
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10414.MTH
Analysis Method : BX10414B.MTH
Sample Amount : 0
ISTD Amount :

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW24	**Client Project No.**	: 722450.21020/Mac D
Lab Sample Number	: X05176Dup	**Lab Project No.**	: 95-1063
Date Sampled	: 3/31/95	**Dilution Factor**	: 1.00
Date Received	: 4/1/95	**Method**	: 602
Date Prepared	: 4/14/95	**Matrix**	: Water
Date Analyzed	: 4/14/95	**Lab File No.**	: BX1041342
		Method Blank No.	: MB041495

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	>80 **		0.4
Toluene	108-88-3	2.7		0.4
Chlorobenzene	108-90-7	2.3		0.4
Ethyl Benzene	100-41-4	>80 **		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	0.6		0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6	0.9		0.4
1,2,3-Trimethylbenzene	526-73-8	0.7		0.4
1,2,3,4-Tetramethylbenzene	488-23-3	62		0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		94%		70%-130% (QC limits

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

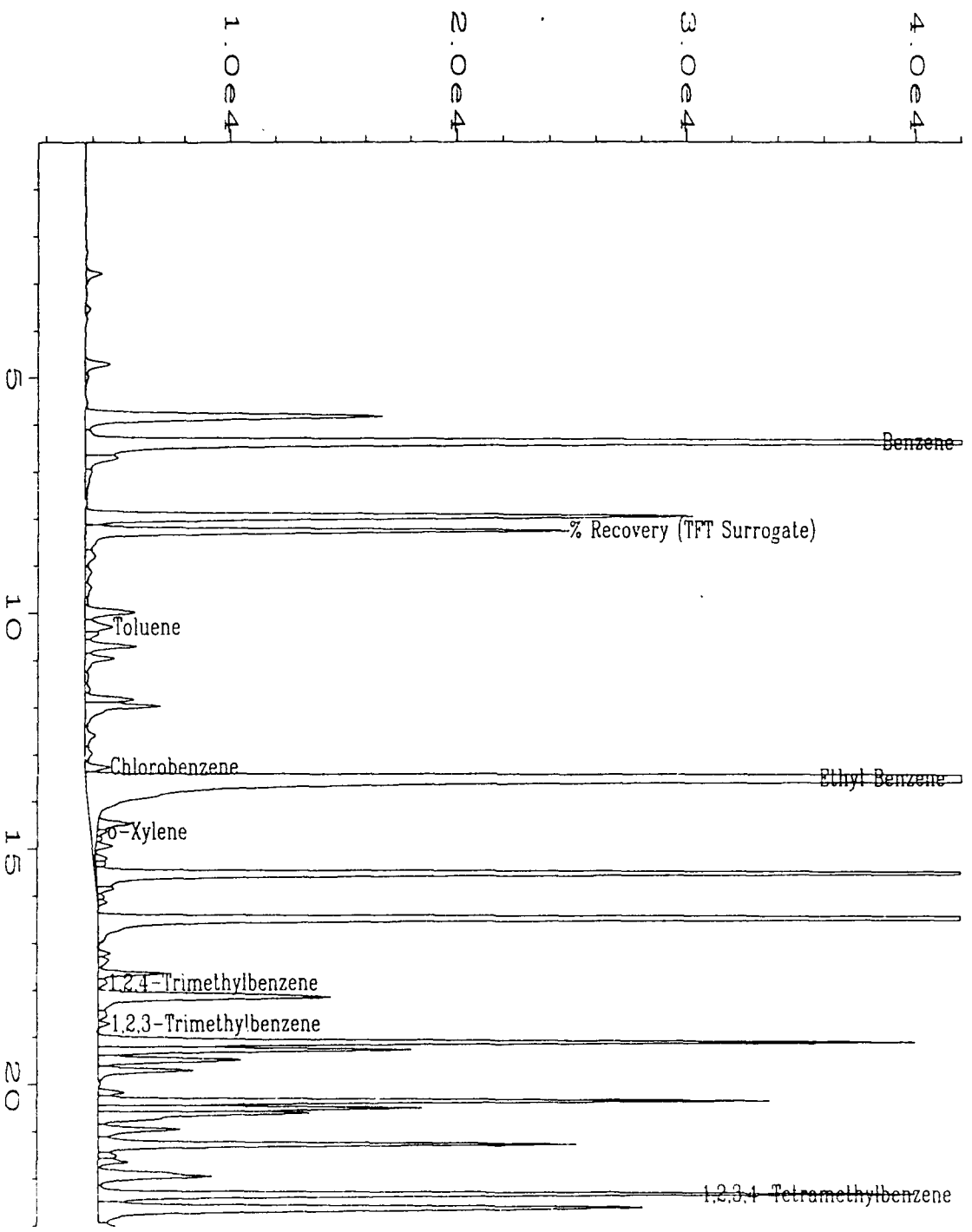
** = Greater than 10% of the calibration range.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved

BTEX1063.XLS



Data File Name	: C:\HPCHEM\1\DATA\BX10413\042F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 42
Sample Name	: X05176DUP;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 02:46 PM	Instrument Method	: BX10414.MTH
Report Created on	: 27 Apr 95 07:26 PM	Analysis Method	: BX10414B.MTH
Last Recalib on	: 15 APR 95 01:55 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW24 Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW24	Client Project No.	: 722450.21020/Mac Dill
Lab Sample Number	: X05176	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 50.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/15/95	Matrix	: Water
Date Analyzed	: 4/15/95	Lab File No.	: BX2041514
		Method Blank No.	: MB041595

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	96.0*		20.0
Toluene	108-88-3	**		20.0
Chlorobenzene	108-90-7	**		20.0
Ethyl Benzene	100-41-4	**		20.0
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	100.0*	B	20.0
1,3,5-Trimethylbenzene	108-67-8	**		20.0
1,2,4-Trimethylbenzene	95-63-6	**		20.0
1,2,3-Trimethylbenzene	526-73-8	**		20.0
1,2,3,4-Tetramethylbenzene	488-23-3	72.0*		20.0
Surrogate Recovery (α,α,α-Trifluorotoluene):		87%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

* = Holding Time Surpassed.
** = See BX1041341.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved

BTEX1063.XLS

External Standard Report

Data File Name : C:\HPCHEM\2\DATA\BX20415\014R0101.D
Operator : T. Lockwood
Instrument : BTEX2
Sample Name : X05176;50;0.1
Run Time Bar Code:
Acquired on : 15 Apr 95 08:36 PM
Report Created on: 16 Apr 95 04:42 PM
Last Recalib on : 16 Apr 95 03:38 PM
Multiplier : 1 X50

Page Number : 1
Vial Number : 14
Injection Number : 1
Sequence Line : 1
Instrument Method: BX20415.MTH
Analysis Method : BX20415A.MTH
Sample Amount : 0
ISTD Amount :

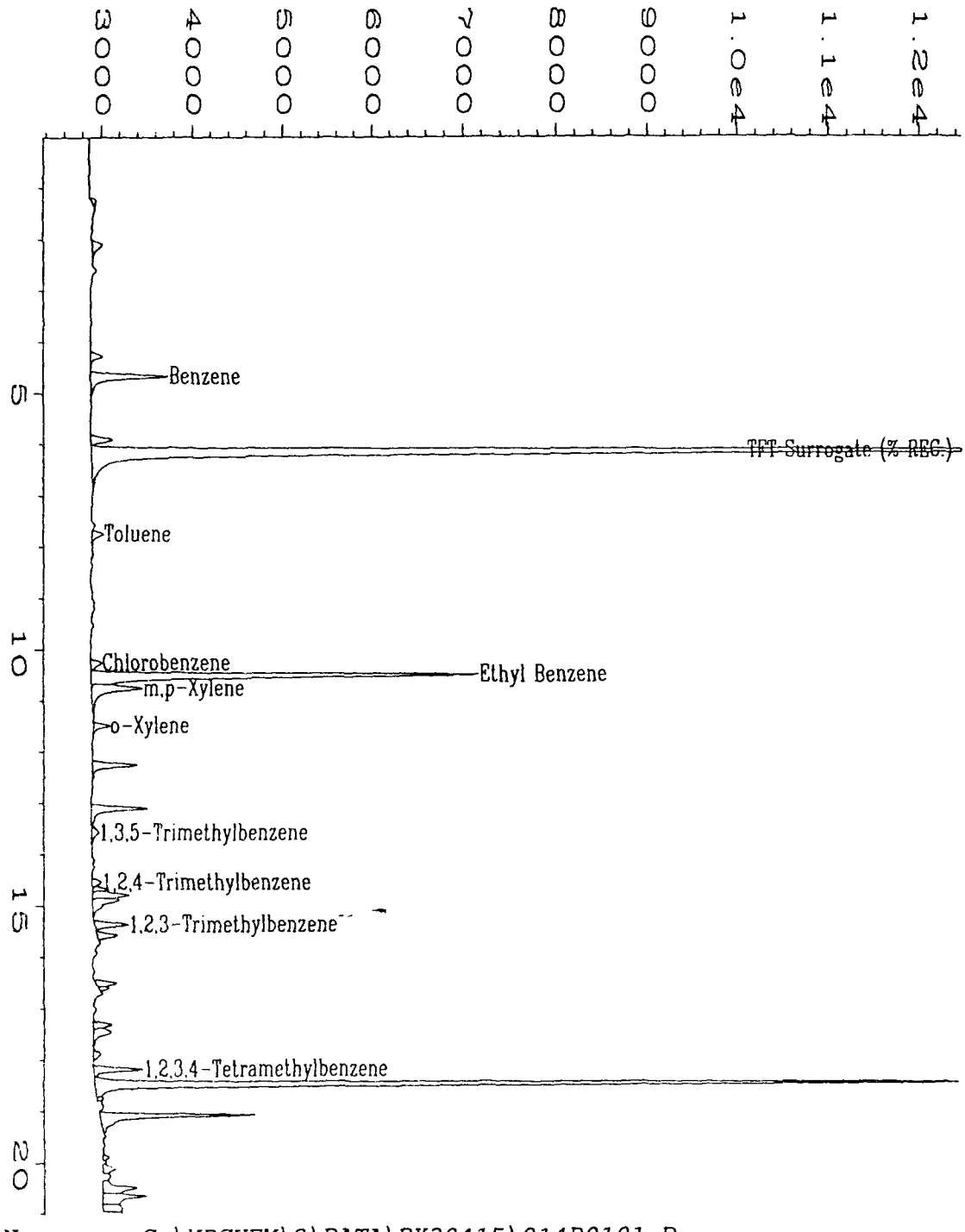
Sig. 2 in C:\HPCHEM\2\DATA\BX20415\014R0101.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
4.660	5594	BB	0.098	1	1.914	Benzene X50
6.143	86867	VB	0.096	1-R	87.270	TFT Surrogate (% REC.)
7.728	902	VB	0.104	1	0.350	Toluene
10.247	810	BV	0.102	1	0.373	Chlorobenzene
10.493	24823	VV	0.089	1	10.830	Ethyl Benzene X50
10.741	4517	VB	0.116	1	~~1.605~~	~~m,p-Xylene~~
11.477	958	BB	0.084	1	~~0.431~~	~~o-Xylene~~ x50=B ok use
13.561	724	VB	0.149	1	0.223	1,3,5-Trimethylbenzene
14.531	656	BV	0.113	1	0.296	1,2,4-Trimethylbenzene
5.354	1942	PV	0.085	1	0.969	1,2,3-Trimethylbenzene
18.173	2698	PV	0.079	1	1.446	1,2,3,4-Tetramethylbenzene B

Time Reference Peak	Expected RT	Actual RT	Difference
2	6.120	6.143	0.023

Holding time up

Not used



Data File Name	: C:\HPCHEM\2\DATA\BX20415\014R0101.D		
Operator	: T. Lockwood	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 14
Sample Name	: X05176;50;0.1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 15 Apr 95 08:36 PM	Instrument Method	: BX20415..
Report Created on	: 16 Apr 95 04:42 PM	Analysis Method	: BX20415A.MT
Last Recalib on	: 16 Apr 95 03:38 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Evergreen Analytical, Inc.
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BTEX Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: MD75-MW16	**Client Project No.**	: 722450.21020
Lab Sample No.	: X05167	**Lab Project No.**	: 95-1063
Date Sampled	: 3/31/95	**EPA Method No.**	: 602
Date Received	: 4/1/95	**Matrix**	: Water
Date Prepared	: 4/13/95	**Lab File Number(s)**	: BX1041414,15
Date Analyzed	: 4/13/95	**Method Blank**	: MB041395

Compound	Spike Added (ug/L)	Sample Concentration (ug/L)	MS Concentration (ug/L)	MS %REC	QC Limits %REC
Benzene	20.0	44.8	58.9	70.5	50-150
Toluene	20.0	0.9	16.5	78.0	50-148
Ethyl Benzene	20.0	108.0 E	118.1 E	50.5	50-150
m,p-Xylene	40.0	2.7	36.2	83.7	50-150
o-Xylene	20.0	0.0	15.6	78.0	50-150
Chlorobenzene	20.0	0.7	16.6	79.5	55-135
1,3,5-TMB	20.0	0.0	16.3	81.4	50-150
1,2,4-TMB	20.0	1.4	20.3	94.5	50-150
1,2,3-TMB	20.0	0.9	18.0	85.7	50-150
1,2,3,4-TeMB	20.0	49.6	68.0 E	92.0	50-150

Compound	Spike Added (ug/L)	MSD Concentration (ug/L)	MSD %REC	RPD	QC Limits RPD	QC Limits %REC
Benzene	20.0	57.2	61.8	3.3	25	50-150
Toluene	20.0	16.1	76.2	0.6	25	50-148
Ethyl Benzene	20.0	114.7 E	33.4	10.2	25	50-150
m,p-Xylene	40.0	35.3	81.5	0.7	25	50-150
o-Xylene	20.0	15.3	76.5	0.5	25	50-150
Chlorobenzene	20.0	16.3	78.0	0.5	25	55-135
1,3,5-TMB	20.0	16.1	80.5	0.3	25	50-150
1,2,4-TMB	20.0	20.0	93.0	0.4	25	50-150
1,2,3-TMB	20.0	17.7	84.0	0.5	25	50-150
1,2,3,4-TeMB	20.0	66.9 E	86.5	1.5	25	50-150

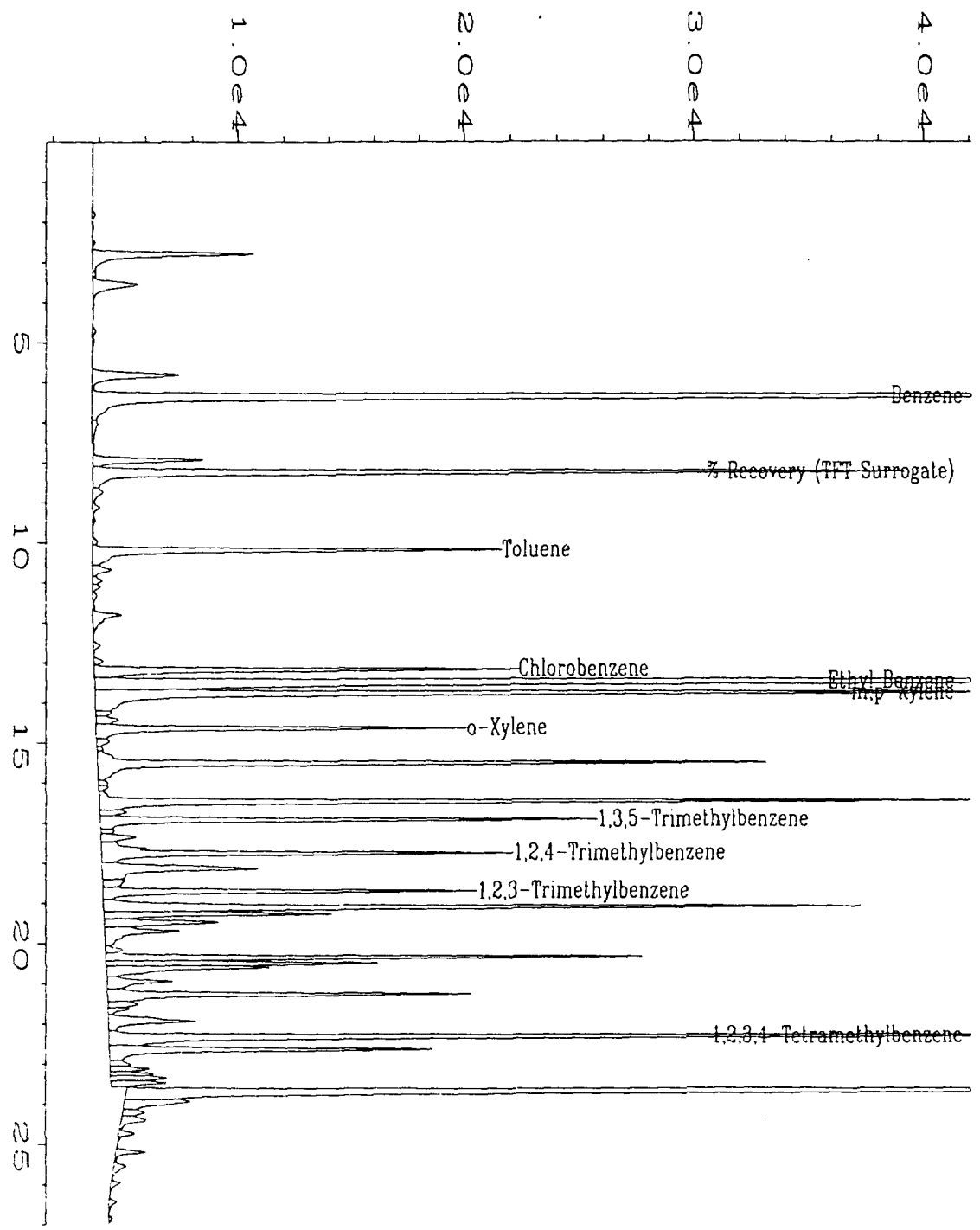
* = Values outside of QC limits.
RPD: 0 out of (10) outside limits.
Spike Recovery: 1 out of (20) outside limits.

Comments: E = Exceeds calibration range.

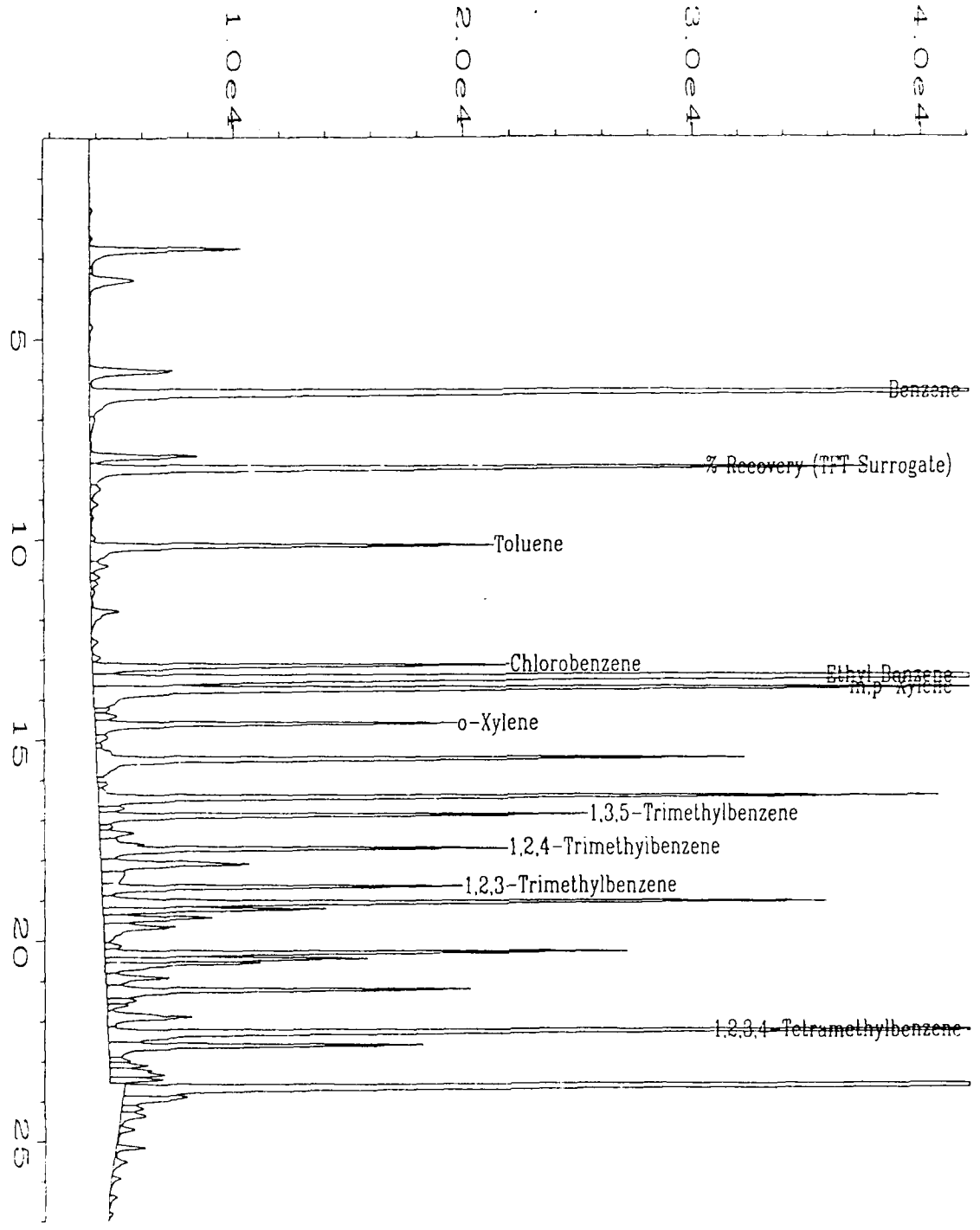
K. Cone
Analyst

P. McClella
Approved

MS1063A.XLS



Data File Name	: C:\HPCHEM\1\DATA\BX10413\016F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 16
Sample Name	: X05167MS;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Apr 95 09:35 PM	Instrument Method	: BX10413A
Report Created on	: 13 Apr 95 10:02 PM	Analysis Method	: BX10413A.MT
Last Recalib on	: 13 APR 95 04:13 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW16 Water		



Data File Name : C:\HPCHEM\1\DATA\BX10413\017F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05167MSD;1;5
Run Time Bar Code:
Acquired on : 13 Apr 95 10:14 PM
Report Created on: 13 Apr 95 10:42 PM
Last Recalib on : 13 APR 95 04:13 PM
Multiplier : 1
Sample Info : Project#: 95-1063 Client#: MD75-MW16 Water

Page Number : 1
Vial Number : 17
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10413A.MTH
Analysis Method : BX10413A.MTH
Sample Amount : 0
ISTD Amount

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BTEX Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: MD75-MW24	Client Project No.	: 722450.2102
Lab Sample No.	: X05176	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	EPA Method No.	: 602
Date Received	: 4/1/95	Matrix	: Water
Date Prepared	: 4/14/95	Lab File Number(s)	: BX1041443,44
Date Analyzed	: 4/14/95	Method Blank	: MB041495

Compound	Spike Added (ug/L)	Sample Concentration (ug/L)	MS Concentration (ug/L)		MS %REC	QC Limits %REC
Benzene	20.0	127.7 E	138.5	E	54.0	50-150
Toluene	20.0	3.1	19.6		82.5	50-148
Ethyl Benzene	20.0	**	**		**	50-150
m,p-Xylene	40.0	0.0	57.0		142.5	50-150
o-Xylene	20.0	0.7	15.4		73.5	50-150
Chlorobenzene	20.0	2.9	18.8		79.5	55-135
1,3,5-TMB	20.0	0.0	15.0		75.0	50-150
1,2,4-TMB	20.0	2.1	18.3		81.0	50-15[illegible]
1,2,3-TMB	20.0	1.6	16.7		75.5	50-1[illegible]
1,2,3,4-TeMB	20.0	83.3 E	99.2	E	79.5	50-150

Compound	Spike Added (ug/L)	MSD Concentration (ug/L)	MSD %REC	RPD	QC Limits RPD	QC Limits %REC
Benzene	20.0	NA	NA	NA	25	50-150
Toluene	20.0	NA	NA	NA	25	50-148
Ethyl Benzene	20.0	NA	NA	NA	25	50-150
m,p-Xylene	40.0	NA	NA	NA	25	50-150
o-Xylene	20.0	NA	NA	NA	25	50-150
Chlorobenzene	20.0	NA	NA	NA	25	55-135
1,3,5-TMB	20.0	NA	NA	NA	25	50-150
1,2,4-TMB	20.0	NA	NA	NA	25	50-150
1,2,3-TMB	20.0	NA	NA	NA	25	50-150
1,2,3,4-TeMB	20.0	NA	NA	NA	25	50-150

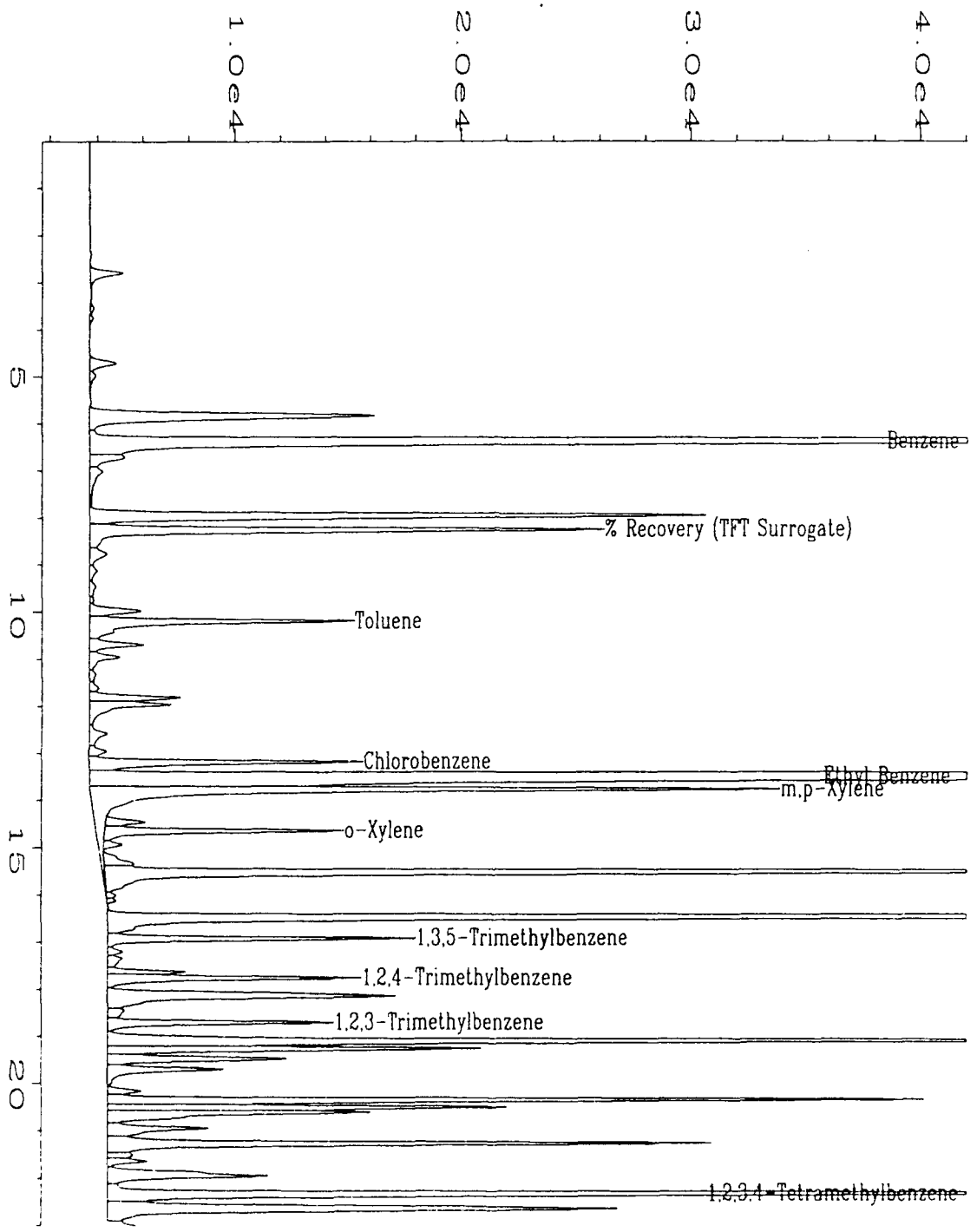
* = Values outside of QC limits.
RPD: 0 out of (0) outside limits.
Spike Recovery: 0 out of (10) outside limits.

Comments: MSD did not purge properly. The surrogate recovery was 36%. See MS/MSD MD75-MW16 and LCS041495. E = Exceeds the calibration range.
** = Results can not be used due to the high concentration in the sample.

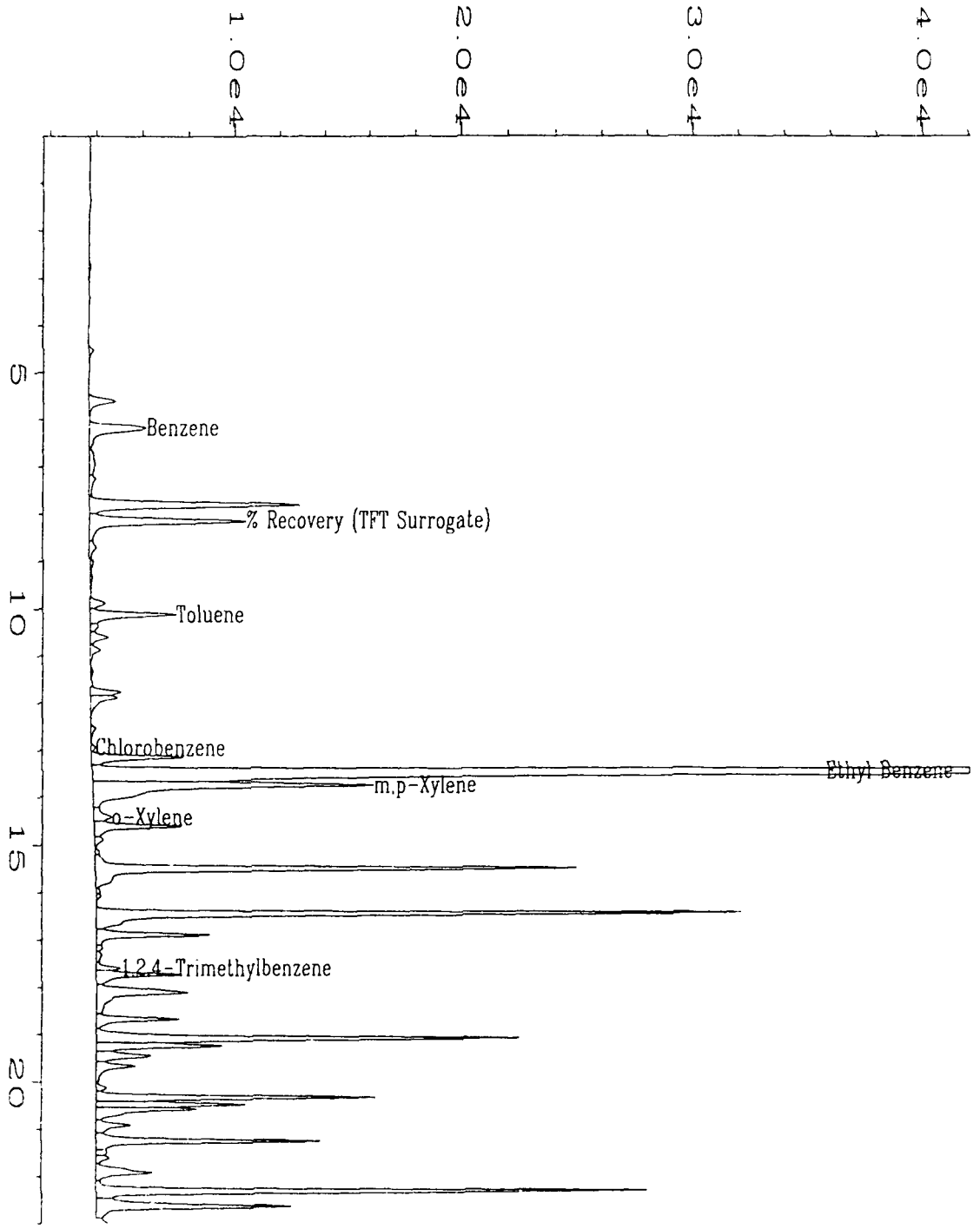
K Cone
Analyst

Approved

MS051063.XLS



Data File Name	: C:\HPCHEM\1\DATA\BX10413\043F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 43
Sample Name	: X05176MS;1;5	Injection Number	: 1
P[illegible] Time Bar Code:		Sequence Line	: 1
[illegible]ired on	: 14 Apr 95 03:25 PM	Instrument Method	: BX10414.MTH
Report Created on	: 27 Apr 95 07:26 PM	Analysis Method	: BX10414B.MTH
Last Recalib on	: 15 APR 95 01:55 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW24 Water		



Data File Name	: C:\HPCHEM\1\DATA\BX10413\044F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 44
Sample Name	: X05176MSD;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 04:05 PM	Instrument Method	: BX10414....
Report Created on	: 27 Apr 95 07:27 PM	Analysis Method	: BX10414B.M
Last Recalib on	: 15 APR 95 01:55 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW24 Water		

Evergreen Analytical, Inc.
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TOTAL VOLATILE HYDROCARBONS
TVH Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: MD75-MW24	Client Project No.	: 722450.21020/MAC
Lab Sample No.	: X05176	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	EPA Method No.	: 5030/8015 Mod.
Date Received	: 4/1/95	Matrix	: Water
Date Prepared	: 4/14/95	Method Blank	: MB041495
Date Analyzed	: 4/14/95		

Compound	Spike Added (mg/L)	Sample Concentration (mg/L)	MS Concentration (mg/L)	MS %REC	QC Limits %REC
Gasoline	2.00	3.50	4.62	56%	60-140

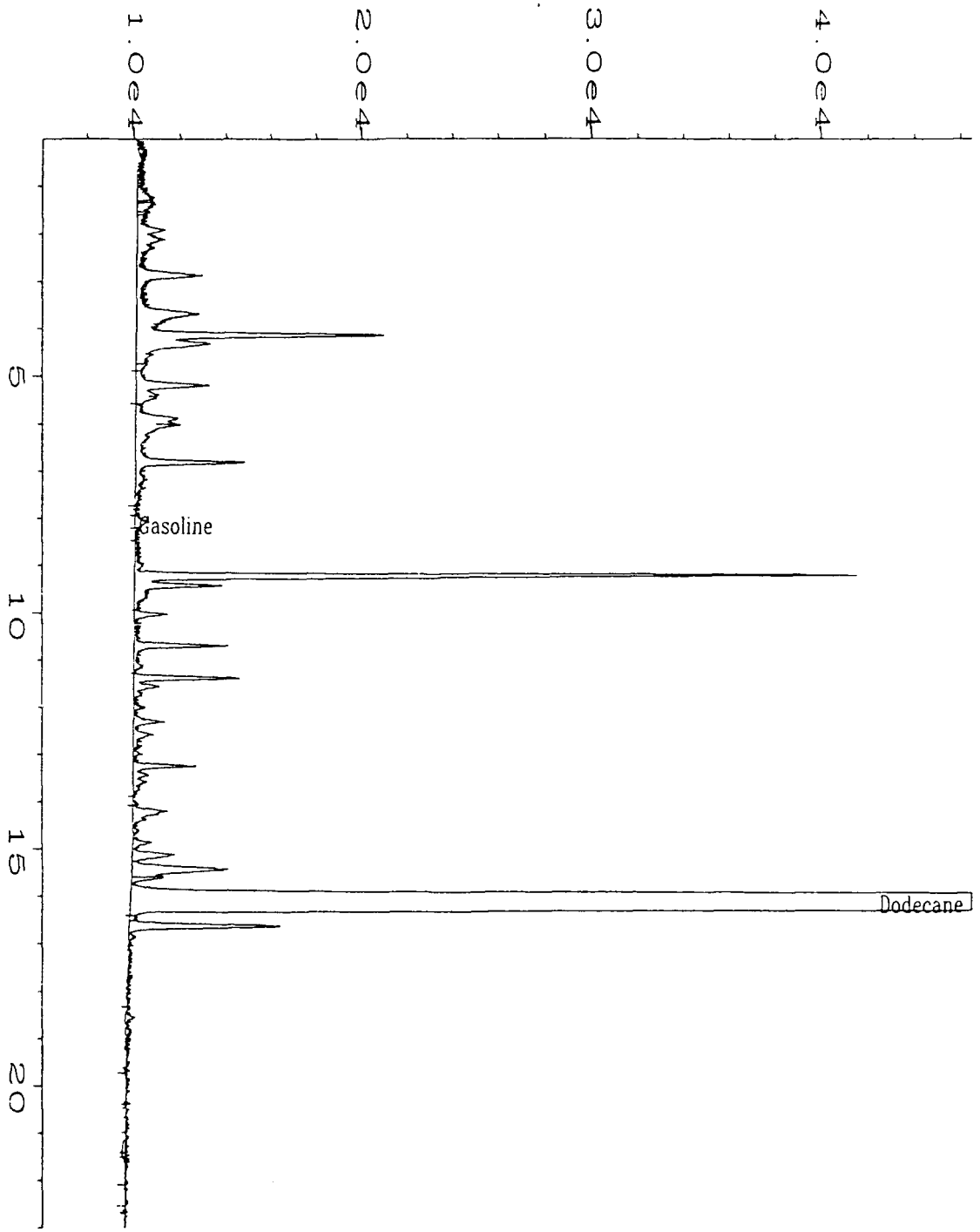
Compound	Spike Added (mg/L)	*MSD* Concentration (mg/L)	MS %REC	RPD	QC Limits RPD	QC Limits %REC
Gasoline	2.00	5.80	115%	69*	50	60-140

* = Values outside of QC limits.

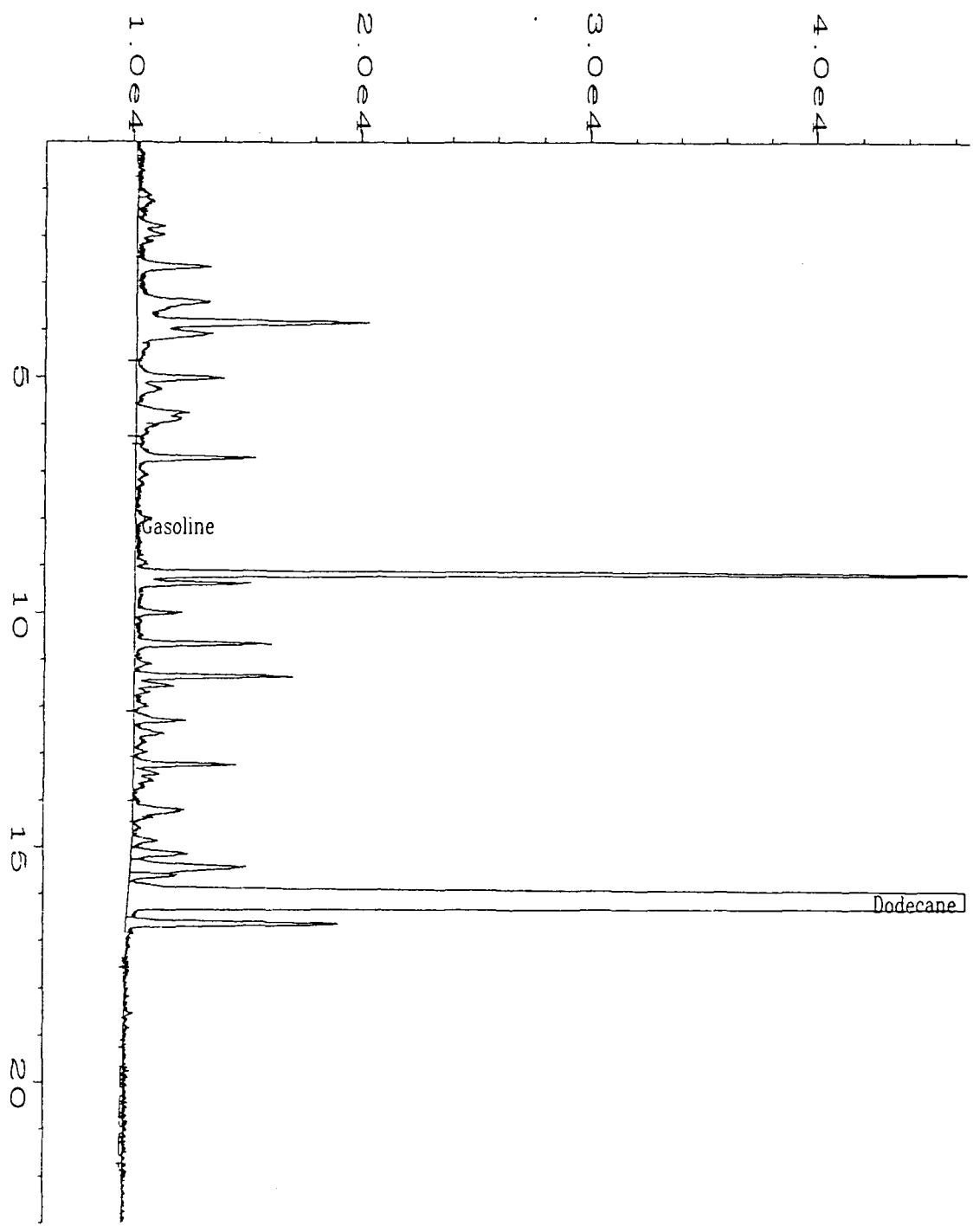
RPD: 1 out of (1) outside limits.

Spike Recovery: 0 out of (2) outside limits.

Comments: NA = Not analyzed/not applicable.



Data File Name	: C:\HPCHEM\1\DATA\tvh0414\022F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 22
Sample Name	: X05176 MS	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 11:59 PM	Instrument Method	: TVH1BAS.
Report Created on	: 16 Apr 95 02:39 PM	Analysis Method	: TVH0415.MT
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



Data File Name	: C:\HPCHEM\1\DATA\tvh0414\023F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 23
Sample Name	: X05176 MSD	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
uired on	: 15 Apr 95 00:35 AM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 16 Apr 95 02:39 PM	Analysis Method	: TVH0415.MTH
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
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Method 602 Data Report

Client Sample Number	: RINSEATE BLANK	Client Project No.	: 722450.21020/Mac D
Lab Sample Number	: X05182	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 1.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/14/95	Matrix	: Water
Date Analyzed	: 4/14/95	Lab File No.	: BX1041350
		Method Blank No.	: MB041495

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	U	0.4
Toluene	108-88-3	U	0.4
Chlorobenzene	108-90-7	U	0.4
Ethyl Benzene	100-41-4	U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	U	0.4
1,2,3-Trimethylbenzene	526-73-8	U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		94%	70%-130% (QC limits)

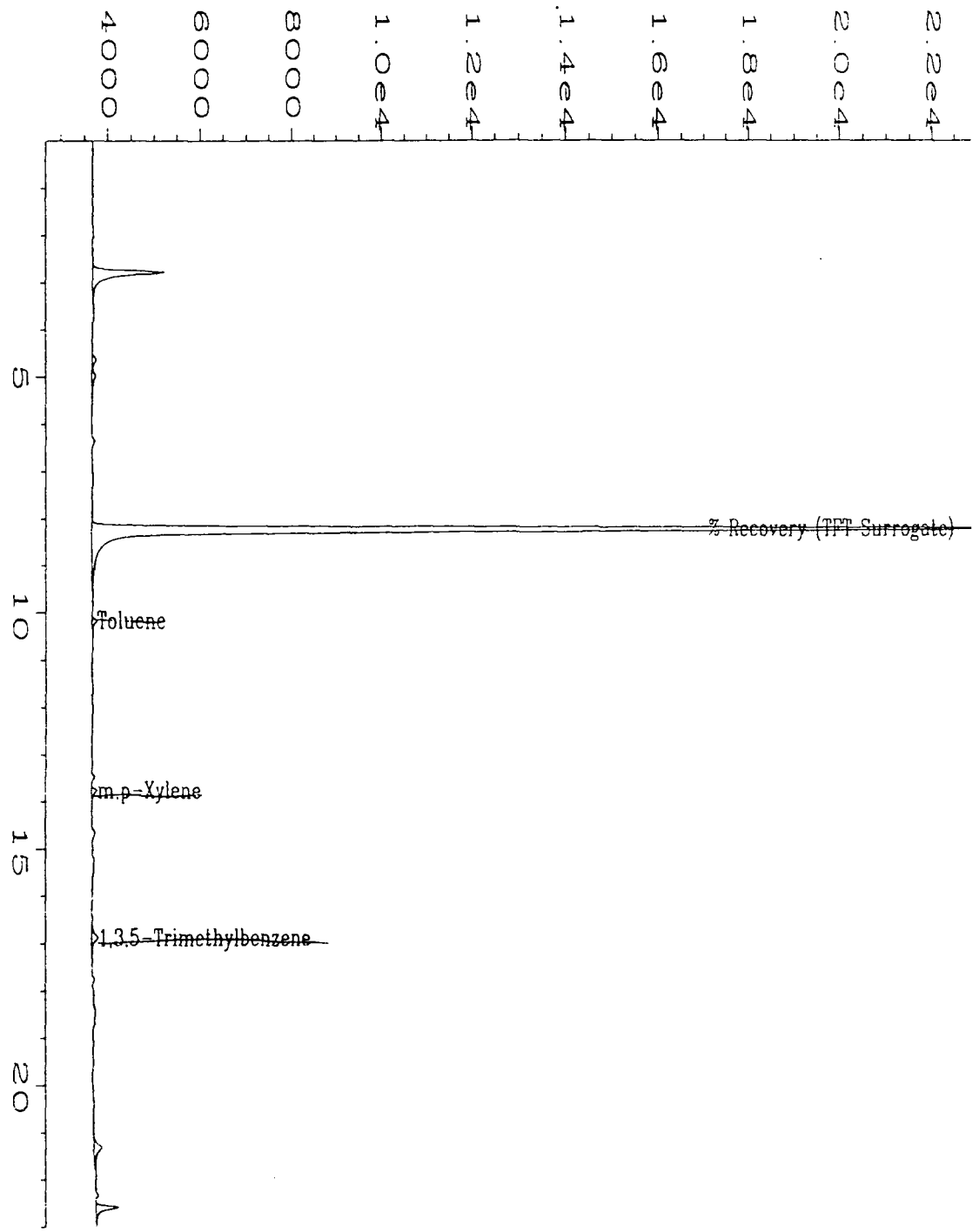
Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved

BTEX1363.XLS



Data File Name : C:\HPCHEM\1\DATA\BX10413\050F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05182;1;5
Time Bar Code:
quired on : 14 Apr 95 08:02 PM
Report Created on: 27 Apr 95 08:03 PM
Last Recalib on : 15 APR 95 01:55 PM
Multiplier : 1
Sample Info : Project#: 95-1063 Client#: RINSEATE BLANK Water

Page Number : 1
Vial Number : 50
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10414.MTH
Analysis Method : BX10414B.MTH
Sample Amount : 0
ISTD Amount :

DM 4/25/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: FIELD BLANK	Client Project No.	: 722450.21020/Mac D
Lab Sample Number	: X05181	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 1.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/14/95	Matrix	: Water
Date Analyzed	: 4/14/95	Lab File No.	: BX1041348
		Method Blank No.	: MB041495

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	U	0.4
Toluene	108-88-3	U	0.4
Chlorobenzene	108-90-7	U	0.4
Ethyl Benzene	100-41-4	U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	U	0.4
1,2,3-Trimethylbenzene	526-73-8	U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		92%	70%-130% (QC limits)

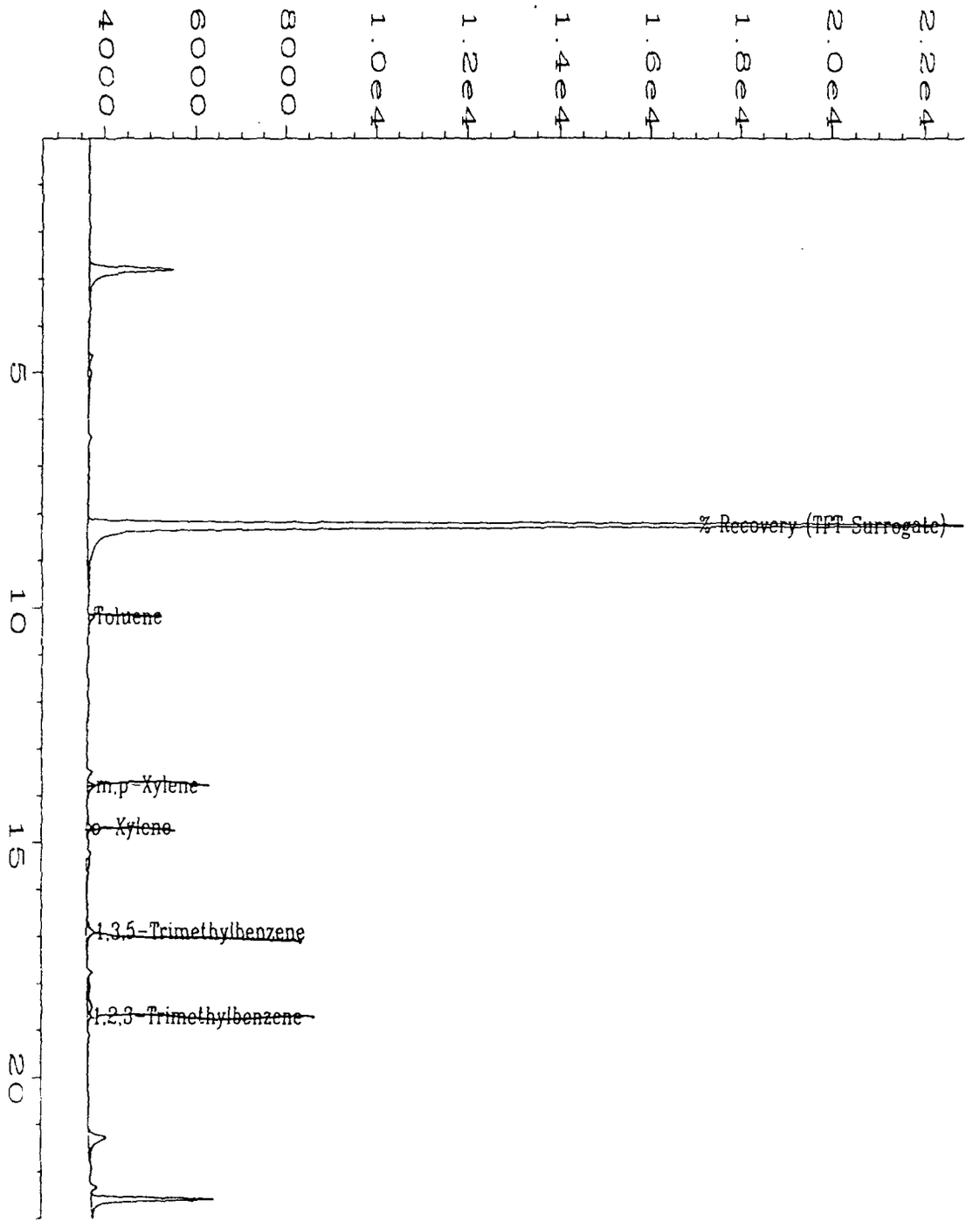
Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cox
Analyst

P. McClellan
Approved

BTEX1063.XLS



Data File Name : C:\HPCHEM\1\DATA\BX10413\048F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05181;1;5
Run Time Bar Code:
Acquired on : 14 Apr 95 06:43 PM
Report Created on: 27 Apr 95 08:27 PM
Last Recalib on : 15 APR 95 01:55 PM
Multiplier : 1
Sample Info : Project#: 95-1063 Client#: FIELD BLANK Water

Page Number : 1
Vial Number : 48
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10414.MTH
Analysis Method : BX10414B.MTH
Sample Amount : 0
ISTD Amount :

dm 4/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: Trip Blank	Client Project No.	: 722450.21020/Mac D
Lab Sample Number	: X05170	Lab Project No.	: 95-1063
Date Sampled	: 3/31/95	Dilution Factor	: 1.00
Date Received	: 4/1/95	Method	: 602
Date Prepared	: 4/13/95	Matrix	: Water
Date Analyzed	: 4/14/95	Lab File No.	: BX1041322
		Method Blank No.	: MB041395

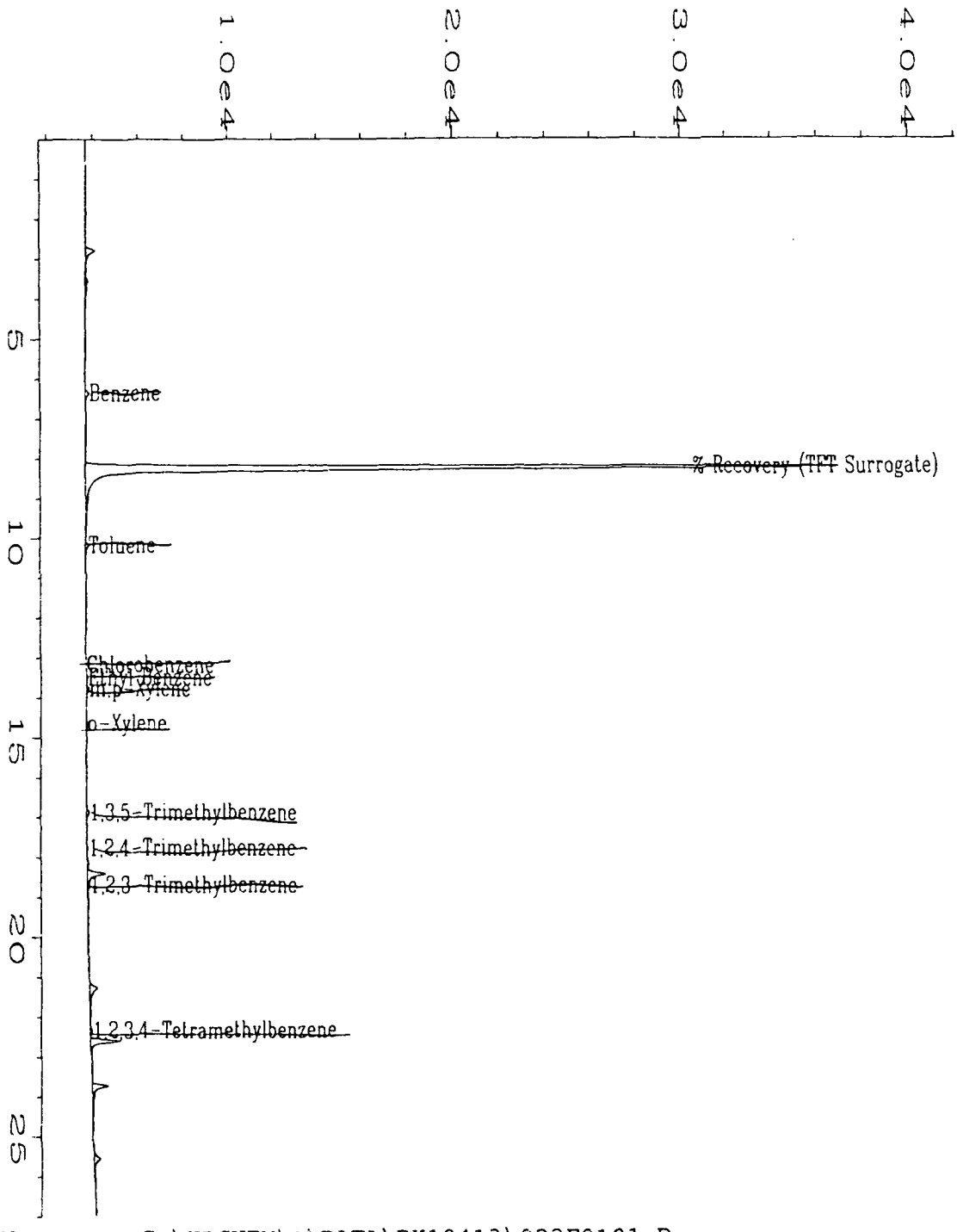
Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	U	0.4
Toluene	108-88-3	U	0.4
Chlorobenzene	108-90-7	U	0.4
Ethyl Benzene	100-41-4	U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	U	0.4
1,2,3-Trimethylbenzene	526-73-8	U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		77%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved



Data File Name	: C:\HPCHEM\1\DATA\BX10413\022F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 22
Sample Name	: X05170;1;5	Injection Number	: 1
n Time Bar Code:		Sequence Line	: 1
quired on	: 14 Apr 95 01:32 AM	Instrument Method	: BX10413A.MTH
Report Created on	: 14 Apr 95 01:59 AM	Analysis Method	: BX10413A.MTH
Last Recalib on	: 13 APR 95 04:13 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: TRIP BLANK Water		

cm 4/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report
Method Blank Report

Method Blank Number	: MB041395	Client Project No.	: 722450.21020/Mac D
Date Prepared	: 4/13/95	Lab Project No.	: 95-1063
Date Analyzed	: 4/13/95	Dilution Factor	: 1.00
		Method	: 602/8020
		Matrix	: Water
		Lab File No.	: NV-F0101.D

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	U	0.4
Toluene	108-88-3	U	0.4
Chlorobenzene	108-90-7	U	0.4
Ethyl Benzene	100-41-4	U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	U	0.4
1,2,3-Trimethylbenzene	526-73-8	U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		94%	70%-130% (QC limits)

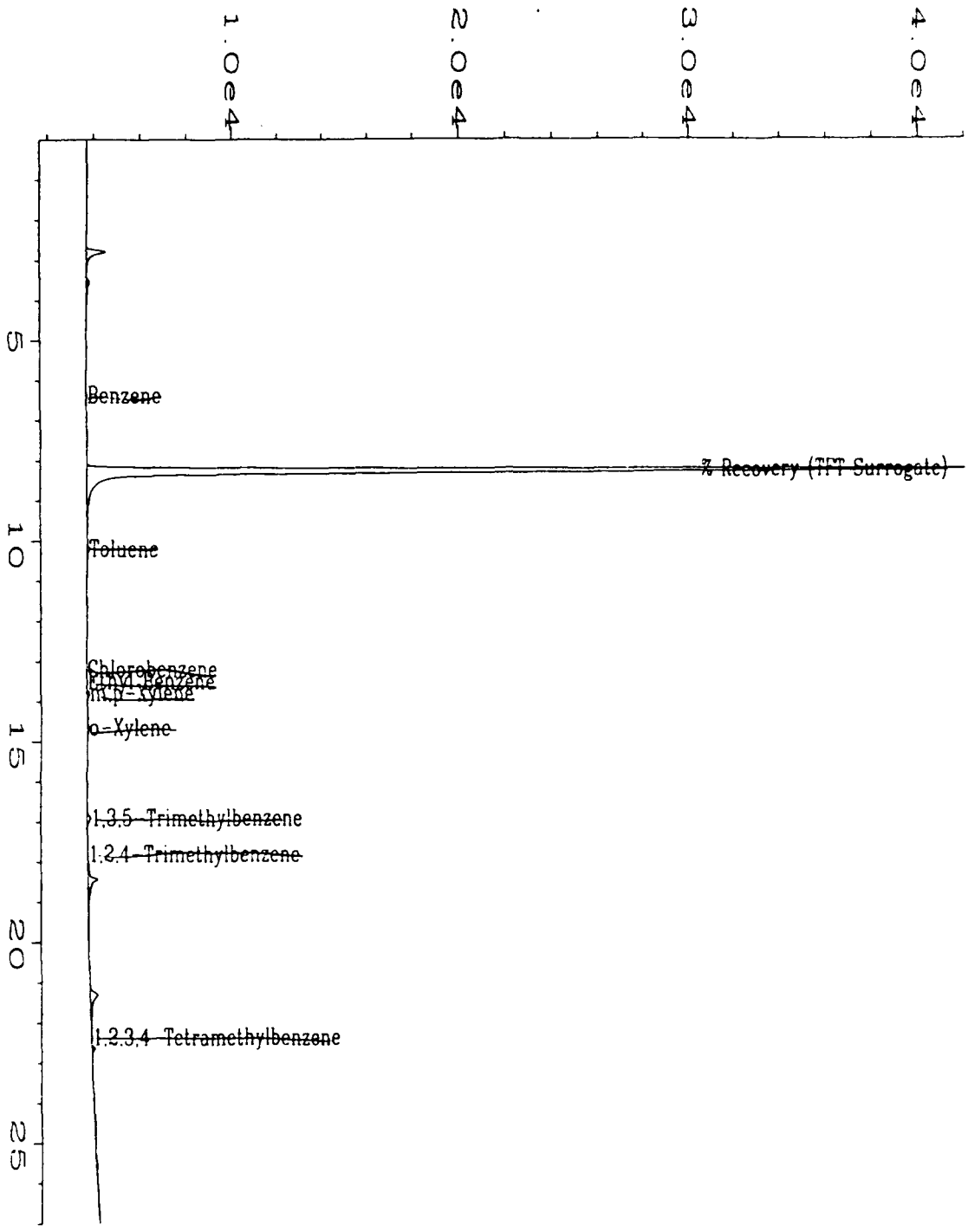
Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved

BTEX1063.XLS



Data File Name : C:\HPCHEM\1\DATA\NV-F0101.D
Operator :
Instrument : BTEX1
Sample Name : MBCH1395 BMI
Run Time Bar Code:
uired on : 13 Apr 95 04:58 PM
Report Created on: 20 Apr 95 01:04 PM
Last Recalib on : 13 APR 95 04:13 PM
Multiplier : 1

Page Number : 1
Vial Number :
Injection Number :
Sequence Line :
Instrument Method: BX10413A.MTH
Analysis Method : BX10413A.MTH
Sample Amount : 0
ISTD Amount :

pm 4/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report
Method Blank Report

Method Blank Number	: MB041495	Client Project No.	: 722450.21020/Mac D
Date Prepared	: 4/14/95	Lab Project No.	: 95-1063
Date Analyzed	: 4/14/95	Dilution Factor	: 1.00
		Method	: 602/8020
		Matrix	: Water
		Lab File No.	: BX1041340

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	U	0.4
Toluene	108-88-3	U	0.4
Chlorobenzene	108-90-7	U	0.4
Ethyl Benzene	100-41-4	U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	U	0.4
1,2,3-Trimethylbenzene	526-73-8	U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		99%	70%-130% (QC limits)

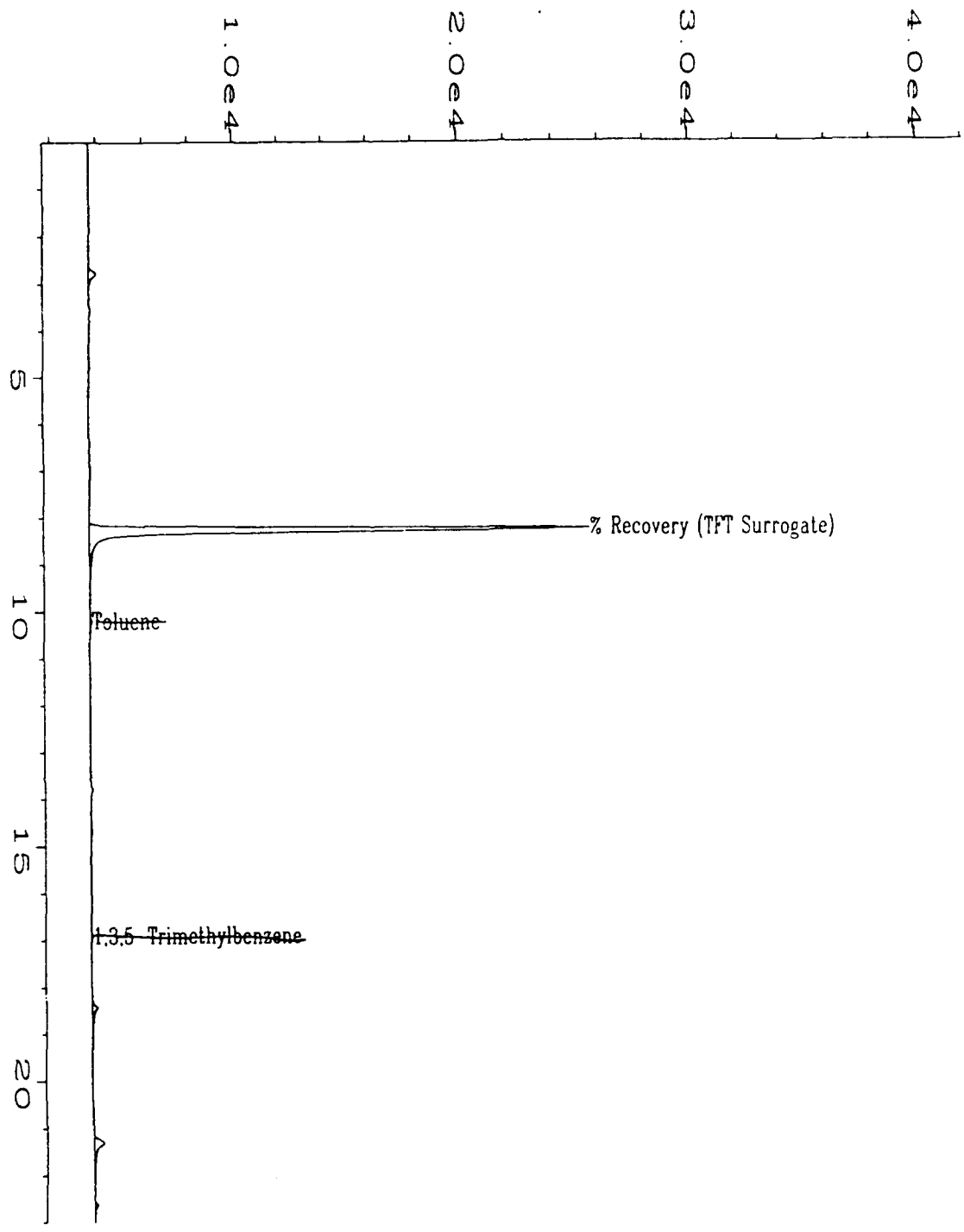
Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K Cone
Analyst

Approved

BTEX1063.XLS



user modified

Data File Name : C:\HPCHEM\1\DATA\BX10413\040F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : MB041495
In Time Bar Code:
Acquired on : 14 Apr 95 01:24 PM
Report Created on: 27 Apr 95 07:31 PM
Last Recalib on : 15 APR 95 01:55 PM
Multiplier : 1

Page Number : 1
Vial Number : 40
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10414.MTH
Analysis Method : BX10414B.MTH
Sample Amount : 0
ISTD Amount :

pm 4/28/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Laboratory Control Sample (LCS)

LCS Number	: LCS041395	Dilution Factor	: 1.00
Date Extracted/Prepared	: 4/13/95	Method	: 602
Date Analyzed	: 4/13/95	Matrix	: Water
Spike Amount (ug/L)	: 20.0	Lab File No.	: BX1041308

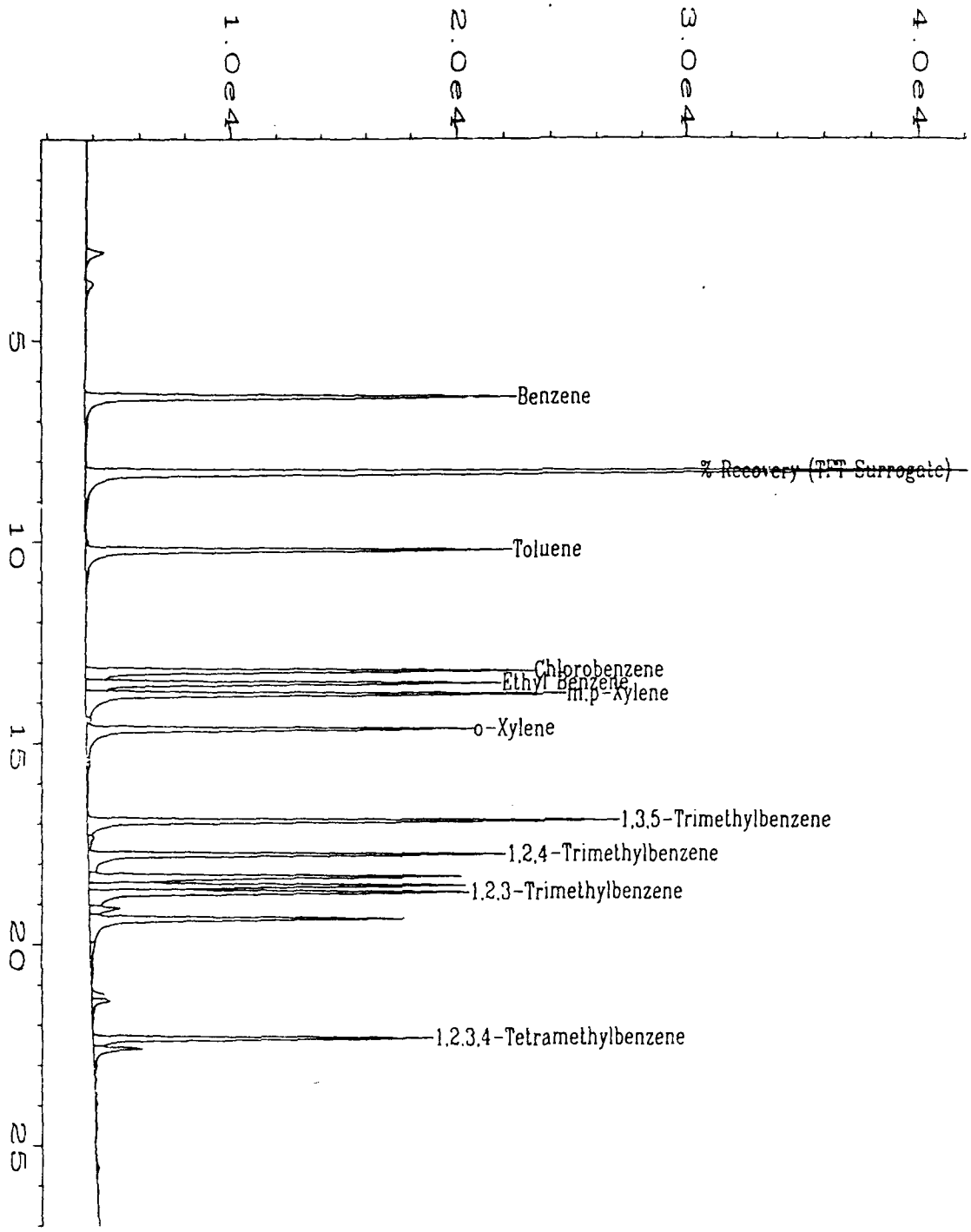
Compound Name	Cas Number	LCS Concentration ug/L	LCS % Recovery	QC Limit % Recovery
Benzene	71-43-2	16.3	81.5	71.0-119.0*
Toluene	108-88-3	17.0	85.0	73.0-111.0*
Chlorobenzene	108-90-7	17.3	86.5	64.0-119.0*
Ethyl Benzene	100-41-4	17.3	86.5	75.0-114.0*
m,p-Xylene	108-38-3 106-42-3	17.1	85.5	75.0-114.0*
o-Xylene	95-47-6	16.9	84.5	64.0-119
1,3,5-Trimethylbenzene	108-67-8	17.8	89.0	50.0-150.0
1,2,4-Trimethylbenzene	95-63-6	18.4	92.0	50.0-150.0
1,2,3-Trimethylbenzene	526-73-8	21.3	106.5	50.0-150.0
1,2,3,4-Tetramethylbenzene	488-23-3	17.8	89.0	50.0-150.0
Surrogate Recovery (α,α,α-Trifluorotoluene):		91%	70%-130% (QC limits)	

* = Limits established 4/3/95 KSC

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
NA = Not available/Not analyzed.

K Core
Analyst

D McClella
Approved



ata File Name	: C:\HPCHEM\1\DATA\BX10413\008F0801.D		
perator	: C.J. Cook	Page Number	: 1
nstrument	: BTEX1	Vial Number	: 8
mple Name	: LCS041395	Injection Number	: 1
in Time Bar Code:		Sequence Line	: 8
c ed on	: 13 Apr 95 04:19 PM	Instrument Method	: BX10413.MTH
p. c Created on	: 13 Apr 95 05:01 PM	Analysis Method	: BX10413A.MTH
st Recalib on	: 13 APR 95 04:13 PM	Sample Amount	: 0
ltiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Laboratory Control Sample (LCS)

LCS Number	: LCS041495	Dilution Factor	: 1.00
Date Extracted/Prepared	: 4/14/95	Method	: 602
Date Analyzed	: 4/14/95	Matrix	: Water
Spike Amount (ug/L)	: 20.0	Lab File No.	: BX1041339

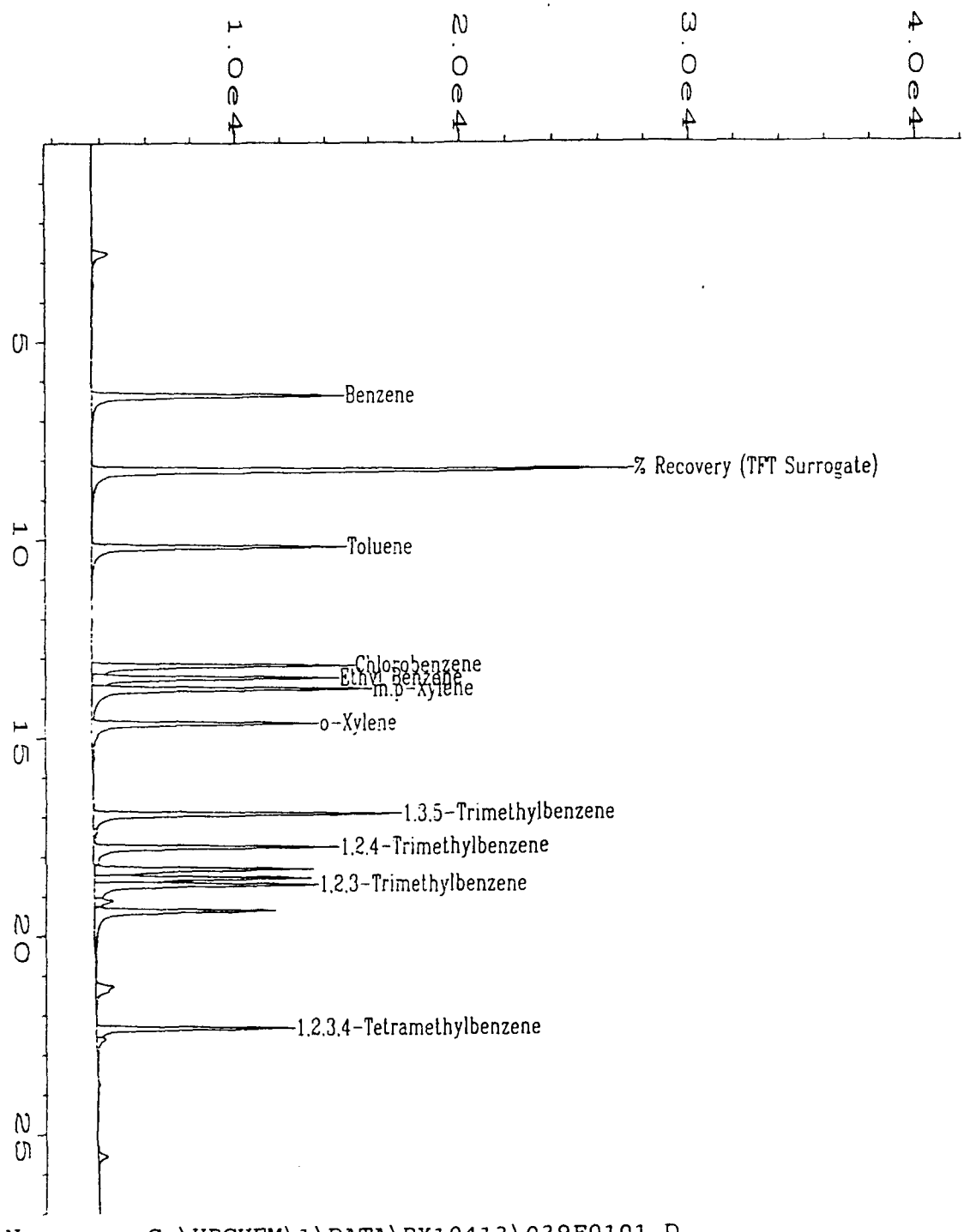
Compound Name	Cas Number	LCS Concentration ug/L	LCS % Recovery	QC Limit % Recovery
Benzene	71-43-2	15.8	79.0	71.0-119.0*
Toluene	108-88-3	16.3	81.5	73.0-111.0*
Chlorobenzene	108-90-7	16.1	80.5	64.0-119.0*
Ethyl Benzene	100-41-4	16.3	81.5	75.0-114.0*
m,p-Xylene	108-38-3	17.6	88.0	75.0-114.0*
o-Xylene	106-42-3 95-47-6	15.7	78.5	64.0-11
1,3,5-Trimethylbenzene	108-67-8	16.5	82.5	50.0-150.0
1,2,4-Trimethylbenzene	95-63-6	16.8	84.0	50.0-150.0
1,2,3-Trimethylbenzene	526-73-8	19.5	97.5	50.0-150.0
1,2,3,4-Tetramethylbenzene	488-23-3	15.0	75.0	50.0-150.0
Surrogate Recovery (α,α,α-Trifluorotoluene):		104%	70%-130% (QC limits)	

* = Limits established 4/3/95 KSC

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
NA = Not available/Not analyzed.

K. Cone
Analyst

Approved



Data File Name : C:\HPCHEM\1\DATA\BX10413\039F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : LCS041495
Run Time Bar Code:
Acquired on : 14 Apr 95 12:45 PM
Report Created on: 15 Apr 95 02:05 PM
Last Recalib on : 15 APR 95 01:55 PM
Multiplier : 1

Page Number : 1
Vial Number : 39
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10413A.MTH
Analysis Method : BX10414A.MTH
Sample Amount : 0
ISTD Amount :

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS (TVH-GASOLINE)

Date Sampled	: 3/31/95	Client Project Number	: 722450.21020/MACDILL
Date Received	: 4/1/95	Lab Project Number	: 95-1063
Date Prepared	: 4/14/95	Matrix	: Water
Date Analyzed	: 4/14/95	Method Number	: 5030/Mod.8015

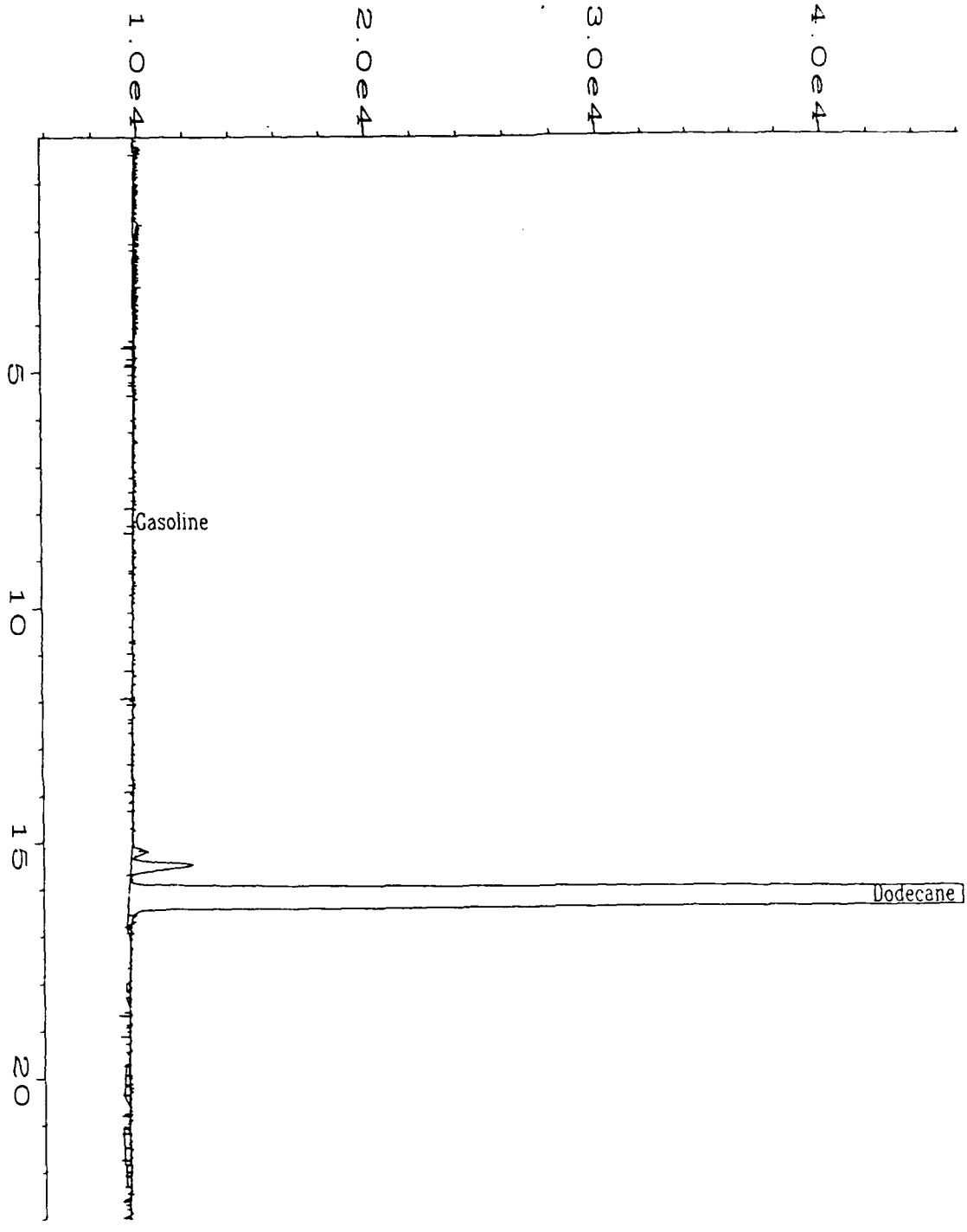
Evergreen Sample #	Client Sample #	Surrogate Recovery	TVH mg/L	RL mg/L
MB041495	METHOD BLANK	100%	U	0.1
X05167	MD75-MW16	95%	0.7	0.1
X05168	75MP-2S	95%	1.8	0.1
X05169	MD75-MW12	99%	0.6	0.1
X05171	MD75-MW3	97%	0.2	0.1
X05172	MD75-MW8	92%	2.0	0.1
X05173	MD75-MW14	94%	3.5	0.1
X05174	75MP-4S	96%	2.6	0.1
X05175	MD75-MW4	100%	2.9	0.1
X05176	MD75-MW24	101%	3.5	0.1
X05177	MD75-MW6	100%	0.1	0.1
X05177 DUP	MD75-MW6	95%	0.1	0.1

QUALIFIERS
U = TVH analyzed for but not detected.
B = TVH found in blank.
E = Extrapolated value.
RL = Reporting Limit.

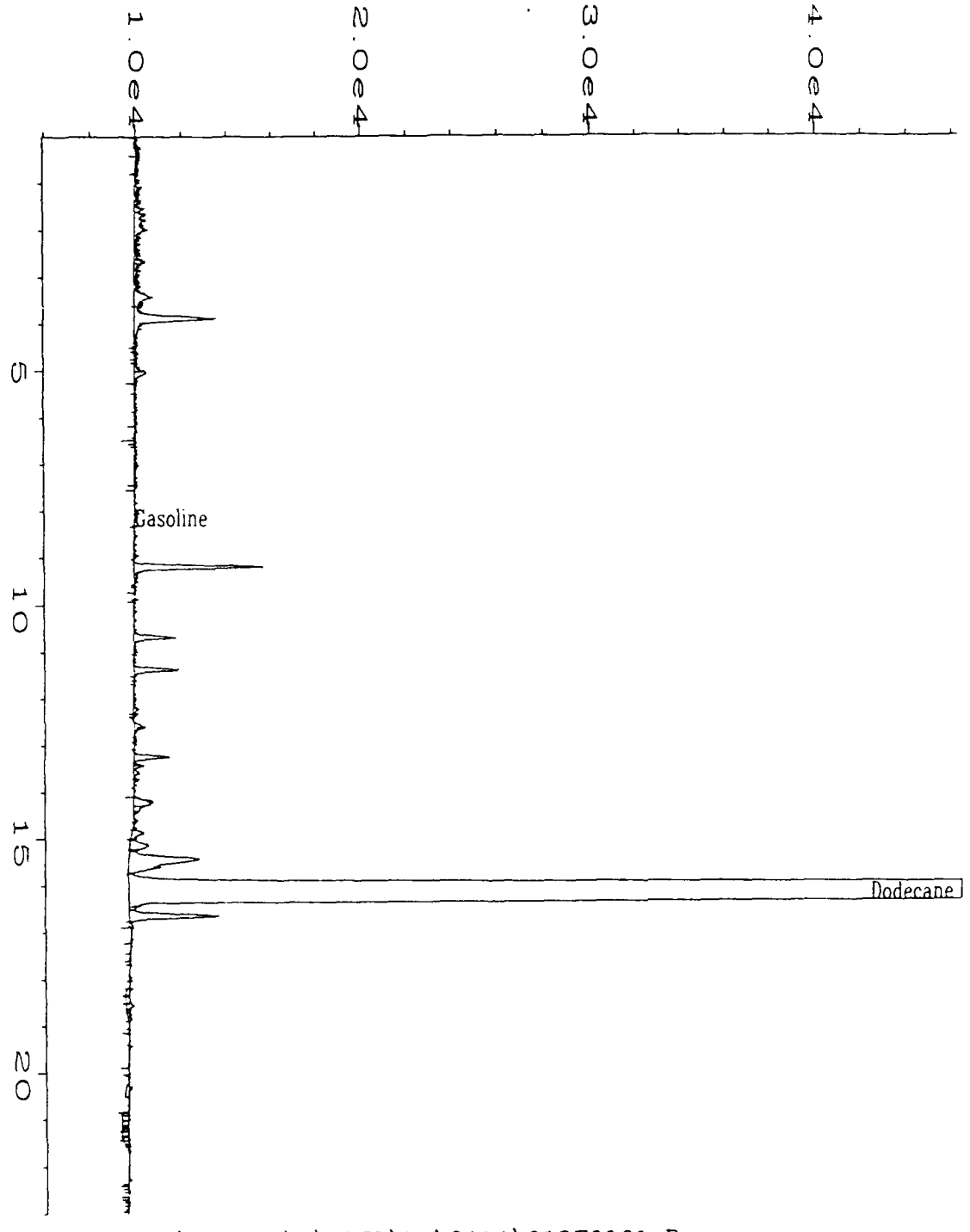
Analyst

Approved

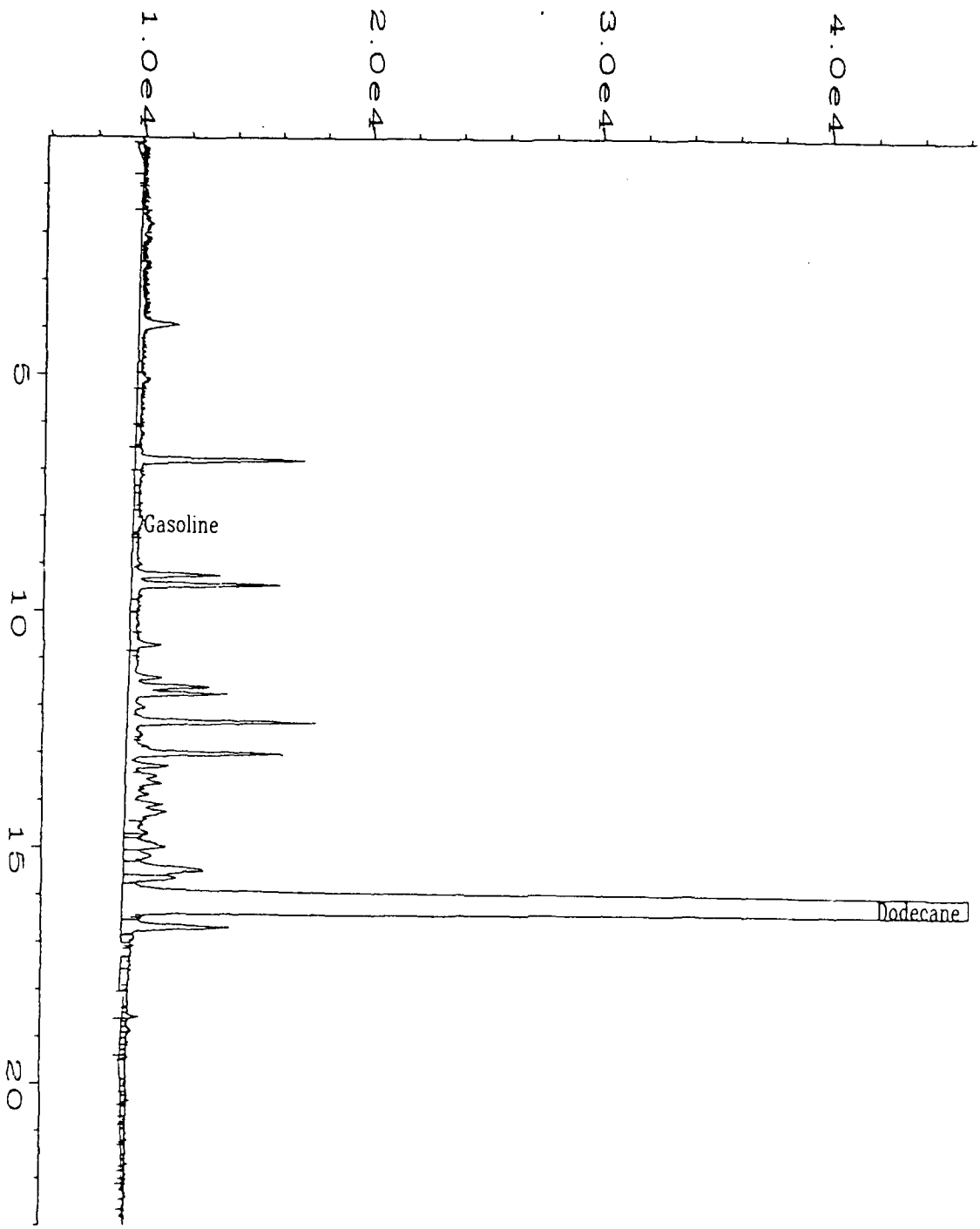
TVH1063.XLS



Data File Name	: C:\HPCHEM\1\DATA\tvh0414\008F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 8
Sample Name	: MB041495	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 03:35 PM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 16 Apr 95 02:37 PM	Analysis Method	: TVH0415.MTH
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

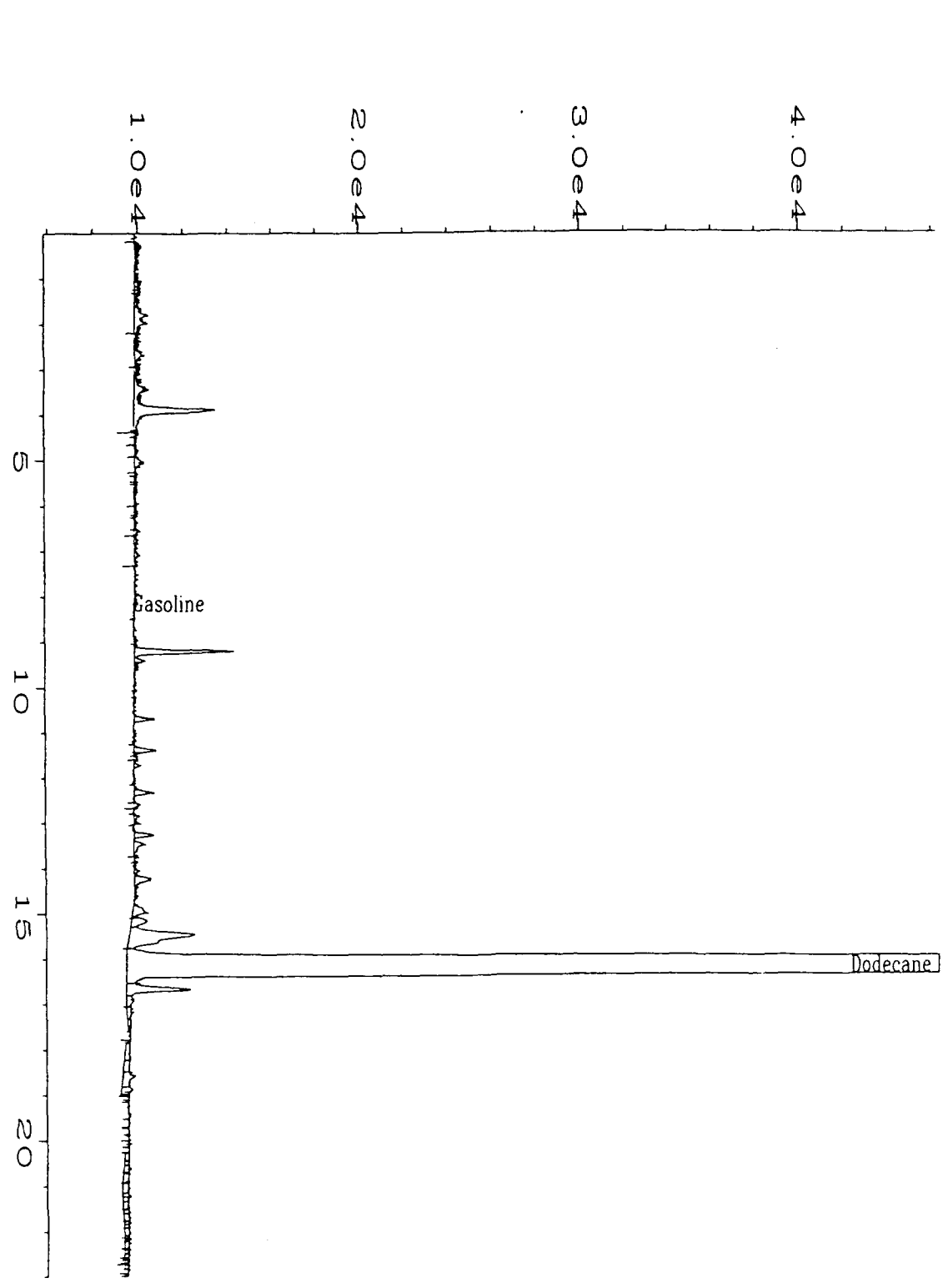


Data File Name	: C:\HPCHEM\1\DATA\tvh0414\012F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 12
Sample Name	: X05167;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 05:59 PM	Instrument Method	: TVH1BA
Report Created on	: 16 Apr 95 02:37 PM	Analysis Method	: TVH0415.M
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1063 CLIENT # MD75-MW16 WATER		

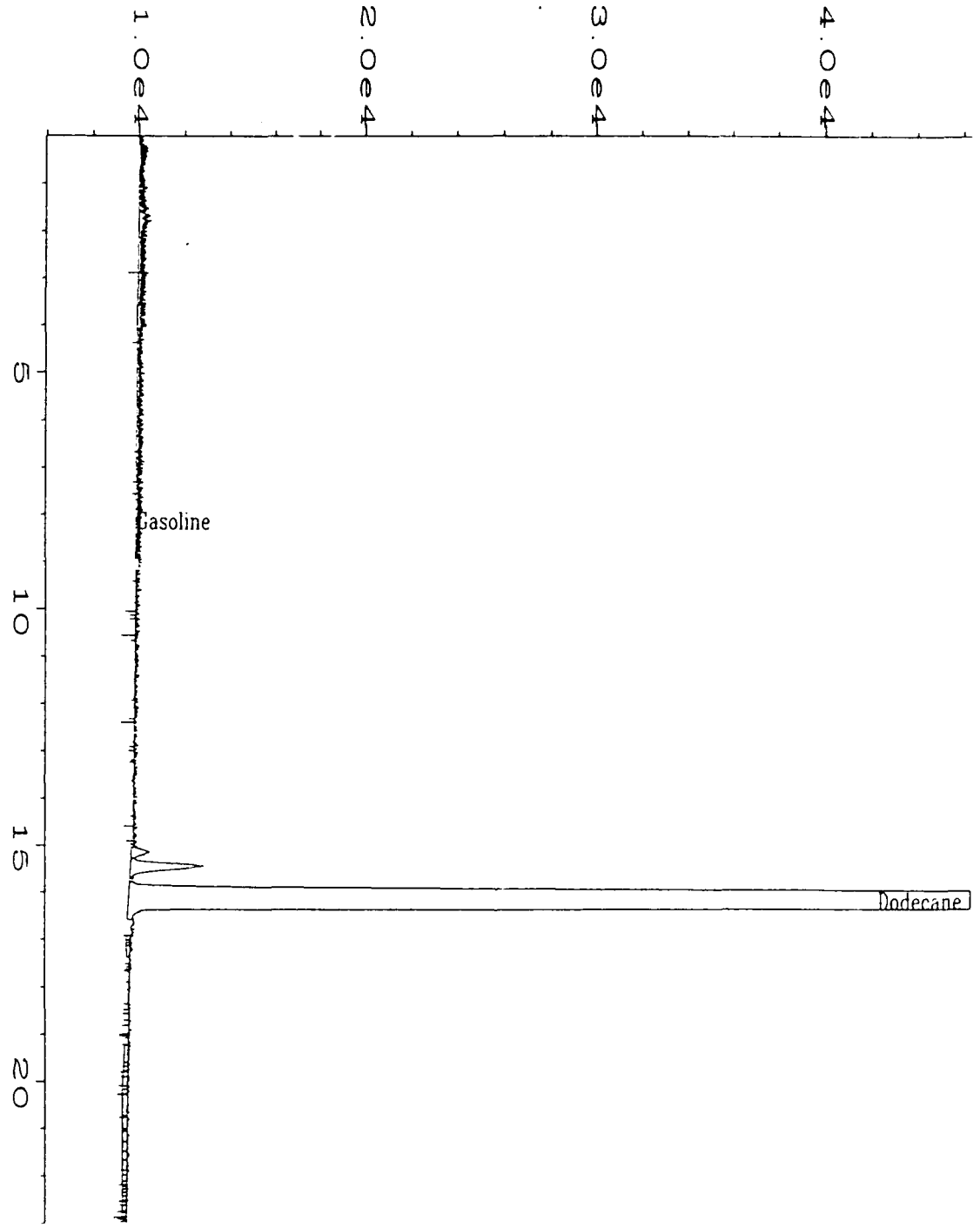


Data File Name	: C:\HPCHEM\1\DATA\TVH0414\011F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 11
Sample Name	: X05168;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
quired on	: 14 Apr 95 05:23 PM	Instrument Method	: TVH1BASE.MTH
.. port Created on	: 25 Apr 95 01:21 PM	Analysis Method	: TVH0414.MTH
Last Recalib on	: 14 APR 95 02:50 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

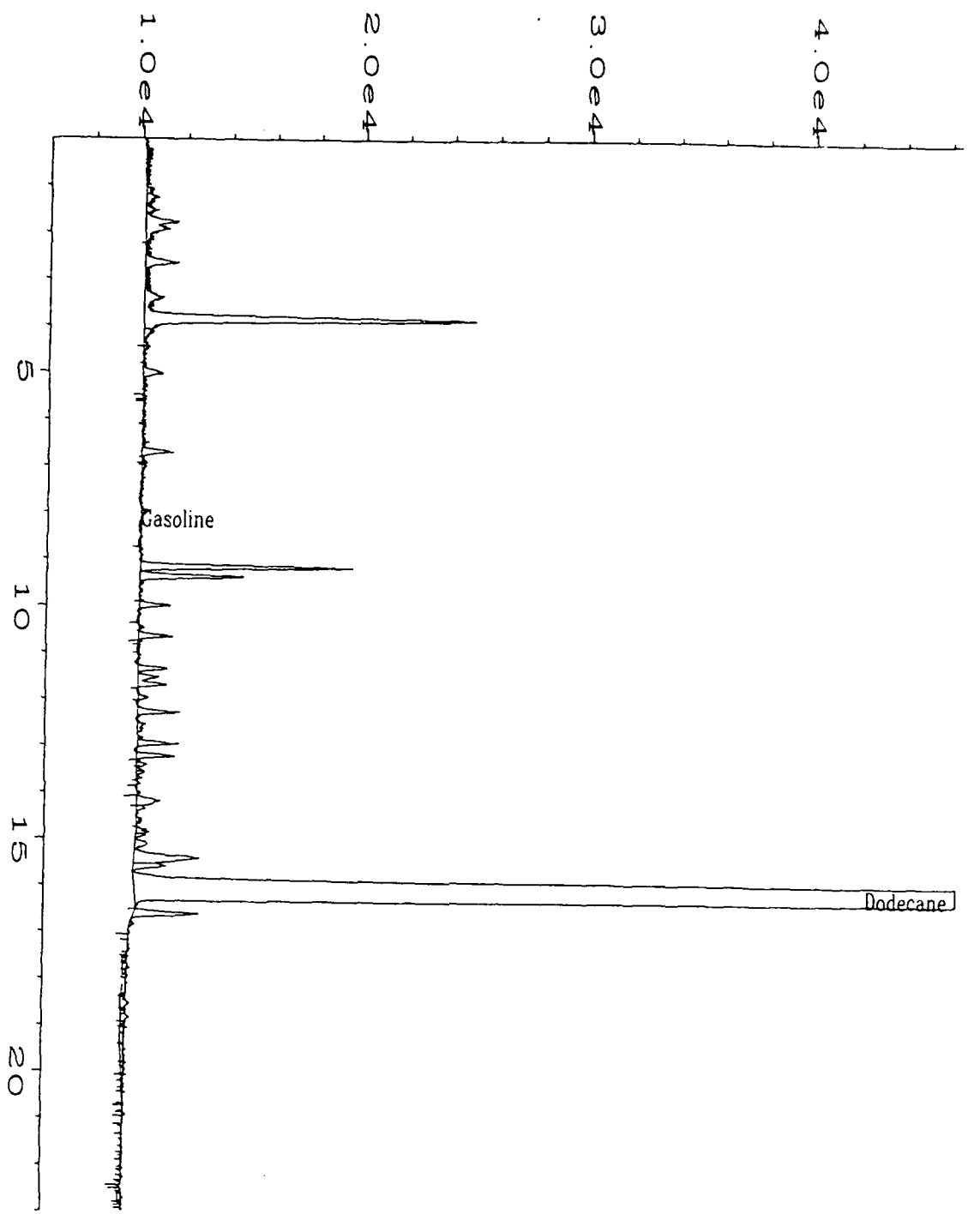
client # 75MP-28



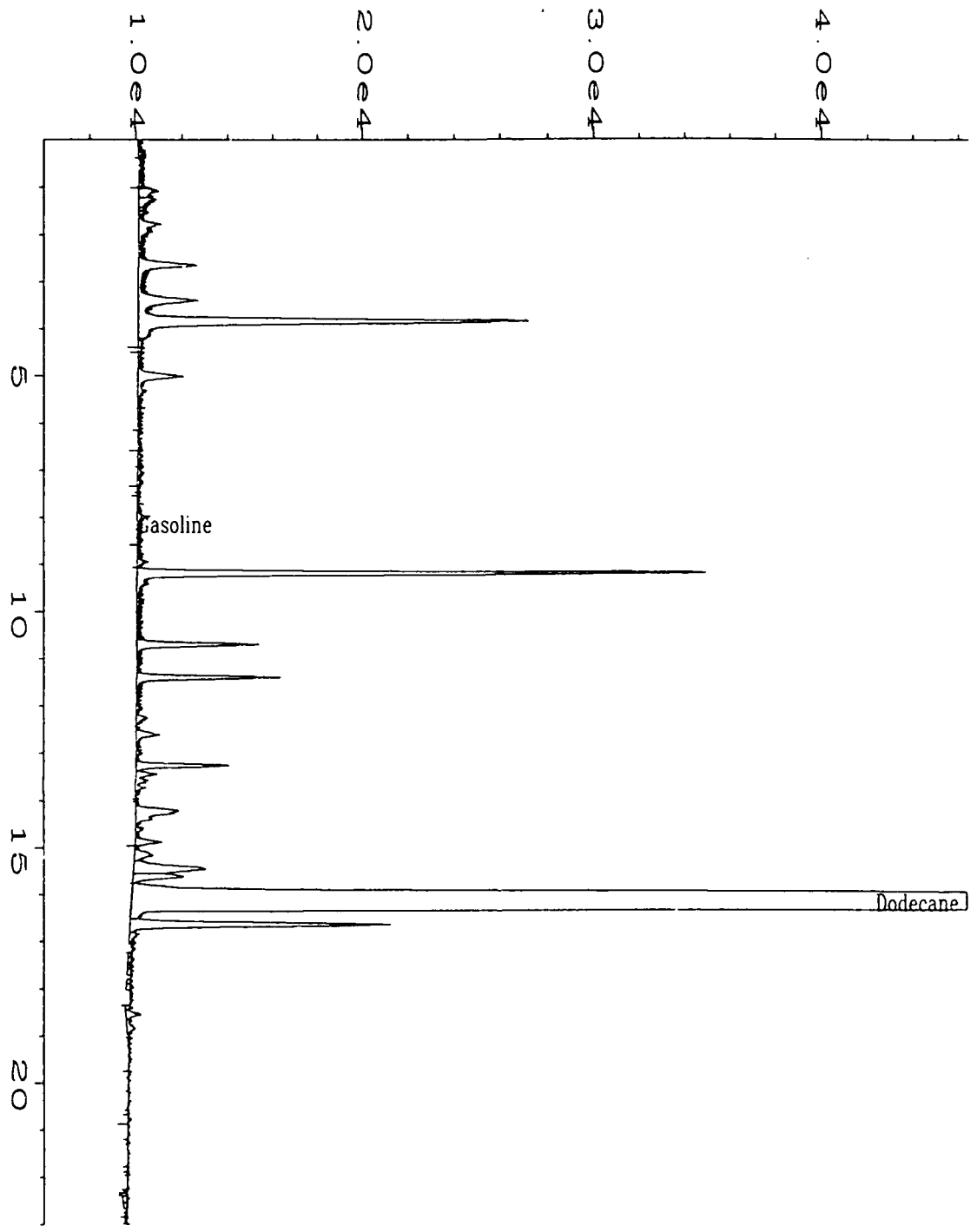
Data File Name	: C:\HPCHEM\1\DATA\tvh0414\010F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 10
Sample Name	: X05169;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 04:47 PM	Instrument Method	: TVH1BA.
Report Created on	: 16 Apr 95 02:37 PM	Analysis Method	: TVH0415.MT
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1063 CLIENT # MD75-MW12 WATER		



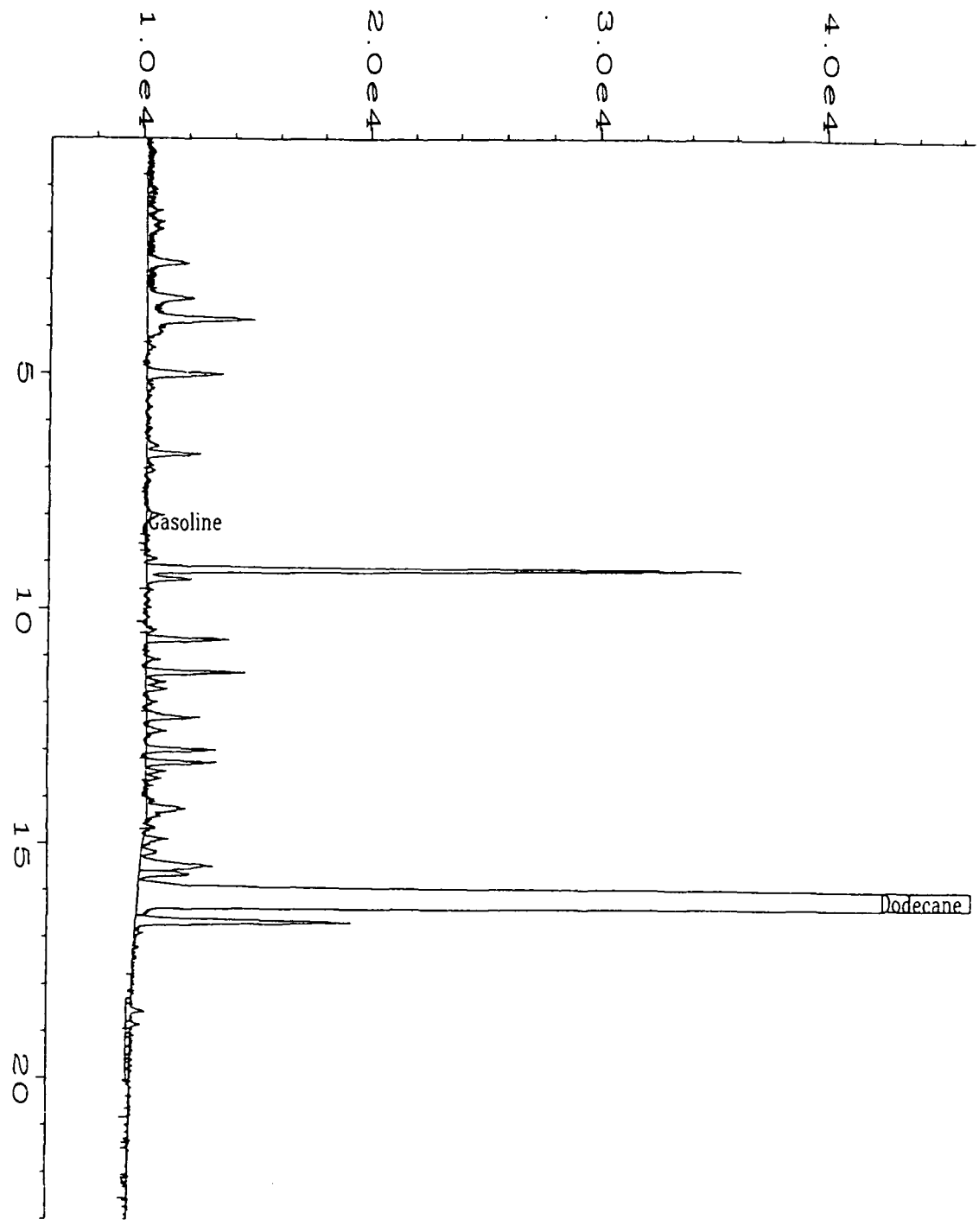
Data File Name	: C:\HPCHEM\1\DATA\tvh0414\013F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 13
Sample Name	: X05171;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 06:35 PM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 16 Apr 95 02:38 PM	Analysis Method	: TVH0415.MTH
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1063 CLIENT # MD75-MW3 WATER		



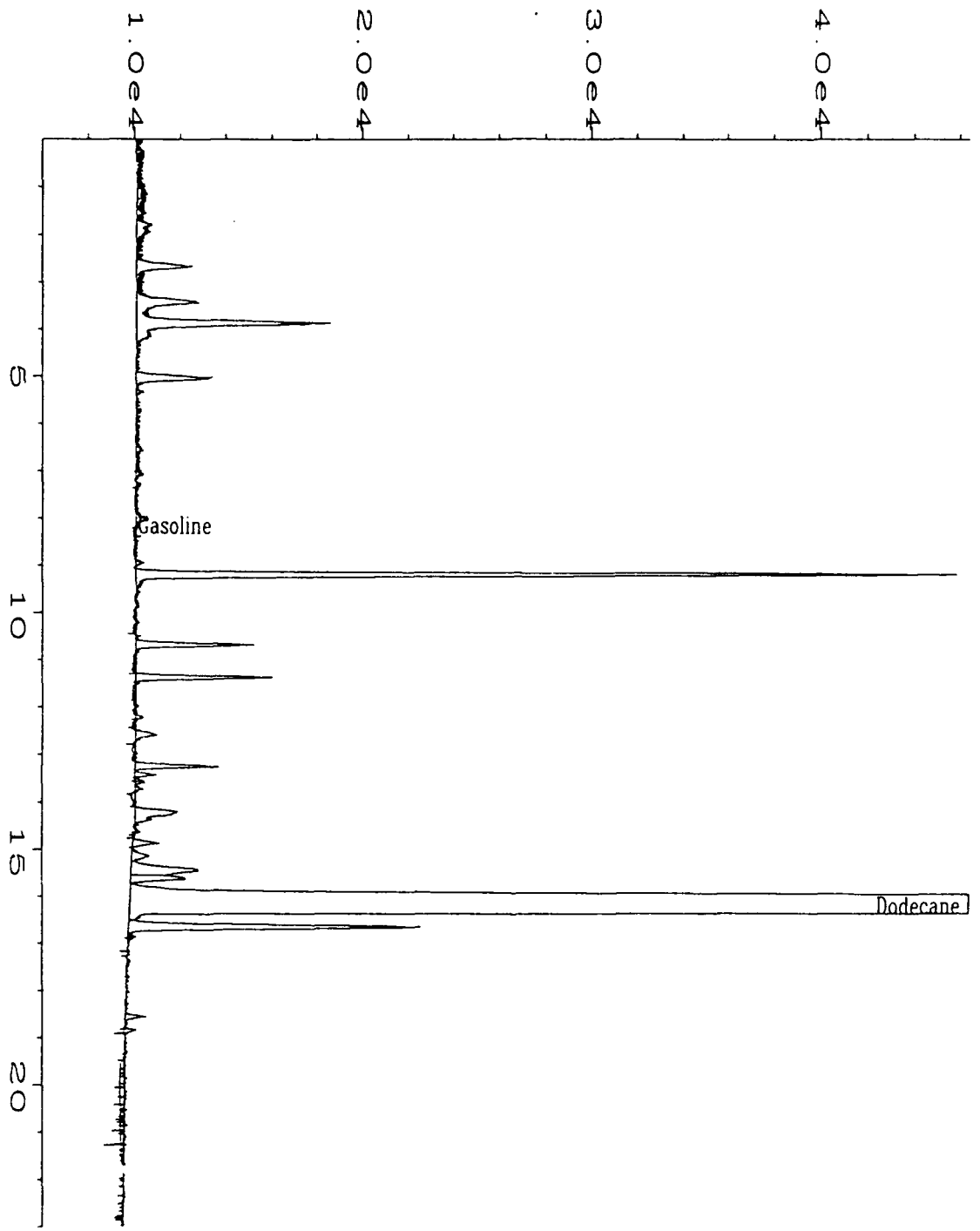
Data File Name	: C:\HPCHEM\1\DATA\tvh0414\014F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 14
Sample Name	: X05172;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 07:11 PM	Instrument Method	: TVH1BAS
Report Created on	: 16 Apr 95 02:38 PM	Analysis Method	: TVH0415.MT
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1063 CLIENT # MD75-MW8 WATER		



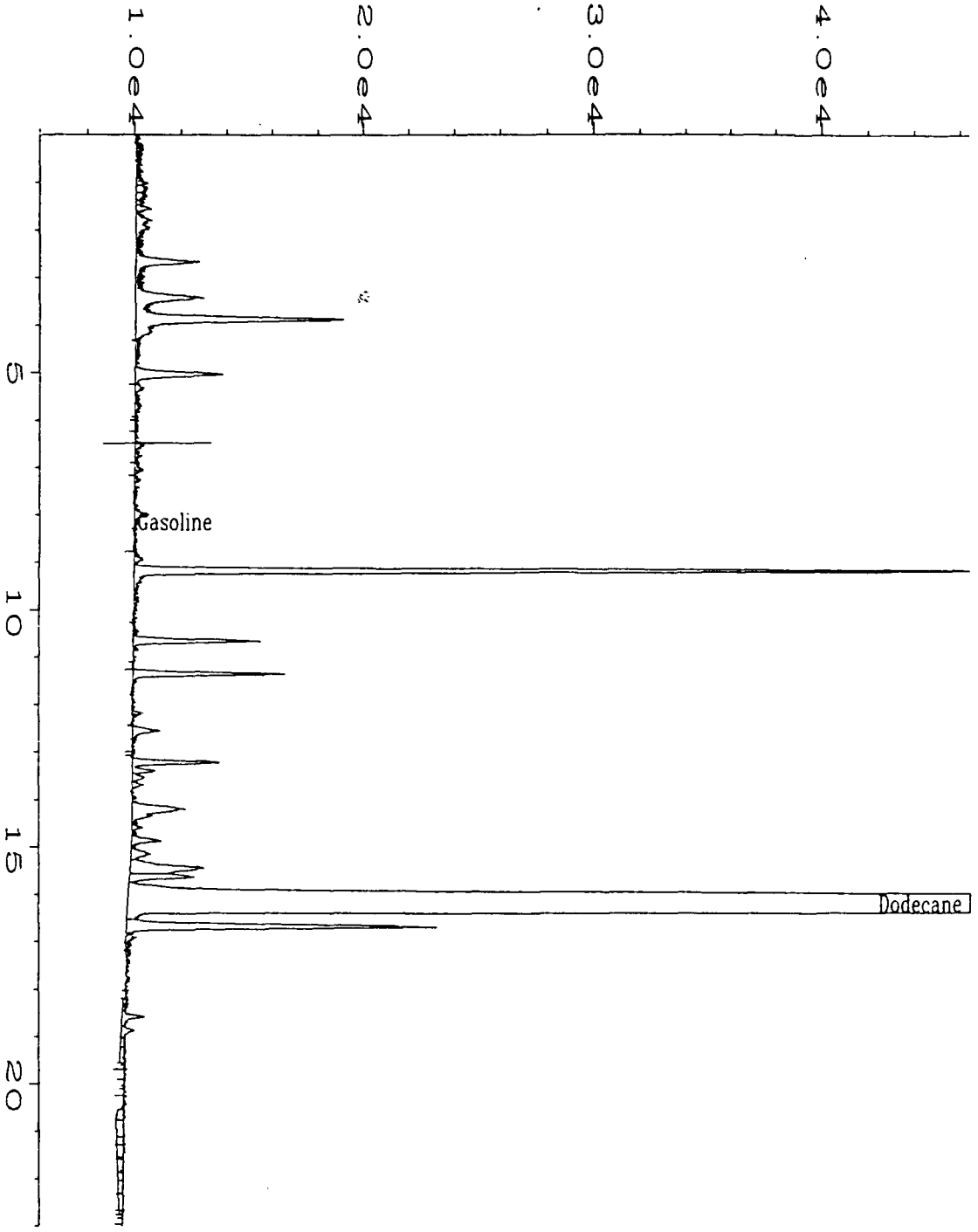
Data File Name	: C:\HPCHEM\1\DATA\tvh0414\015F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 15
Sample Name	: X05173;1;5	Injection Number	: 1
`n Time Bar Code:		Sequence Line	: 1
quired on	: 14 Apr 95 07:47 PM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 16 Apr 95 02:38 PM	Analysis Method	: TVH0415.MTH
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1063 CLIENT # MD75-MW14 WATER		



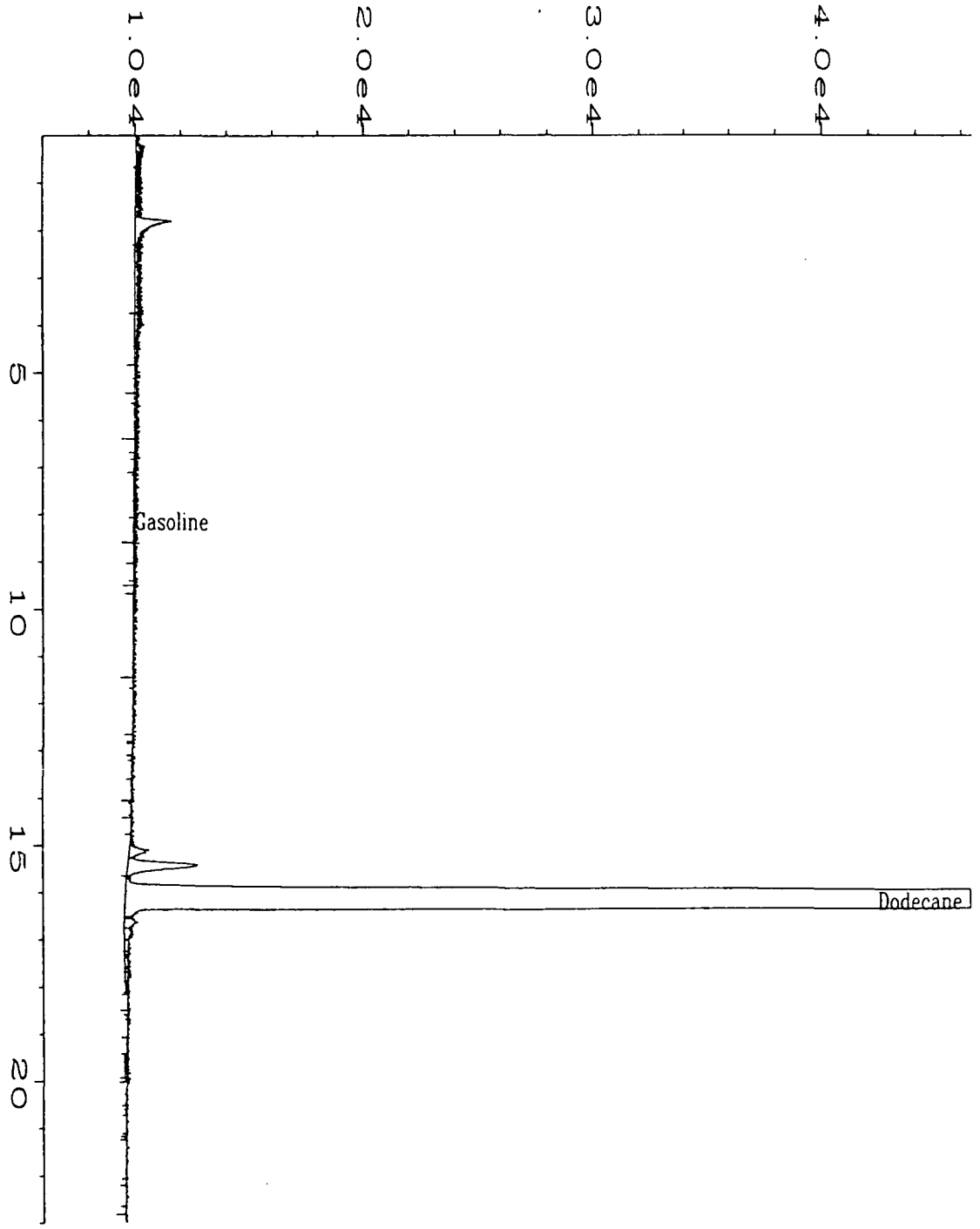
Data File Name	: C:\HPCHEM\1\DATA\tvh0414\017F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 17
Sample Name	: X05174;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 08:59 PM	Instrument Method	: TVH1BAS
Report Created on:	16 Apr 95 02:39 PM	Analysis Method	: TVH0415.MT
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1063 CLIENT # 75MP-4S WATER		



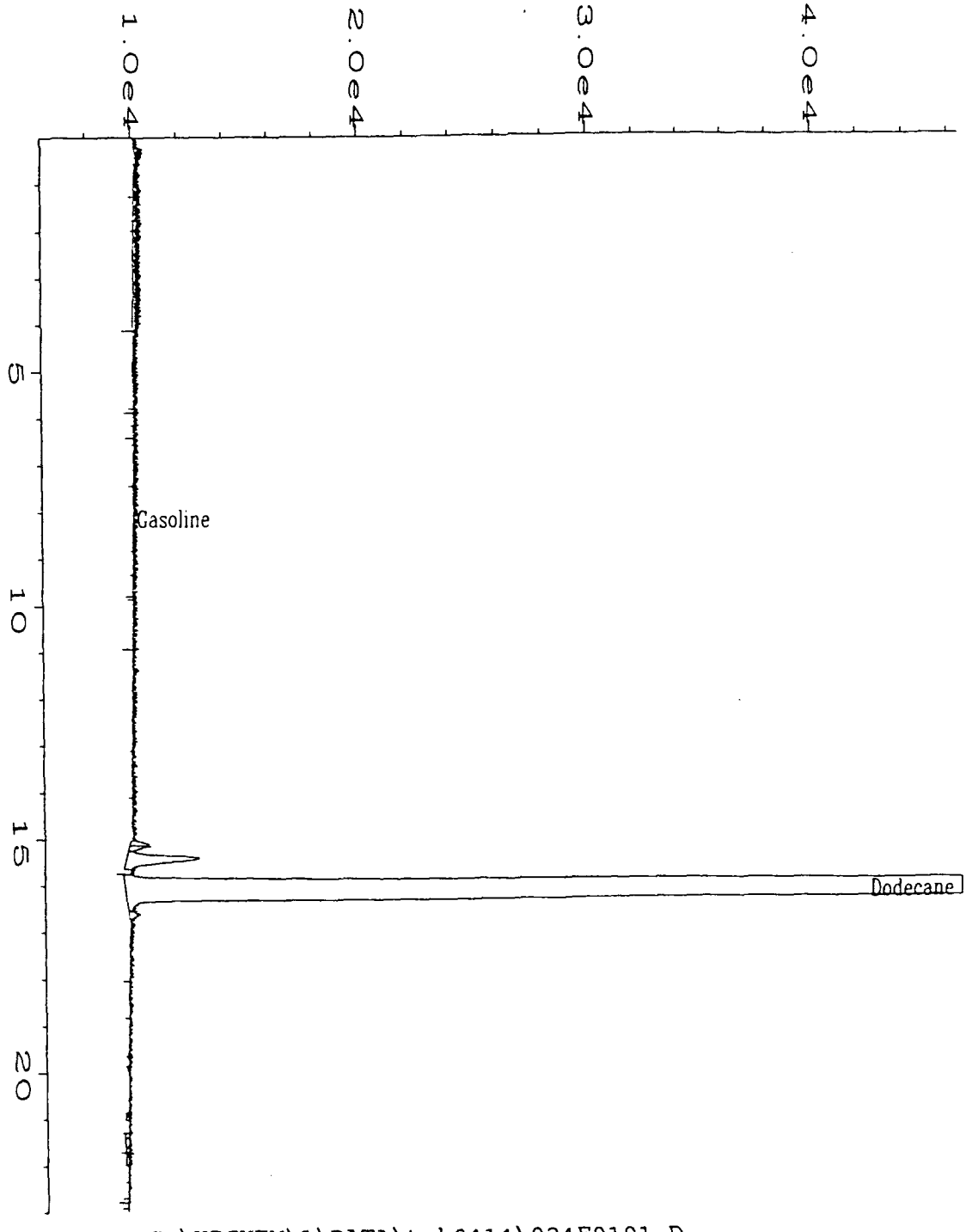
Data File Name	: C:\HPCHEM\1\DATA\tvh0414\018F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 18
Sample Name	: X05175;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 09:35 PM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 16 Apr 95 02:39 PM	Analysis Method	: TVH0415.MTH
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1063 CLIENT # MD75-MW4 WATER		



Data File Name	: C:\HPCHEM\1\DATA\tvh0414\019F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 19
Sample Name	: X05176;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 10:11 PM	Instrument Method	: TVH1BA
Report Created on	: 16 Apr 95 02:39 PM	Analysis Method	: TVH0415.MT
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1063 CLIENT # MD75-MW24 WATER		



Data File Name	: C:\HPCHEM\1\DATA\tvh0414\020F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 20
Sample Name	: X05177;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 10:47 PM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 16 Apr 95 02:39 PM	Analysis Method	: TVH0415.MTH
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1063 CLIENT # MD75-MW6 WATER		



Data File Name	: C:\HPCHEM\1\DATA\tvh0414\024F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 24
Sample Name	: X05177 DUP	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 15 Apr 95 01:11 AM	Instrument Method	: TVH1BA.
Report Created on	: 16 Apr 95 02:39 PM	Analysis Method	: TVH0415.M
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

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(303) 425-6021

TOTAL VOLATILE HYDROCARBONS (TVH)
Laboratory Control Sample (LCS)

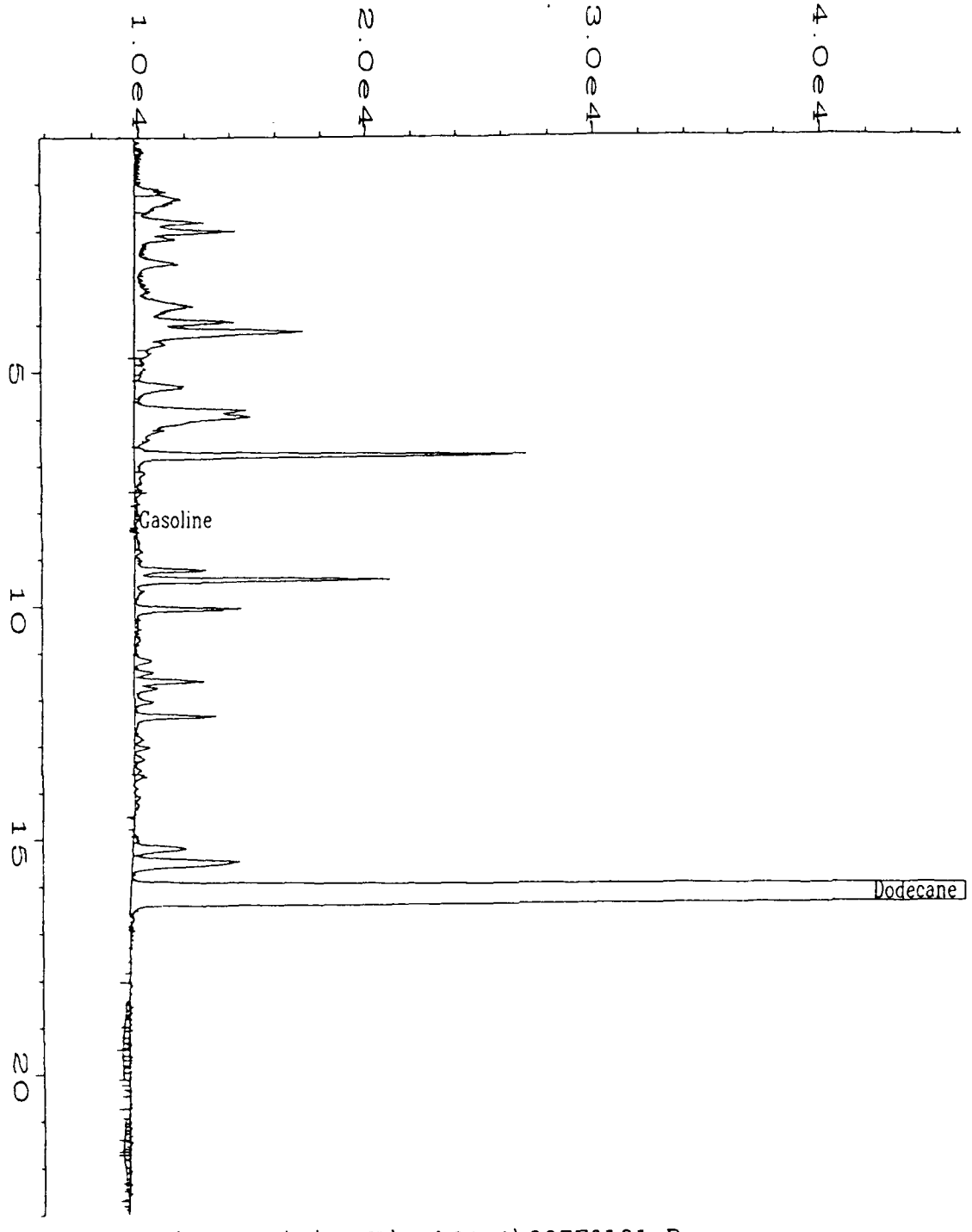
LCS Number	: LCS041495	Matrix	: WATER
Date Prepared	: 4/14/95	Method Number	: 5030/MOD.8015
Date Analyzed	: 4/14/95		
Sequence Number	: TVH7		

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/ L	LCS % Recovery	QC Limit % Recovery
Gasoline	5.00	4.93	99%	70%-130%

QUALIFIERS
U = TVH analyzed for but not detected.
B = TVH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

Analyst

Approved



Data File Name	: C:\HPCHEM\1\DATA\tvh0414\007F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 7
Sample Name	: LCS041495	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 14 Apr 95 02:59 PM	Instrument Method	: TVH1BASE
Report Created on	: 16 Apr 95 02:37 PM	Analysis Method	: TVH0415.MTH
Last Recalib on	: 16 APR 95 02:01 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

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(303) 425-6021

TOTAL EXTRACTABLE HYDROCARBONS (TEH, as JET FUEL)

Date Sampled	: 3/31/95	Client Project Number	: 722450-21020
Date Received	: 4/1/95	Lab Project Number	: 95-1063
Date Prepared	: 4/3/95	Matrix	: Water
Date Analyzed	: 4/4,5,6/95	Method Number	: 3500/Mod.8015

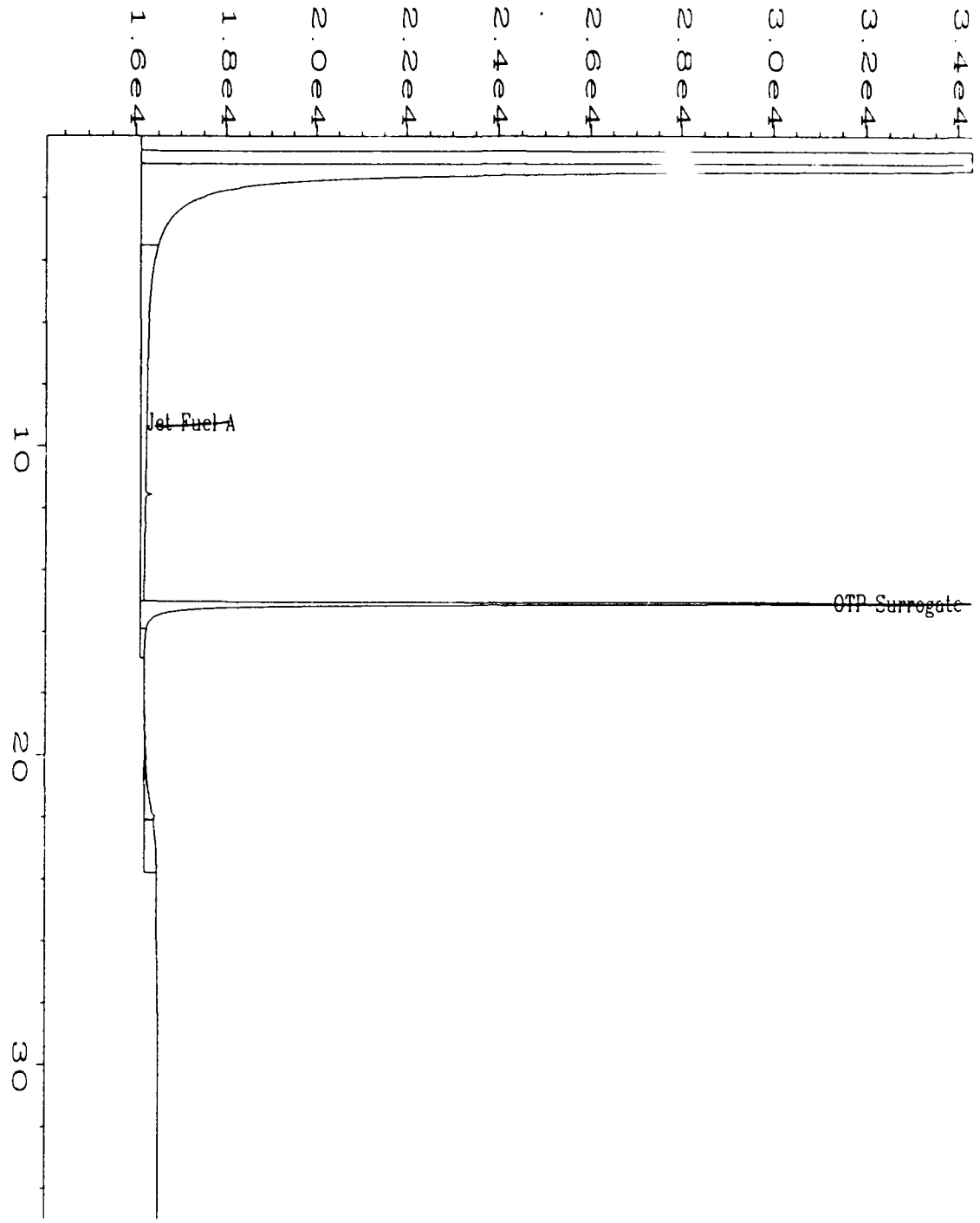
Evergreen Sample #	Client Sample #	Surrogate Recovery	TEH mg/L	RL mg/L
WB040395	WATER BLANK	75%	U	0.5
X05169	MD75-MW12	94%	3.1	0.5
X05172	MD75-MW8	110%	14	0.5
X05175	MD75-MW4	77%	15	0.5
X05178	24MP-2S	47%	4.0	0.5
X05178-R	24MP-2S	47%	3.9	0.5
X05179	MD24-MW6	61%	1.4	0.5
X05179-R	MD24-MW6	61%	1.3	0.5
X05183	MD24-MW2	45%	U	0.5
X05183-R	MD24-MW2	43%	U	0.5
X05184	MD24-MW26	53%	1.2	0.5
X05184-R	MD24-MW26	58%	1.4	0.5
X05185	MS/MSD	46%	U	0.5
X05185-R	MS/MSD	44%	U	0.5

QUALIFIERS
U = TEH analyzed for but not detected.
B = TEH found in blank.
E = Extrapolated value.
RL = Reporting Limit
R = Reanalysis of original sample extract.

Analyst

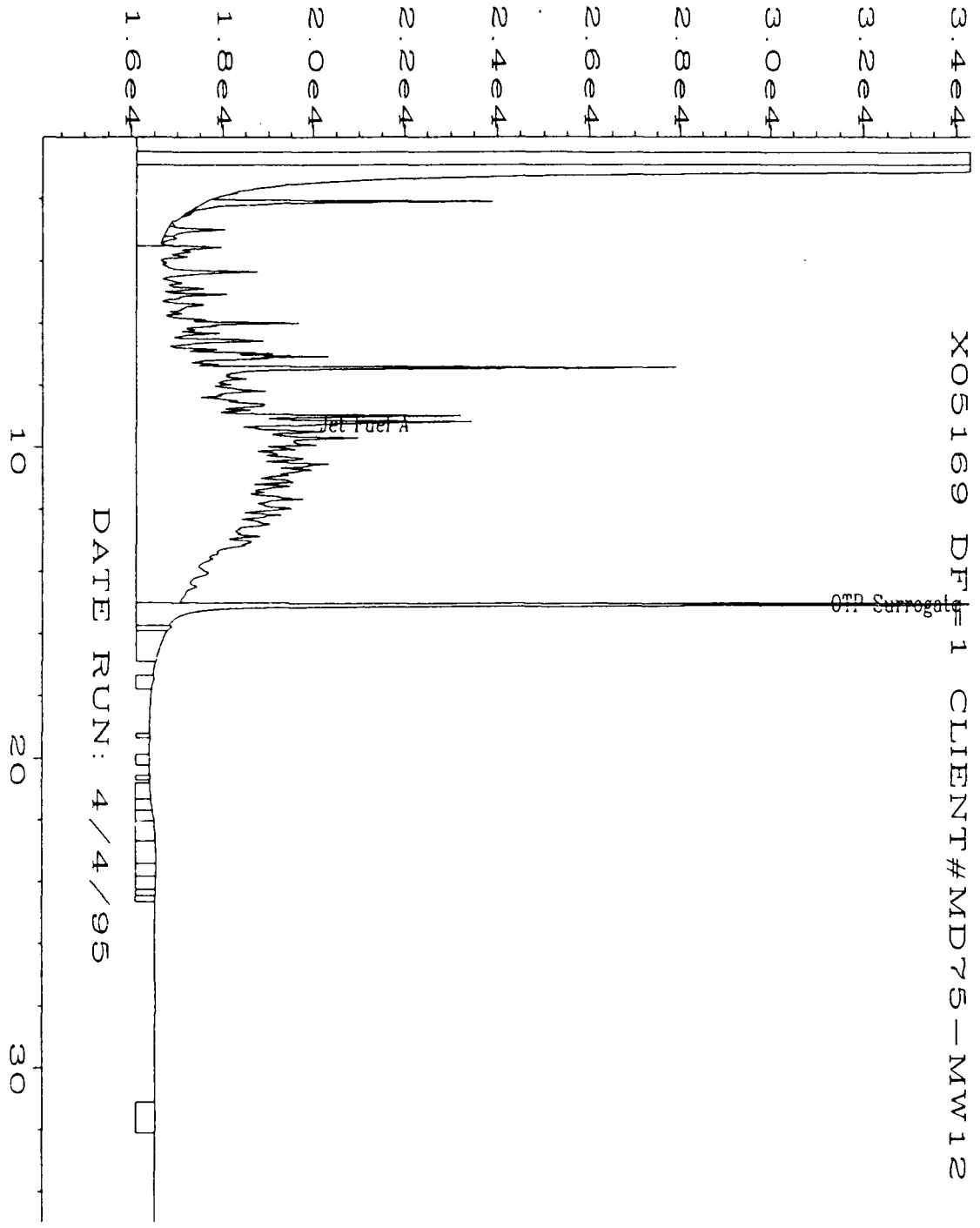
Approved

TEH1063.XLS

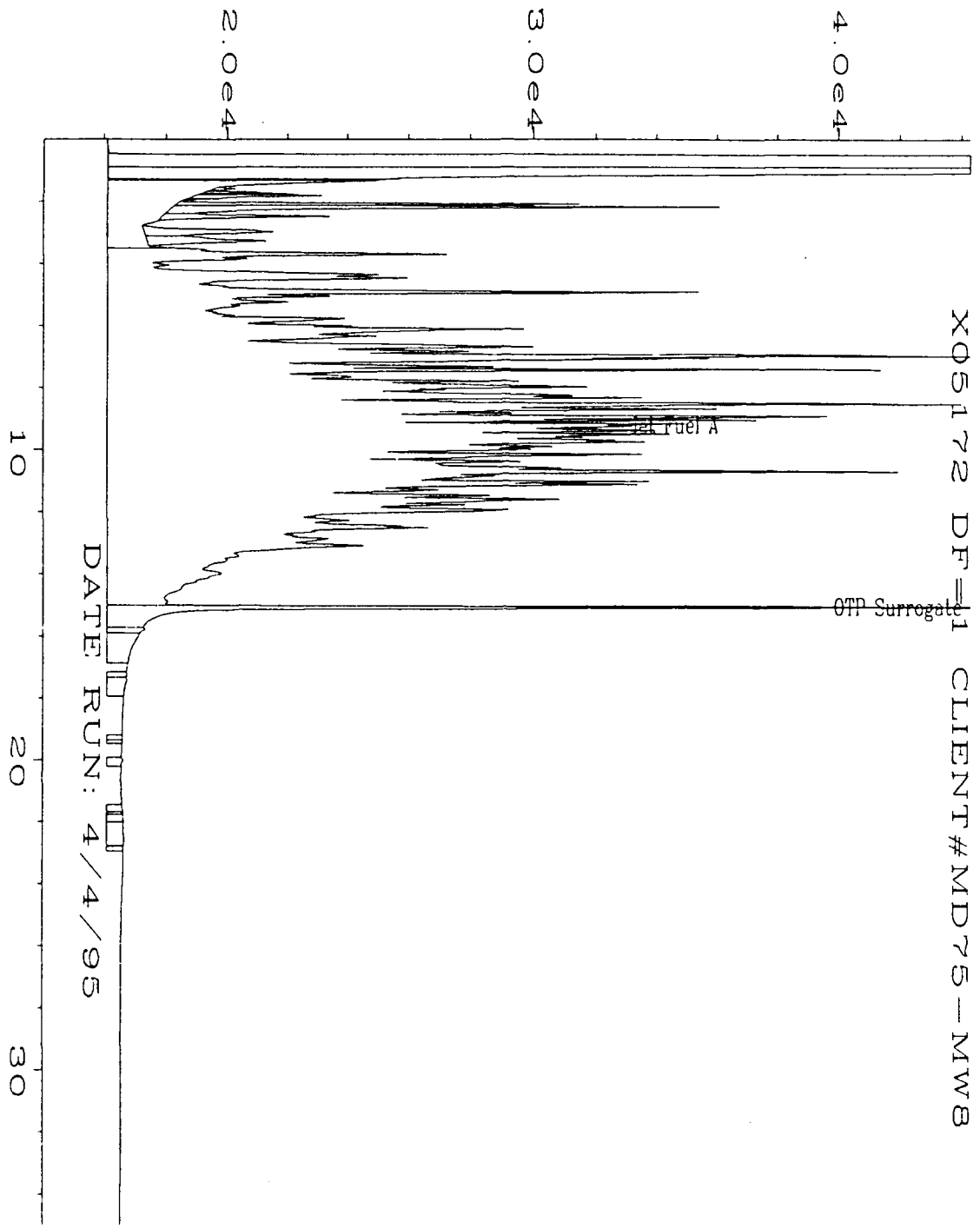


Data File Name	: C:\HPCHEM\2\DATA\JET0404\009R0801.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 9
Sample Name	: WB040395	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 04 Apr 95 06:13 PM	Instrument Method	: JET04C
Report Created on	: 05 Apr 95 01:33 PM	Analysis Method	: JET0404.M
Last Recalib on	: 05 APR 95 10:34 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

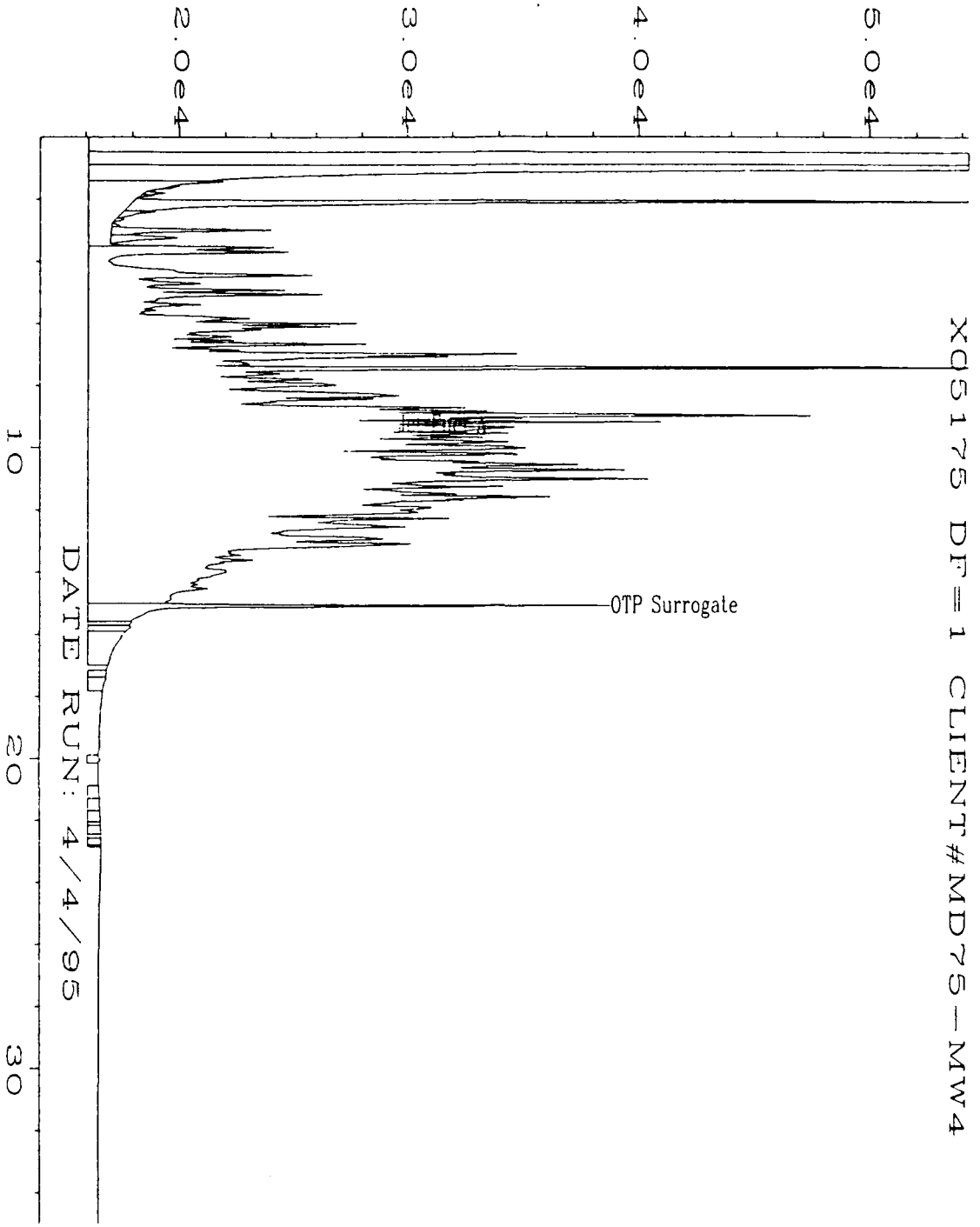
4/12/95



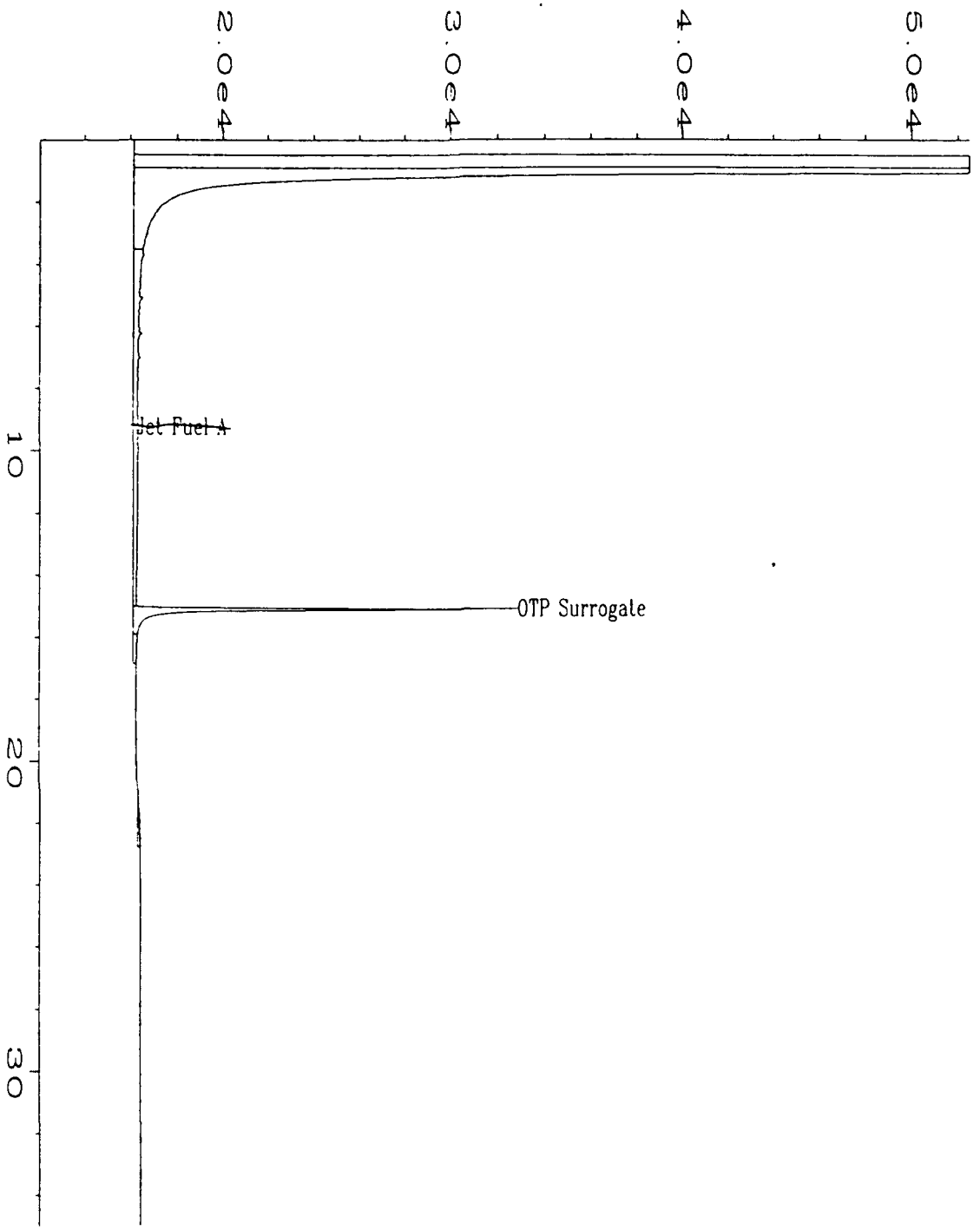
Data File Name	: C:\HPCHEM\2\DATA\JET0404\011R0801.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 11
Sample Name	: X05169 DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 04 Apr 95 07:53 PM	Instrument Method	: JET0404.MTH
Report Created on	: 05 Apr 95 01:35 PM	Analysis Method	: JET0404.MTH
Last Recalib on	: 05 APR 95 10:34 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



Data File Name	: C:\HPCHEM\2\DATA\JET0404\012R0801.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 12
Sample Name	: X05172 DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 04 Apr 95 08:42 PM	Instrument Method	: JET040
Report Created on	: 05 Apr 95 01:38 PM	Analysis Method	: JET0404.M
Last Recalib on	: 05 APR 95 10:34 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

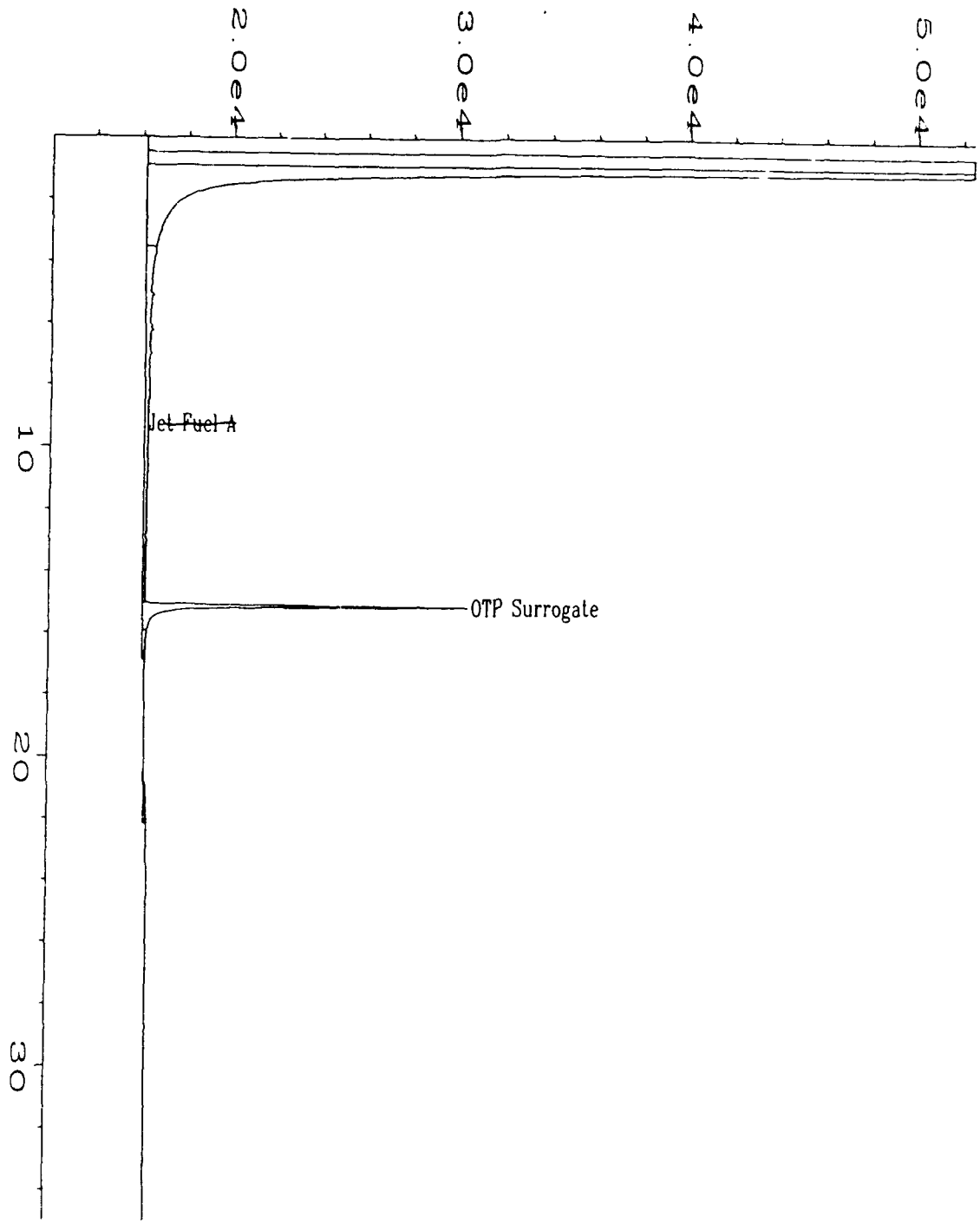


Data File Name	: C:\HPCHEM\2\DATA\JET0404\013R0801.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 13
Sample Name	: X05175 DF=1	Injection Number	: 1
ı Time Bar Code:		Sequence Line	: 8
quired on	: 04 Apr 95 09:32 PM	Instrument Method	: JET0404.MTH
Report Created on	: 05 Apr 95 01:39 PM	Analysis Method	: JET0404.MTH
Last Recalib on	: 05 APR 95 10:34 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



Data File Name	: C:\HPCHEM\2\DATA\jet0405\021R0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 21
Sample Name	: X05185 DF=1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 06 Apr 95 03:30 AM	Instrument Method	: FID1BAS..
Report Created on	: 14 Apr 95 12:27 PM	Analysis Method	: JET0405.MT
Last Recalib on	: 06 APR 95 08:59 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1063 CLIENT # MS/MSD WATER		

From 4/27/95



Data File Name	: C:\HPCHEM\2\DATA\jet0405\030R0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 30
Sample Name	: X05185 DF=1 – R	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 06 Apr 95 04:11 PM	Instrument Method	: FID1BASE.MTH
Report Created on	: 07 Apr 95 10:20 AM	Analysis Method	: JET0405.MTH
Last Recalib on	: 06 APR 95 08:59 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1063 CLIENT # MS/MSD WATER		

pm 4/7/95

EVERGREEN ANALYTICAL, INC.
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TOTAL EXTRACTABLE HYDROCARBONS (TEH)
Laboratory Control Sample (LCS)

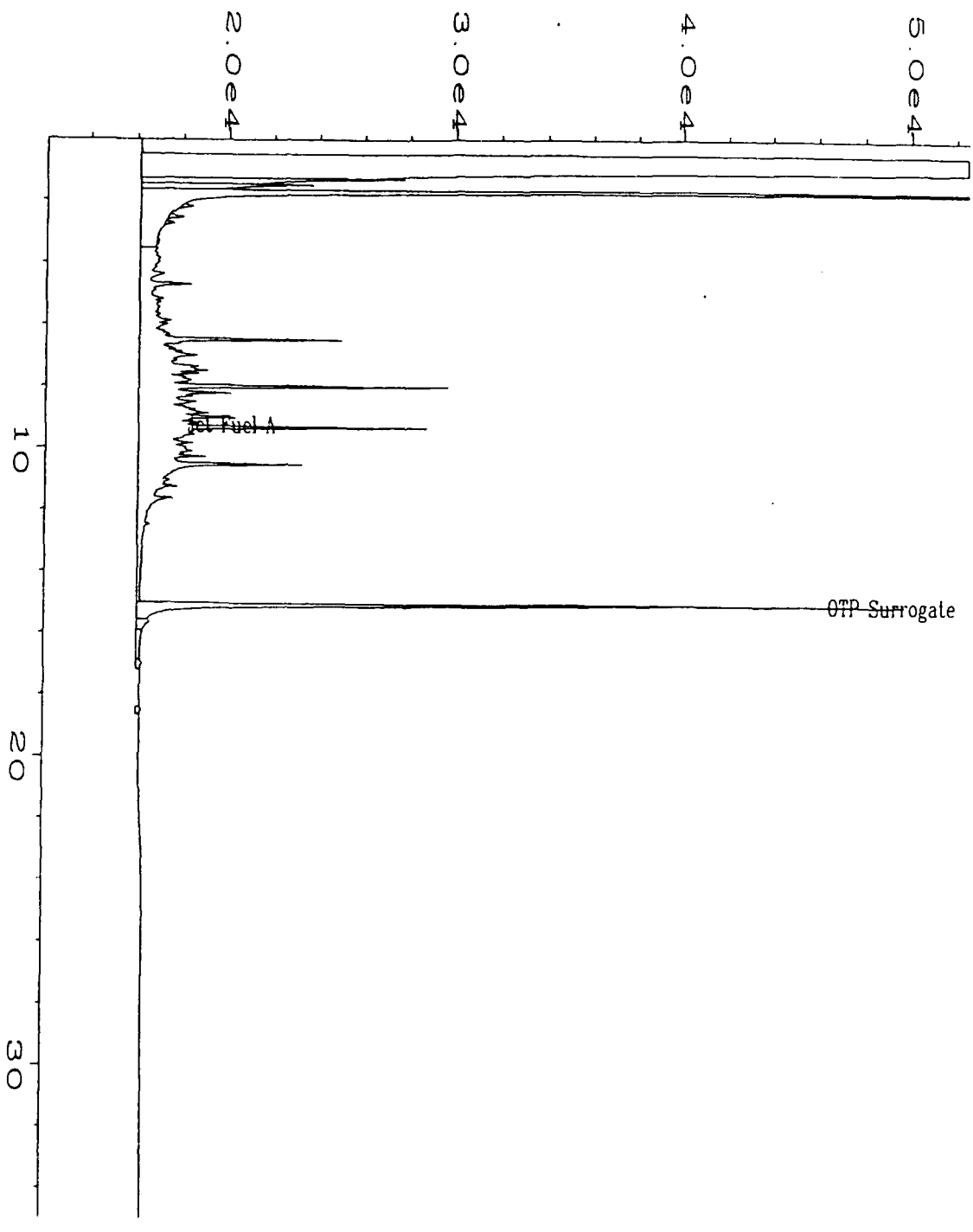
LCS Number	: LCS040495	Matrix	: WATER
Date Prepared	: 4/3/95	Method Number	: 3500/MOD.8015
Date Analyzed	: 4/5/95		
Sequence Number	: JET10		

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/ L	LCS % Recovery	QC Limit % Recovery
JET FUEL	1000	855	86%	70%-130%

QUALIFIERS
U = TEH analyzed for but not detected.
B = TEH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\jet0405\010R0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 10
Sample Name	: LCS040495 R	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 05 Apr 95 06:22 PM	Instrument Method	: FID1BASE.MTH
Report Created on	: 06 Apr 95 08:56 AM	Analysis Method	: JET0405.MTH
Last Recalib on	: 06 APR 95 08:52 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
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TOTAL EXTRACTABLE HYDROCARBONS (TEH)
Laboratory Control Sample (LCS)

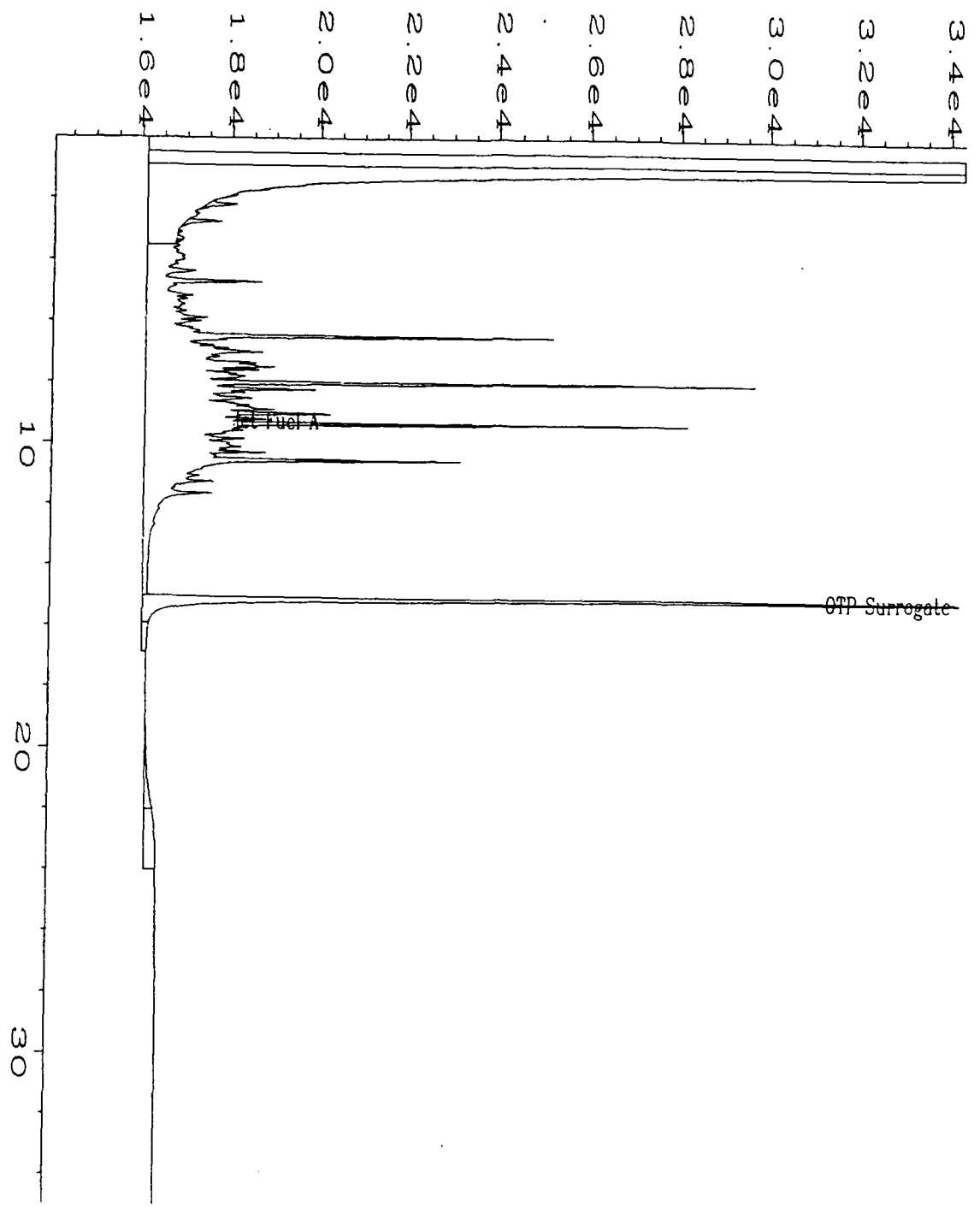
LCS Number	: LCS040495	Matrix	: WATER
Date Prepared	: 4/3/95	Method Number	: 3500/MOD.8015
Date Analyzed	: 4/4/95		
Sequence Number	: JET10		

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/ L	LCS % Recovery	QC Limit % Recovery
JET FUEL	1000	834	83%	70%-130%

QUALIFIERS
U = TEH analyzed for but not detected.
B = TEH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\JET0404\010R0801.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TEH	Vial Number	: 10
Sample Name	: LCS040495	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
quired on	: 04 Apr 95 07:03 PM	Instrument Method	: JET0404.MTH
Report Created on	: 05 Apr 95 01:33 PM	Analysis Method	: JET0404.MTH
Last Recalib on	: 05 APR 95 10:34 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

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Miscellaneous Analyses

Date Sampled	: 3/31/95	Client Project ID.	: 722450-21020 /MacDill AFB
Date Received	: 4/1/95	Lab Project No.	: 95-1063
Date Prepared	: 4/1/95	Method	: EPA 300.0
Date Analyzed	: 4/1/95	Detection Limit	: 0.250 mg/L

Evergreen Sample #	Client Sample ID	Matrix	Chloride (mg/L)
X05167	MD75-MW16	Water	9.51
X05168	75MP-2S	Water	13.4
X05169	MD75-MW12	Water	11.0
X05171	MD75-MW3	Water	10.0
X05172	MD75-MW8	Water	14.4
X05173	MD75-MW14	Water	13.5
X05174	75MP-4S	Water	24.8
X05175	MD75-MW4	Water	16.8
X05176	MD75-MW24	Water	16.0
X05177	MD75-MW6	Water	7.37
X05177 dup	MD75-MW6 dup	Water	7.26
Method Blank (4/1/95)			<0.250

Quality Assurance

	True Value (mg/L)	Result (mg/L)	% Recovery
Alltech Anion Mixture A Lot #J-I0N01134	20.0	18.8	94.0

Analyst

Approved

1063tm.4

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

			722450-21020
Date Sampled	: 3/31/95	Client Project ID.	: /MacDill AFB
Date Received	: 4/1/95	Lab Project No.	: 95-1063
Date Prepared	: 4/1/95	Method	: EPA 300.0
Date Analyzed	: 4/1/95	Detection Limit	: 0.076 mg/L

Evergreen Sample #	Client Sample ID	Matrix	Nitrite-N (mg/L)
X05167	MD75-MW16	Water	<0.076
X05168	75MP-2S	Water	<0.076
X05169	MD75-MW12	Water	<0.076
X05171	MD75-MW3	Water	<0.076
X05172	MD75-MW8	Water	<0.076
X05173	MD75-MW14	Water	<0.076
X05174	75MP-4S	Water	0.125
X05175	MD75-MW4	Water	<0.076
X05176	MD75-MW24	Water	<0.076
X05177	MD75-MW6	Water	<0.076
X05177 dup	MD75-MW6 dup	Water	<0.076
Method Blank (4/1/95)			<0.076

Quality Assurance**

	True Value (mg/L)	Result (mg/L)	% Recovery
Alltech Anion Mixture A Lot #J-I0N01134	21.0	21.6	103

** = Quality assurance results reported as Nitrite (NO_2)

Analyst

Approved

1063tm.4

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

Date Sampled	: 3/31/95	Client Project ID.	: 722450-21020 /MacDill AFB
Date Received	: 4/1/95	Lab Project No.	: 95-1063
Date Prepared	: 4/1/95	Method	: EPA 300.0
Date Analyzed	: 4/1/95	Detection Limit	: 0.056 mg/L

Evergreen Sample #	Client Sample ID	Matrix	Nitrate-N (mg/L)
X05167	MD75-MW16	Water	<0.056
X05168	75MP-2S	Water	0.060
X05169	MD75-MW12	Water	<0.056
X05171	MD75-MW3	Water	<0.056
X05172	MD75-MW8	Water	0.070
X05173	MD75-MW14	Water	0.072
X05174	75MP-4S	Water	0.069
X05175	MD75-MW4	Water	0.082
X05176	MD75-MW24	Water	0.061
X05177	MD75-MW6	Water	0.162
X05177 dup	MD75-MW6 dup	Water	0.162
Method Blank (4/1/95)			<0.056

Quality Assurance**

	True Value (mg/L)	Result (mg/L)	% Recovery
Alltech Anion Mixture A Lot #J-I0N01134	20.0	17.7	88.5

** = Quality assurance results reported as Nitrate (NO_3)

Analyst

Approved

1063tm.4

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

			722450-21020
Date Sampled	: 3/31/95	Client Project ID.	: /MacDill AFB
Date Received	: 4/1/95	Lab Project No.	: 95-1063
Date Prepared	: 4/1/95	Method	: EPA 300.0
Date Analyzed	: 4/1/95	Detection Limit	: 0.250 mg/L

Evergreen Sample #	Client Sample ID	Matrix	Sulfate(mg/L)
X05167	MD75-MW16	Water	1.23
X05168	75MP-2S	Water	3.15
X05169	MD75-MW12	Water	11.3
X05171	MD75-MW3	Water	22.8
X05172	MD75-MW8	Water	1.22
X05173	MD75-MW14	Water	1.92
X05174	75MP-4S	Water	1.82
X05175	MD75-MW4	Water	1.91
X05176	MD75-MW24	Water	1.57
X05177	MD75-MW6	Water	26.6
X05177 dup	MD75-MW6 dup	Water	26.3
Method Blank (4/1/95)			<0.250

Quality Assurance

	True Value (mg/L)	Result (mg/L)	% Recovery
Alltech Anion Mixture A Lot #J-I0N01134	30.0	29.0	96.7

Analyst

Approved

1063tm 4

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

Date Sampled	: 3/31/95	Client Project ID.	: 722450-21020 /MacDill AFB
Date Received	: 4/1/95	Lab Project No.	: 95-1063
Date Prepared	: 4/5/95	Method	: EPA 310.1
Date Analyzed	: 4/5/95	Detection Limit	: 5.00 $mgCaCO_3/L$

Evergreen Sample #	Client Sample ID	Matrix	Total Alkalinity ($mgCaCO_3/L$)
X05169	MD75-MW12	Water	18.4
X05171	MD75-MW3	Water	61.5
X05172	MD75-MW8	Water	138
X05172 dup	MD75-MW8 dup	Water	136
X05175	MD75-MW4	Water	300
X05176	MD75-MW24	Water	286
Method Blank (4/5/95)			<5.00

Quality Assurance

	True Value ($mgCaCO_3/L$)	Result ($mgCaCO_3/L$)	% Recovery
APG Minerals Reference Lot #13862	11.8	10.8	91.5

Analyst

Approved

10-3tm.10

External Standard Report

Data File Name : C:\HPCHEM\2\DATA\BX20415\014R0101.D
erator : T. Lockwood
Instrument : BTEX2
Sample Name : X05176;50;0.1
Run Time Bar Code:
Acquired on : 15 Apr 95 08:36 PM
Report Created on: 16 Apr 95 04:42 PM
Last Recalib on : 16 Apr 95 03:38 PM
Multiplier : 1 X50

Page Number : 1
Vial Number : 14
Injection Number : 1
Sequence Line : 1
Instrument Method: BX20415.MTH
Analysis Method : BX20415A.MTH
Sample Amount : 0
ISTD Amount :

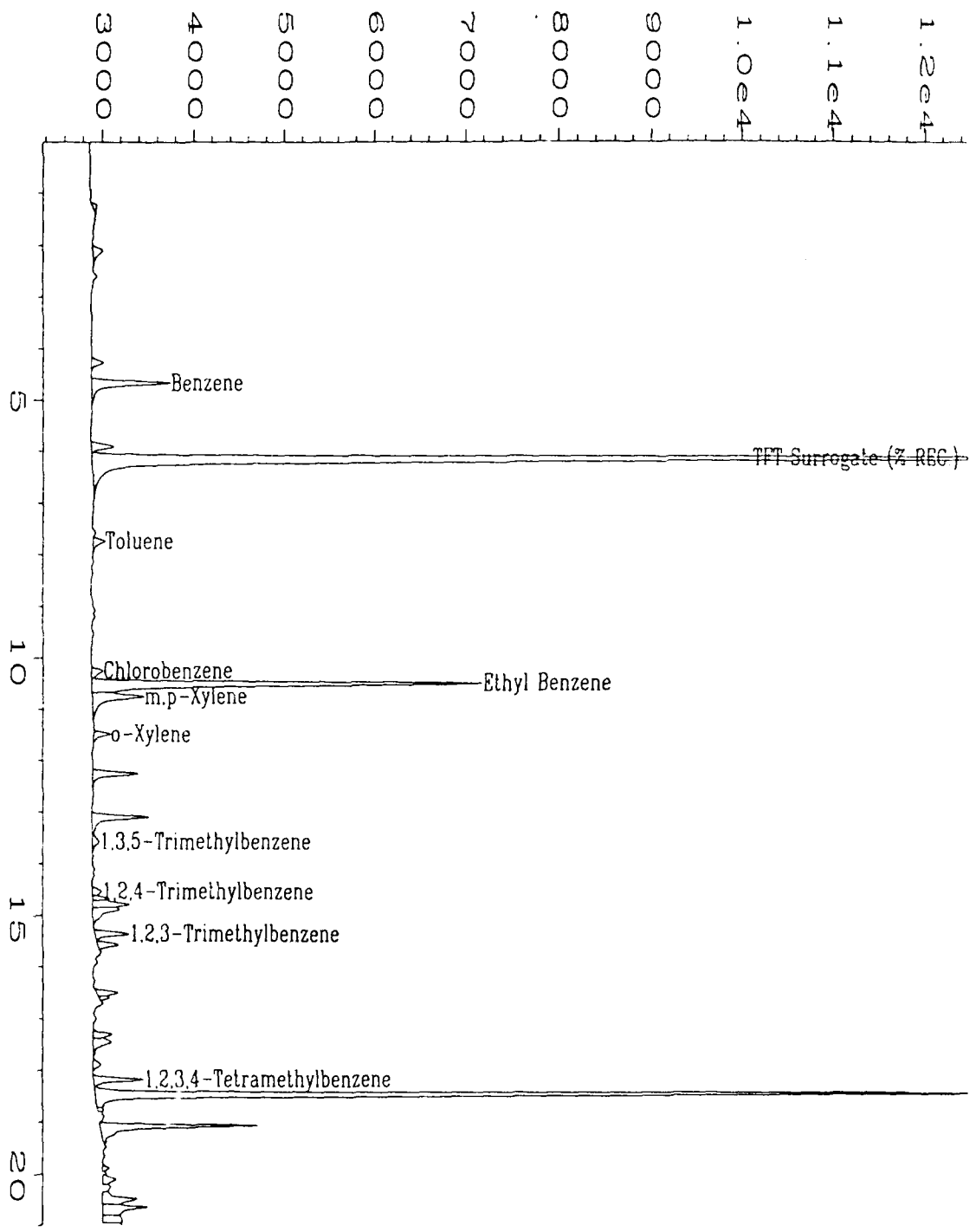
Sig. 2 in C:\HPCHEM\2\DATA\BX20415\014R0101.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
4.660	5594	BB	0.098	1	1.914	Benzene X50
6.143	86867	VB	0.096	1-R	87.270	TFT Surrogate (% REC.)
7.728	902	VB	0.104	1	0.350	Toluene
10.247	810	BV	0.102	1	0.373	Chlorobenzene
10.493	24823	VV	0.089	1	10.830	Ethyl Benzene X50
10.741	4517	VB	0.116	1	~~1.605~~	~~m,p-Xylene~~ X50 = B ck mac
11.477	958	BB	0.084	1	~~0.431~~	~~o-Xylene~~
13.561	724	VB	0.149	1	0.223	1,3,5-Trimethylbenzene
14.531	656	BV	0.113	1	0.296	1,2,4-Trimethylbenzene
15.354	1942	PV	0.085	1	0.969	1,2,3-Trimethylbenzene
18.173	2698	PV	0.079	1	1.446	1,2,3,4-Tetramethylbenzene B

Time Reference Peak	Expected RT	Actual RT	Difference
2	6.120	6.143	0.023

Holding time up

not used



Data File Name	: C:\HPCHEM\2\DATA\BX20415\014R0101.D		
Operator	: T. Lockwood	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 14
Sample Name	: X05176;50;0.1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 15 Apr 95 08:36 PM	Instrument Method	: BX20415.
Report Created on	: 16 Apr 95 04:42 PM	Analysis Method	: BX20415A.M
Last Recalib on	: 16 Apr 95 03:38 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\BX10417\017F1001.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05175;20;0.250
Run Time Bar Code:
Acquired on : 17 Apr 95 04:31 PM
Report Created on: 17 Apr 95 07:29 PM
Last Recalib on : 17 APR 95 07:07 PM
Multiplier : 20
Sample Info : Project#: 95-1063 Client#: MD75-MW4 Water

Page Number : 1
Vial Number : 17
Injection Number : 1
Sequence Line : 10
Instrument Method: BX10417A.MTH
Analysis Method : BX10417B.MTH
Sample Amount : 0
ISTD Amount :

Sig. 1 in C:\HPCHEM\1\DATA\BX10417\017F1001.D

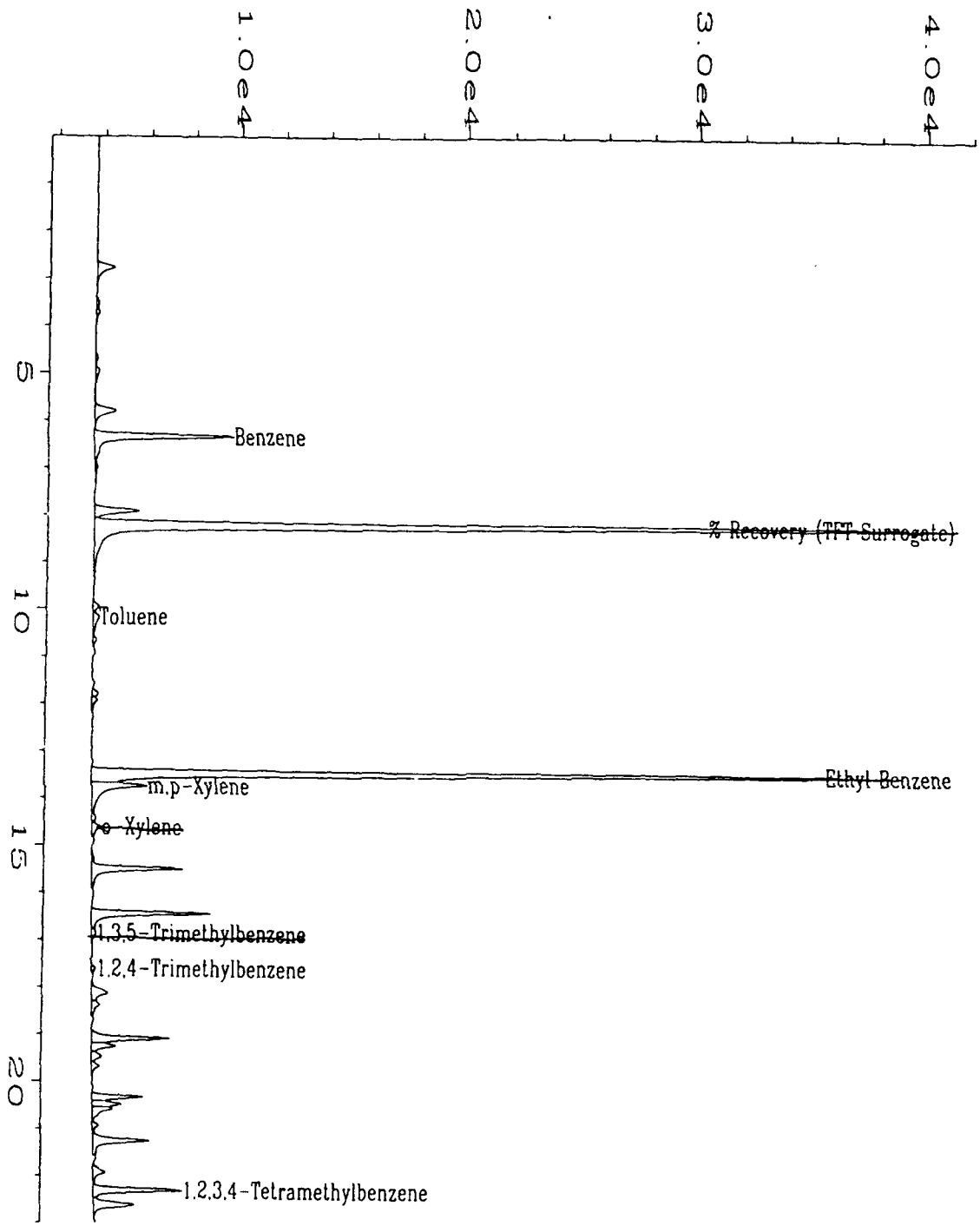
Ret Time	Area	Type	Width	Ref#	ug/L	Name
6.333	43572	VV	0.107	1	94.359	Benzene
8.218	261271	VV	0.106	1-R	1699.725	% Recovery (TFT Surrogate) 85%
10.172	3841	VV	0.196	1	9.015	Toluene
13.196	* not found *			1		Chlorobenzene
13.464	209657	VV	0.091	1	583.727	Ethyl Benzene
13.741	23300	VV	0.134	1	52.583	m,p-Xylene
14.613	3728	VV	0.129	1	9.673	o-Xylene
16.871	1985	VV	0.165	1	4.440	1,3,5-Trimethylbenzene
17.610	1119	PV	0.094	1	3.417	1,2,4-Trimethylbenzene
18.722	* not found *			1		1,2,3-Trimethylbenzene
22.301	22466	VV	0.089	1	92.176	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
2	8.275	8.218	-0.057

Not all calibrated peaks were found

Holding Time up

Not used for QC



Data File Name : C:\HPCHEM\1\DATA\BX10417\017F1001.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05175;20;0.250
Run Time Bar Code:
Acquired on : 17 Apr 95 04:31 PM
Report Created on: 17 Apr 95 07:30 PM
Last Recalib on : 17 APR 95 07:07 PM
Multiplier : 20
Sample Info : Project#: 95-1063 Client#: MD75-MW4 Water

Page Number : 1
Vial Number : 17
Injection Number : 1
Sequence Line : 10
Instrument Method: BX10417.
Analysis Method : BX10417B.M
Sample Amount : 0
ISTD Amount :

pm 4/28/95

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\BX10417\016F1001.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05174;20;0.250
Run Time Bar Code:
Acquired on : 17 Apr 95 03:51 PM
Report Created on: 17 Apr 95 07:28 PM
Last Recalib on : 17 APR 95 07:07 PM
Multiplier : 20

Page Number : 1
Vial Number : 16
Injection Number : 1
Sequence Line : 10
Instrument Method: BX10417A.MTH
Analysis Method : BX10417B.MTH
Sample Amount : 0
ISTD Amount :

Sample Info : Project#: 95-1063 Client#: 75MP-45 Water

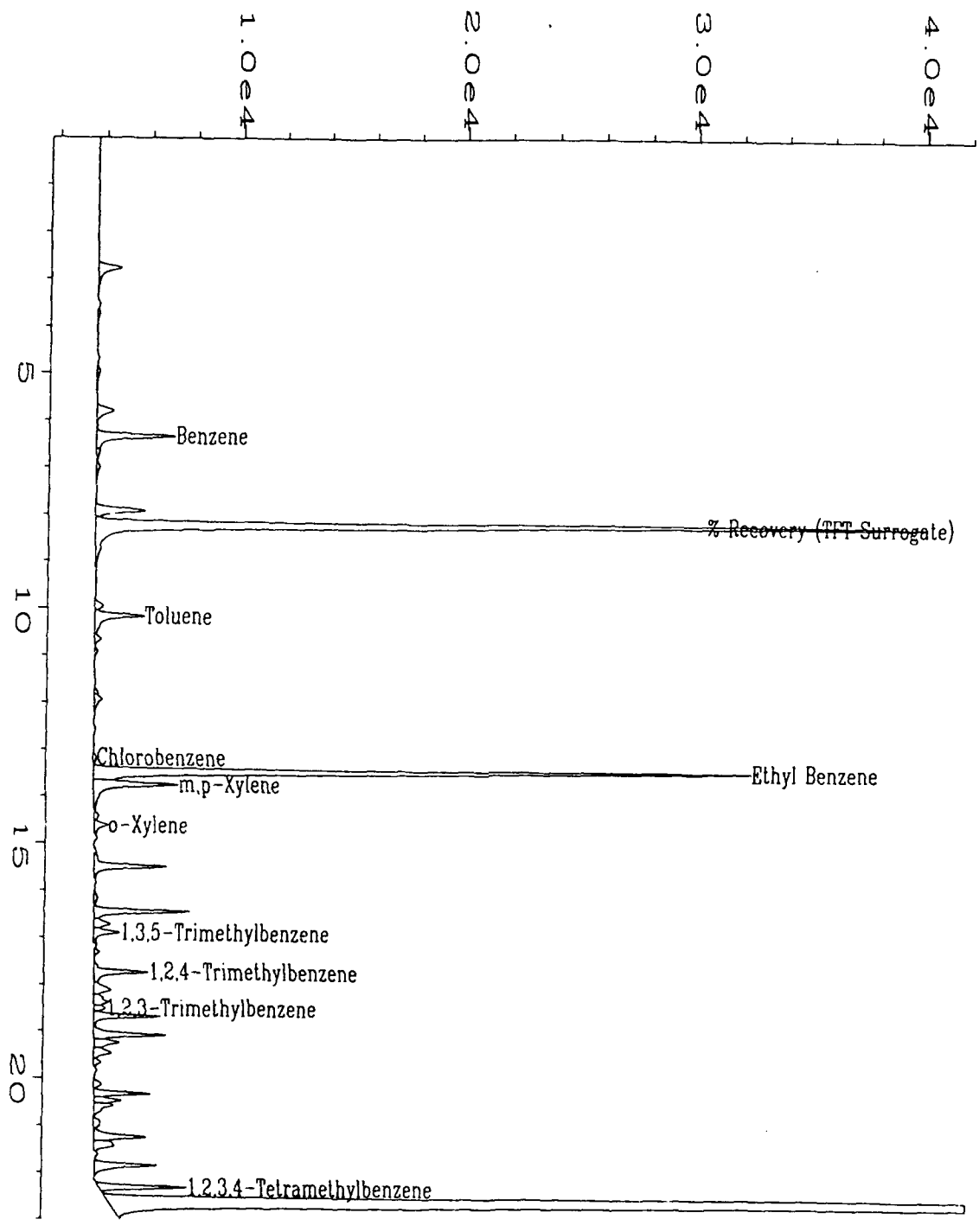
Sig. 1 in C:\HPCHEM\1\DATA\BX10417\016F1001.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
6.330	24882	VV	0.107	1	53.885	Benzene
8.213	252850	VV	0.106	1-R	1644.939	% Recovery (TFT Surrogate) 82%
10.151	16893	VV	0.114	1	39.647	Toluene
13.169	1325	VV	0.151	1	3.616	Chlorobenzene
13.456	165067	VV	0.088	1	459.579	Ethyl Benzene
13.738	29452	VV	0.115	1	66.467	m,p-Xylene
14.606	4565	VV	0.114	1	11.847	o-Xylene
16.889	7670	VV	0.102	1	17.154	1,2,5-Trimethylbenzene
17.726	15398	VV	0.096	1	47.038	1,2,4-Trimethylbenzene
18.503	2959	VV	0.087	1	9.089	1,2,3-Trimethylbenzene
22.302	19127	PV	0.079	1	78.479	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
2	8.275	8.213	-0.062

Holding Time up

Not used pp



Data File Name	: C:\HPCHEM\1\DATA\BX10417\016F1001.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 16
Sample Name	: X05174;20;0.250	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 10
Acquired on	: 17 Apr 95 03:51 PM	Instrument Method	: BX10417F
Report Created on	: 17 Apr 95 07:29 PM	Analysis Method	: BX10417B...
Last Recalib on	: 17 APR 95 07:07 PM	Sample Amount	: 0
Multiplier	: 20	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: 75MP-45 Water		

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\BX10413\059F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05172;10;500ul
Run Time Bar Code:
Acquired on : 15 Apr 95 01:57 AM
Report Created on: 27 Apr 95 07:38 PM
Last Recalib on : 15 APR 95 01:55 PM
Multiplier : ~~0.5~~ 10
Sample Info : Project#: 95-1063 Client#: MD75-MW8 Water

Page Number : 1
Vial Number : 59
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10414.MTH
Analysis Method : BX10414B.MTH
Sample Amount : 0
ISTD Amount :

$\left(\frac{10}{0.5}\right) = 20$

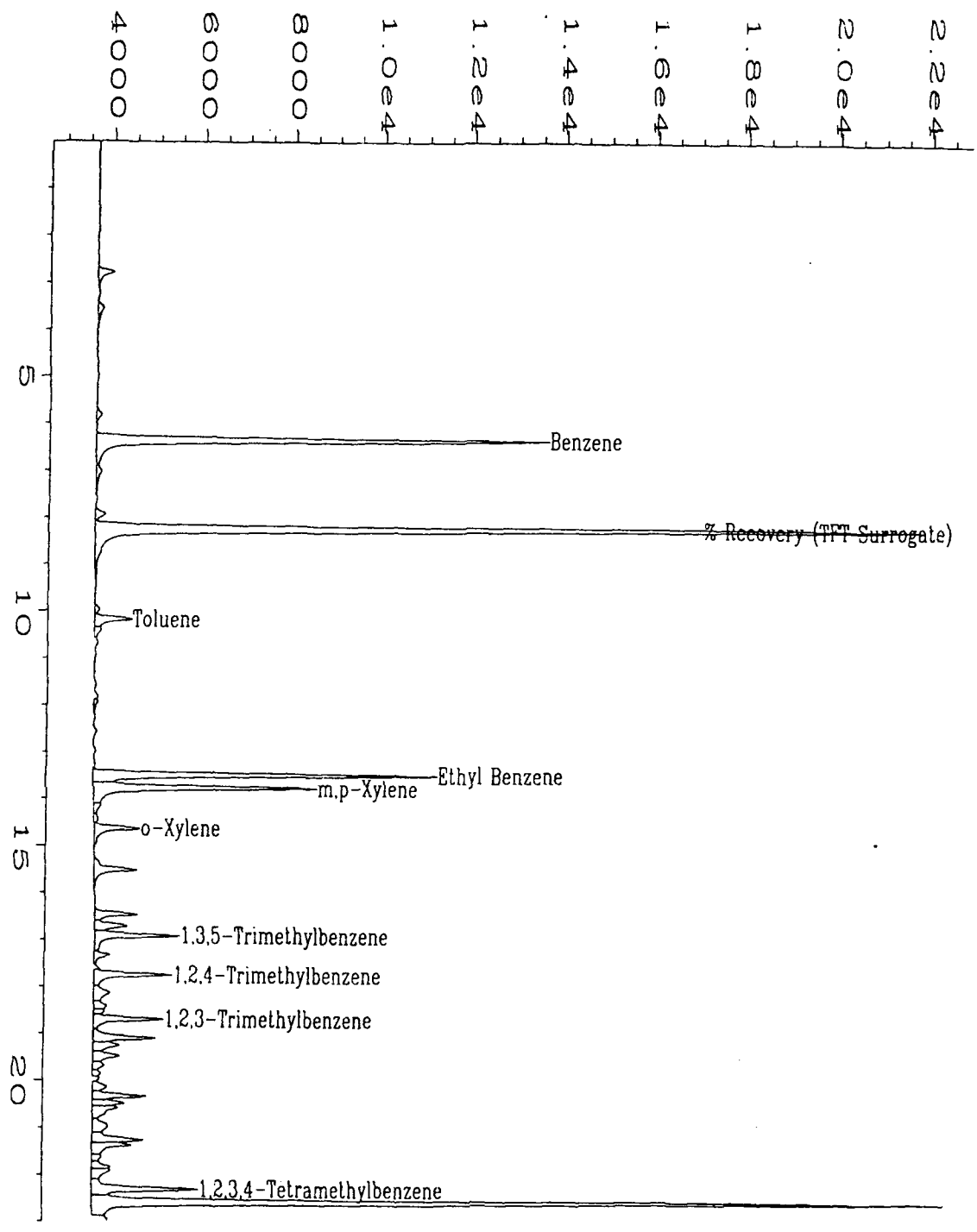
Sig. 1 in C:\HPCHEM\1\DATA\BX10413\059F0101.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
6.342	67582	VV	0.103	1	7.299	Benzene x20 x20
8.231	124091	VV	0.105	1-R	40.116	% Recovery (TFT Surrogate) 80%
10.170	5850	VV	0.105	1	0.675	Toluene
13.189	* not found *			1		Chlorobenzene
13.484	43118	VV	0.086	1	5.791	Ethyl Benzene x20
13.764	32604	VV	0.099	1	3.539	m,p-Xylene
14.632	7187	VV	0.106	1	0.906	o-Xylene
16.917	12049	VV	0.096	1	1.211	1,3,5-Trimethylbenzene
17.754	10787	VV	0.094	1	1.481	1,2,4-Trimethylbenzene
18.694	9541	VV	0.093	1	1.426	1,2,3-Trimethylbenzene
22.309	15804	HH	0.101	1	2.847	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
2	8.228	8.231	0.003

Not all calibrated peaks were found

past holding time
Rec'd DF = 1



Data File Name	: C:\HPCHEM\1\DATA\BX10413\059F0101.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 59
Sample Name	: X05172;10;500ul	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 15 Apr 95 01:57 AM	Instrument Method	: BX10414 H
Report Created on	: 27 Apr 95 07:38 PM	Analysis Method	: BX10414B.MT
Last Recalib on	: 15 APR 95 01:55 PM	Sample Amount	: 0
Multiplier	: 0.5	ISTD Amount	:
Sample Info	: Project#: 95-1063 Client#: MD75-MW8 Water		

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\BX10417\015F1001.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05173;20;0.250
Run Time Bar Code:
Acquired on : 17 Apr 95 03:12 PM
Report Created on: 17 Apr 95 07:28 PM
Last Recalib on : 17 APR 95 07:07 PM
Multiplier : 20
Sample Info : Project#: 95-1063 Client#: MD75-MW14 Water

Page Number : 1
Vial Number : 15
Injection Number : 1
Sequence Line : 10
Instrument Method: BX10417A.MTH
Analysis Method : BX10417B.MTH
Sample Amount : 0
ISTD Amount :

Sig. 1 in C:\HPCHEM\1\DATA\BX10417\015F1001.D

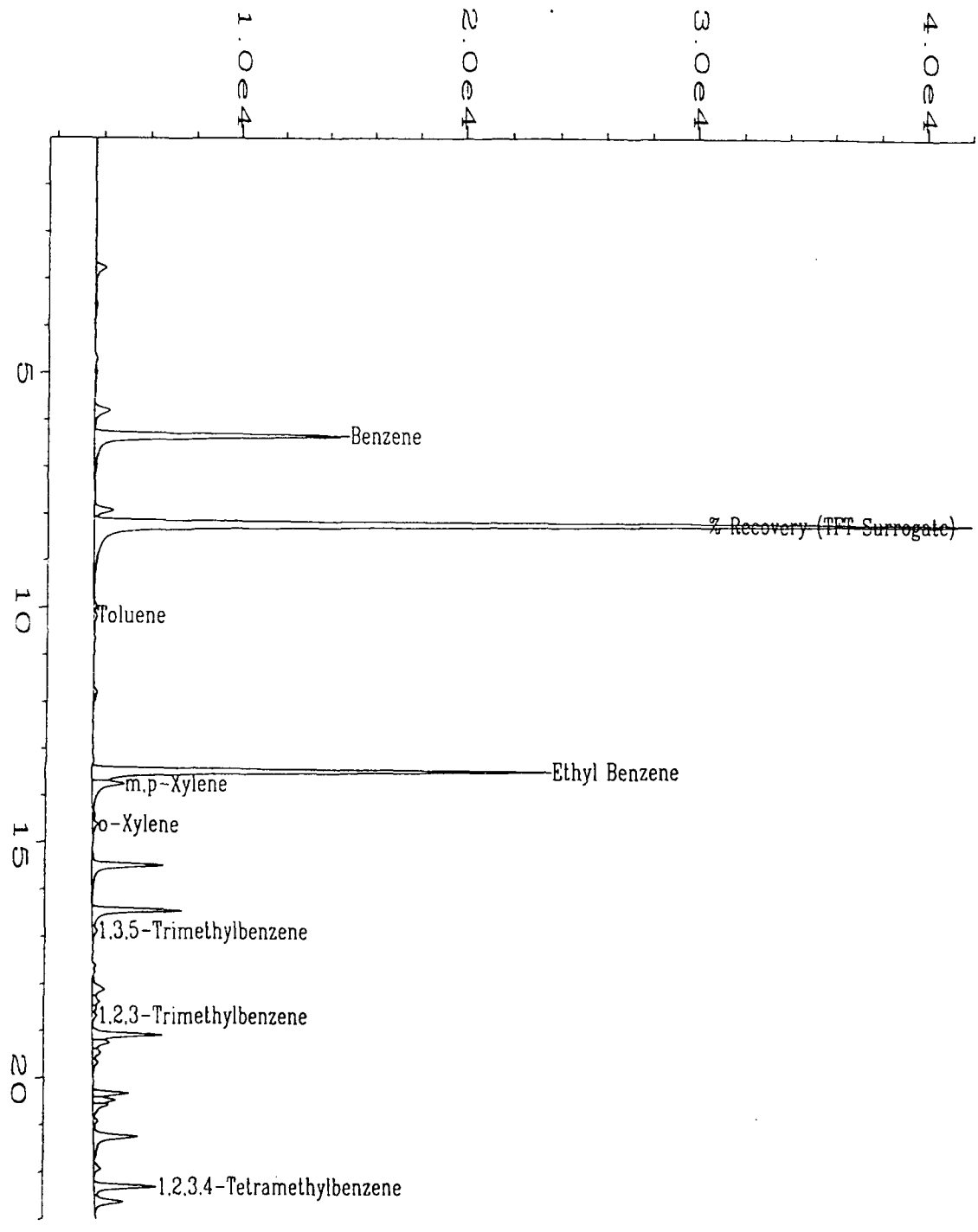
Ret Time	Area	Type	Width	Ref#	ug/L	Name
6.329	80094	VV	0.108	1	173.451	Benzene
8.214	279353	VV	0.107	1-R	1817.356	% Recovery (TFT Surrogate)
10.158	2133	VV	0.192	1	5.006	Toluene
13.196	* not found *			1		Chlorobenzene
13.453	118673	VV	0.090	1	330.408	Ethyl Benzene
13.732	14373	VV	0.144	1	32.436	m,p-Xylene
14.603	2380	VV	0.141	1	6.176	o-Xylene
16.876	2003	VV	0.149	1	4.479	1,3,5-Trimethylbenzene
17.775	* not found *			1		1,2,4-Trimethylbenzene
18.670	1658	VV	0.120	1	5.092	1,2,3-Trimethylbenzene
22.293	15313	PV	0.089	1	62.829	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
2	8.275	8.214	-0.061

Not all calibrated peaks were found

Holding Time up

not used pc



Data File Name	: C:\HPCHEM\1\DATA\BX10417\015F1001.D		
Operator	: C.J. Cook	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 15
Sample Name	: X05173;20;0.250	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 10
Acquired on	: 17 Apr 95 03:12 PM	Instrument Method	: BX10417
Report Created on	: 17 Apr 95 07:40 PM	Analysis Method	: BX10417B.M
Last Recalib on	: 17 APR 95 07:07 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Evergreen

CASE NARRATIVE

Evergreen Analytical Laboratory (EAL) Project #: 95-1044

Parsons Engineering Science, Inc. (PES) Project: MacDill AFB (722450.21020)

Sample Receipt

On March 31, 1995, 26 water samples, one field blank and two trip blanks were received in good condition at EAL with the following discrepancies: the alkalinity bottle for MD75-MW5 was labeled MW4; all bottles for MD75-2 were labeled MD75-MW2 except the bottle for anions which was labeled MW1; alkalinity and TOC bottles were missing for 75MP-8D; there were extra TOC bottles for 75MP-8S and 75MP-9D; TOC bottles were missing for 75MP-8S MSD, and 75MP-9S; alkalinity bottles were missing for 75MP-9D, 75MP-9S and MD75-MW13; anion bottles were received but not listed on the chain of custody for 75MP-9D, 75MP-9S and MD75-MW13.

These discrepancies were handled as follows per instructions from John Hicks and Mark Vessely of PES: the alkalinity bottle MD75-MW4 was relabeled MW5; the sample IDs for MD75-2 were corrected to read MD75-MW2; alkalinity and TOC samples were not taken for 75MP-8D; the TOC bottle labeled for 75MP-9D was relabeled 75MP-9S; bottles for alkalinity 75MP-9D, 75MP-9S and MD75-MW13 were reassigned for anions.

There were several sets of MS/MSD samples submitted to cover those missing from previous sample shipments. The aliquots had already been taken for those samples, therefore, only one set of MS/MSD samples per method were used on this project.

Refer to the EAL Sample Log Sheet for specific log-in information and cross-reference of EAL and PES sample identifications.

BTEX, Water Matrix, Method 602

All samples were analyzed within holding times except MD75-MW9 which was re-run outside holding times to confirm low surrogate recovery,(64% vs 70%). The sample was also analyzed at a 10x dilution 4 days out of holding time for 1,2,3,4-tetramethylbenzene. The original results are reported.

The Method Blank MB041295 exhibited toluene and total xylene contamination at less than 1 ppb.

There were no other quality control anomalies to report.

Total Volatile Hydrocarbons (TVH), Water Matrix, Method 8015M
There were no quality control anomalies to report.

General Chemistry
Samples submitted for MS/MSD analyses for alkalinity and TOC are not appropriate to the method.

There were no quality control anomalies to report.

P McClellan

Patricia A. McClellan, Project Manager

Evergreen Analytical Sample Log Sheet

Project # 95-1044

Date(s) Sampled: 03/29,30/95 COC

Date Due: 04/05/95-BTEX,TVPH
04/14/95-OTHERS

Date Received: 03/31/95 0900

Holding Time(s): 3/31,4/1-NO_2^-,NO_3^-
04/12,13-BTEX,TVPH,ALKALINITY

Client Project I.D. 722450.21020/MAC DILL

Rush STANDARD

Client: Parsons Engineering Science, Inc.

Address: 1700 Broadway Suite 900
Denver, CO 80290

Contact: TODD WEIDEMEIER

Client P.O. _____

Phone #831-8100 **Fax #**831-8208

Shipping Charges N/A

E.A. Cooler # 218,612

Airbill # FED EX 9581826380,
9581826542

Custody Seal Intact? Y
Cooler X Bottles ___
COC Present Y
Sample Tags Present? Y
Sample Tags Listed? Y
Sample(s) Sealed? Y

Special Invoicing/Billing _____

Special Instructions AN MS/MSD AND LAB DUPLICATE IS TO ANALYZED ON THIS PROJECT. * ALL BTEX SAMPLES ARE TO INCLUDE CHLOROBENZENE, TMB AND TEMB

★SAMPLE ID PER SPECIAL INSTRUCTIONS ATTACHED.

Lab #	Client ID#	Analysis	Mtx	Btl	Loc
X05056A/B	56 MP-2S	* BTEX	W	40V	2
X05057A/B	56 MP-7S	* BTEX	W	40V	2
X05058C/D	MATRIX SPIKE	HOLD	W	40V	2
X05059C/D	MATRIX SPIKE DUP	HOLD	W	40V	2
X05060A/B	MD56-MW4	* BTEX	W	40V	2
X05061C/D	MATRIX SPIKE	HOLD	W	40V	2
X05062C/D	MATRIX SPIKE DUP	HOLD	W	40V	2
X05063A/B	MD 75-MW5	* BTEX	W	40V	2
X05064C/D	MATRIX SPIKE	HOLD	W	40V	2
X05065C/D	MATRIX SPIKE DUP	HOLD	W	40V	2
X05066A/B	MD75-MW1	* BTEX	W	40V	2
X05067A/B	75MP-5D	* BTEX	W	40V	2
X05068A/B	75MP-6D	* BTEX	W	40V	2
X05069A/B	MD75-MW2	* BTEX	W	40V	2
X05070A	TRIP BLANK	* BTEX	W	40V	2

R=Sample to be returned

Route To: GC/MS ___ GC 3 Metals ___ Wet Chem 3 SxPrep ___ Acctg 1
SxRec C QA/QC C Sales C File Orig

Page 1 of 1 Page(s)

Custodian/Date: 3/31/95
Rm 4/4/95

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
X05071A/B	75MP-8D	* BTEX	W	40V	2
X05072A/B	75MP-8S	* BTEX	W	40V	2
X05073A/B	75MP-28S	* BTEX	W	40V	2
X05074A/B	75MP-8S (MS)	* BTEX	W	40V	2
X05075A/B	75MP-8S (MSD)	* BTEX	W	40V	2
X05076A	RINSEATE BLANK	* BTEX	W	40V	2
X05077A	FIELD BLANK	* BTEX	W	40V	2
X05078A/B	75MP-9D	* BTEX	W	40V	2
X05079A/B	75MP-9S	* BTEX	W	40V	2
X05080A/B	MD75-MW13	* BTEX	W	40V	2
X05081A/B	MD75-MW11	* BTEX	W	40V	2
X05082A/B	MD75-MW10	* BTEX	W	40V	2
X05083A/B	MD75-MW9	* BTEX	W	40V	2
X05084A/B	TRIP BLANK	* BTEX	W	40V	2
X05056C/D	56 MP-2S	TVPH	W	40V	2
X05057C/D	56 MP-7S	TVPH	W	40V	2
X05058C/D	MATRIX SPIKE	HOLD	W	40V	2
X05059C/D	MATRIX SPIKE DUP	HOLD	W	40V	2
X05060C/D	MD56-MW4	TVPH	W	40V	2
X05061C/D	MATRIX SPIKE	HOLD	W	40V	2
X05062C/D	MATRIX SPIKE DUP	HOLD	W	40V	2
X05063C/D	MD75-MW5	TVPH	W	40V	2
X05064C/D	MATRIX SPIKE	HOLD	W	40V	2
X05065C/D	MATRIX SPIKE DUP	HOLD	W	40V	2
X05066C/D	MD75-MW1	TVPH	W	40V	2
X05067C/D	75MP-5D	TVPH	W	40V	2
X05068C/D	75MP-6D	TVPH	W	40V	2
X05069C/D	MD75-MW2	TVPH	W	40V	2
X05071C	75MP-8D	TVPH	W	40V	2
X05072C/D	75MP-8S	TVPH	W	40V	2
X05073C/D	75MP-28S	TVPH	W	40V	2
X05074C/D	75MP-8S (MS)	TVPH	W	40V	2
X05075C	75MP-8S (MSD)	TVPH	W	40V	2
X05078C/D	75MP-9D	TVPH	W	40V	2
X05079C	75MP-9S	TVPH	W	40V	2
X05080C/D	MD75-MW13	TVPH	W	40V	2

Project # 95- 1044

R=Sample to be returned

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
5081C/D	MD75-MW11	TVPH	W	40V	2
X05082C/D	MD75-MW10	TVPH	W	40V	2
X05083C/D	MD75-MW9	TVPH	W	40V	2
X05056	56 MP-2S	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05057	56 MP-7S	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05058	MATRIX SPIKE	HOLD	W	125P	2
X05059	MATRIX SPIKE DUP	HOLD	W	125P	2
X05060	MD56-MW4	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05061	MATRIX SPIKE	HOLD	W	125P	2
X05062	MATRIX SPIKE DUP	HOLD	W	125P	2
X05063	MD75-MW5	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05064	MATRIX SPIKE	HOLD	W	125P	2
X05065	MATRIX SPIKE DUP	HOLD	W	125P	2
X05066	MD75-MW1	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05067	75MP-5D	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05068	75MP-6D	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05069	★ MD75-MW2	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
5072	75MP-8S	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05073	75MP-28S	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05074	75MP-8S (MS)	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05075	75MP-8S (MSD)	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05081	MD75-MW11	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05082	MD75-MW10	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05083	MD75-MW9	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05071	75MP-8D	ANIONS Cl^-,NO_2^-,NO_4^-, SO_4^{-2}	W	125P	C2
X05078	75MP-9D	ANIONS Cl^-,NO_2^-,NO_4^-,SO_4^{-2}	W	250P	C2
X05079	75MP-9S	ANIONS Cl^-,NO_2^-,NO_4^-,SO_4^{-2}	W	250P	C2
X05080	MD75-MW13	ANIONS Cl^-,NO_2^-,NO_4^-,SO_4^{-2}	W	250P	C2
X05057	56 MP-7S	ALKALINITY	W	250P	C2
X05060	MD56-MW4	ALKALINITY	W	250P	C2
X05063	★ MD75-MW5	ALKALINITY	W	250P	C2
X05072	75MP-8S	ALKALINITY	W	250P	C2
X05073	75MP-28S	ALKALINITY	W	250P	C2
X05074	75MP-8S (MS)	HOLD	W	250P	C2

Project # 95-1044

R=Sample to be returned

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
X05075	75MP-8S (MSD)	HOLD	W	250P	C2
X05081	MD75-MW11	ALKALINITY	W	250P	C2
X05057	56 MP-7S	TOC	W	250A	C2
X05060	MD56-MW4	TOC	W	250A	C2
X05063	MD75-MW5	TOC	W	250A	C2
X05075	75MP-8S (MSD)	TOC	W	250A	C2
X05072	75MP-8S	TOC	W	250A	C2
X05073	75MP-28S	TOC	W	250A	C2
X05074	75MP-8S (MS)	TOC	W	250A	C2
X05079	75MP-9S	TOC	W	250A	C2

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons Engineering Science
ADDRESS 1700 Broadway, Suite 900
CITY Denver STATE CO ZIP 80290
PHONE# 303-831-8100 FAX # _____ FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Niedermeier
PROJECT I.D. 722450.21020
EAL. QUOTE # _____ P.O.# _____
TURNAROUND REQUIRED* 30 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Mark Vessely
(print) MARK VESSELY

Evergreen Analytical Cooler No. 218
Cooler Received _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen 40 V	BTEX 8020/602 (circle)/MTBE (circle)	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline) 40 V	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Alkalinity 250P	Toc 250A	Anions 125P				EAL Sample No.
56 MP-2S	3/29/95	8:00	5	X										X		Y						X				X05056
56 MP-7S	3/29/95	8:45	7	X										X		X				X	X	X				57
MATRIX Spike	3/29/95	8:45	5	X						HOLD				X		X						X				58
Matrix Spike dup	3/29/95	8:45	5	X						HOLD				X		X						X				59
MD56-MW4	3/29/95	9:45	7	X										X		X				X	X	X				60
matrix Spike	3/29/95	9:45	5	X						HOLD				X		X						X				61
matrix Spike dup	3/29/95	9845	5	X						HOLD				X		X						X				62
MD75-MW5	3/29/95	10:45	7	X										X		X		Tabled		X	X	X				63
matrix Spike	3/29/95	10:45	5	X						HOLD				X		X						X				64
Matrix Spike dup	3/29/95	10:45	5	X						HOLD				X		X						X				65
HT:																										Location C2,2
DD:																										Container Size

EAL use only
Do not write in shaded area

EAL Project # 1044
Custodian _____

Instructions: Samples packed in ICE

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Mark Vessely	3/29/95 1700	Fed ex		Fed ex		Lee Norton	3/31/95

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons Engineering Science
ADDRESS 1700 Broadway, Suite 900
CITY Denver STATE CO ZIP 80290
PHONE # 303-831-8100 FAX # _____ FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Wiemeier
PROJECT I.D. 722450.21020
EAL. QUOTE # _____ P.O.# _____
TURNAROUND REQUIRED* 30 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Mark Vessely
(print) MARK VESSELY
Evergreen Analytical Cooler No. 218
Cooler Received _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	ANALYSIS REQUESTED	EAL Sample No.
MO75-MW1	3/29/95	11:30	5	X			BTEX 8020/602 (circle)/MTBE (circle) Flow Rate MB; TVPH 8015mod. (Gasoline) 40V; Alkalinity 250P; Anions 250A; Tot 125P	X050666
75MP-5D	3/29/95	12:15	5	X			BTEX; TVPH; Alkalinity; Anions	67
75MP-6D	3/29/95	13:30	5	X			BTEX; TVPH; Alkalinity; Anions	68
MO75-~~2~~MW2	3/29/95	14:15	5	X			BTEX; TVPH; Alkalinity; Anions; labelled MW2 on mw2	69
Trip Blank			1				BTEX	70
HT:								Location C2,2
DD:								Container Size

EAL use only
Do not write in shaded area

EAL Project # 1044
Custodian _____

Instructions: See Page 1

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Mark Vessely	3/29/95	Fedex		Fedex		Fed Common	3/31/95 9:00

Evergreen Analytical Inc.

4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons Engineering Science
ADDRESS 1700 Broadway, Suite 900
CITY Denver STATE CO ZIP 80290
PHONE# 303-831-8100 FAX # FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Wiedemeier
PROJECT I.D. 722450.21020
EAL. QUOTE # P.O.#
TURNAROUND REQUIRED* 30 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Mark Vessely
(print) MARK VESSELY

Evergreen Analytical Cooler No. 612
Cooler Received

Please **PRINT** all information:

EAL use only
Do not write in shaded area

EAL Project # 1044
Custodian

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle) Ethanol Methanol	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Anions (Cl, NO3, SO4)	Alkalinity	TOC				EAL Sample No.
75MP-8D	3/30/95	10:45	10	X										X		X				X	X	X				X05071
75MP-8S	3/30/95	11:15	7	X										X		X				X	X	X				72
75MP-28S	3/30/95	11:15	7	X										X		X				X	X	X				73
MATRIX Spike	3/30/95	11:15	7	X										X		X				X	X	X	extra 75MP-8S			74
Matrix Spike Dup	3/30/95	11:15	10	X										X		X				X	X	X				75
Rinsate Blank	3/30/95	11:15	1	X										X												76
Field Blank	3/30/95	11:15	1											X												77
75MP-9D	3/30/95	12:00	10	X										X		X				X	X					78
75MP-9S	3/30/95	12:30	5	X										X		X				X	X	X	bottle labeled 75MP-9D			79
MD75-MW13	3/30/95	1320	5	X										X		X				X	X					80
HT:																									Location	
DD:																									Container Size	

Instructions: Samples Packed in Ice

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Mark Vessely	3/30/95 17:00	Fed ex		Fed ex		Lee Turner	3/31/95

Evergreen Analytical Inc.
4 ungfield St.
W Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Pur s Engineering Science
ADDRESS 1700 Broadway, Suite 900
CITY Denver STATE CO ZIP 80290
PHONE# 303-831-8100 FAX # FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Uemeier
PROJECT I.D. 722450.21020
EAL. QUOTE # P.O.#
TURNAROUND REQUIRED* 30 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Mark Vassely
(print) MARK VASSELY

Evergreen Analytical Cooler No. 612
Cooler Received

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	ANALYSIS REQUESTED: TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle)	TRPH 418.1/Oil & Grease 413.1 (circle)	VPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Alkalinity	Anions (Cl, NO3, SO4)	TOC					EAL Sample No.
MO75-MW11	3/30/95	14:15	5	X									X		X				X	X	X					X05081
MO75-MW10	3/30/95	15:00	5	X									X		X					X						82
MO75-MW9	3/30/95	16:00	5	X									X		X					X						83
Trip Blank			2										X													84
HT:																									Location	
DD:																									Container Size	

EAL use only
Do not write in shaded area

EAL Project # 1044
Custodian

Instructions: See Page 1

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Mark Vassely	3/30/95 17:10	Fed ex		Fed ex		Fed Courier	3/31/95 0730

95-1044

PROJECT SPECIAL INSTRUCTIONS ~~94~~

Date: 3/31 EAL Contact: Patty Client Contact: John Hicks Parsons ES

INSTRUCTIONS: Several discrepancies will be handled as follows:

X05071 75MP-8D try to analyze alkalinity from anions - wait on TC

X05072 75MP-8S hold TOC ~~75MP 8S~~

X05074 & X05075 are the MS & MSD for X05072. TOC is missing for spike dup - can we use the matrix spike bottle for tc

X05089 X05078 & X05079 = Analyze anions and alkalinity from anion bottles (marked alkalinity on COC).

X05078 - ~~Hold TOC bottle~~ - No TOC Requested on COC

X05069 - mis ID'd on COC. Should be MD75-MW2

X05063 - alkalinity mislabled. Should read MD75-MW5

X05058, X05059, X05061, X05062, X05064 and X05065 are cancelled.

FAX TO: KATTY [illegible]

FROM: MARK VESSELY; PARSONS E.S.

WITH REGARD TO THE COC MIX UP:

(1) Alkalinity bottle MW4 SHOULD be labeled MD5 - my mistake

(2) Bottles should read MD75-MW2; THE Sample name was wrong ON the C.O.C. Again, MW1 should be MW2 - mislabeled

(3) Alkalinity bottles and Toc bottles were not taken at 75MP-BD. I accidently checked the Alkalinity and Toc. Boxes

(4) The Extra TOC Bottle for 75MP-BS should be for 75MP-BS MSD, I mislabeled the bottle.

(5) THE Toc Bottle for 75MP-90 Should be for 75MP-95. Again, I mislabeled the Sample

(6) As For the missing Alkalinity Bottles; 75MP-75MP-95, & MD75-MW8. I checked the wrong box on the COC. They were intended for Anion tests

- Sorry about the mix up - I hope this fax will straighten things out.

MARK VESSELY
Parsons E.S.

Evergreen Analytical Sample Receipt/Check-in Record

Date & Time Rec'd: 3/31/95 900 Shipped Via: FedEx 9581826 8
(Airbill # if applicable)

Client : Parsons Eng.

Client Project ID(s): 722450.21020

EAL Project #(s): 95- 1044 EAL Cooler(s): (Y) N

Cooler#	218								
Ice packs	(Y)	N	Y	N	Y	N	Y	N	Y	N
Temperature °C	Cold								

	Y	N	N/A
1. Custody seal(s) present:	✓		
Seals on cooler intact	✓		
Seals on bottle intact			✓
2. Chain of Custody present:	✓		
3. Containers broken or leaking: (Comment on COC if Y)		✓	
4. Containers labeled:	✓		
5. COC agrees w/ bottles received: (Comment on COC if N)	✓		
6. COC agrees w/ labels: (Comment on COC if N)	✓		
7. Headspace in VOA vials-waters only (comment on COC if Y)		✓	
8. VOA samples preserved:	✓		
9. pH measured on metals, cyanide or phenolics*:			✓
List discrepancies			
*Non-EAL provided containers only, water samples only.			
10. Metal samples present:			✓
Total _____ , Dissolved _____			
D or PD to be filtered:			
T,TR,D,PD to be Preserved:			
11. Short holding times:		✓	
Specify parameters			
12. Multi-phase sample(s) present:		✓	
13. COC signed w/ date/time:	✓		

Comments: _____

(Additional comments on back)
Custodian Signature/Date: Lee Connor 3/31/95

Evergreen Analytical Inc.

4 [illegible] Youngfield St.
W[illegible] Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Fluor Engineering Science
ADDRESS 1700 Broadway, Suite 900
CITY Denver STATE CO ZIP 80290
PHONE# 303-831-8100 FAX # _____ FAX RESULTS Y / N

CLIENT CONTACT (print) Todd M. Vermeir
PROJECT I.D. 722450.21020
EAL. QUOTE # _____ P.O.# _____
TURNAROUND REQUIRED* 30 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Mark Vessely
(print) MARK VESSELY

Evergreen Analytical Cooler No. 218
Cooler Received _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle)	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Alkalinity	Toc	Anions					EAL Sample No.
56 MP-2S	3/29/95	8:00	~~5~~	X										X		X						X					
56 MP-7S	3/29/95	8:45	~~7~~	X										X		X				X	X	X					
MATRIX Spike	3/29/95	8:45	5	X										X		X						X					
Matrix Spike dup	3/29/95	8:45	5	X										X		X						X					
MD56-MW4	3/29/95	9:45	7	X										X		X				X	X	X					
Matrix Spike	3/29/95	9:45	5	X										X		X						X					
Matrix Spike dup	3/29/95	9:45	5	X										X		X						X					
MD75-MW5	3/29/95	10:45	7	X										X		X			labeled MW5	X	X	X					
Matrix Spike	3/29/95	10:45	5	X										X		X						X					
Matrix Spike dup	3/29/95	10:45	5	X										X		X						X					
HT:																											Location
DD:																											Container Size

ANALYSIS REQUESTED

EAL use only
Do not write in shaded area

EAL
Project # _____
Custodian _____

Instructions: Samples packed in ICE

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Mark Vessely	3/29/95 17:00	Fed ex		Fed ex		Rec Connor	3/31/95

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons Engineering Science
ADDRESS 1700 BROADWAY, SUITE 900
CITY Denver STATE CO ZIP 80290
PHONE# 303-831-8100 FAX # FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Wiedemeier
PROJECT I.D. 722450.21020
EAL. QUOTE # P.O.#
TURNAROUND REQUIRED* 30 DAYS
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Mark Vessely
(print) MARK VESSELY

Evergreen Analytical Cooler No. 218
Cooler Received

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle) Time for MTBE	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Alkalinity	Anions	TOC					EAL Sample No.
MO75-MW1	3/29/95	11:30	5	X										X		X					X						
75MP-5D	3/29/95	12:15	5	X										X		X					X						
75MP-6D	3/29/95	13:30	5	X										X		X					X						
MO75-2	3/29/95	14:15	5	X										X		X					X						
Trip Blank			1											X													
HT:																										Location	
DD:																										Container Size	

(X) Please call MW1

EAL use only
Do not write in shaded area

EAL
Project #
Custodian

Instructions: See Page 1

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Mark V	3/29/95 1700	Fedex		Fedex		Fed Connor	3/31/95 0930

Evergreen Analytical Sample Receipt/Check-in Record

Date & Time Rec'd: 3/3/95 900 Shipped Via: Fed Ex 9581826
(Airbill # if applicable)

Client : Parsons

Client Project ID(s): 722450.2120

EAL Project #(s): 95- 1044 EAL Cooler(s): (Y) N

Cooler#	(c)2								
Ice packs	(Y)	N	Y	N	Y	N	Y	N	Y	N
Temperature °C	cold								

	Y	N	N/A
1. Custody seal(s) present:		✓	
Seals on cooler intact			✓
Seals on bottle intact			✓
2. Chain of Custody present:	✓		
3. Containers broken or leaking: (Comment on COC if Y)		✓	
4. Containers labeled:	✓		
5. COC agrees w/ bottles received: (Comment on COC if N)	✓		
6. COC agrees w/ labels: (Comment on COC if N)	✓		
7. Headspace in VOA vials-waters only (comment on COC if Y)		✓	
8. VOA samples preserved:	✓		
9. pH measured on metals, cyanide or phenolics*:			✓
List discrepancies			
*Non-EAL provided containers only, water samples only.			
10. Metal samples present:			✓
Total _____ , Dissolved _____			
D or PD to be filtered:			
T,TR,D,PD to be Preserved:			
11. Short holding times:		✓	
Specify parameters			
12. Multi-phase sample(s) present:		✓	
13. COC signed w/ date/time:	✓		

Comments: _____

(Additional comments on back)
Custodian Signature/Date: Kell Common 3/3/95

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons Engineering Science
ADDRESS 1700 Broadway, Suite 900
CITY Denver STATE CO ZIP 80290
PHONE# 303-831-8100 FAX # _____ FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Wiedemeier
PROJECT I.D. 722450.21020
EAL QUOTE # _____ P.O # _____
TURNAROUND REQUIRED* 30 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Mark Vessely
(print) MARK VESSELY

Evergreen Analytical Cooler No. 612
Cooler Received _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Groundwater (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	ANALYSIS REQUESTED: TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle) Ethanol, TetraEthyl Lead	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Anions (Cl, NO3, NO2, SO4)	Alkalinity	TOC	EAL use only Do not write in shaded area: EAL Sample No.
75MP-8D	3/30/95	10:45	5	X									X		X					X	X	X	
75MP-8S	3/30/95	11:15	7	X									X		X					X	X	X	
75MP-28S	3/30/95	11:15	7	X									X		X					X	X	X	
MATRIX Spike	3/30/95	11:15	7	X									X		X					X	X	X	
Matrix Spike Dup	3/30/95	11:15	7	X									X		X					X	X	X	
Rinsate Blank	3/30/95	11:15	1	X									X										
Field Blank	3/30/95	11:15	1										X										
75MP-9D	3/30/95	12:00	5	X									X		X					·	X		
75MP-9S	3/30/95	12:30	6	X									X		X						X	X	
MD75-MW13	3/30/95	1320	5	X									X		X						X		
HT:																							Location
DD:																							Container Size

Instructions: Samples Packed in Ice

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Mark Vessely	3/30/95 17:00	Fed ex		Fed ex		Rel Cochran	3/31/95 0900

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons Engineering Science
ADDRESS 1700 Broadway, Suite 900
CITY Denver STATE CO ZIP 80290
PHONE# 303-831-8100 FAX # _____ FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Wiedemeier
PROJECT I.D. 722450.21020
EAL. QUOTE # _____ P.O.# _____
TURNAROUND REQUIRED* 30 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) _____
(print) MARK VESSELY

Evergreen Analytical Cooler No 612
Cooler Received _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Groundwater (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	ANALYSIS REQUESTED: TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle) TMB & Tert-BB	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Alkalinity	Anions (Cl, NO3, NO2, SO4)	TOC	10-MW	EAL Sample No.
MW75-MW11	3/30/95	14:15	3	X										X	X	X				X	X	X		
MW75-MW10	3/30/95	15:00	5	X										X	X	X					X			
MW75-MW9	3/30/95	16:00	5	X										X	X	X					X			
Trip Blank			1											X										
HT:																							Location	
DD:																							Container Size	

EAL use only
Do not write in shaded area

EAL
Project # _____
Custodian _____

Instructions: See Page 1

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
[signature]	3/30/95	Fed ex		Fed ex		[illegible]	3/31/95

Evergr Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

Page 1 of 3

COMPANY Ecms Engineering Science
ADDRESS 700 Broadway, Suite 400
CITY Denver STATE CO ZIP 80290
PHONE# 303-831-8100 FAX #
FAX RESULTS Y / N

CLIENT CONTACT (print) Todd Wiedemeier
PROJECT I.D. 722450.2020
EAL QUOTE # P.O.#
TURNAROUND REQUIRED* 30 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Mark Vessely
(print) MARK VESSELY
Evergreen Analytical Cooler No. 612
Cooler Received

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Groundwater (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	ANALYSIS REQUESTED: TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle) Test for MTBE	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Anions (Cl, NO3, NO2, SO4)	Alkalinity	TOC				EAL Sample No.
75MP-8D	3/30/95	10:45	5	X									X		X			X		X	X					
75 MP-8S	3/30/95	11:15	7	X									X		X			X	X	X						
75MP-28S	3/30/95	11:15	7	X									X		X			X	X	X						
MATRIX Spike	3/30/95	11:15	7	X									X		X			X	X	X						
Matrix Spike Dup	3/30/95	11:15	7	X									X		X			X	X	X						
Rinsate Blank	3/30/95	11:00	1	X									X													
Field Blank	3/30/95	11:15	1	X									X													
75MP-9D	3/30/95	12:00	5	X									X		X			X		X	X					
75MP-9S	3/30/95	12:30	6	X									X		X			X	X	X	X					
MD75-MW13	3/30/95	1320	5	X									X		X			X		X	X					
TAT:																									Location	
DD:																									Container Size	

EAL use only
Do not write in shaded area
EAL Project #
Custodian

Instructions: Samples packed in Ice

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
		Fed Ex		Fed Ex			

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Parsons Engineering Science
ADDRESS 100 Broadway, Suite 900
CITY Denver STATE CO ZIP 80290
PHONE# 303-831-8100 FAX # _____ FAX RESULTS Y / N

CLIENT CONTACT (print): Todd Wiedemeier
PROJECT I.D. 722450.21020
EAL QUOTE # _____ P.O.# _____
TURNAROUND REQUIRED* 30 days
*expedited turnaround subject to additional fee

Sampler Name:
(signature) Mark Vessely
(print) MARK VESSELY
Evergreen Analytical Cooler No. 1012
Cooler Received _____

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil / Solid	MATRIX: Oil / Sludge	ANALYSIS REQUESTED: TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	Anions (Cl, NO3, SO4) Alkalinity TDS	EAL Sample No.
75MP-8D	3/30/95	10:45	5	X										X		X				X	
75MP-8S	3/30/95	11:15	7	X										X		X				X X X	
75MP-28S	3/30/95	11:35	7	X										X		X				X X X	
MATRIX Spike	3/30/95	11:35	7	X										X		X				X X X	
Matrix Spike Dup	3/30/95	11:45	7	X										X		X				X X X	
Rinsate Blank	3/30/95	11:55	1											X							
Field Blank	3/30/95	11:55	1											X							
75MP-9D	3/30/95	12:00	5	X										X		X				X X	
75MP-9S	3/30/95	12:30	6	X										X		X				X X X	
MD75-Mw13	3/30/95	13:20	5	X										X		X				X X	
RT:																					Location
DD:																					Container Size

Instructions: Samples Packed in Ice

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time

95-1044

Memo to Patty McClellan, Evergreen Analytical
3/31/95
Subject: Your fax of earlier today

Here's a list of the discrepencies between the samples and the COC, and the resolution that we agreed on over the phone. Since then, I have talked to the field people, and their clarifications/comments are also described below (**in bold**). They will send you a marked-up copy of the COCs showing the corrections (via fax I think).

Alkalinity bottle labeled MW4--will assume is MW5. **Field people say that should have been MW5.**

Bottles labeled MW2 except anion labeled MW1--will assume all are MW2. **Field people say that MW2 is correct.**

Alkalinity and TOC bottles missing for 75MP-8D--will take alkalinity sample from anions bottle, and will hold on TOC for our instructions. **TOC will not be collected from this well.**

Extra TOC for 75MP-8S and 9D, and missing TOC for 75MP8S MSD and 9S--hold per our instructions. **TOC for 75MP-8S should be 75MP-8S MSD, and 9D should be 9S.**

Alkalinity (should be anions, not alkalinity) bottles missing for 75MP-9D, 9S, and MD75-MW13 (bottles say anions but COC says alkalinity). Will run both analyses on the samples. **They checked the alkalinity box by mistake. Should be run for anions and not alkalinity.**

Anions received but not on COC for 75MP-9D, 9S, and MD75-MW13--will run the anions definitely, and also do alkalinity if have enough sample.
Alkalinity not scoped, so just run anions.

I said to expect about 11 samples not including QC on Saturday. **This is about right. Will also receive 8 TEH samples tomorrow.**

Patty will check whether the TOC is being filtered. **Did you find out? If so, please call me today.**

John Hicks

F2245.

Post-it™ Fax Note 7671	Date 3/31/95	# of pages ▶ 1
To Patty McClellan	From John Hicks	
Co./Dept. Evergreen	Co. Pacific ES	
Phone #	Phone # 831-8100	
Fax # 925-6854	Fax # 820-8	

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW1	**Client Project No.**	: 722450.21020/MacD
Lab Sample Number	: X05066	**Lab Project No.**	: 95-1044
Date Sampled	: 3/29/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/12/95	**Matrix**	: Water
Date Analyzed	: 4/12/95	**Lab File No.**	: BX1041219
		Method Blank No.	: MB041295

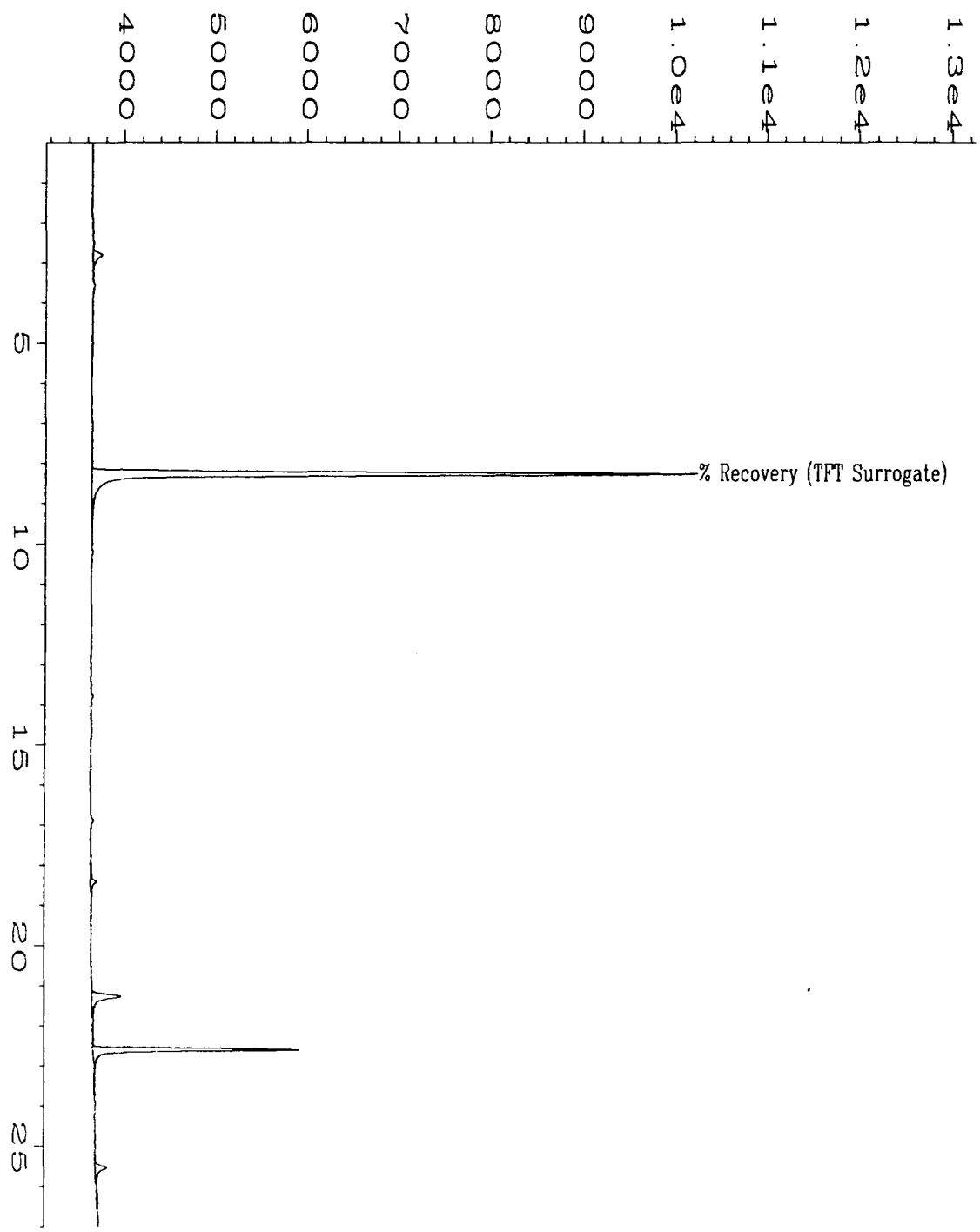
Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6		U	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		82%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



Data File Name	: C:\HPCHEM\1\DATA\BX10412\019F0801.D		
Operator	: S.W. Tyson	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 19
Sample Name	: X05067;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 12 Apr 95 01:08 PM	Instrument Method	: BX10408.MTH
Report Created on	: 28 Apr 95 07:39 PM	Analysis Method	: BX10412B.MTH
Last Recalib on	: 28 APR 95 07:11 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project # 95-1044 Client # ~~75MP-5D~~ Water MD75-MW1		

5/1/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW2	**Client Project No.**	: 722450.21020/MacD
Lab Sample Number	: X05069	**Lab Project No.**	: 95-1044
Date Sampled	: 3/29/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/12/95	**Matrix**	: Water
Date Analyzed	: 4/12/95	**Lab File No.**	: BX1041223
		Method Blank No.	: MB041295

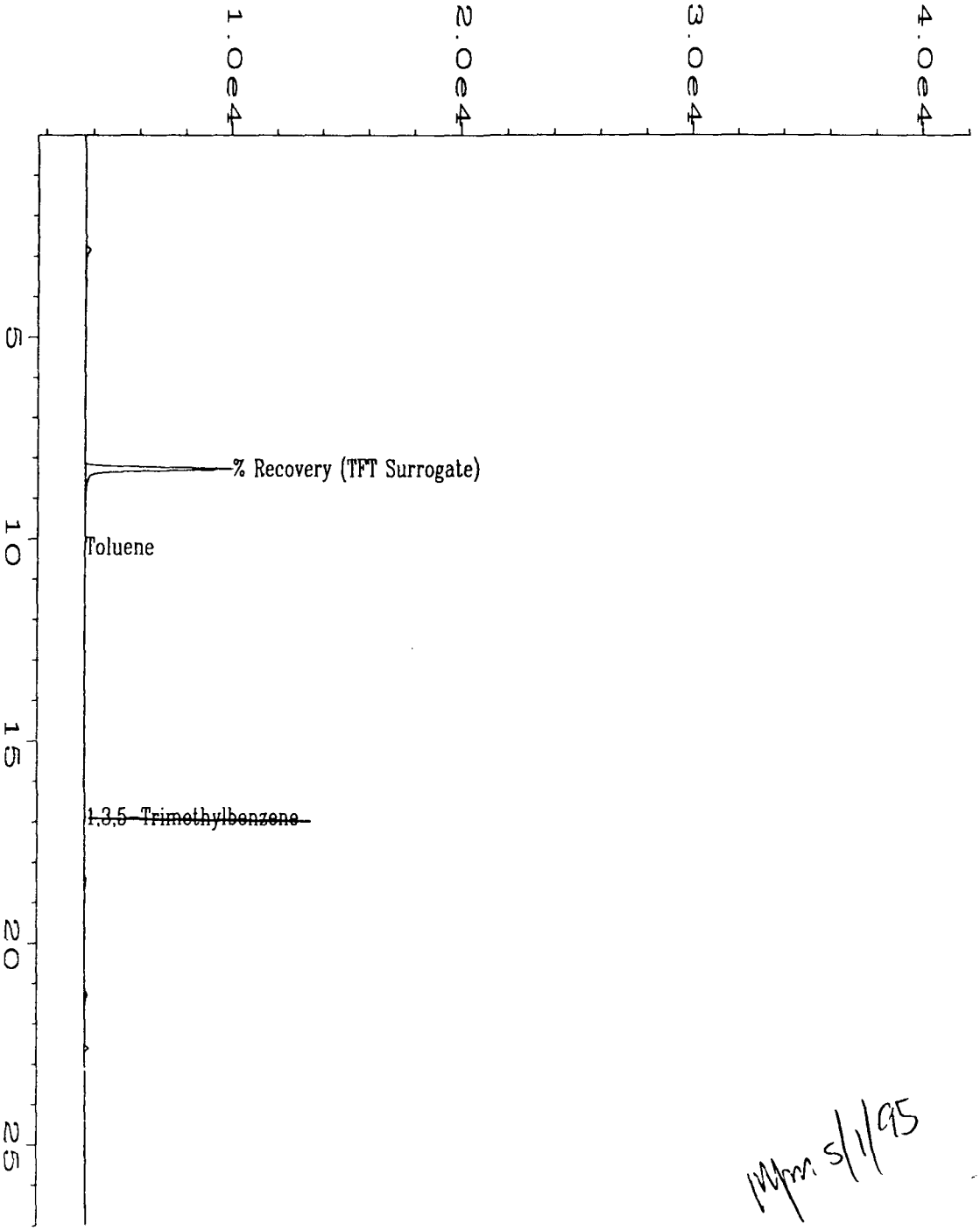
Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3	0.6	B	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6		U	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		80%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



MPM 5/1/95

Data File Name	: C:\HPCHEM\1\DATA\BX10412\023F0901.D		
Operator	: S.W. Tyson	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 23
Sample Name	: X05069;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 9
quired on	: 12 Apr 95 03:42 PM	Instrument Method	: BX10412.MTH
port Created on	: 28 Apr 95 07:41 PM	Analysis Method	: BX10412B.MTH
Last Recalib on	: 28 APR 95 07:11 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project # 95-1044 Client # MD75-MW2 Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD56-MW4	**Client Project No.**	: 722450.21020/MacD
Lab Sample Number	: X05060	**Lab Project No.**	: 95-1044
Date Sampled	: 3/29/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/12/95	**Matrix**	: Water
Date Analyzed	: 4/12/95	**Lab File No.**	: BX1041214
		Method Blank No.	: MB041295

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3	0.6	B	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6		U	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4

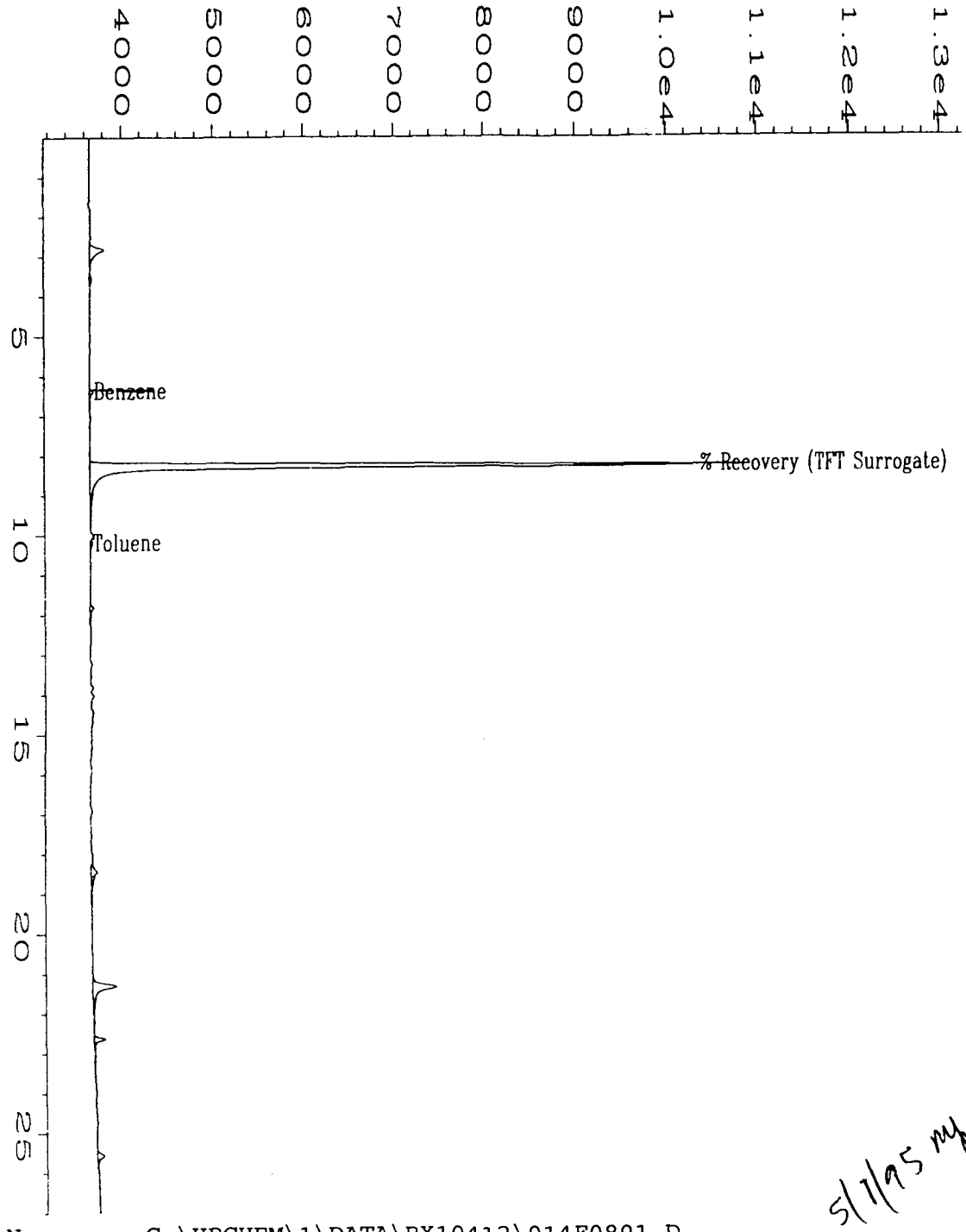
Surrogate Recovery (α,α,α-Trifluorotoluene):	91%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



5/1/95 mfm

Data File Name : C:\HPCHEM\1\DATA\BX10412\014F0801.D
Operator : S.W. Tyson
Instrument : BTEX1
Sample Name : X05060;1;5
Run Time Bar Code:
'quired on : 12 Apr 95 09:55 AM
.eport Created on: 28 Apr 95 07:37 PM
Last Recalib on : 28 APR 95 07:11 PM
Multiplier : 1
Sample Info : Project # 95-1044 Client # MD56-MW4 Water

Page Number : 1
Vial Number : 14
Injection Number : 1
Sequence Line : 8
Instrument Method: BX10408.MTH
Analysis Method : BX10412B.MTH
Sample Amount : 0
ISTD Amount :

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW5	Client Project No.	: 722450.21020/MacD
Lab Sample Number	: X05C63	Lab Project No.	: 95-1044
Date Sampled	: 3/29/95	Dilution Factor	: 1.00
Date Received	: 3/31/95	Method	: 602
Date Prepared	: 4/12/95	Matrix	: Water
Date Analyzed	: 4/12/95	Lab File No.	: BX1041217
		Method Blank No.	: MB041295

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3	0.9	B	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6		U	0.4
1,3,5-Trimethylbenzene	108-67-8	0.6		0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8	0.5		0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4

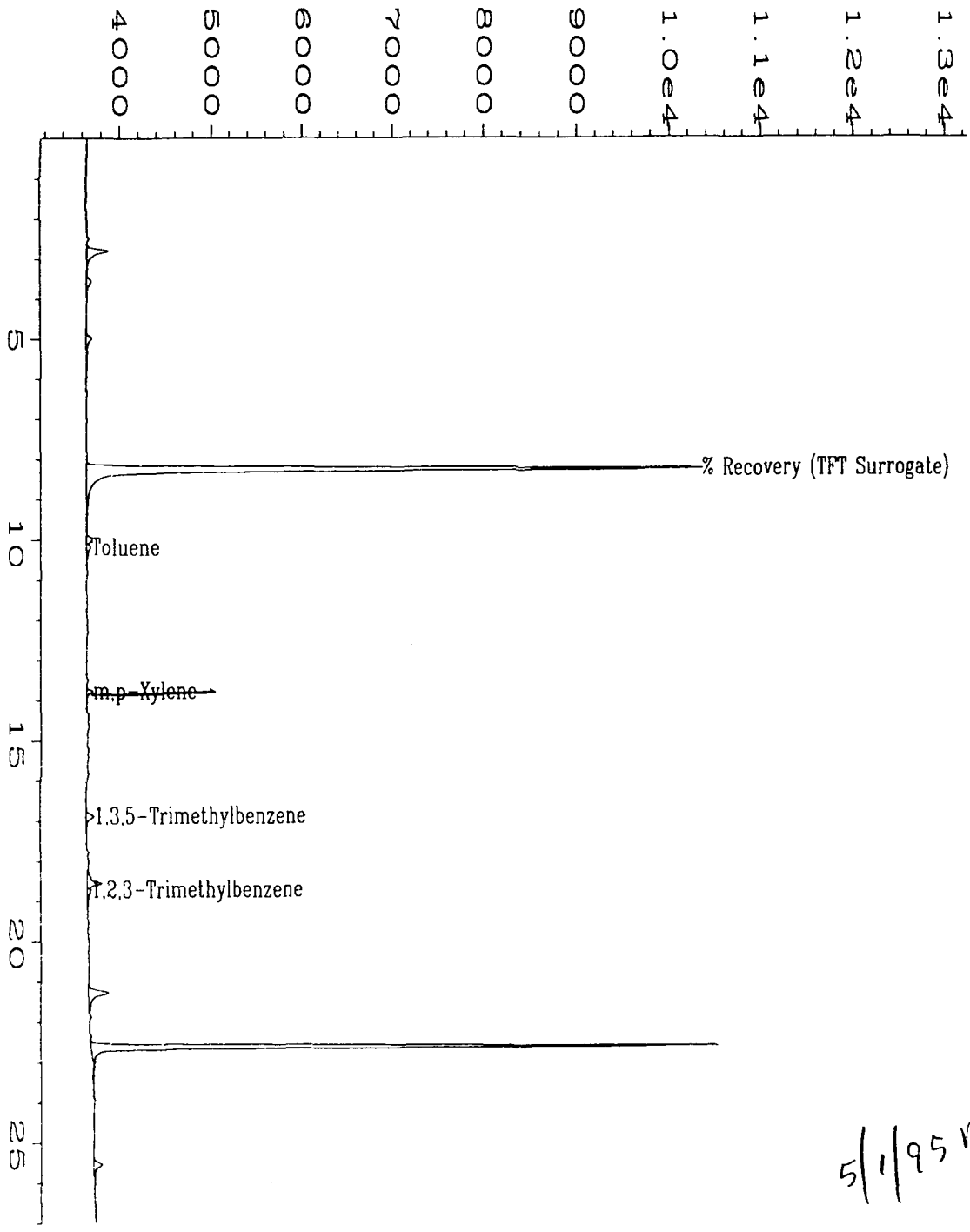
Surrogate Recovery (α,α,α-Trifluorotoluene):	84%	70%-130% (QC limits

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



5/1/95 mfm

Data File Name : C:\HPCHEM\1\DATA\BX10412\017F0801.D
Operator : S.W. Tyson
Instrument : BTEX1
Sample Name : X05063;1;5
Run Time Bar Code:
Acquired on : 12 Apr 95 11:51 AM
Report Created on: 28 Apr 95 07:38 PM
Last Recalib on : 28 APR 95 07:11 PM
Multiplier : 1
Sample Info : Project # 95-1044 Client # MD75-MW5 Water

Page Number : 1
Vial Number : 17
Injection Number : 1
Sequence Line : 8
Instrument Method: BX10408.MTH
Analysis Method : BX10412B.MTH
Sample Amount : 0
ISTD Amount :

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW5	**Client Project No.**	: 722450.21020/Macl
Lab Sample Number	: X05063DUP	**Lab Project No.**	: 95-1044
Date Sampled	: 3/29/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/12/95	**Matrix**	: Water
Date Analyzed	: 4/12/95	**Lab File No.**	: BX1041218
		Method Blank No.	: MB041295

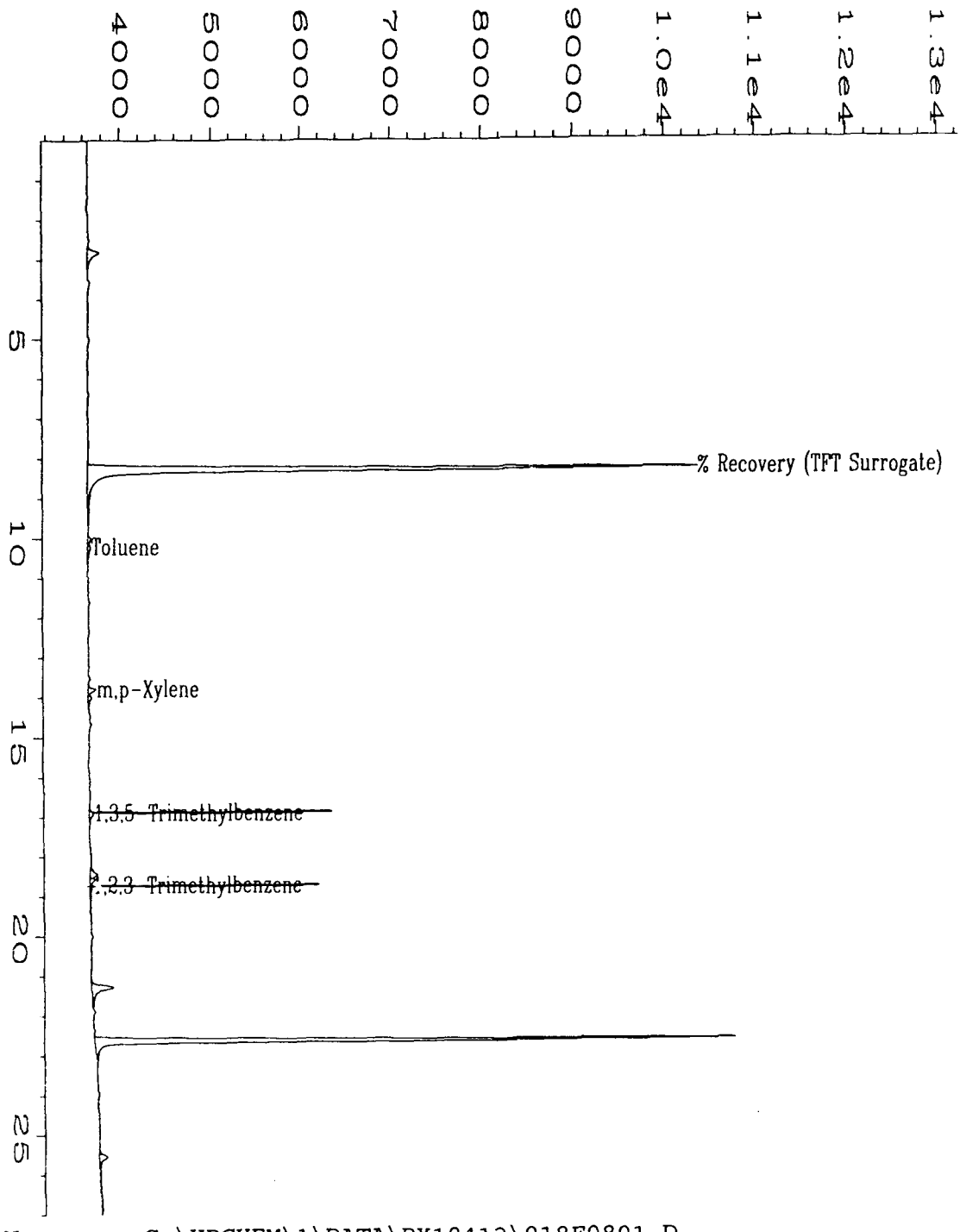
Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3	0.7	B	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	0.4	B	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		84%		70%-130% (QC limit:

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K Cone
Analyst

Approved



Data File Name : C:\HPCHEM\1\DATA\BX10412\018F0801.D
Operator : S.W. Tyson
Instrument : BTEX1 3 Dup
Sample Name : X05066;1;5 pc
Run Time Bar Code:
quired on : 12 Apr 95 12:29 PM
port Created on: 28 Apr 95 07:39 PM
Last Recalib on : 28 APR 95 07:11 PM
Multiplier : 1
Sample Info : Project # 95-1044 Client # MD75-MW5 Water

Page Number : 1
Vial Number : 18
Injection Number : 1
Sequence Line : 8
Instrument Method: BX10408.MTH
Analysis Method : BX10412B.MTH
Sample Amount : 0
ISTD Amount :

5

mfm 5/1/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW9	**Client Project No.**	: 722450.21020/Macl
Lab Sample Number	: X05083	**Lab Project No.**	: 95-1044
Date Sampled	: 3/30/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/13/95	**Lab File No.**	: BX2041325
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3	1.0		0.4
Chlorobenzene	108-90-7	0.8		0.4
Ethyl Benzene	100-41-4	57		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	1.1		0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6	0.7		0.4
1,2,3-Trimethylbenzene	526-73-8	0.4		0.4
1,2,3,4-Tetramethylbenzene	488-23-3	>80**		0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		64% *		70%-130% (QC limits

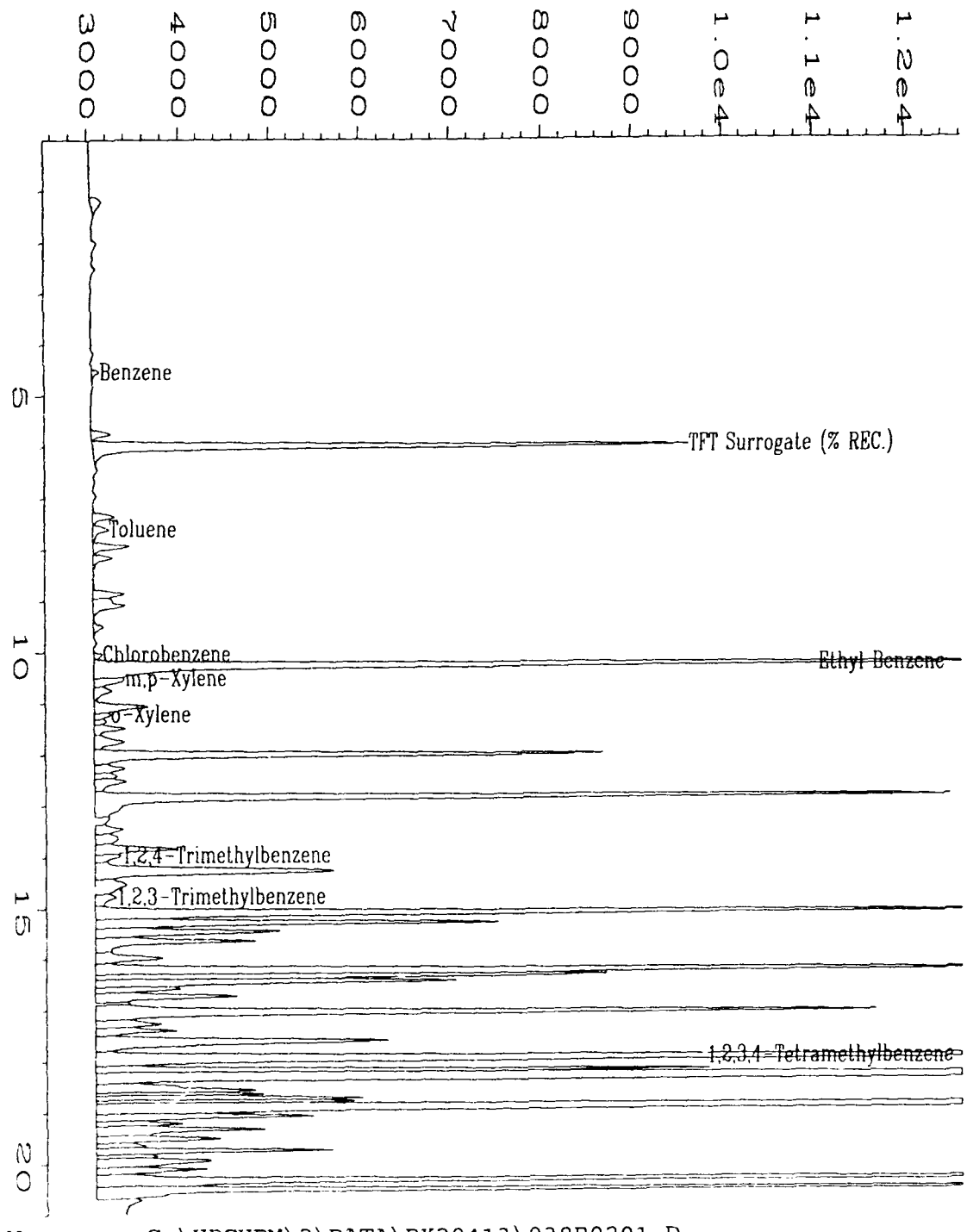
Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

** = Greater than 10% calibration range. See BX10417020 (DF=10) run past holding time.
* = Out of limit. See BX1041338 (DF=1) run past holding time.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20413\038R0201.D		
Operator	: SW Tyson	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 38
Sample Name	: X05083;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 2
Acquired on	: 14 Apr 95 02:04 AM	Instrument Method	: BX20413A.MTH
Report Created on	: 14 Apr 95 11:59 AM	Analysis Method	: BX20413B.MTH
Last Recalib on	: 14 APR 95 00:39 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW10	**Client Project No.**	: 722450.21020/MacD
Lab Sample Number	: X05082	**Lab Project No.**	: 95-1044
Date Sampled	: 3/30/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/13/95	**Lab File No.**	: BX2041327
		Method Blank No.	: MB041395

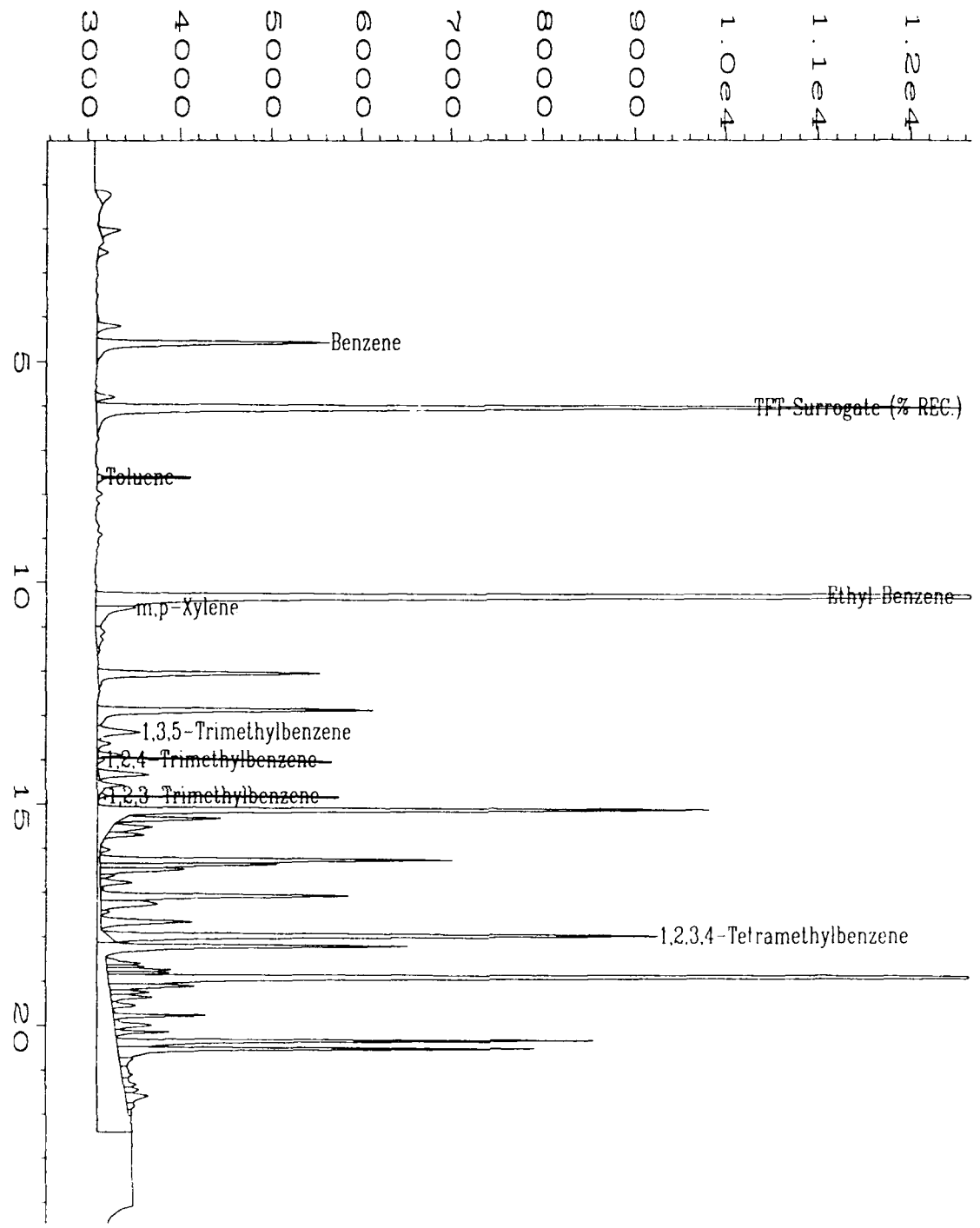
Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	7.2		0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4	65		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	1.6		0.4
1,3,5-Trimethylbenzene	108-67-8	1.5		0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	28		0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		71%		70%-130% (QC limits

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected,
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



Data File Name	: C:\HPCHEM\2\DATA\BX20413\027R0101.D		
Operator	: SW Tyson	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 27
Sample Name	: X05082;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
quired on	: 13 Apr 95 05:47 PM	Instrument Method	: BX20413.MTH
eport Created on	: 13 Apr 95 06:12 PM	Analysis Method	: BX20413.MTH
Last Recalib on	: 13 APR 95 02:16 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project # 95-1044 Client # MD75-MW10 Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW11	**Client Project No.**	: 722450.21020/MacD
Lab Sample Number	: X05081	**Lab Project No.**	: 95-1044
Date Sampled	: 3/30/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/13/95	**Lab File No.**	: BX2041323
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	0.9		0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6	0.5		0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4

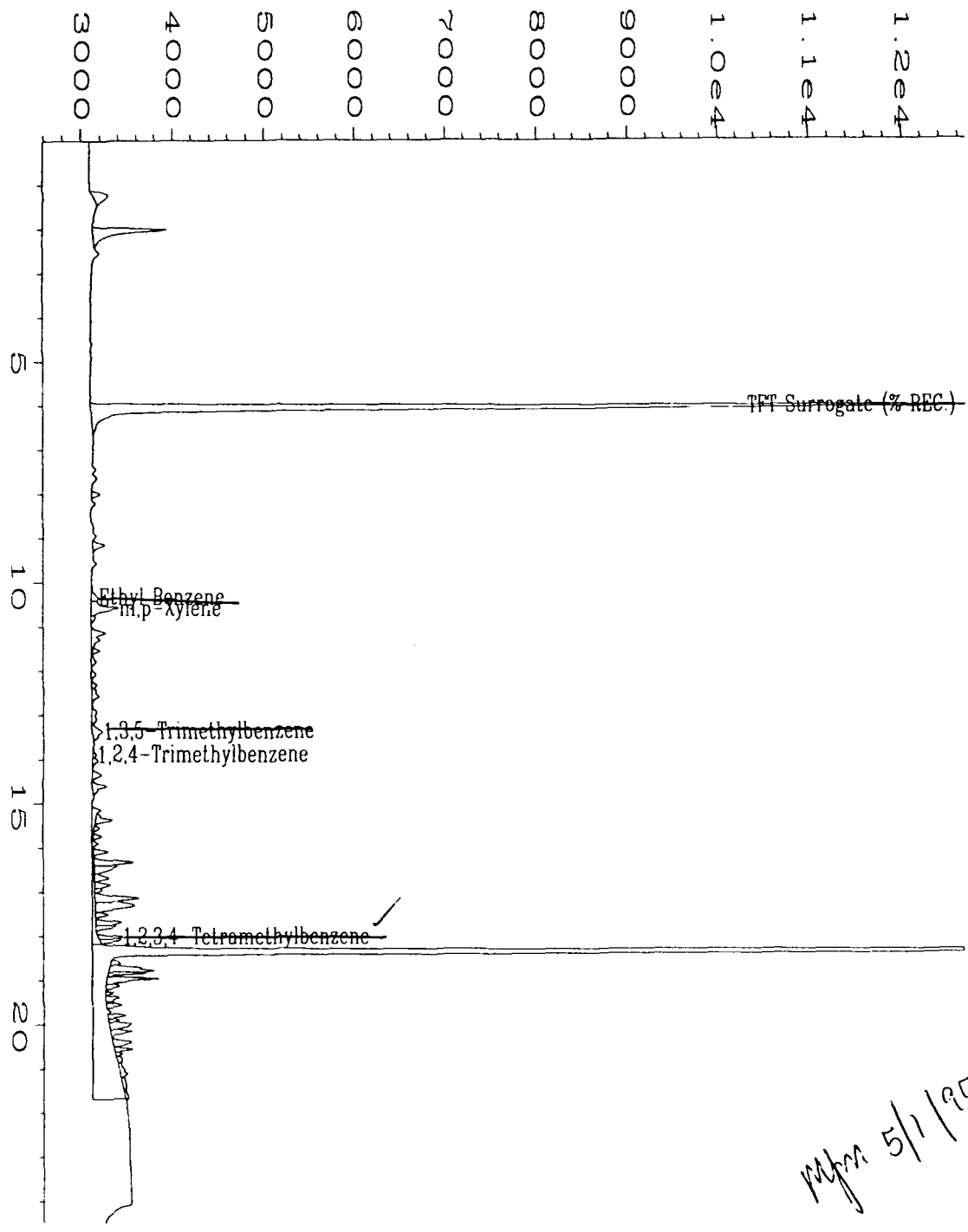
Surrogate Recovery (α,α,α-Trifluorotoluene):	78%	70%-130% (QC limits

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



mfgm 5/1/95

Data File Name	: C:\HPCHEM\2\DATA\BX20413\023R0701.D		
Operator	: SW Tyson	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 23
Sample Name	: X05081;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
quired on	: 13 Apr 95 02:40 PM	Instrument Method	: BX20413.MTH
port Created on	: 13 Apr 95 03:06 PM	Analysis Method	: BX20413.MTH
Last Recalib on	: 13 APR 95 02:16 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

MD75-MW11

EVERGREEN ANALYTICAL, INC.
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(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW13	**Client Project No.**	: 722450.21020/MacD
Lab Sample Number	: X05080	**Lab Project No.**	: 95-1044
Date Sampled	: 3/30/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/13/95	**Lab File No.**	: BX2041321
		Method Blank No.	: MB041395

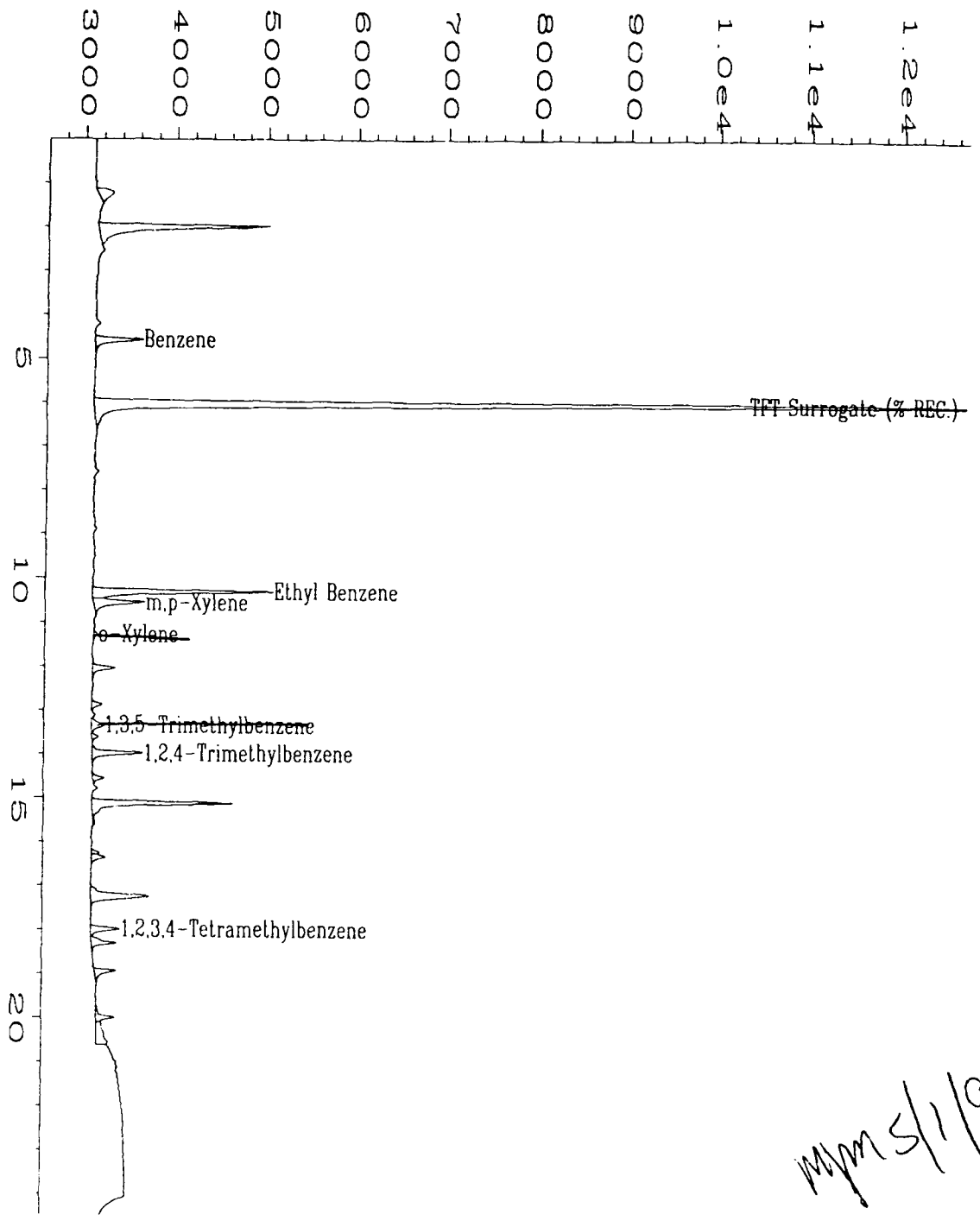
Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	1.3		0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4	6.5		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	1.2		0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6	2.1		0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	1.1		0.4
Surrogate Recovery (α,α,α-Trifluorotoiuene):		79%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

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mpm 5/1/95

Data File Name	: C:\HPCHEM\2\DATA\BX20413\021R0701.D		
Operator	: SW Tyson	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 21
Sample Name	: X05080;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
quired on	: 13 Apr 95 01:08 PM	Instrument Method	: BX20413.MTH
port Created on	: 13 Apr 95 02:19 PM	Analysis Method	: BX20413.MTH
Last Recalib on	: 13 APR 95 02:16 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

MD75-MW13

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4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: MD75-MW13	**Client Project No.**	: 722450.21020/MacD
Lab Sample Number	: X05080DUP	**Lab Project No.**	: 95-1044
Date Sampled	: 3/30/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/13/95	**Lab File No.**	: BX2041322
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	1.3		0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4	6.6		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	1.5		0.4
1,3,5-Trimethylbenzene	108-67-8	0.5		0.4
1,2,4-Trimethylbenzene	95-63-6	2.2		0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	1.3		0.4

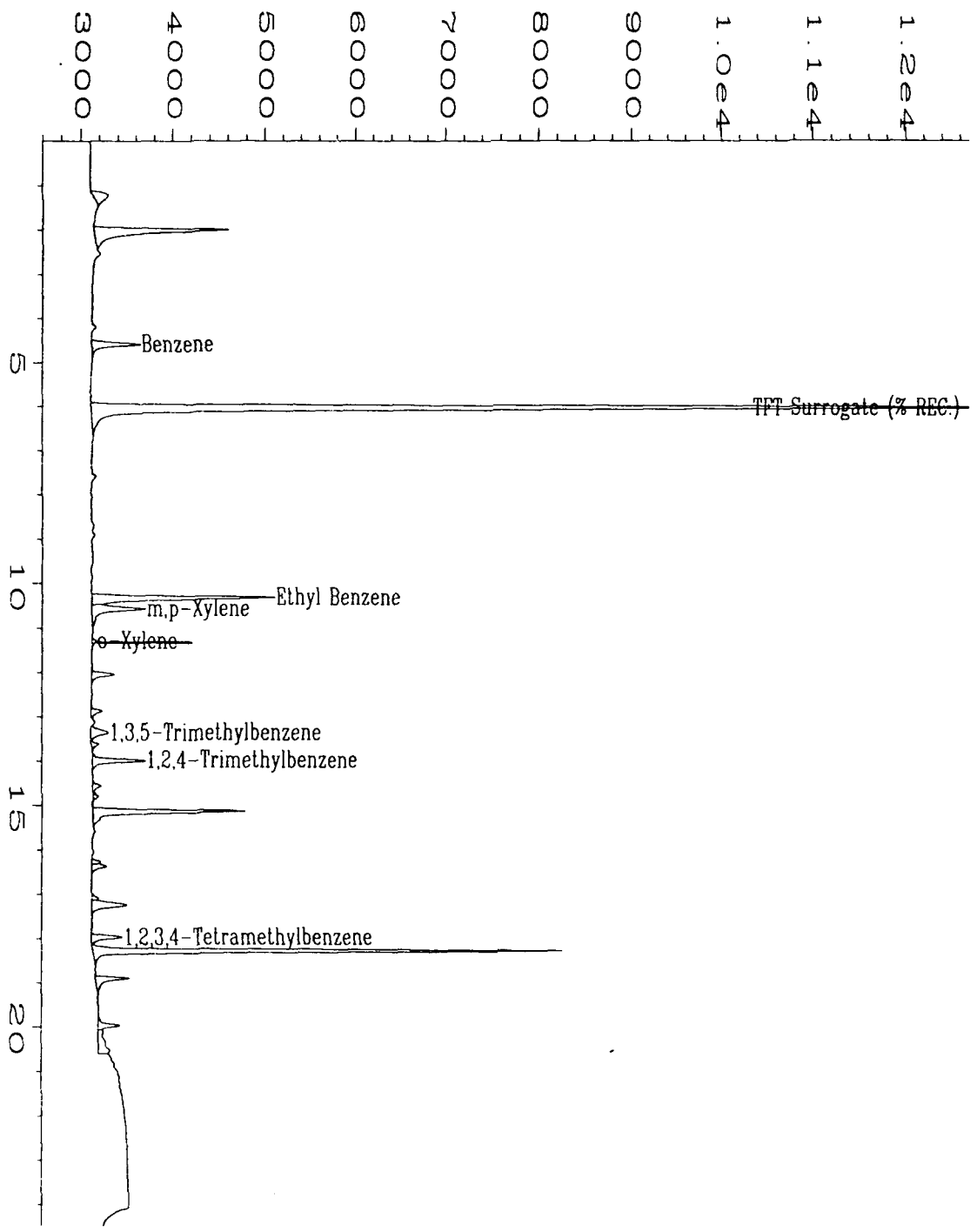
Surrogate Recovery (α,α,α-Trifluorotoluene):	79%	70%-130% (QC limits

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

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Data File Name	: C:\HPCHEM\2\DATA\BX20413\022R0701.D		
Operator	: SW Tyson	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 22
Sample Name	: X05080DUP;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
Acquired on	: 13 Apr 95 01:53 PM	Instrument Method	: BX20413.MTH
Report Created on	: 13 Apr 95 02:21 PM	Analysis Method	: BX20413.MTH
Last Recalib on	: 13 APR 95 02:16 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

MD75-MW13

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(303) 425-6021

Method 602 Data Report

Client Sample Number	: 75MP-5D	Client Project No.	: 722450.21020/Macl
Lab Sample Number	: X05067	Lab Project No.	: 95-1044
Date Sampled	: 3/29/95	Dilution Factor	: 1.00
Date Received	: 3/31/95	Method	: 602
Date Prepared	: 4/12/95	Matrix	: Water
Date Analyzed	: 4/12/95	Lab File No.	: BX1041220
		Method Blank No.	: MB041295

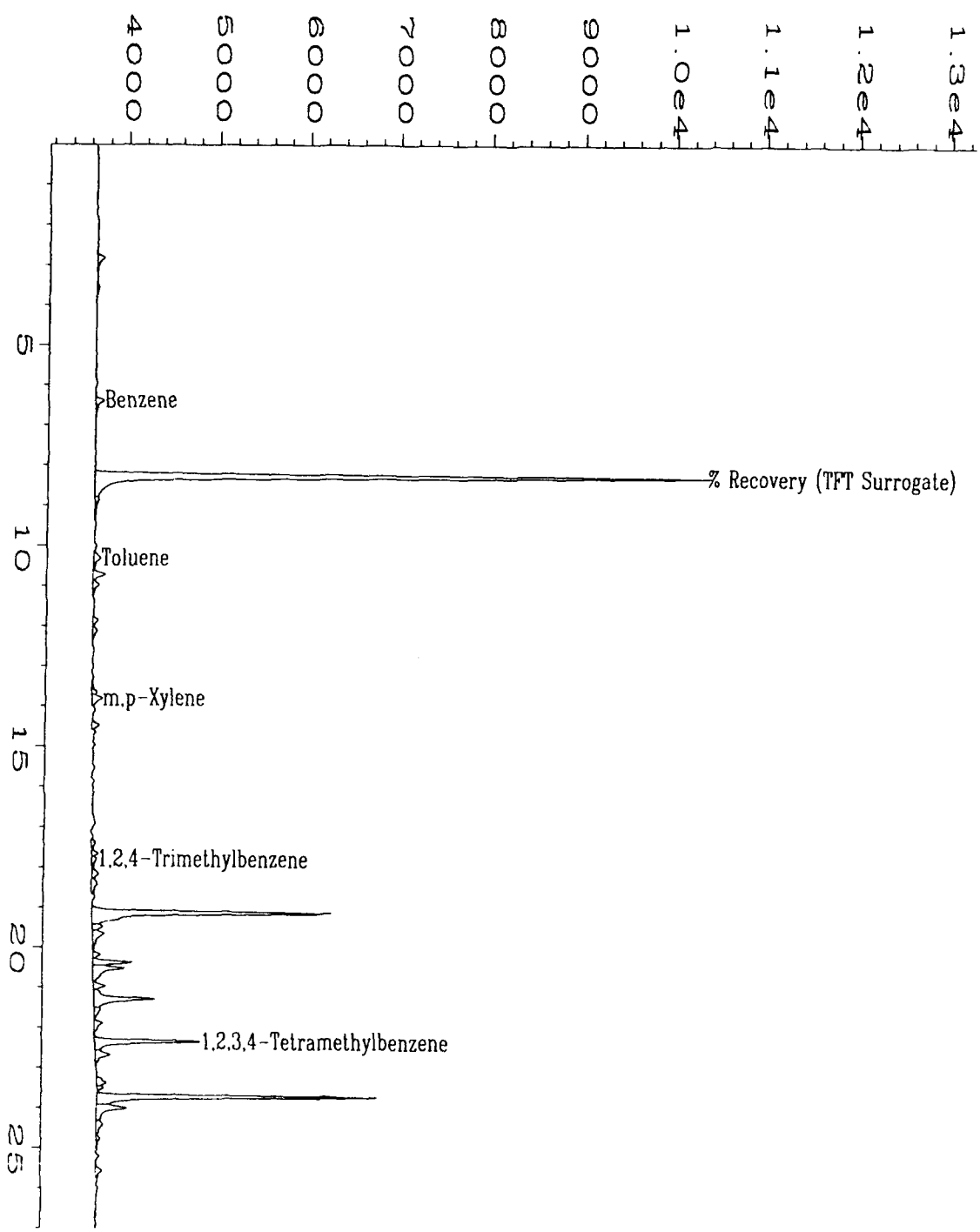
Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	0.8		0.4
Toluene	108-88-3	0.9	B	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	0.6	B	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6	0.4		0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	8.3		0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		83%		70%-130% (QC limit:

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



Data File Name : C:\HPCHEM\1\DATA\BX10412\020F0801.D
Operator : S.W. Tyson
Instrument : BTEX1
Sample Name : X05067;1;5
Run Time Bar Code:
Acquired on : 12 Apr 95 01:46 PM
Report Created on: 28 Apr 95 07:39 PM
Last Recalib on : 28 APR 95 07:11 PM
Multiplier : 1
Sample Info : Project # 95-1044 Client # 75MP-5D Water

Page Number : 1
Vial Number : 20
Injection Number : 1
Sequence Line : 8
Instrument Method: BX10408.MTH
Analysis Method : BX10412B.MTH
Sample Amount : 0
ISTD Amount :

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4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: 75MP-6D	**Client Project No.**	: 722450.21020/MacD
Lab Sample Number	: X05068	**Lab Project No.**	: 95-1044
Date Sampled	: 3/29/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/12/95	**Matrix**	: Water
Date Analyzed	: 4/12/95	**Lab File No.**	: BX1041222
		Method Blank No.	: MB041295

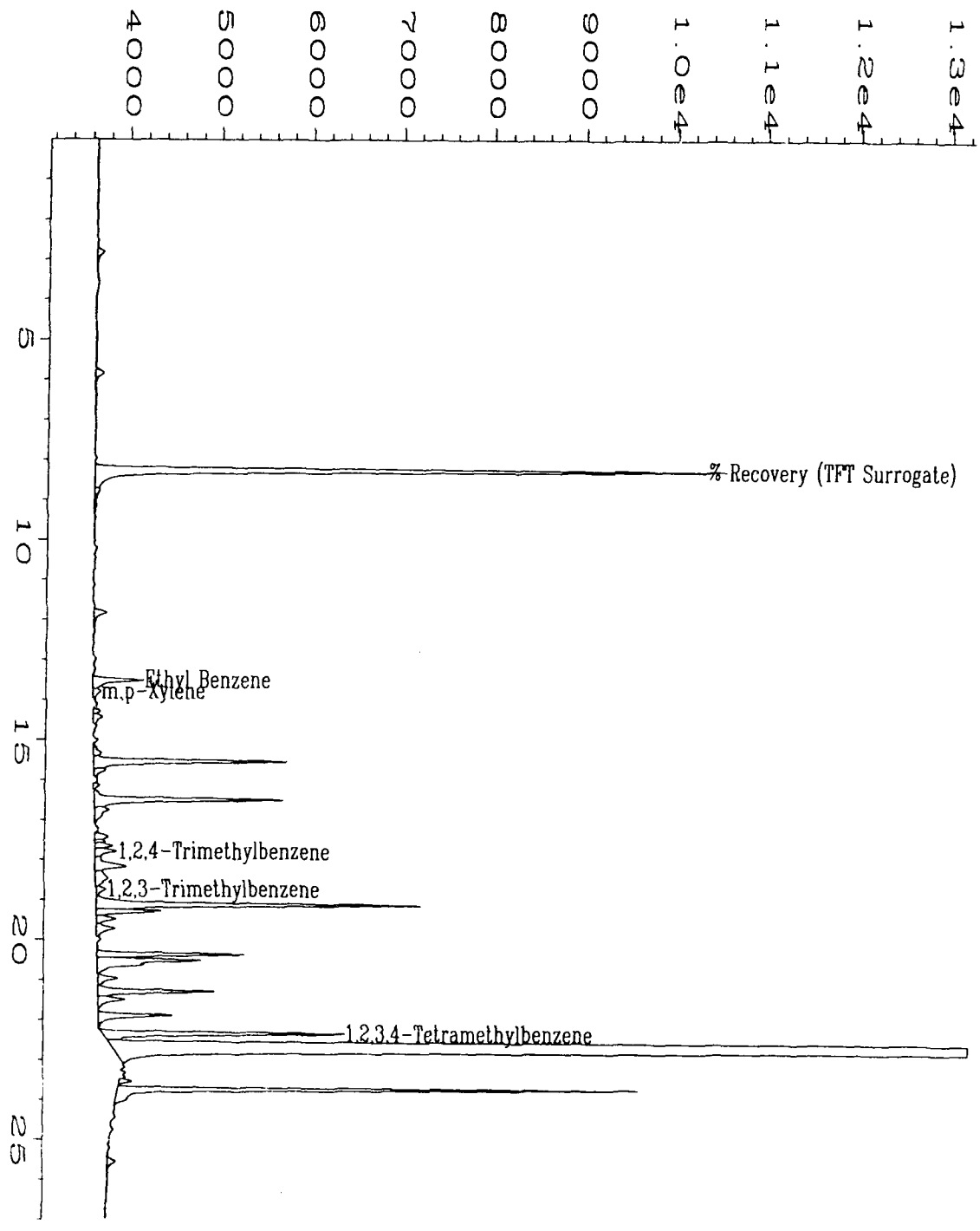
Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4	3.2		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	0.5	B	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6	1.5		0.4
1,2,3-Trimethylbenzene	526-73-8	0.8		0.4
1,2,3,4-Tetramethylbenzene	488-23-3	17		0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		83%		70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



Data File Name	: C:\HPCHEM\1\DATA\BX10412\022F0801.D		
Operator	: S.W. Tyson	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 22
Sample Name	: X05068;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 12 Apr 95 03:03 PM	Instrument Method	: BX10408.MTH
Report Created on	: 28 Apr 95 07:40 PM	Analysis Method	: BX10412B.MTH
Last Recalib on	: 28 APR 95 07:11 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project # 95-1044 Client # 75MP-6D Water		

EVERGREEN ANALYTICAL, INC.
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Method 602 Data Report

Client Sample Number	: 75MP-8S	Client Project No.	: 722450.21020/MacD
Lab Sample Number	: X05072	Lab Project No.	: 95-1044
Date Sampled	: 3/30/95	Dilution Factor	: 1.00
Date Received	: 3/31/95	Method	: 602
Date Prepared	: 4/13/95	Matrix	: Water
Date Analyzed	: 4/13/95	Lab File No.	: BX2041311
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	U	0.4
Toluene	108-88-3	U	0.4
Chlorobenzene	108-90-7	U	0.4
Ethyl Benzene	100-41-4	U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	U	0.4
1,2,3-Trimethylbenzene	526-73-8	U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U	0.4

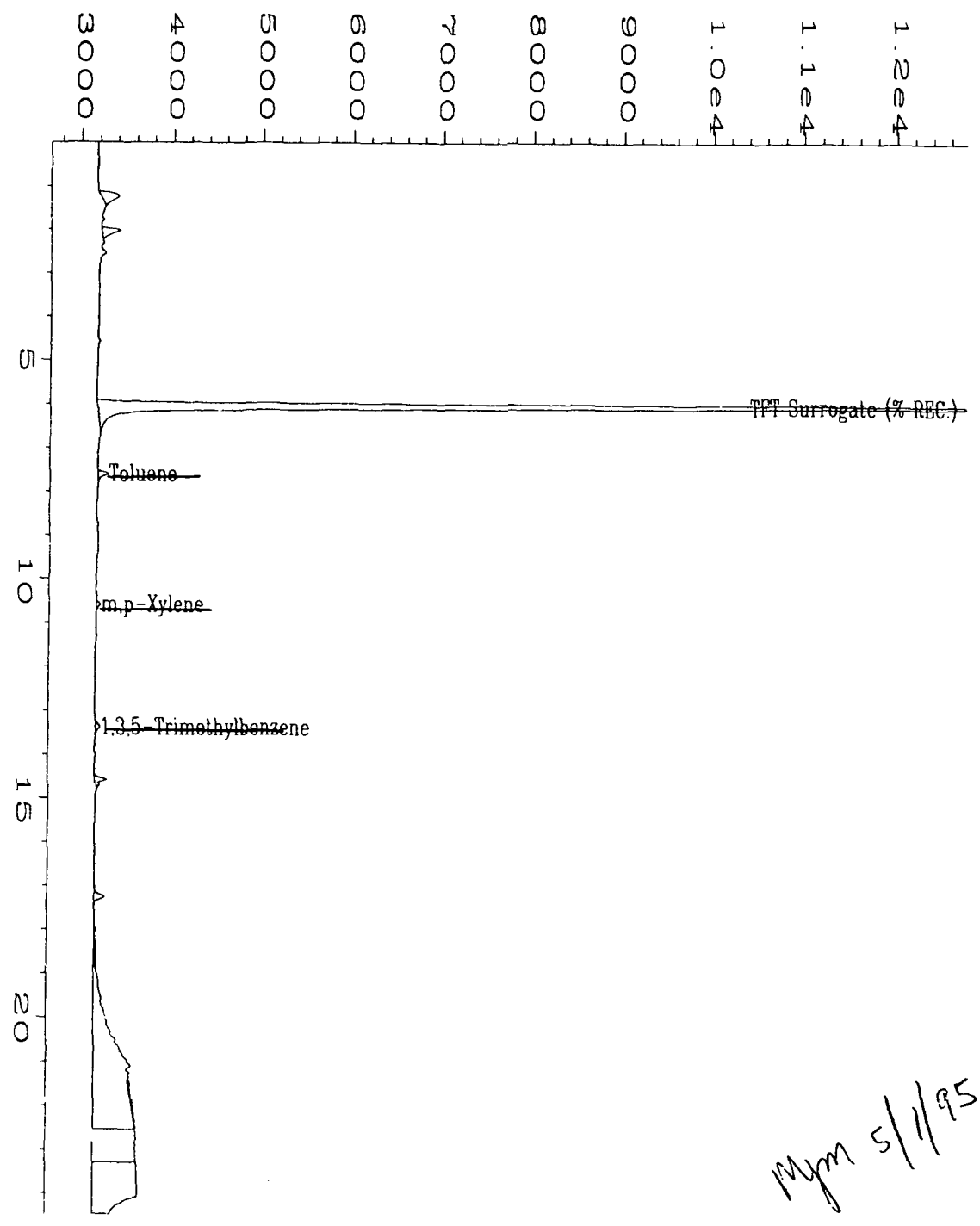
Surrogate Recovery (α,α,α-Trifluorotoluene):	95%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



mym 5/1/95

Data File Name : C:\HPCHEM\2\DATA\BX20413\011R0701.D
Operator : SW Tyson
Instrument : BTEX2
Sample Name : X05072;1;5
Run Time Bar Code:
quired on : 13 Apr 95 05:34 AM
port Created on: 13 Apr 95 10:10 AM
Last Recalib on : 13 APR 95 02:16 AM
Multiplier : 1

Page Number : 1
Vial Number : 11
Injection Number : 1
Sequence Line : 7
Instrument Method: BX20413.MTH
Analysis Method : BX20413.MTH
Sample Amount : 0
ISTD Amount :

75-MP85

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4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: 75MP-8D	Client Project No.	: 722450.21020/Macl
Lab Sample Number	: X05071	Lab Project No.	: 95-1044
Date Sampled	: 3/30/95	Dilution Factor	: 1.00
Date Received	: 3/31/95	Method	: 602
Date Prepared	: 4/13/95	Matrix	: Water
Date Analyzed	: 4/13/95	Lab File No.	: BX2041310
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6		U	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8	0.9		0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4

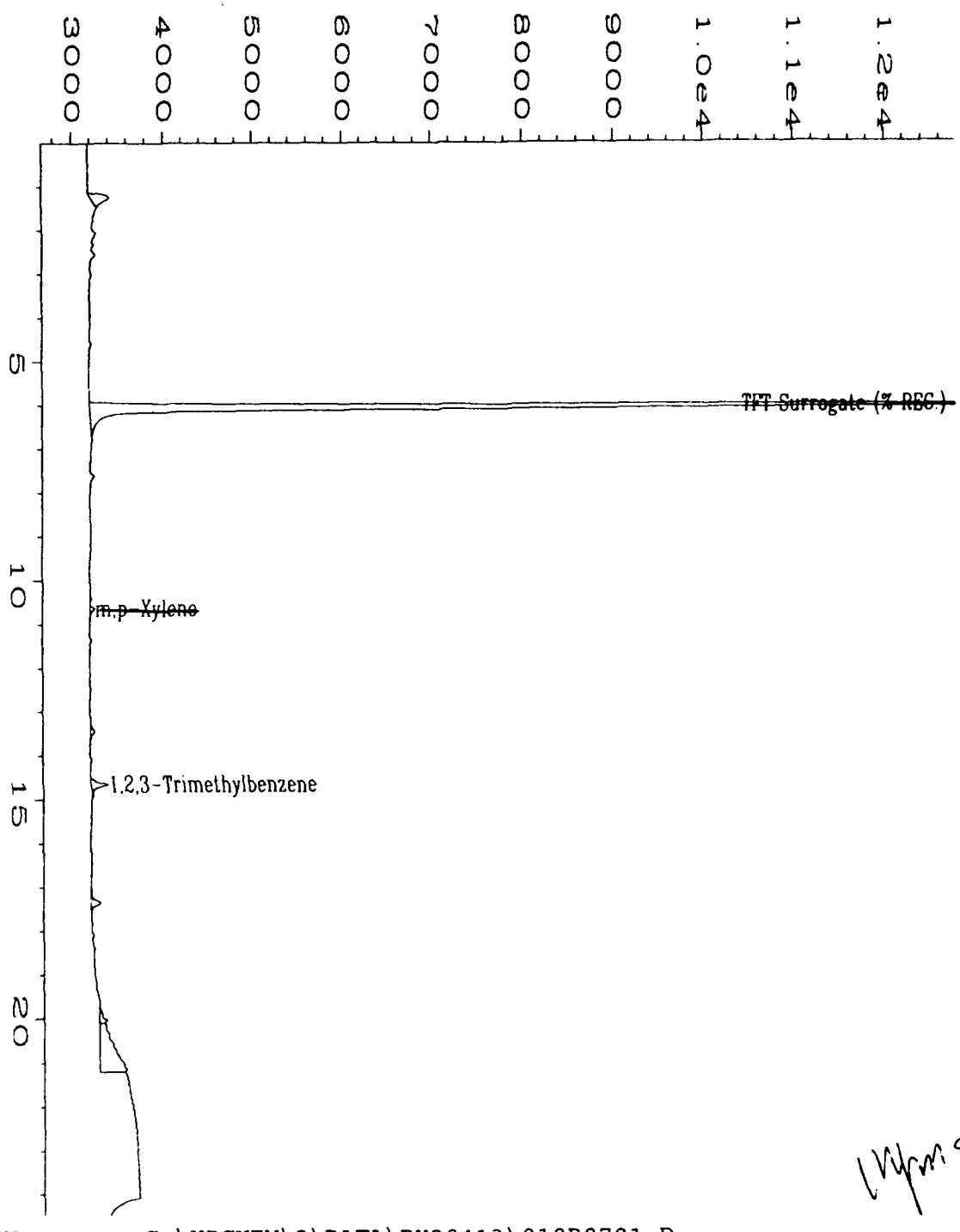
Surrogate Recovery (α,α,α-Trifluorotoluene):	93%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

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WHpm 5/1/95

Data File Name : C:\HPCHEM\2\DATA\BX20413\010R0701.D
Operator : SW Tyson
Instrument : BTEX2
Sample Name : X05071;1;5
Run Time Bar Code:
uired on : 13 Apr 95 04:49 AM
port Created on: 13 Apr 95 09:48 AM
Last Recalib on : 13 APR 95 02:16 AM
Multiplier : 1
Sample Info : Project # 95-1044 Client # 75MP-8D Water

Page Number : 1
Vial Number : 10
Injectior Number : 1
Sequence Line : 7
Instrument Method: BX20413.MTH
Analysis Method : BX20413.MTH
Sample Amount : 0
ISTD Amount :

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Method 602 Data Report

Client Sample Number	: 75MP-9S	**Client Project No.**	: 722450.21020/MacD
Lab Sample Number	: X05079	**Lab Project No.**	: 95-1044
Date Sampled	: 3/30/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/13/95	**Lab File No.**	: BX2041320
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3	9.1		0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6		U	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4

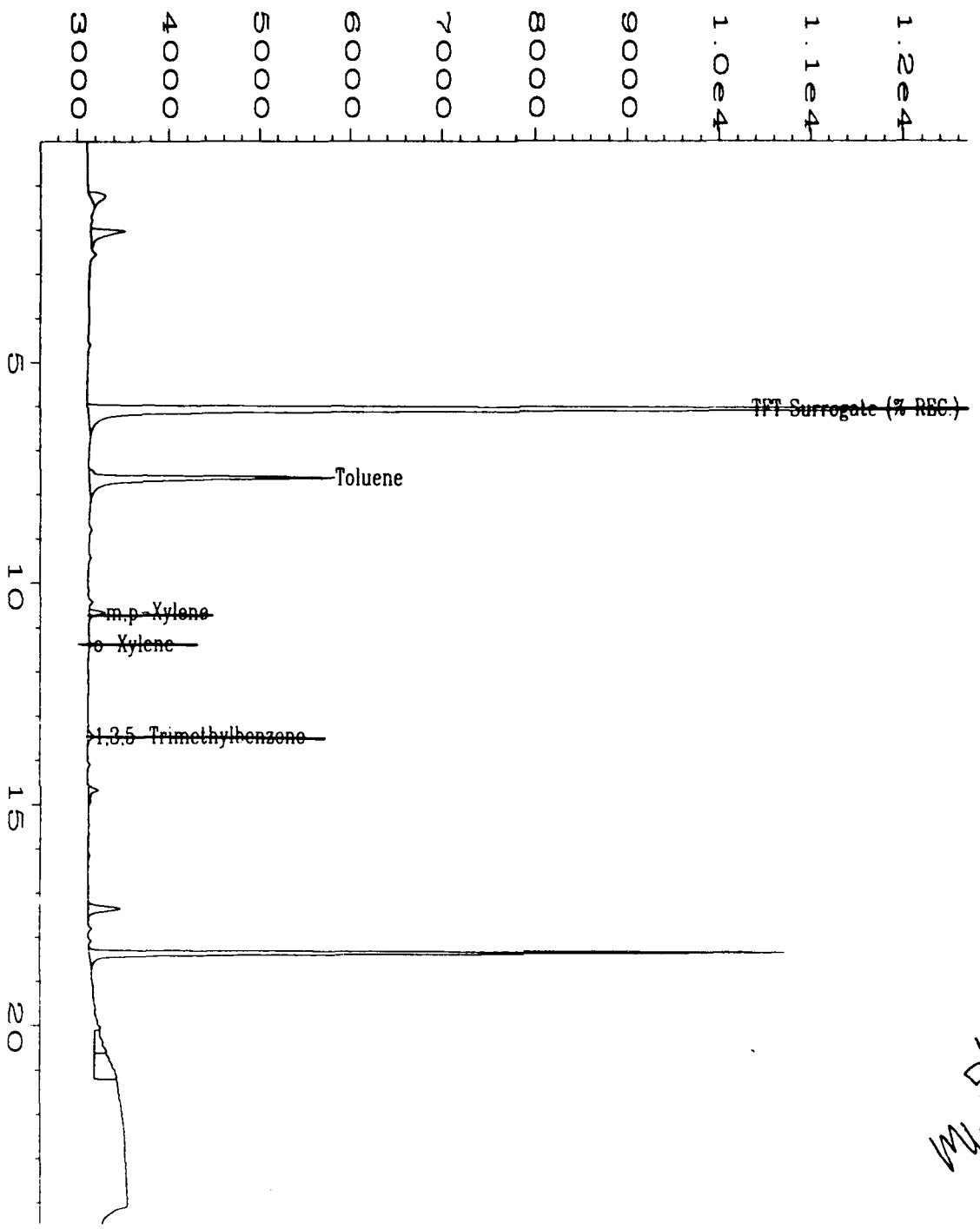
Surrogate Recovery (α,α,α-Trifluorotoluene):	85%	70%-130% (QC limits

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



5/1/95

Data File Name	: C:\HPCHEM\2\DATA\BX20413\020R0701.D		
Operator	: SW Tyson	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 20
Sample Name	: X05079;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
Acquired on	: 13 Apr 95 12:22 PM	Instrument Method	: BX20413.MTH
Report Created on	: 13 Apr 95 02:18 PM	Analysis Method	: BX20413.MTH
Last Recalib on	: 13 APR 95 02:16 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

75MP-95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: 75MP-9D	**Client Project No.**	: 722450.21020/MacD
Lab Sample Number	: X05078	**Lab Project No.**	: 95-1044
Date Sampled	: 3/30/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/13/95	**Lab File No.**	: BX2041319
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	U	0.4
Toluene	108-88-3	U	0.4
Chlorobenzene	108-90-7	U	0.4
Ethyl Benzene	100-41-4	U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	U	0.4
1,2,3-Trimethylbenzene	526-73-8	U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U	0.4

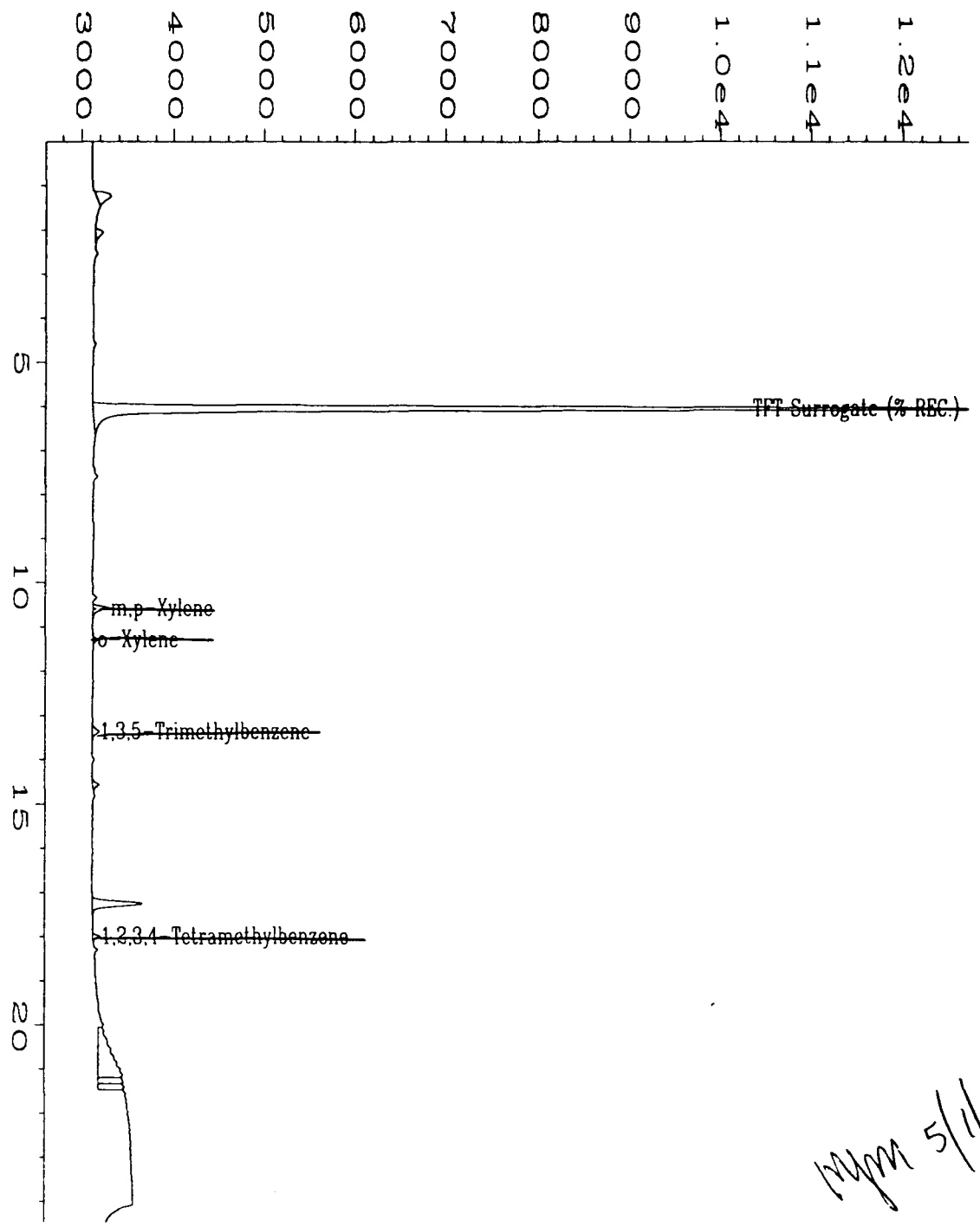
Surrogate Recovery (α,α,α-Trifluorotoluene):	81%	70%-130% (QC limits

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



mpm 5/1/95

Data File Name	: C:\HPCHEM\2\DATA\BX20413\019R0701.D		
Operator	: SW Tyson	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 19
Sample Name	: X05078;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
quired on	: 13 Apr 95 11:37 AM	Instrument Method	: BX20413.MTH
port Created on	: 13 Apr 95 02:17 PM	Analysis Method	: BX20413.MTH
Last Recalib on	: 13 APR 95 02:16 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

75MP-9D

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: 75MP-28S	**Client Project No.**	: 722450.21020/Macl
Lab Sample Number	: X05073	**Lab Project No.**	: 95-1044
Date Sampled	: 3/30/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/13/95	**Lab File No.**	: BX2041314
		Method Blank No.	: MB041395

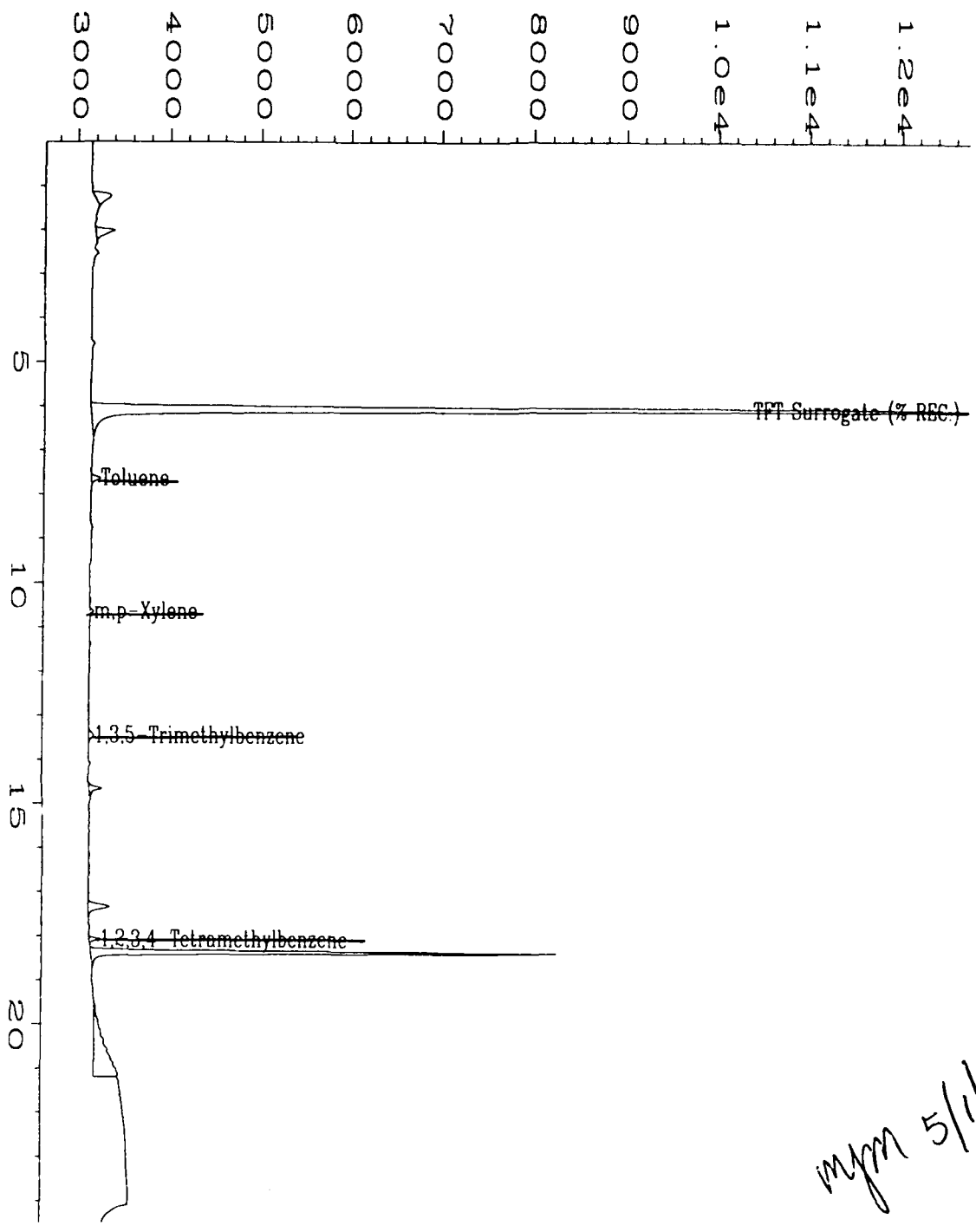
Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	U	0.4
Toluene	108-88-3	U	0.4
Chlorobenzene	108-90-7	U	0.4
Ethyl Benzene	100-41-4	U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	U	0.4
1,2,3-Trimethylbenzene	526-73-8	U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		90%	70%-130% (QC limits

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



mgm 5/1/95

Data File Name	: C:\HPCHEM\2\DATA\BX20413\014R0701.D		
Operator	: SW Tyson	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 14
Sample Name	: X05073;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
quired on	: 13 Apr 95 07:50 AM	Instrument Method	: BX20413.MTH
port Created on	: 13 Apr 95 10:13 AM	Analysis Method	: BX20413.MTH
Last Recalib on	: 13 APR 95 02:16 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

75MP-285

Evergreen Analytical, Inc.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

BTEX Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: 75MP-8S	Client Project No.	: 722450.21020/MacDill
Lab Sample No.	: X05072	Lab Project No.	: 95-1044
Date Sampled	: 3/30/95	EPA Method No.	: 602
Date Received	: 3/31/95	Matrix	: Water
Date Prepared	: 4/13/95	Lab File Number(s)	: BX1041312,13
Date Analyzed	: 4/13/95	Method Blank	: MB041395

Compound	Spike Added (ug/L)	Sample Concentration (ug/L)	MS Concentration (ug/L)	MS %REC	QC Limits %REC
Benzene	20.0	0.0	11.0	55	50-150
Toluene	20.0	0.0	19.1	96	50-148
Ethyl Benzene	20.0	0.0	18.3	92	50-150
m,p-Xylene	40.0	0.0	37.4	94	50-150
o-Xylene	20.0	0.0	18.4	92	50-150
Chlorobenzene	20.0	0.0	18.0	90	55-135
1,3,5-TMB	20.0	0.0	18.4	92	50-150
1,2,4-TMB	20.0	0.0	18.3	92	50-150
1,2,3-TMB	20.0	0.0	18.7	94	50-15
1,2,3,4-TeMB	20.0	0.0	19.4	97	50-15

Compound	Spike Added (ug/L)	MSD Concentration (ug/L)	MSD %REC	RPD	QC Limits RPD	QC Limits %REC
Benzene	20.0	10.4	52	5.6	25	50-150
Toluene	20.0	18.0	90	5.9	25	50-148
Ethyl Benzene	20.0	17.4	87	5.0	25	50-150
m,p-Xylene	40.0	35.1	88	6.3	25	50-150
o-Xylene	20.0	17.5	88	5.0	25	50-150
Chlorobenzene	20.0	17.0	85	5.7	25	55-135
1,3,5-TMB	20.0	17.3	87	6.2	25	50-150
1,2,4-TMB	20.0	16.8	84	8.5	25	50-150
1,2,3-TMB	20.0	17.2	86	8.4	25	50-150
1,2,3,4-TeMB	20.0	16.6	83	15.6	25	50-150

* = Values outside of QC limits.

RPD: 0 out of (10) outside limits.

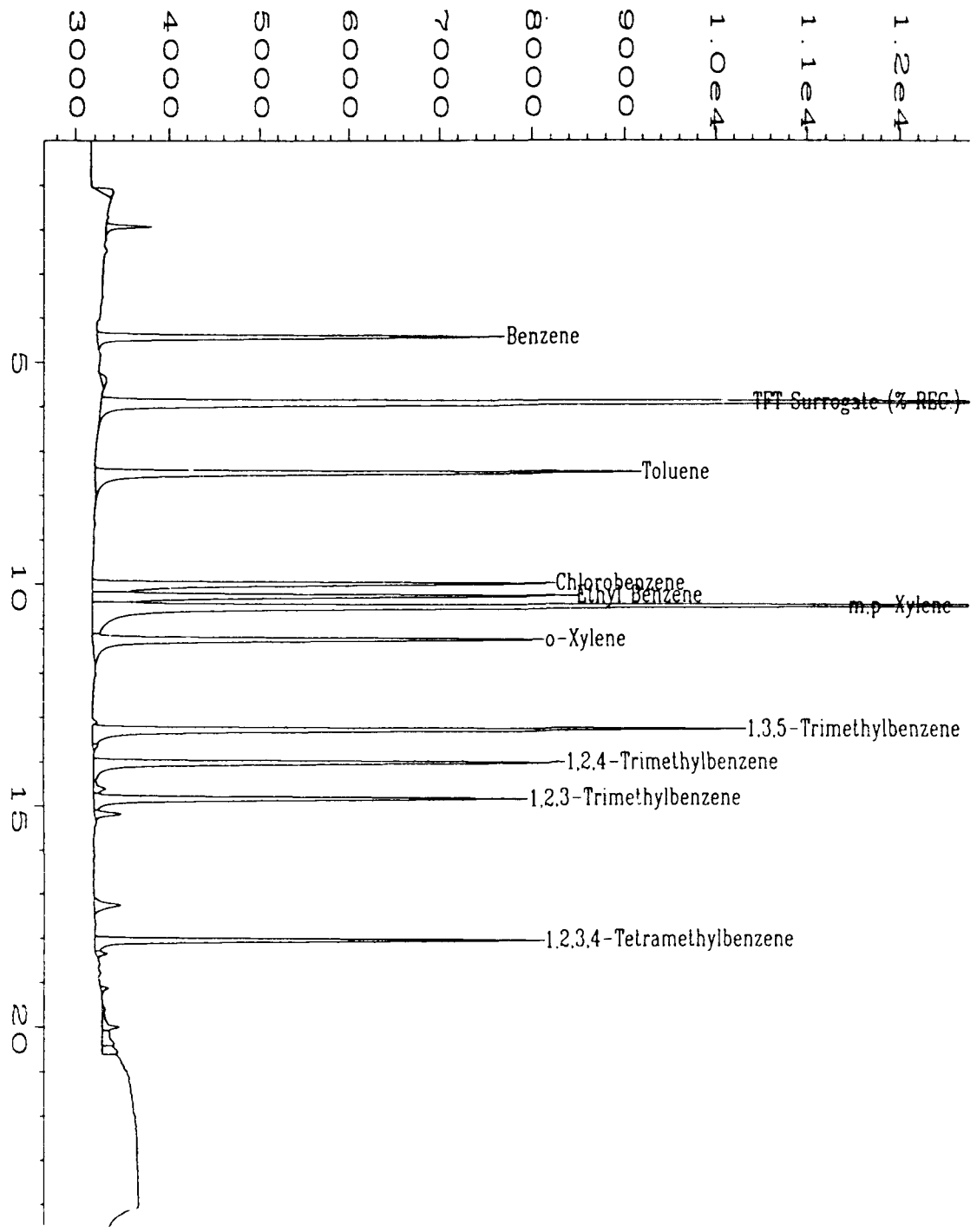
Spike Recovery: 0 out of (20) outside limits.

Comments:

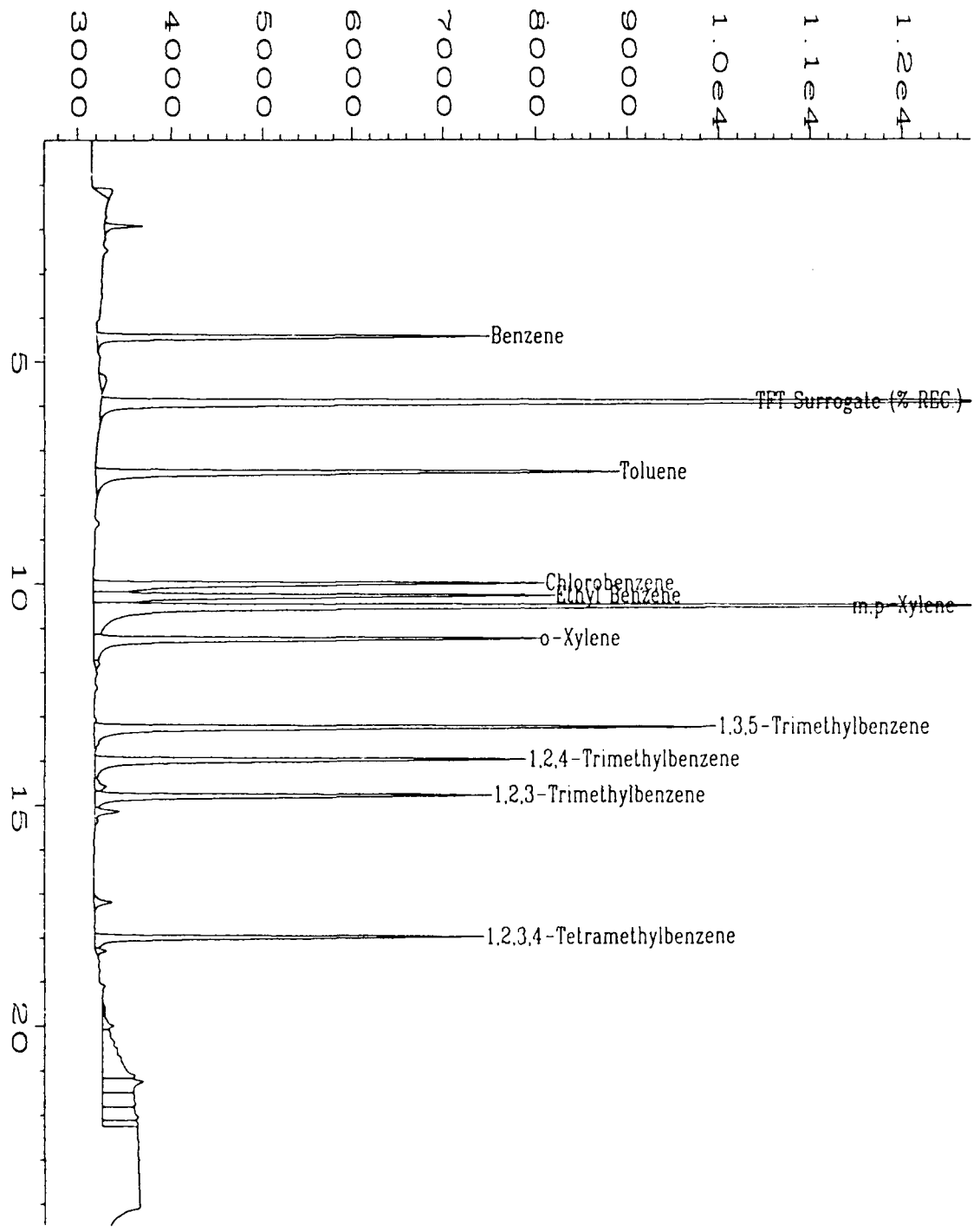
K. Cone
Analyst

Approved

MS10448.XLS



Data File Name	: C:\HPCHEM\2\DATA\BX20413\012R0701.D		
Operator	: SW Tyson	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 12
Sample Name	: X05072MS;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
Acquired on	: 13 Apr 95 06:19 AM	Instrument Method	: BX20413.MTH
Report Created on	: 13 Apr 95 10:22 AM	Analysis Method	: BX20413.MTH
Last Recalib on	: 13 APR 95 02:16 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



Data File Name	: C:\HPCHEM\2\DATA\BX20413\013R0701.D		
Operator	: SW Tyson	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 13
Sample Name	: X05072MSD;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
Acquired on	: 13 Apr 95 07:04 AM	Instrument Method	: BX20413
Report Created on	: 13 Apr 95 10:22 AM	Analysis Method	: BX20413
Last Recalib on	: 13 APR 95 02:16 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Evergreen Analytical, Inc.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS
TVH Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: 56MP-2S	**Client Project No.**	: 722450.21020\MAC
Lab Sample No.	: X05056	**Lab Project No.**	: 95-1044
Date Sampled	: 3/29/95	**EPA Method No.**	: 5030/8015 Mod.
Date Received	: 3/31/95	**Matrix**	: Water
Date Prepared	: 4/11/95	**Method Blank**	: MB041295
Date Analyzed	: 4/12/95		

Compound	Spike Added (mg/L)	Sample Concentration (mg/L)	MS Concentration (mg/L)	MS %REC	QC Limits %REC
Gasoline	2.00	0.00	2.07	104%	60-140

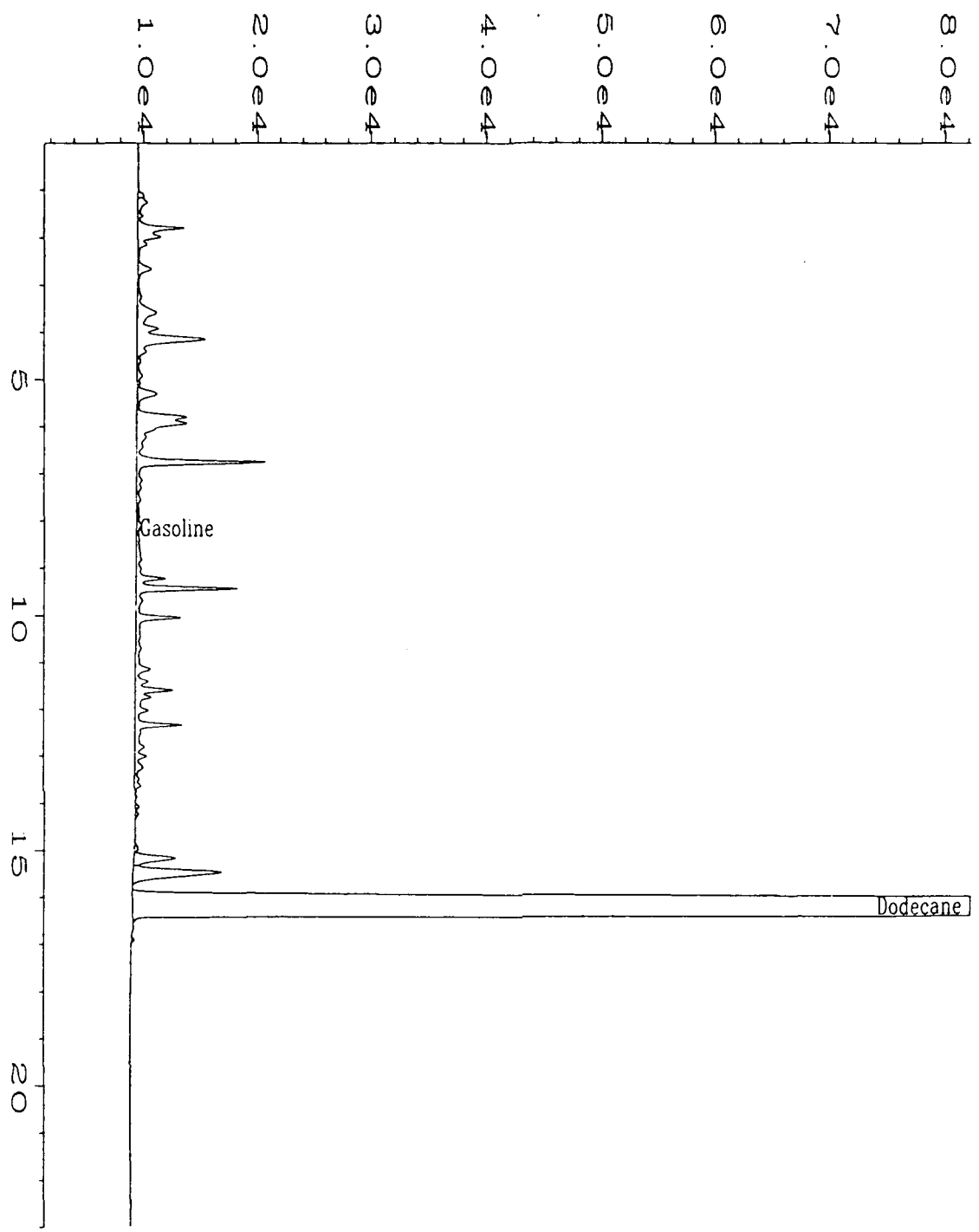
Compound	Spike Added (mg/L)	MSD Concentration (mg/L)	MS %REC	RPD	QC Limits RPD	QC Limits %REC
Gasoline	2.00	1.95	98%	6	50	60-140

* = Values outside of QC limits.

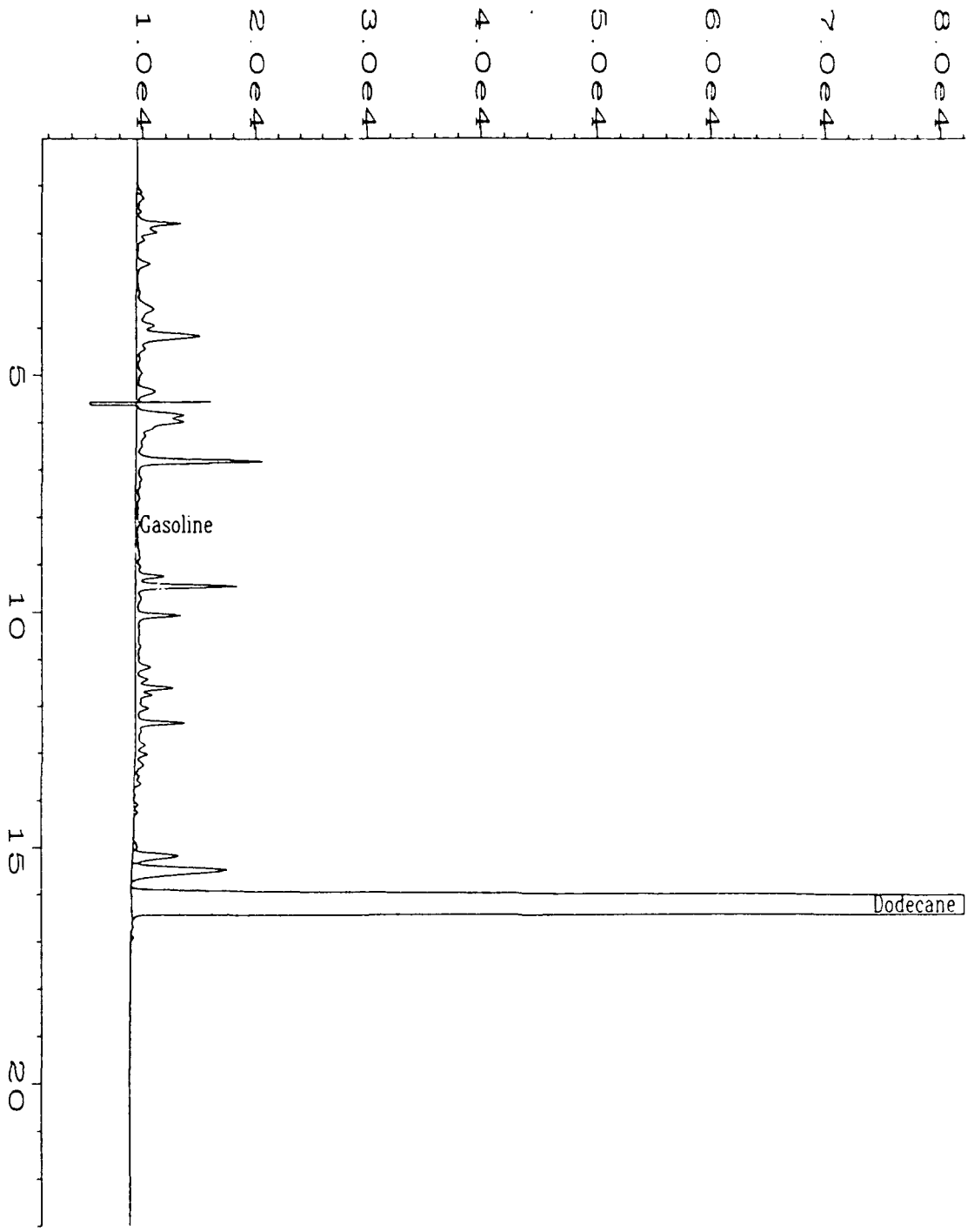
RPD: 0 out of (1) outside limits.

Spike Recovery: 0 out of (2) outside limits.

Comments: NA = Not analyzed/not applicable.



Data File Name	: C:\HPCHEM\1\DATA\tvh0412\011F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 11
Sample Name	: X05056 MS	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 12 Apr 95 06:01 AM	Instrument Method	: TVH1BA
Report Created on	: 12 Apr 95 10:04 AM	Analysis Method	: TVH0412.MT
Last Recalib on	: 12 APR 95 10:00 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



Data File Name	: C:\HPCHEM\1\DATA\tvh0412\012F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 12
Sample Name	: X05056 MSD	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 12 Apr 95 06:37 AM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 12 Apr 95 10:05 AM	Analysis Method	: TVH0412.MTH
Last Recalib on	: 12 APR 95 10:00 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Evergreen Analytical, Inc.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS
TVH Matrix Spike/Matrix Spike Duplicate Data Report

Client Sample No.	: 75MP-8S	**Client Project No.**	: 722450.21020\MAC
Lab Sample No.	: X05074,75	**Lab Project No.**	: 95-1044
Date Sampled	: 3/30/95	**EPA Method No.**	: 5030/8015 Mod.
Date Received	: 3/31/95	**Matrix**	: Water
Date Prepared	: 4/13/95	**Method Blank**	: MB041295
Date Analyzed	: 4/13/95		MB041395

Compound	Spike Added (mg/L)	Sample Concentration (mg/L)	MS Concentration (mg/L)	MS %REC	QC Limits %REC
Gasoline	2.00	0.00	1.89	95%	60-140

Compound	Spike Added (mg/L)	MSD Concentration (mg/L)	MS %REC	RPD	QC Limits RPD	QC Limits %REC
Gasoline	2.00	1.65	83%	14	50	60-140

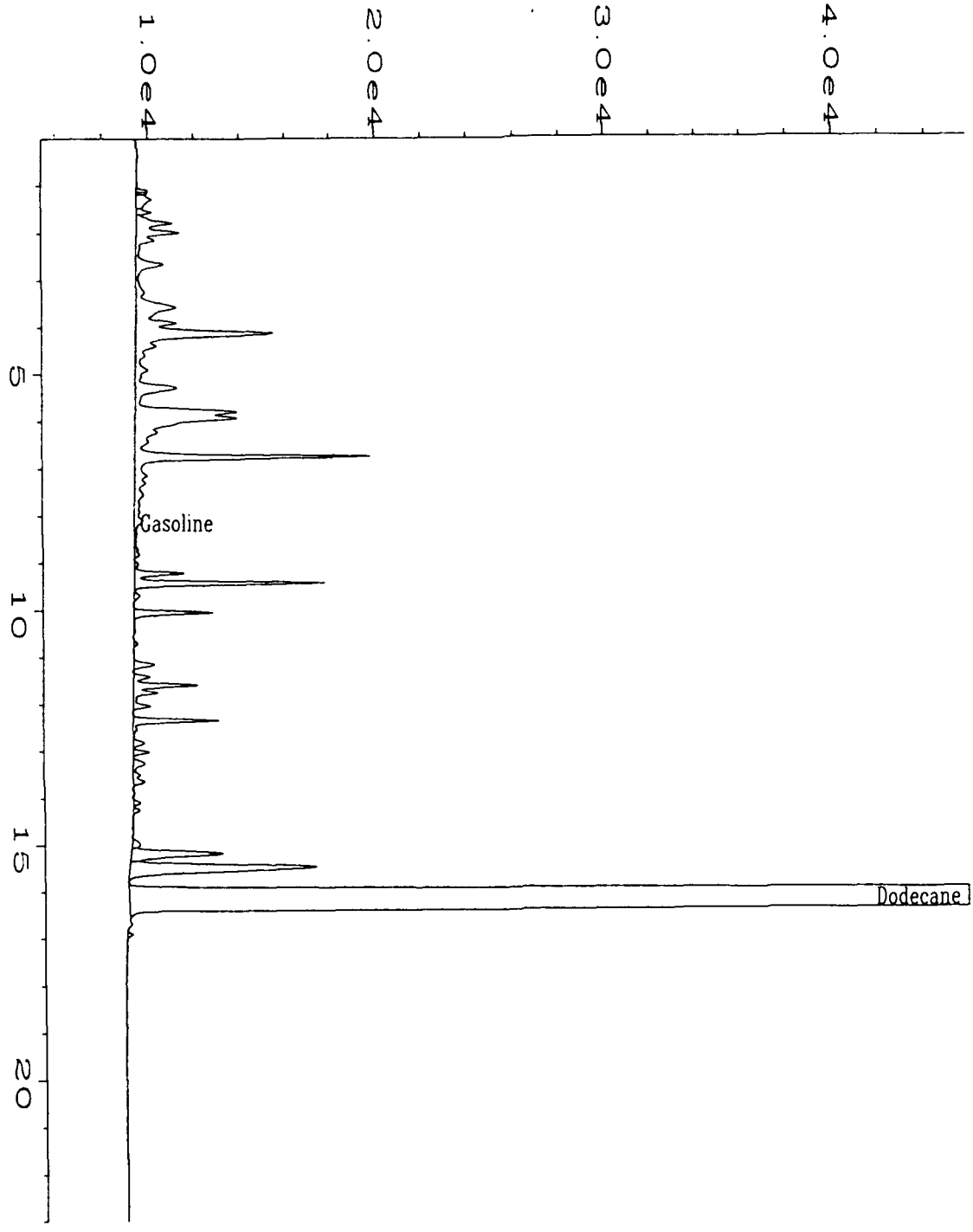
* = Values outside of QC limits.

RPD: 0 out of (1) outside limits.

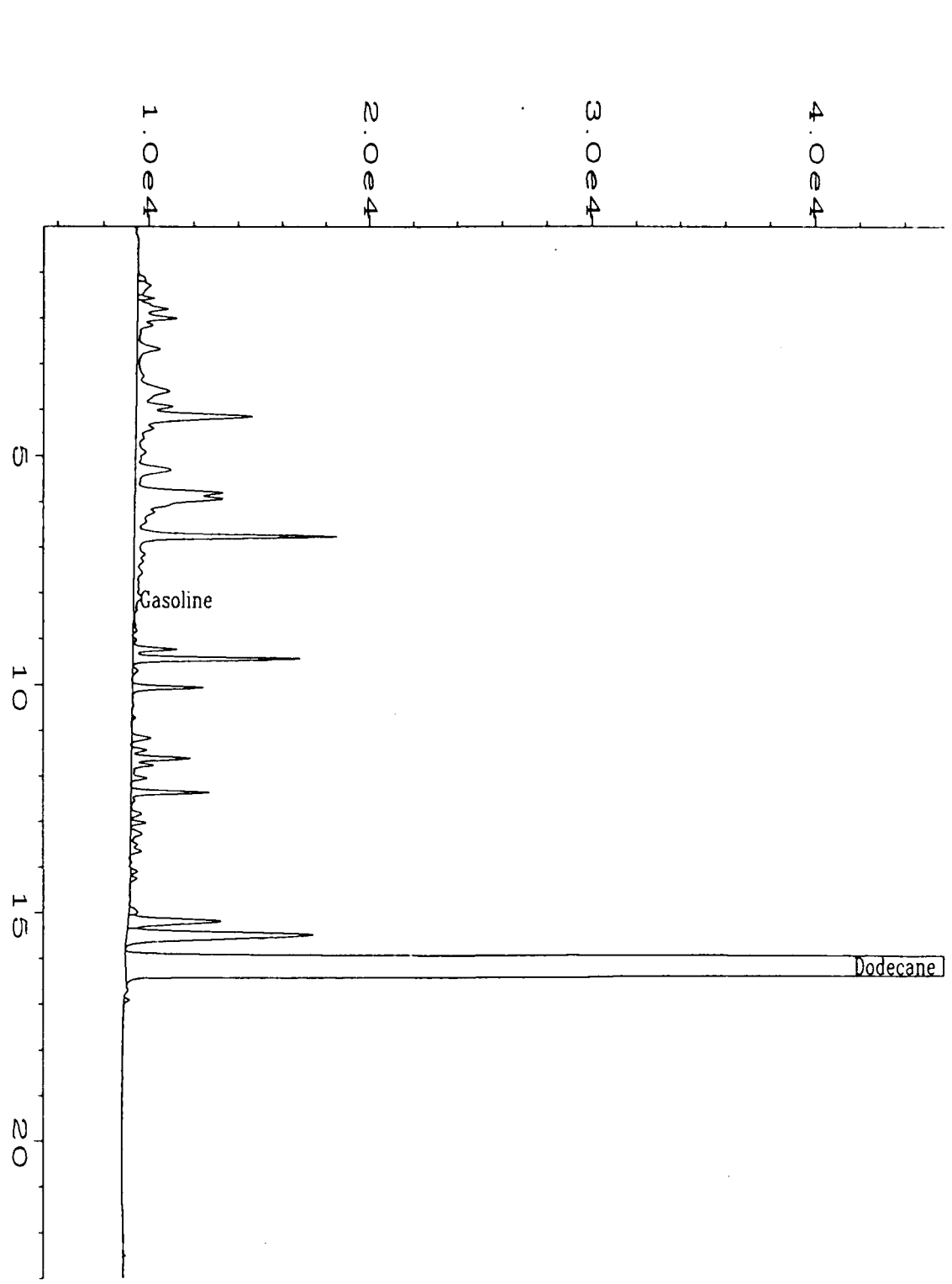
Spike Recovery: 0 out of (2) outside limits.

Comments: NA = Not analyzed/not applicable.

pr



Data File Name	: C:\HPCHEM\1\DATA\tvh0413\012F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 12
Sample Name	: X05074 MS	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Apr 95 04:48 PM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 14 Apr 95 09:48 AM	Analysis Method	: TVH0413.MTH
Last Recalib on	: 13 APR 95 02:21 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1044 CLIENT # MATRIX SPIKE WATER		



Data File Name	: C:\HPCHEM\1\DATA\tvh0413\013F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 13
Sample Name	: X05075 MSD	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Apr 95 05:24 PM	Instrument Method	: TVH1BA
Report Created on	: 14 Apr 95 09:48 AM	Analysis Method	: TVH0413.M
Last Recalib on	: 13 APR 95 02:21 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1044 CLIENT # MATRIX SPIKE DUP WATER		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: Field Blank	**Client Project No.**	: 722450.21020/MacDill
Lab Sample Number	: X05077	**Lab Project No.**	: 95-1044
Date Sampled	: 3/30/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/13/95	**Lab File No.**	: BX2041316
		Method Blank No.	: MB041395

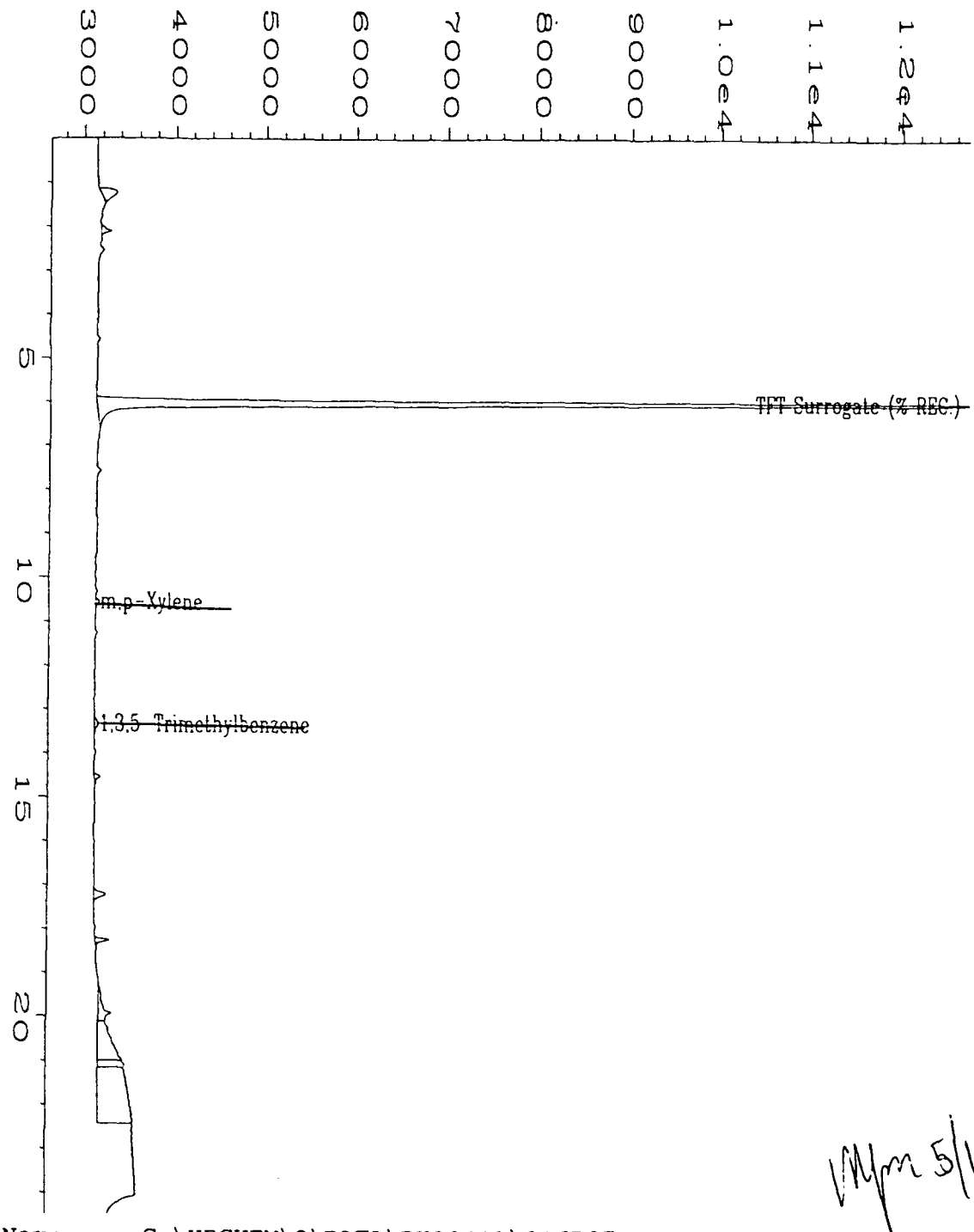
Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	U	0.4
Toluene	108-88-3	U	0.4
Chlorobenzene	108-90-7	U	0.4
Ethyl Benzene	100-41-4	U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	U	0.4
1,2,3-Trimethylbenzene	526-73-8	U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U	0.4
Surrogate Recovery (α,α,α-Trifluorotoluene):		84%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



VMm 5/1/95

Data File Name	: C:\HPCHEM\2\DATA\BX20413\016R0701.D		
Operator	: SW Tyson	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 16
Sample Name	: X05077;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 7
Acquired on	: 13 Apr 95 09:20 AM	Instrument Method	: BX20413
Report Created on	: 13 Apr 95 10:11 AM	Analysis Method	: BX20413...
Last Recalib on	: 13 APR 95 02:16 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Field Blank

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: Rinseate Blank	**Client Project No.**	: 722450.21020/MacDill
Lab Sample Number	: X05076	**Lab Project No.**	: 95-1044
Date Sampled	: 3/30/95	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/13/95	**Lab File No.**	: BX2041315
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3		U	0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6		U	0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4

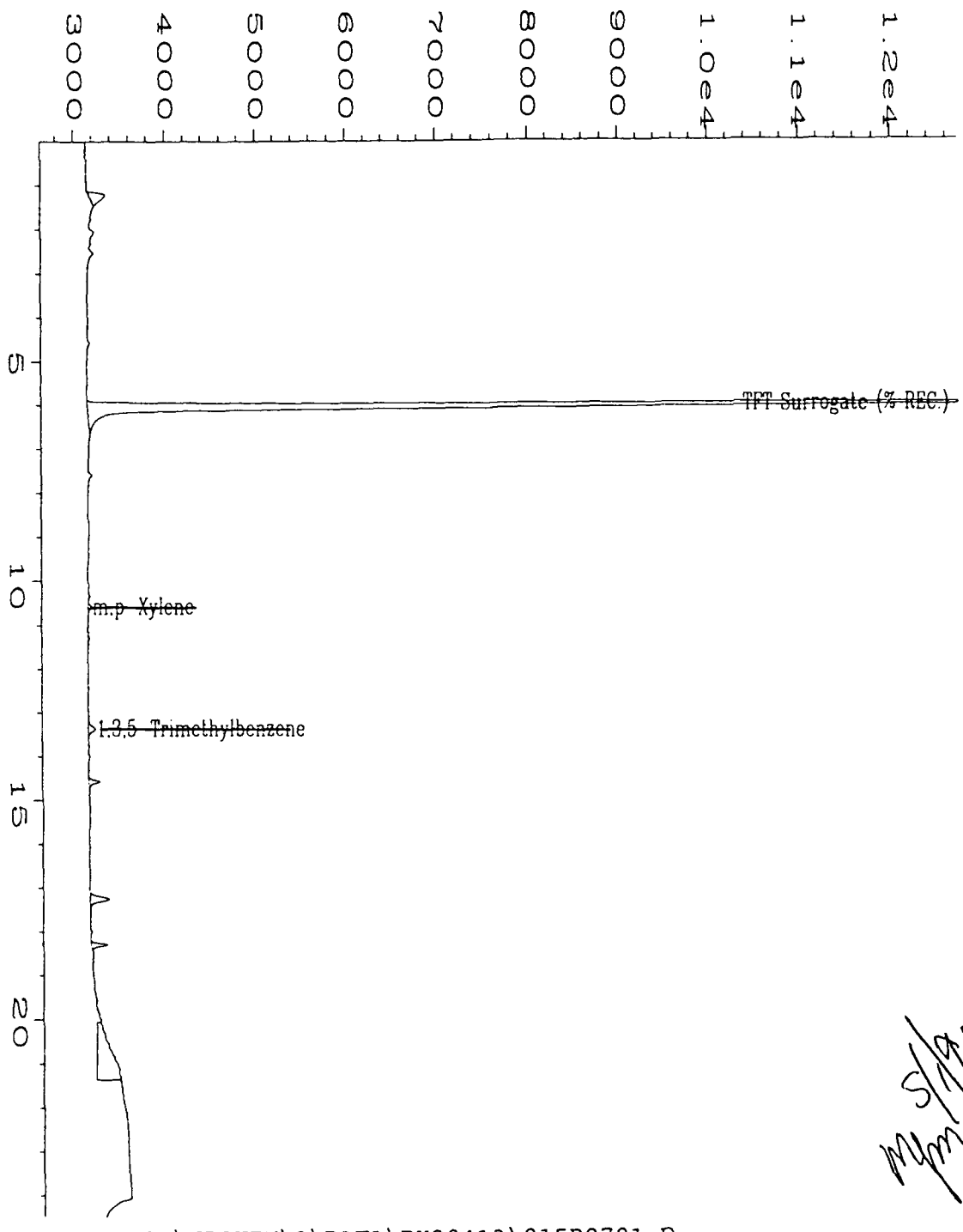
Surrogate Recovery (α,α,α-Trifluorotoluene):	92%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20413\015R0701.D
Operator : SW Tyson
Instrument : BTEX2
Sample Name : X05076;1;5
Run Time Bar Code:
Acquired on : 13 Apr 95 08:35 AM
Report Created on: 13 Apr 95 10:11 AM
Last Recalib on : 13 APR 95 02:16 AM
Multiplier : 1

Page Number : 1
Vial Number : 15
Injection Number : 1
Sequence Line : 7
Instrument Method: BX20413
Analysis Method : BX20413....
Sample Amount : 0
ISTD Amount :

Rinsate Blank

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: Trip Blank	Client Project No.	: 722450.21020/MacDill
Lab Sample Number	: X05070	Lab Project No.	: 95-1044
Date Sampled	: NA	Dilution Factor	: 1.00
Date Received	: 3/31/95	Method	: 602
Date Prepared	: 4/12/95	Matrix	: Water
Date Analyzed	: 4/12/95	Lab File No.	: BX1041224
		Method Blank No.	: MB041295

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	U	0.4
Toluene	108-88-3	U	0.4
Chlorobenzene	108-90-7	U	0.4
Ethyl Benzene	100-41-4	U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	U	0.4
1,2,3-Trimethylbenzene	526-73-8	U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U	0.4

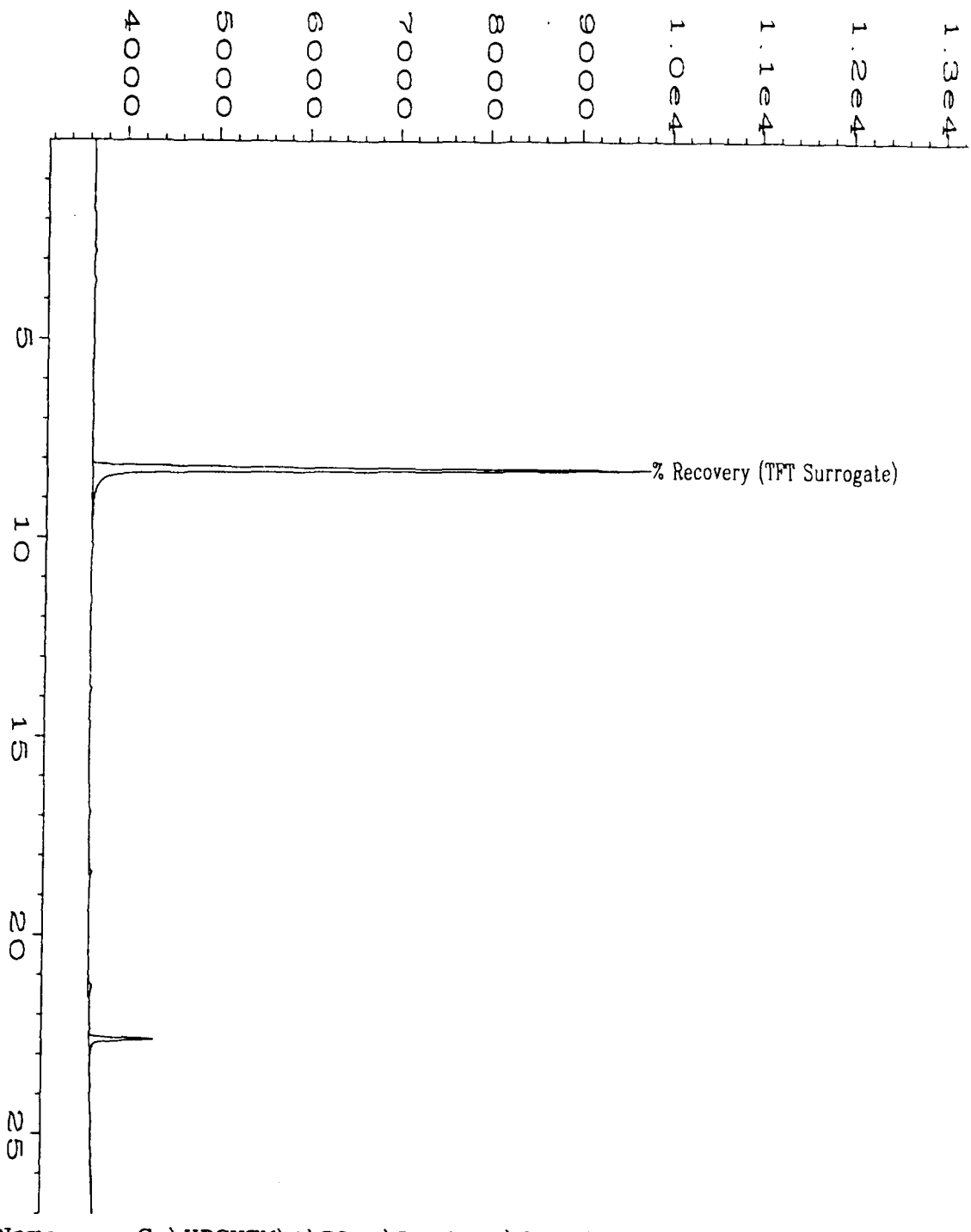
Surrogate Recovery (α,α,α-Trifluorotoluene):	77%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

K. Cone
Analyst

Approved



Data File Name	: C:\HPCHEM\1\DATA\BX10412\024F0901.D		
Operator	: S.W. Tyson	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 24
Sample Name	: X05070;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 9
Acquired on	: 12 Apr 95 04:20 PM	Instrument Method	: BX10412
Report Created on	: 28 Apr 95 07:41 PM	Analysis Method	: BX10412B.MT
Last Recalib on	: 28 APR 95 07:11 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project # 95-1044 Client # Trip Blank Water		

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

Method 602 Data Report

Client Sample Number	: Trip Blank	**Client Project No.**	: 722450.21020/MacDill
Lab Sample Number	: X05084	**Lab Project No.**	: 95-1044
Date Sampled	: NA	**Dilution Factor**	: 1.00
Date Received	: 3/31/95	**Method**	: 602
Date Prepared	: 4/13/95	**Matrix**	: Water
Date Analyzed	: 4/13/95	**Lab File No.**	: BX2041326
		Method Blank No.	: MB041395

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2	U		0.4
Toluene	108-88-3	U		0.4
Chlorobenzene	108-90-7	U		0.4
Ethyl Benzene	100-41-4	U		0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U		0.4
1,3,5-Trimethylbenzene	108-67-8	U		0.4
1,2,4-Trimethylbenzene	95-63-6	U		0.4
1,2,3-Trimethylbenzene	526-73-8	U		0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U		0.4

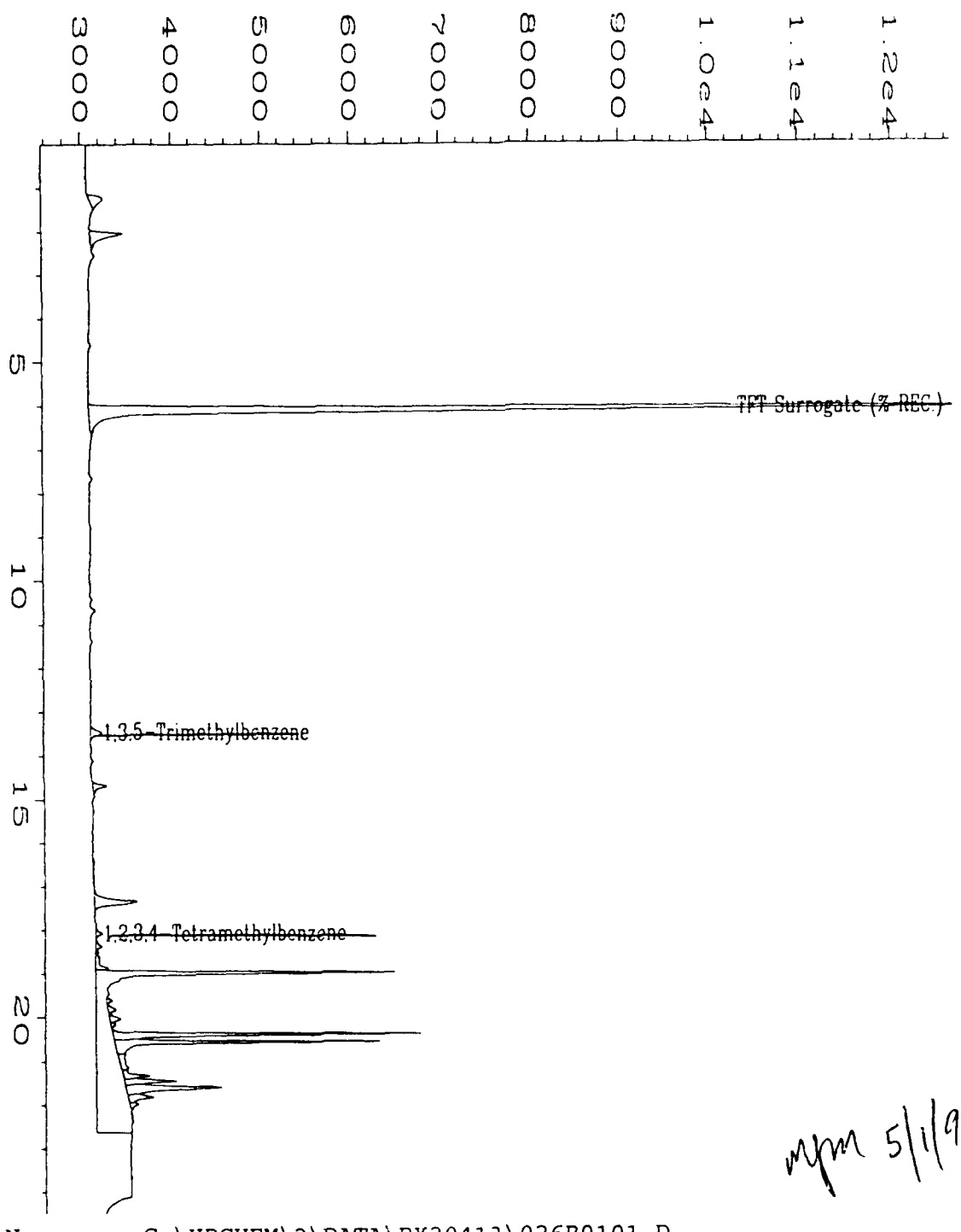
Surrogate Recovery (α,α,α-Trifluorotoluene):	84%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
NA = Not Available/Not Applicable.

Analyst

Approved



mpm 5/1/95

Data File Name	: C:\HPCHEM\2\DATA\BX20413\026R0101.D		
Operator	: SW Tyson	Page Number	: 1
Instrument	: BTEX2	Vial Number	: 26
Sample Name	: X05084;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Apr 95 05:00 PM	Instrument Method	: BX20413
Report Created on	: 13 Apr 95 05:25 PM	Analysis Method	: BX20413.MTH
Last Recalib on	: 13 APR 95 02:16 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: Project # 95-1044 Client # Trip Blank Water		

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(303) 425-6021

Method 602 Data Report
Method Blank Report

Method Blank Number	: MB041295	Client Project No.	: 722450.21020/MacDill
Date Prepared	: 4/12/95	Lab Project No.	: 95-1044
Date Analyzed	: 4/12/95	Dilution Factor	: 1.00
		Method	: 602/8020
		Matrix	: Water
		Lab File No.	: BX1041211

Compound Name	Cas Number	Sample Concentration ug/L		RL ug/L
Benzene	71-43-2		U	0.4
Toluene	108-88-3	0.7		0.4
Chlorobenzene	108-90-7		U	0.4
Ethyl Benzene	100-41-4		U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	0.4		0.4
1,3,5-Trimethylbenzene	108-67-8		U	0.4
1,2,4-Trimethylbenzene	95-63-6		U	0.4
1,2,3-Trimethylbenzene	526-73-8		U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3		U	0.4

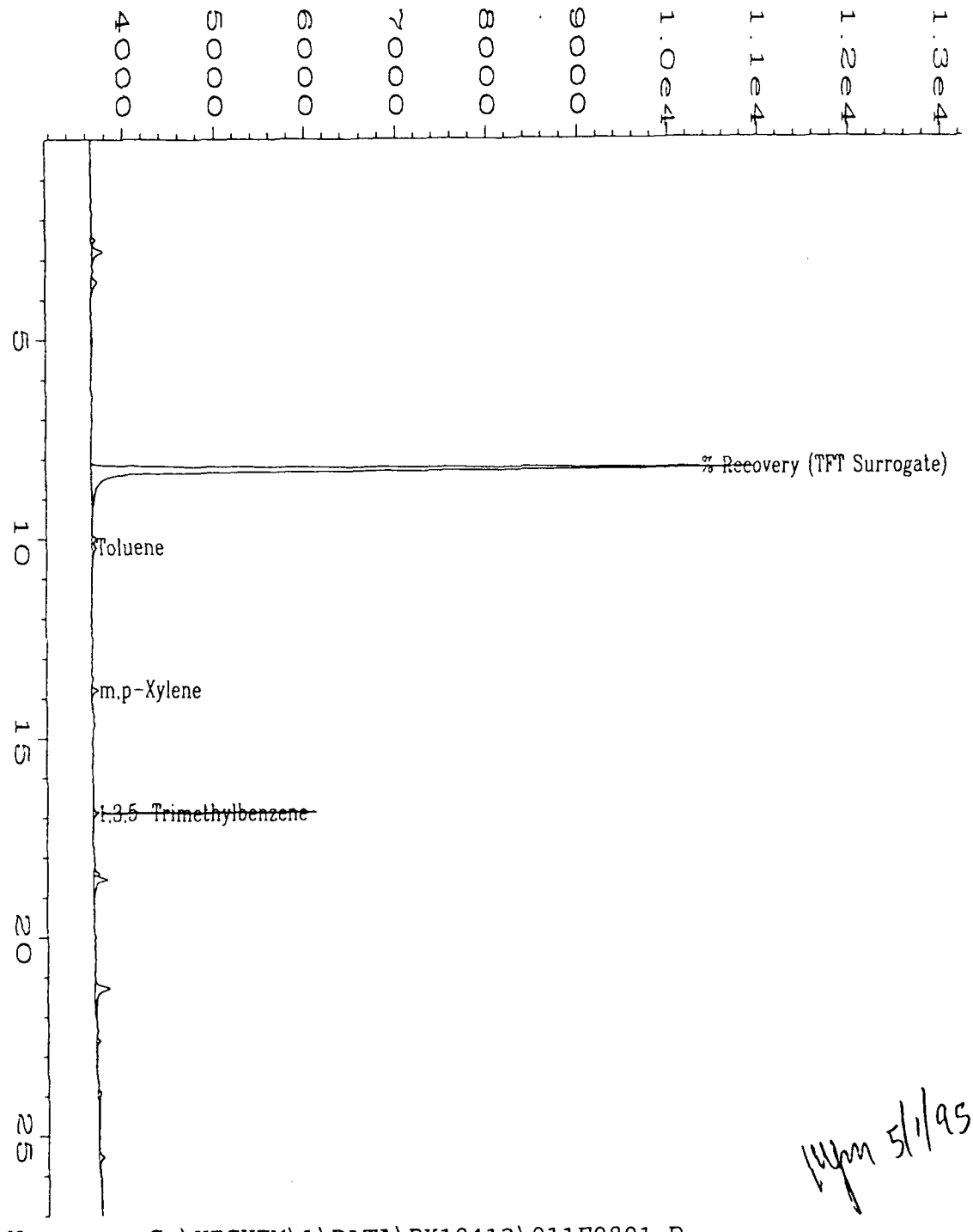
Surrogate Recovery (α,α,α-Trifluorotoluene):	90%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
A = Not Available/Not Applicable.

K. Cone
Analyst

Approved



user modifi

lkym 5/1/95

Data File Name : C:\HPCHEM\1\DATA\BX10412\011F0801.D
Operator : S.W. Tyson
Instrument : BTEX1
Sample Name : MB041295
Run Time Bar Code:
Acquired on : 12 Apr 95 08:00 AM
Report Created on: 28 Apr 95 07:32 PM
Last Recalib on : 28 APR 95 07:11 PM
Multiplier : 1

Page Number : 1
Vial Number : 11
Injection Number : 1
Sequence Line : 8
Instrument Method: BX10408
Analysis Method : BX10412b..I
Sample Amount : 0
ISTD Amount :

EVERGREEN ANALYTICAL, INC.
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Method 602 Data Report
Method Blank Report

Method Blank Number	: MB041395	Client Project No.	: 722450.21020/MacDill
Date Prepared	: 4/13/95	Lab Project No.	: 95-1044
Date Analyzed	: 4/13/95	Dilution Factor	: 1.00
		Method	: 602/8020
		Matrix	: Water
		Lab File No.	: BX2041309

Compound Name	Cas Number	Sample Concentration ug/L	RL ug/L
Benzene	71-43-2	U	0.4
Toluene	108-88-3	U	0.4
Chlorobenzene	108-90-7	U	0.4
Ethyl Benzene	100-41-4	U	0.4
Total Xylenes (m, p & o)	108-38-3, 106-42-3 and 95-47-6	U	0.4
1,3,5-Trimethylbenzene	108-67-8	U	0.4
1,2,4-Trimethylbenzene	95-63-6	U	0.4
1,2,3-Trimethylbenzene	526-73-8	U	0.4
1,2,3,4-Tetramethylbenzene	488-23-3	U	0.4

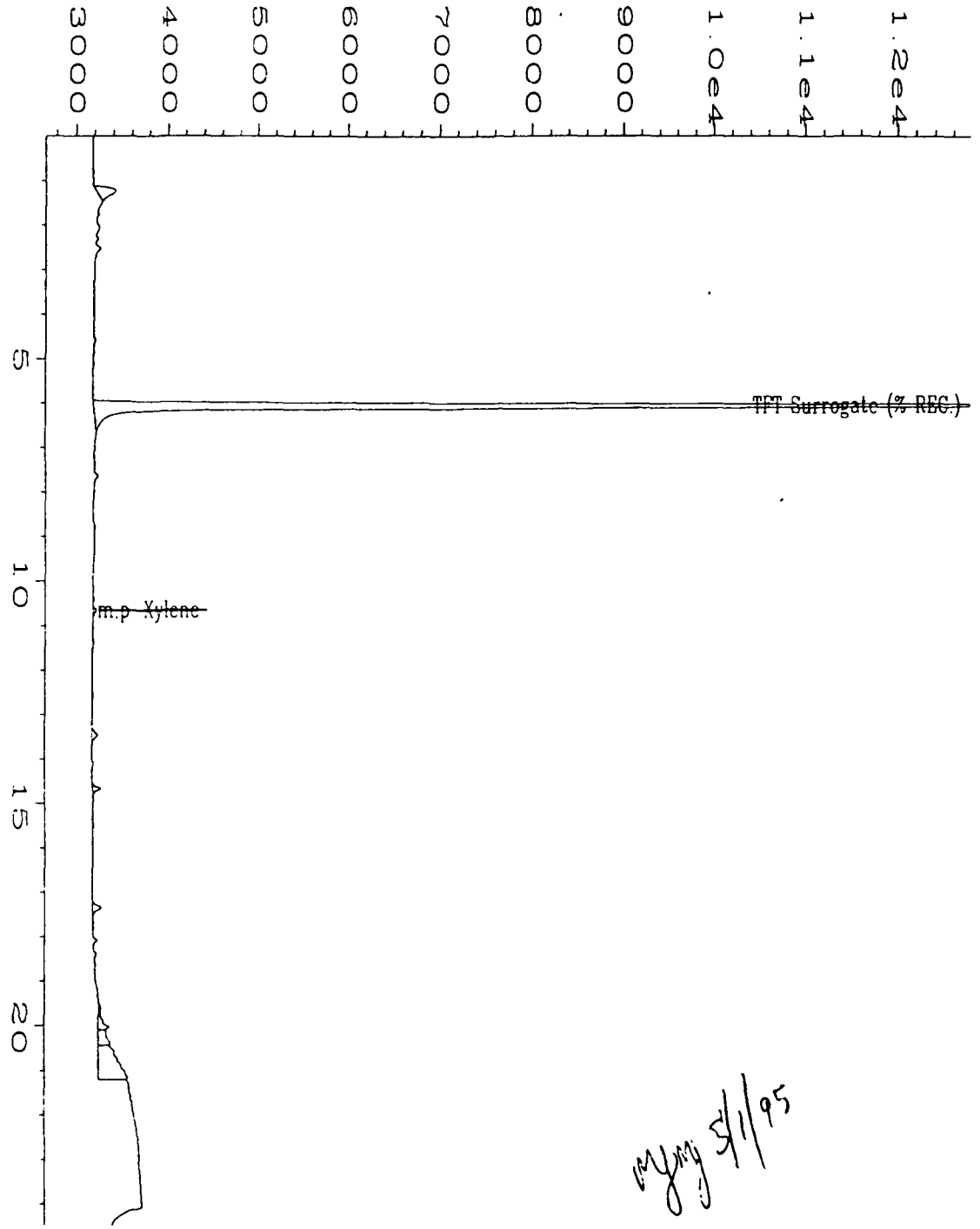
Surrogate Recovery (α,α,α-Trifluorotoluene):	99%	70%-130% (QC limits)

Note: Total Xylenes consist of three isomers, two of which co-elute.
The Xylene RL is for a single peak.

QUALIFIERS:
E = Extrapolated value.
U = Compound analyzed for, but not detected.
B = Compound also found in the blank.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
RL = Reporting Limit.
A = Not Available/Not Applicable.

Analyst

K. Cone
Approved



5/1/95

)ata File Name : C:\HPCHEM\2\DATA\BX20413\009R0701.D
)perator : SW Tyson
'nstrument : BTEX2
;ample Name : MB041395
:un Time Bar Code:
.cquired on : 13 Apr 95 04:04 AM
eport Created on: 13 Apr 95 09:48 AM
ast Recalib on : 13 APR 95 02:16 AM
ultiplier : 1

Page Number : 1
Vial Number : 9
Injection Number : 1
Sequence Line : 7
Instrument Method: BX20413.M
Analysis Method : BX20413.MTH
Sample Amount : 0
ISTD Amount :

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS (TVH)
Laboratory Control Sample (LCS)

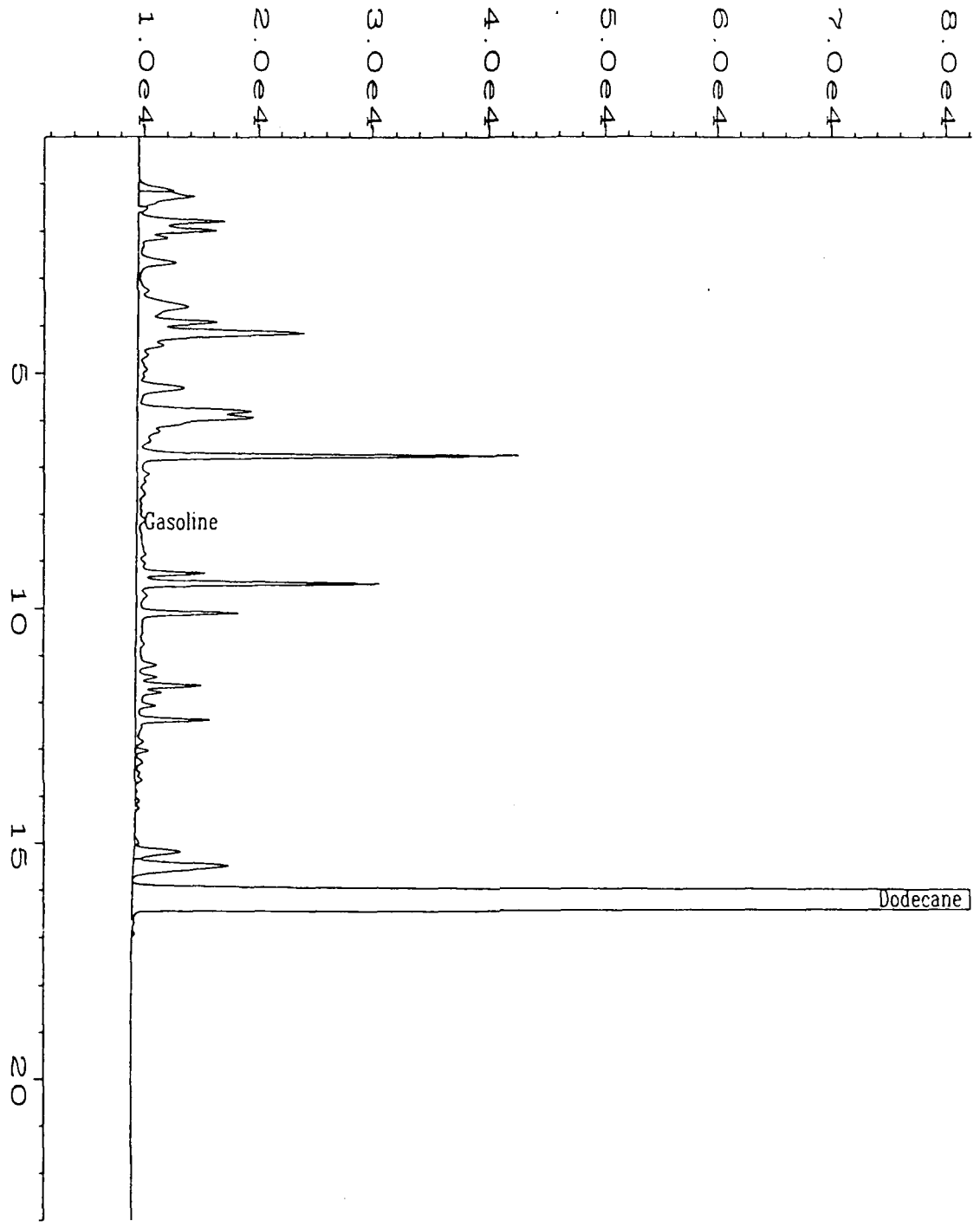
LCS Number	: LCS041295	Matrix	: WATER
Date Prepared	: 4/11/95	Method Number	: 5030/MOD.8015
Date Analyzed	: 4/12/95		
Sequence Number	: TVH8		

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/ L	LCS % Recovery	QC Limit % Recovery
Gasoline	5.00	5.22	104%	70%-130%

QUALIFIERS
U = TVH analyzed for but not detected.
B = TVH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

Analyst

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Data File Name	: C:\HPCHEM\1\DATA\tvh0412\008F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 8
Sample Name	: LCS041295	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 12 Apr 95 04:13 AM	Instrument Method	: TVH1BASE
Report Created on	: 12 Apr 95 10:04 AM	Analysis Method	: TVH0412.MTH
Last Recalib on	: 12 APR 95 10:00 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

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TOTAL VOLATILE HYDROCARBONS (TVH)
Laboratory Control Sample (LCS)

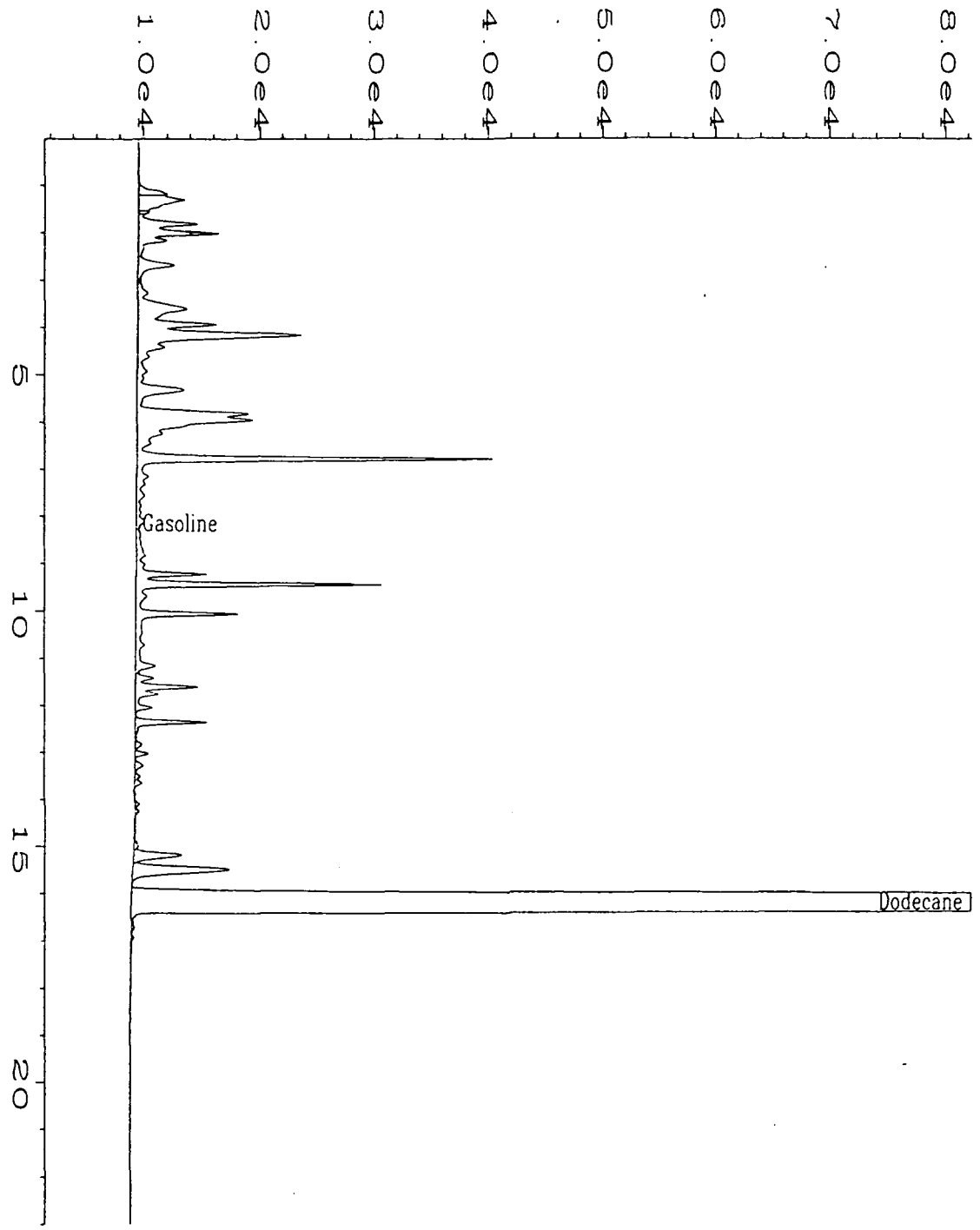
LCS Number	: LCS041395	Matrix	: WATER
Date Prepared	: 4/12/95	Method Number	: 5030/MOD.8015
Date Analyzed	: 4/13/95		
Sequence Number	: TVH8		

Compound Name	Theoretical Concentration mg/L	LCS Concentration mg/ L	LCS % Recovery	QC Limit % Recovery
Gasoline	5.00	5.17	103%	70%-130%

QUALIFIERS
U = TVH analyzed for but not detected.
B = TVH found in blank as well as sample (blank data should be compared).
E = Extrapolated value.
NA = Not Available.

Analyst

Approved



Data File Name	: C:\HPCHEM\1\DATA\TVH0413\008F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 8
Sample Name	: LCS041395	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Apr 95 02:24 PM	Instrument Method	: TVH1BASE
Report Created on	: 13 Apr 95 02:48 PM	Analysis Method	: TVH0413.MTH
Last Recalib on	: 13 Apr 95 02:21 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

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4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

			722450.21020
Date Sampled	: 3/29,30/95	Client Project ID.	: /MacDill AFB
Date Received	: 3/31/95	Lab Project No.	: 95-1044
Date Prepared	: 3/31/95	Method	: EPA 300.0
Date Analyzed	: 3/31/95	Matrix	: Water
		Detection Limit	: 0.250 mg/L

Evergreen Sample #	Client Sample ID	Chloride (mg/L)
X05056	56MP-2S	45.3
X05057	56MP-7S	32.8
X05060	MD56-MW4	24.9
X05063	MD75-MW5	12.3
X05066	MD75-MW1	6.27
X05067	75MP-5D	10.3
X05068	75MP-6D	12.2
X05069	MD75-MW2	12.6
X05071	75MP-8D	12.6
X05072	75MP-8S	12.5
X05072 dup	75MP-8S dup	12.5
Method blank (3-31-95)		<0.250

Quality Assurance

		Spike Amount (mg/L)	Sample Result (mg/L)	Spike Result (mg/L)	% Recovery
X05074	75MP-8S Matrix Spike	10.0	12.5	23.4	109
X05075	75MP-8S Matrix Spike Dup	10.0	12.5	22.9	104
	MS/MSD RPD				4.89
X05072/X05072 Dup	RPD				0.160

Analyst

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EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

Date Sampled	: 3/29,30/95	Client Project ID.	: 722450.21020 /MacDill AFB
Date Received	: 3/31/95	Lab Project No.	: 95-1044
Date Prepared	: 3/31/95	Method	: EPA 300.0
Date Analyzed	: 3/31/95	Matrix	: Water
		Detection Limit	: 0.250 mg/L

Evergreen Sample #	Client Sample ID	Chloride (mg/L)
X05073	75MP-28S	12.2
X05078	75MP-9D	4.80
X05079	75MP-9S	8.20
X05080	MD75-MW13	14.9
X05081	MD75-MW11	20.8
X05082	MD75-MW10	9.01
X05083	MD75-MW9	8.21

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EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

Date Sampled	: 3/29,30/95	Client Project ID.	: 722450.21020 /MacDill AFB
Date Received	: 3/31/95	Lab Project No.	: 95-1044
Date Prepared	: 3/31/95	Method	: EPA 300.0
Date Analyzed	: 3/31/95	Matrix	: Water
		Detection Limit	: 0.076 mg/L

Evergreen Sample #	Client Sample ID	Nitrite-N (mg/L)
X05056	56MP-2S	<0.076
X05057	56MP-7S	<0.076
X05060	MD56-MW4	<0.076
X05063	MD75-MW5	<0.076
X05066	MD75-MW1	<0.076
X05067	75MP-5D	<0.076
X05068	75MP-6D	<0.076
X05069	MD75-MW2	<0.076
X05071	75MP-8D	<0.076
X05072	75MP-8S	<0.076
X05072 dup	75MP-8S dup	<0.076
Method blank (3-31-95)		<0.076

Quality Assurance**

		Spike Amount (mg/L)	Sample Result (mg/L)	Spike Result (mg/L)	% Recovery
X05074	75MP-8S Matrix Spike	10.0	<0.250	10.2	102
X05075	75MP-8S Matrix Spike Dup	10.0	<0.250	9.86	98.6
	MS/MSD RPD				3.68
X05072/X05072 Dup	RPD				NC

** = Quality assurance results reported as Nitrite (NO_2).
NC = Not calculated because sample and/or duplication results below detection limit.

Debra L. Byrne
Analyst

Approved

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EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

Date Sampled	: 3/29,30/95	Client Project ID.	: 722450.21020 /MacDill AFB
Date Received	: 3/31/95	Lab Project No.	: 95-1044
Date Prepared	: 3/31/95	Method	: EPA 300.0
Date Analyzed	: 3/31/95	Matrix	: Water
		Detection Limit	: 0.076 mg/L

Evergreen Sample #	Client Sample ID	Nitrite-N (mg/L)
X05073	75MP-28S	<0.076
X05078	75MP-9D	<0.076
X05079	75MP-9S	<0.076
X05080	MD75-MW13	<0.076
X05081	MD75-MW11	<0.076
X05082	MD75-MW10	<0.076
X05083	MD75-MW9	<0.076

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(303)425-6021

Anions

			722450.21020
Date Sampled	: 3/29,30/95	Client Project ID.	: /MacDill AFB
Date Received	: 3/31/95	Lab Project No.	: 95-1044
Date Prepared	: 3/31/95	Method	: EPA 300.0
Date Analyzed	: 3/31/95	Matrix	: Water
		Detection Limit	: 0.056 mg/L

Evergreen Sample #	Client Sample ID	Nitrate-N (mg/L)
X05056	56MP-2S	<0.056
X05057	56MP-7S	<0.056
X05060	MD56-MW4	0.195
X05063	MD75-MW5	<0.056
X05066	MD75-MW1	<0.056
X05067	75MP-5D	<0.056
X05068	75MP-6D	<0.056
X05069	MD75-MW2	0.080
X05071	75MP-8D	0.060
X05072	75MP-8S	0.990
X05072 dup	75MP-8S dup	0.973
Method blank (3-31-95)		<0.056

Quality Assurance**

		Spike Amount (mg/L)	Sample Result (mg/L)	Spike Result (mg/L)	% Recovery
X05074	75MP-8S Matrix Spike	10.0	4.38	14.5	101
X05075	75MP-8S Matrix Spike Dup	10.0	4.38	13.6	91.9
	MS/MSD RPD				9.53
X05072/X05072 Dup	RPD				1.61

** = Quality assurance results reported as Nitrate (NO_3).

Analyst

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4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

Date Sampled	: 3/29,30/95	Client Project ID.	: 722450.21020 /MacDill AFB
Date Received	: 3/31/95	Lab Project No.	: 95-1044
Date Prepared	: 3/31/95	Method	: EPA 300.0
Date Analyzed	: 3/31/95	Matrix	: Water
		Detection Limit	: 0.056 mg/L

Evergreen Sample #	Client Sample ID	Nitrate-N (mg/L)
X05073	75MP-28S	0.959
X05078	75MP-9D	<0.056
X05079	75MP-9S	<0.056
X05080	MD75-MW13	<0.056
X05081	MD75-MW11	<0.056
X05082	MD75-MW10	<0.056
X05083	MD75-MW9	0.069

Debra L. Byrne
Analyst

Approved

1044tm 25

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

Date Sampled : 3/29,30/95
Date Received : 3/31/95
Date Prepared : 3/31/95
Date Analyzed : 3/31/95

Client Project ID. : 722450.21020 /MacDill AFB
Lab Project No. : 95-1044
Method : EPA 300.0
Matrix : Water
Detection Limit : 0.250 mg/L

Evergreen Sample #	Client Sample ID	Sulfate (mg/L)
X05056	56MP-2S	331
X05057	56MP-7S	108
X05060	MD56-MW4	104
X05063	MD75-MW5	27.8
X05066	MD75-MW1	15.2
X05067	75MP-5D	7.41
X05068	75MP-6D	2.16
X05069	MD75-MW2	25.8
X05071	75MP-8D	9.21
X05072	75MP-8S	28.4
X05072 dup	75MP-8S dup	28.5
Method blank (3-31-95)		<0.250

Quality Assurance

		Spike Amount (mg/L)	Sample Result (mg/L)	Spike Result (mg/L)	% Recovery
X05074	75MP-8S Matrix Spike	10.0	28.4	39.4	110
X05075	75MP-8S Matrix Spike Dup	10.0	28.4	39.3	109
	MS/MSD RPD				0.547
X05072/X05072 Dup	RPD				0.246

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4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Anions

Date Sampled : 3/29,30/95
Date Received : 3/31/95
Date Prepared : 3/31/95
Date Analyzed : 3/31/95

Client Project ID. : 722450.21020 /MacDill AFB
Lab Project No. : 95-1044
Method : EPA 300.0
Matrix : Water
Detection Limit : 0.250 mg/L

Evergreen Sample #	Client Sample ID	Sulfate (mg/L)
X05073	75MP-28S	28.9
X05078	75MP-9D	12.1
X05079	75MP-9S	20.2
X05080	MD75-MW13	30.7
X05081	MD75-MW11	65.8
X05082	MD75-MW10	10.3
X05083	MD75-MW9	1.46

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4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Miscellaneous Analyses

			722450.21020
Date Sampled	: 3/29,30/95	Client Project ID.	: /MacDill AFB
Date Received	: 3/31/95	Lab Project No.	: 95-1044
Date Prepared	: 3/31/95	Matrix	: 5.00 $mgCaCO_3/L$
Date Analyzed	: 3/31/95	Method	: EPA 310.1

Evergreen Sample #	Client Sample ID	Matrix	Total Alkalinity ($mgCaCO_3/L$)
X05057	56MP-7S	Water	152
X05060	MD56-MW4	Water	166
X05063	MD75-MW5	Water	119
X05072	75MP-8S	Water	116
X05072 Dup	75MP-8S Dup	Water	117
X05073	75MP-28S	Water	117
X05081	MD75-MW11	Water	41.8
Method Blank (3/31/95)			<5.00

Quality Assurance

	True Value ($mgCaCO_3/L$)	Result ($mgCaCO_3/L$)	% Recovery
APG Minerals Reference Lot #13862	11.8	11.1	93.4

Analyst

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1044tm 4

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303)425-6021

Total Organic Carbon

722450-21020

Date Sampled : 3/29,30/95
Date Received : 3/31/95
Date Prepared : 4/3/95
Date Analyzed : 4/3/95

Client Project ID. : /MacDill AFB
Lab Project No. : 95-1044
Method : EPA 415.1
Detection Limit : 1.00 mgC/L

Evergreen Sample #	Client Sample ID	Matrix	mg C/Liter
X05057	56MP-7S	Water	20.0
X05060	MD56-MW4	Water	10.5
X05063	MD75-MW5	Water	7.42
X05072	75MP-8S	Water	5.18
X05072 dup	75MP-8S dup	Water	5.24
X05073	75MP-28S	Water	5.28
X05079	75MP-9S	Water	4.68
Method Blank 4/3/95			<1.00

Quality Assurance

	True Value (mg C/L)	Result (mg C/L)	% Recovery
Spex Demand Reference Lot 2-7 DEM	40.9	45.9	112

Analyst

Approved

1044tm.10

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Laboratory Control Sample (LCS)

LCS Number	: LCS041295	**Dilution Factor**	: 1.00
Date Extracted/Prepared	: 4/12/95	**Method**	: 602
Date Analyzed	: 4/12/95	**Matrix**	: Water
Spike Amount (ug/L)	: 20.0	**Lab File No.**	: BX1041210

Compound Name	Cas Number	LCS Concentration ug/L	LCS % Recovery	QC Limit % Recovery
Benzene	71-43-2	16.5	82.5	71.0-119.0*
Toluene	108-88-3	16.5	82.5	73.0-111.0*
Chlorobenzene	108-90-7	17.4	87.0	64.0-119.0*
Ethyl Benzene	100-41-4	17.0	85.0	75.0-114.0*
m,p-Xylene	108-38-3	17.2	86.0	75.0-114.0*
o-Xylene	106-42-3 95-47-6	16.5	82.5	64.0-119.0*
1,3,5-Trimethylbenzene	108-67-8	16.3	81.5	50.0-150.0
1,2,4-Trimethylbenzene	95-63-6	17.3	86.5	50.0-150.0
1,2,3-Trimethylbenzene	526-73-8	21.5	107.5	50.0-150.0
1,2,3,4-Tetramethylbenzene	488-23-3	17.6	88.0	50.0-150.0
Surrogate Recovery (α,α,α-Trifluorotoluene):		97%	70%-130% (QC limits)	

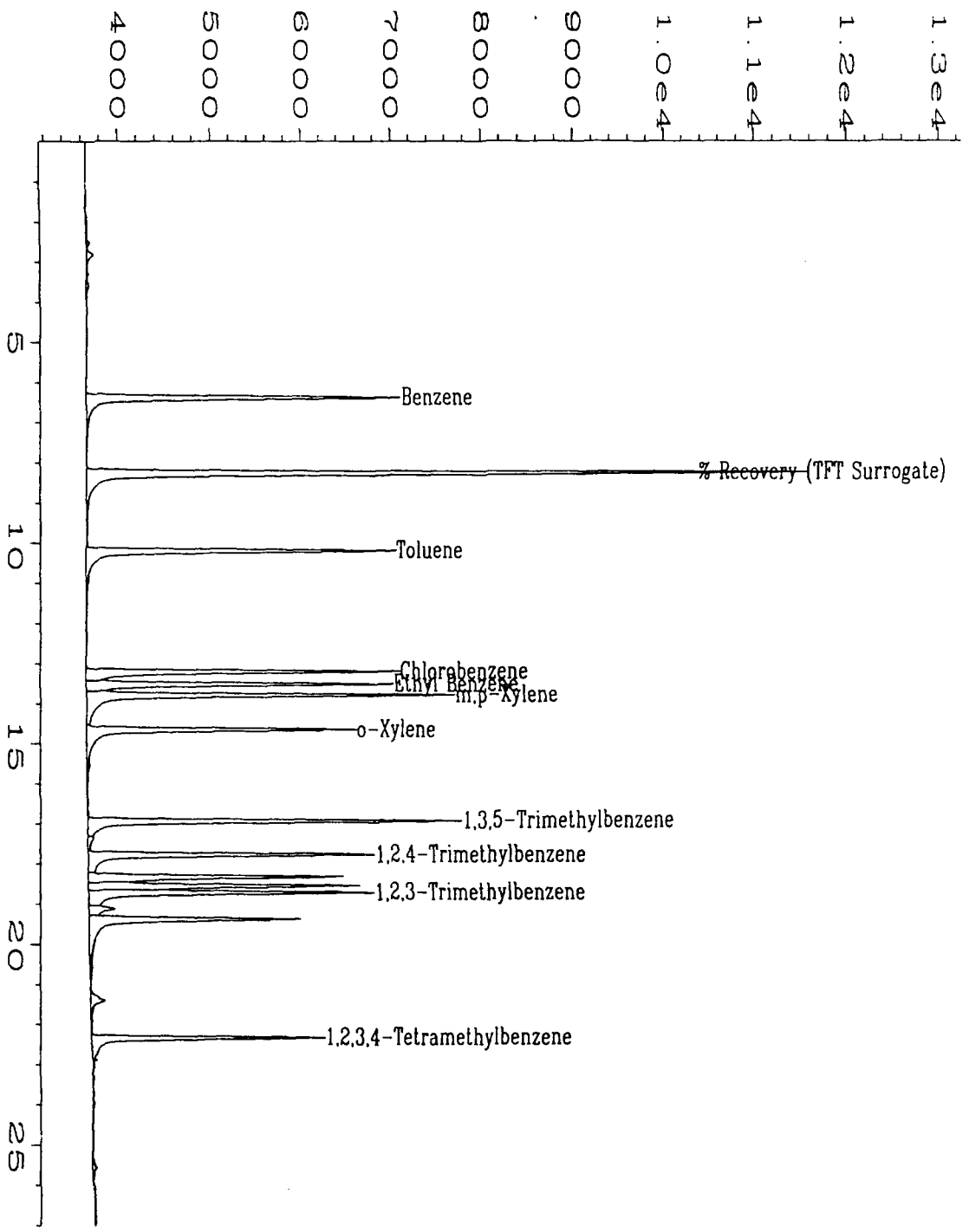
* = Limits established 4/3/95 KSC

QUALIFIERS:

E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
NA = Not available/Not analyzed.

Analyst

Approved



Data File Name	: C:\HPCHEM\1\DATA\BX10412\010F0801.D		
Operator	: S.W. Tyson	Page Number	: 1
Instrument	: BTEX1	Vial Number	: 10
Sample Name	: LCS041295	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 8
Acquired on	: 12 Apr 95 07:21 AM	Instrument Method	: BX10408.
Report Created on	: 28 Apr 95 07:26 PM	Analysis Method	: BX10412B.MT
Last Recalib on	: 28 APR 95 07:11 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

BTEX Data Report
Laboratory Control Sample (LCS)

LCS Number	: LCS041395	Dilution Factor	: 1.00
Date Extracted/Prepared	: 4/13/95	Method	: 602
Date Analyzed	: 4/13/95	Matrix	: Water
Spike Amount (ug/L)	: 20.0	Lab File No.	: BX2041308

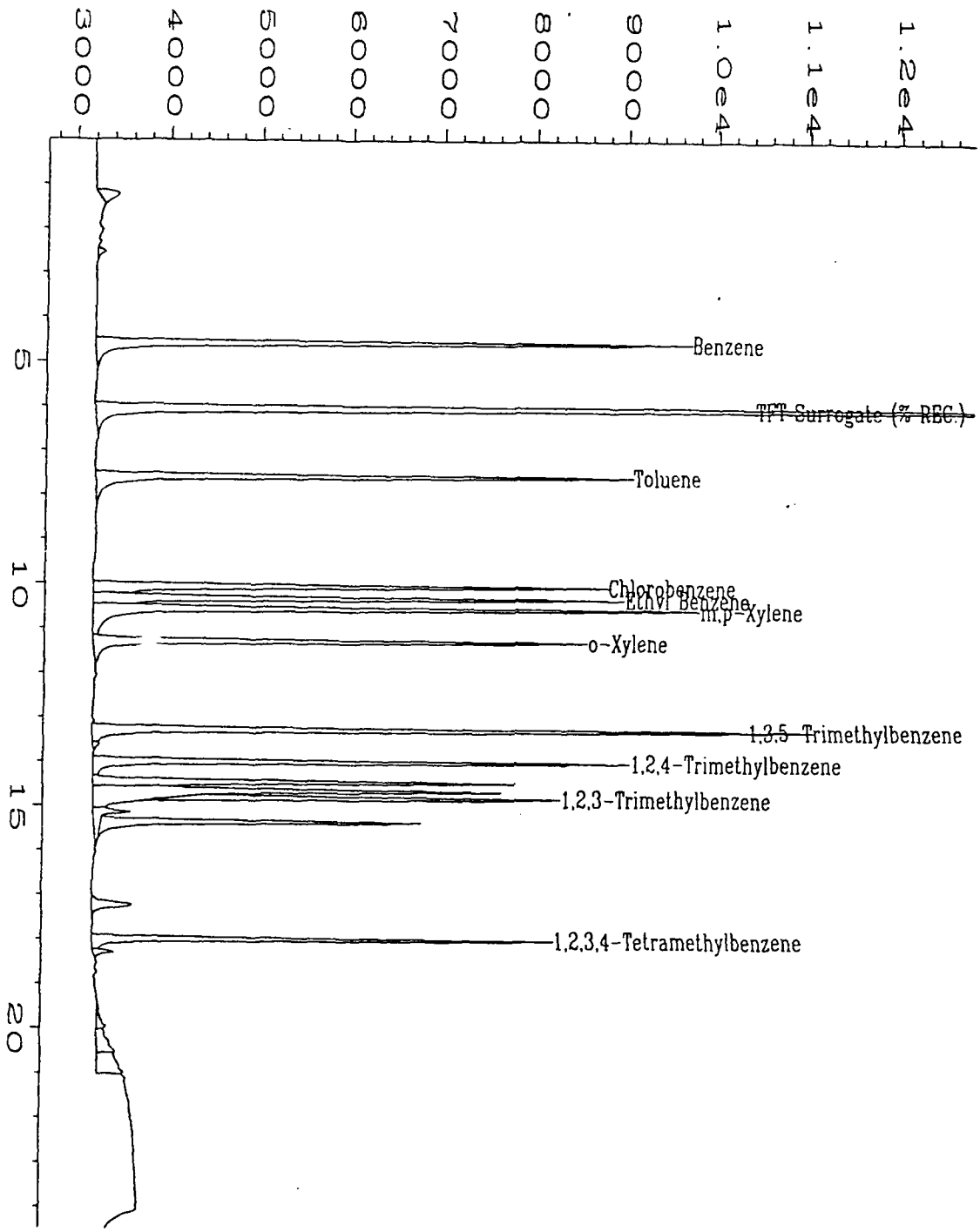
Compound Name	Cas Number	LCS Concentration ug/L	LCS % Recovery	QC Limit* % Recovery
Benzene	71-43-2	18.0	90.0%	71.0%-119.0%
Toluene	108-88-3	18.7	93.5%	73.0%-111.0%
Chlorobenzene	108-90-7	19.0	95.0%	64.0%-119.0%
Ethyl Benzene	100-41-4	19.3	96.5%	75.0%-114.0%
m,p-Xylene	108-38-3 106-42-3	20.1	101%	75.0%-114.0%
o-Xylene	95-47-6	18.9	94.5%	64.0%-119.0%
1,3,5-Trimethylbenzene	108-67-8	19.7	98.5%	68.0%-101.0%
1,2,4-Trimethylbenzene	95-63-6	20.3	102%	61.0%-88.0%
1,2,3-Trimethylbenzene	526-73-8	15.1	76%	63.0%-101.0%
1,2,3,4-Tetramethylbenzene	488-23-3	19.7	98.5%	58.0%-102.0%
Surrogate Recovery (α,α,α-Trifluorotoluene):		101%	70%-130% (QC limits)	

* = Limits established 4/3/95 KSC

QUALIFIERS:
E = Extrapolated value
U = Compound analyzed for, but not detected.
B = Compound found in blank and sample. Compare blank and sample data.
J = Indicates an estimated value when the compound is detected, but is below the Reporting Limit (RL).
NA = Not available/Not analyzed.

K. Cone
Analyst

Approved



Data File Name : C:\HPCHEM\2\DATA\BX20413\008R0701.D
Operator : SW Tyson
Instrument : BTEX2
Sample Name : LCS041395
Run Time Bar Code:
Acquired on : 13 Apr 95 03:20 AM
Report Created on: 13 Apr 95 09:47 AM
Last Recalib on : 13 APR 95 02:16 AM
Multiplier : 1

Page Number : 1
Vial Number : 8
Injection Number : 1
Sequence Line : 7
Instrument Method: BX20413.M
Analysis Method : BX20413.MTH
Sample Amount : 0
ISTD Amount :

EVERGREEN ANALYTICAL, INC.
4036 Youngfield, Wheat Ridge, CO 80033
(303) 425-6021

TOTAL VOLATILE HYDROCARBONS (TVH-GASOLINE)

Date Sampled	: 3/29,30/95	Client Project Number	: 722450.21020/MACDILL
Date Received	: 3/31/95	Lab Project Number	: 95-1044
Date Prepared	: 4/11,13/95	Matrix	: Water
Date Analyzed	: 4/12,13/95	Method Number	: 5030/Mod.8015

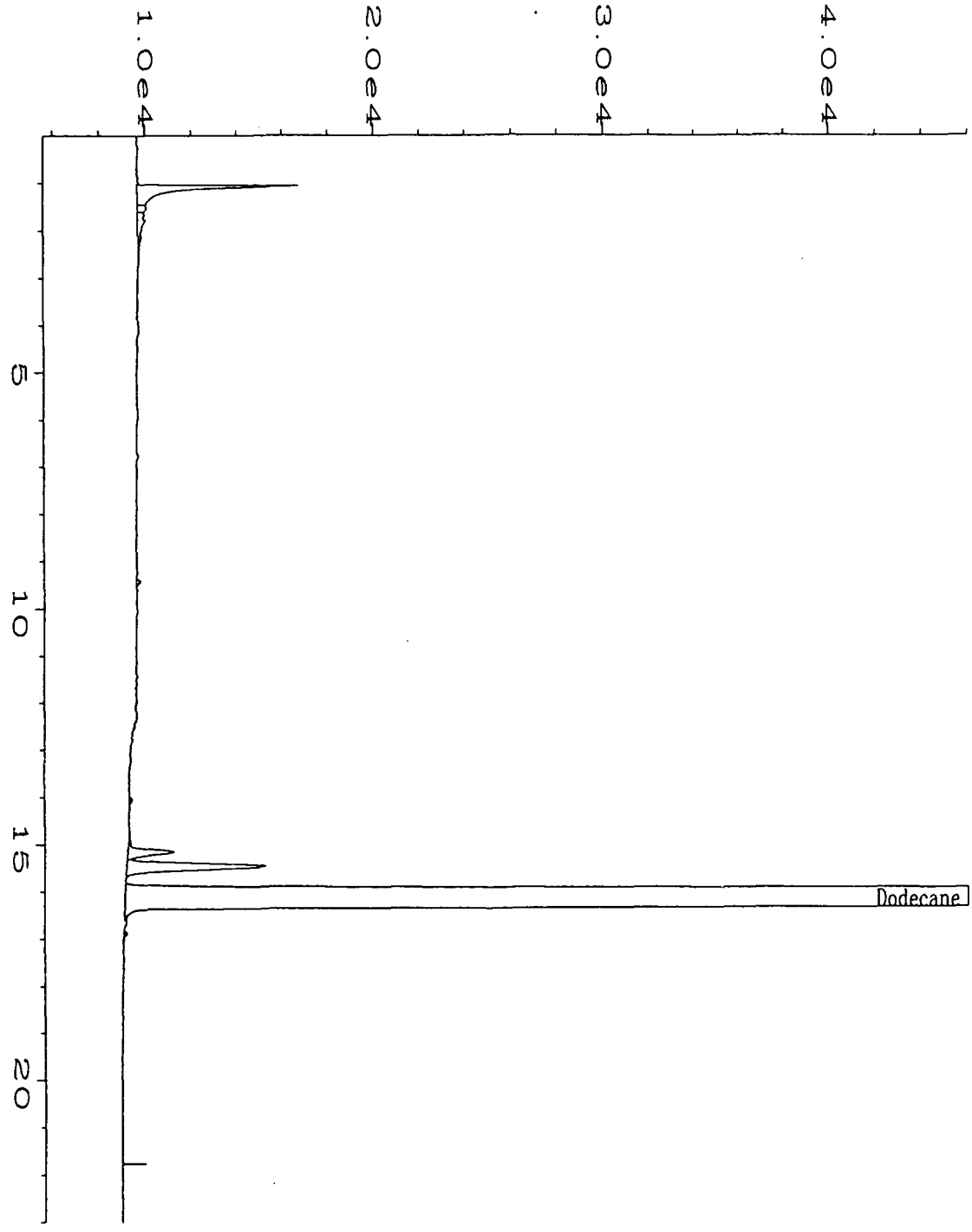
Evergreen Sample #	Client Sample #	Surrogate Recovery	TVH mg/L	RL mg/L
MB041295	METHOD BLANK	100%	U	0.1
MB041395	METHOD BLANK	100%	U	0.1
X05056	56MP-2S	100%	U	0.1
X05057	56MP-7S	96%	U	0.1
X05057 DUP	56MP-7S	97%	U	0.1
X05060	MD56-MW4	98%	U	0.1
X05063	MD75-MW5	93%	U	0.1
X05066	MD75-MW1	89%	U	0.1
X05067	75MP-5D	95%	U	0.1
X05068	75MP-6D	92%	0.1	0.1
X05068 DUP	75MP-6D	92%	0.1	0.1
X05069	MD75-MW2	88%	U	0.1
X05071	75MP-8D	84%	U	0.1
X05072	75MP-8S	85%	U	0.1
X05072 DUP	75MP-8S	85%	U	0.1
X05073	75MP-28S	96%	U	0.1
X05078	75MP-9D	99%	U	0.1
X05079	75MP-9S	99%	U	0.1
X05080	MD75-MW13	73%	U	0.1
X05081	MD75-MW11	97%	U	0.1
X05082	MD75-MW10	95%	0.5	0.1
X05083	MD75-MW9	96%	1.2	0.1

QUALIFIERS
U = TVH analyzed for but not detected.
B = TVH found in blank.
E = Extrapolated value.
RL = Reporting Limit.

Analyst

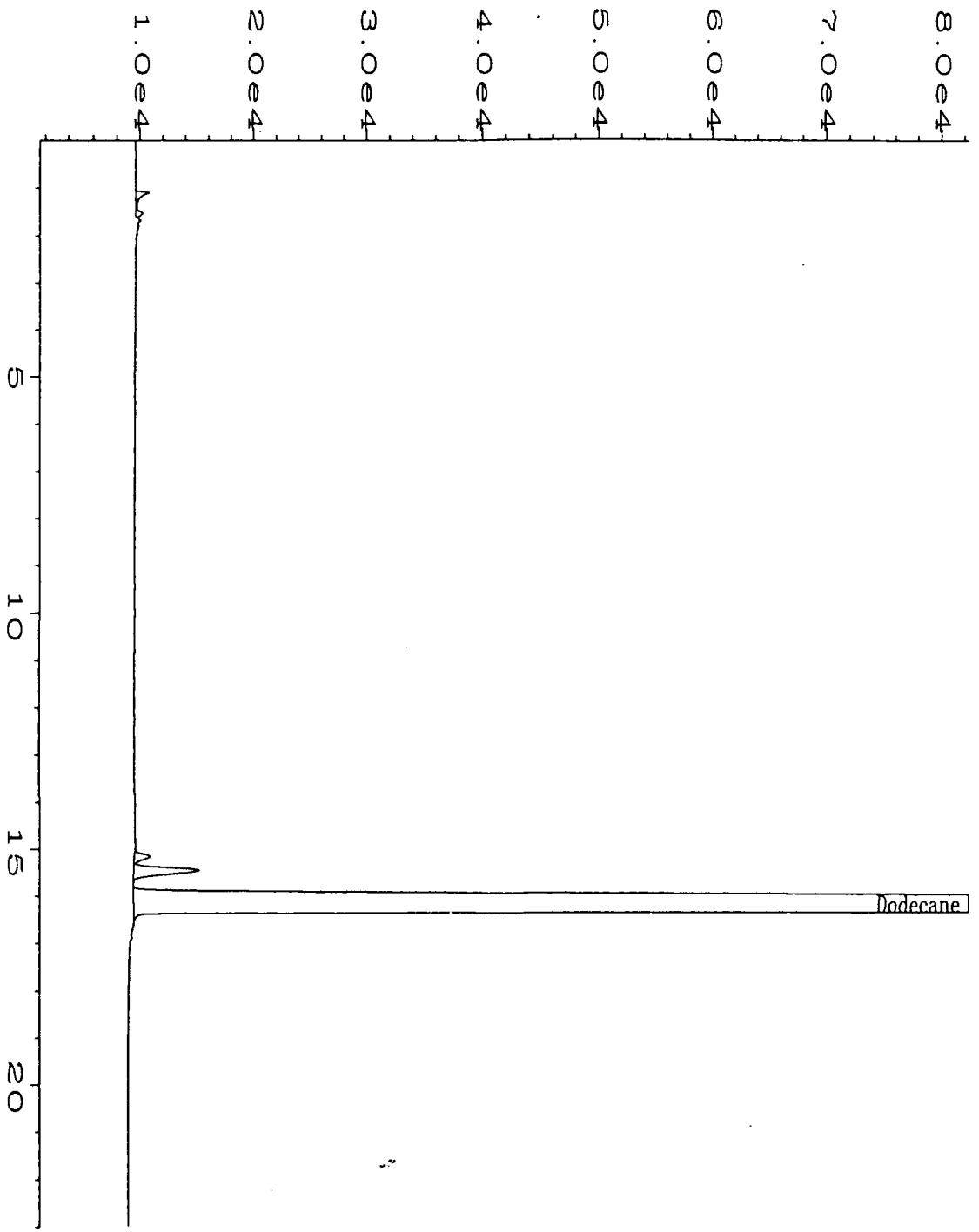
Approved

TVH1044.XLS



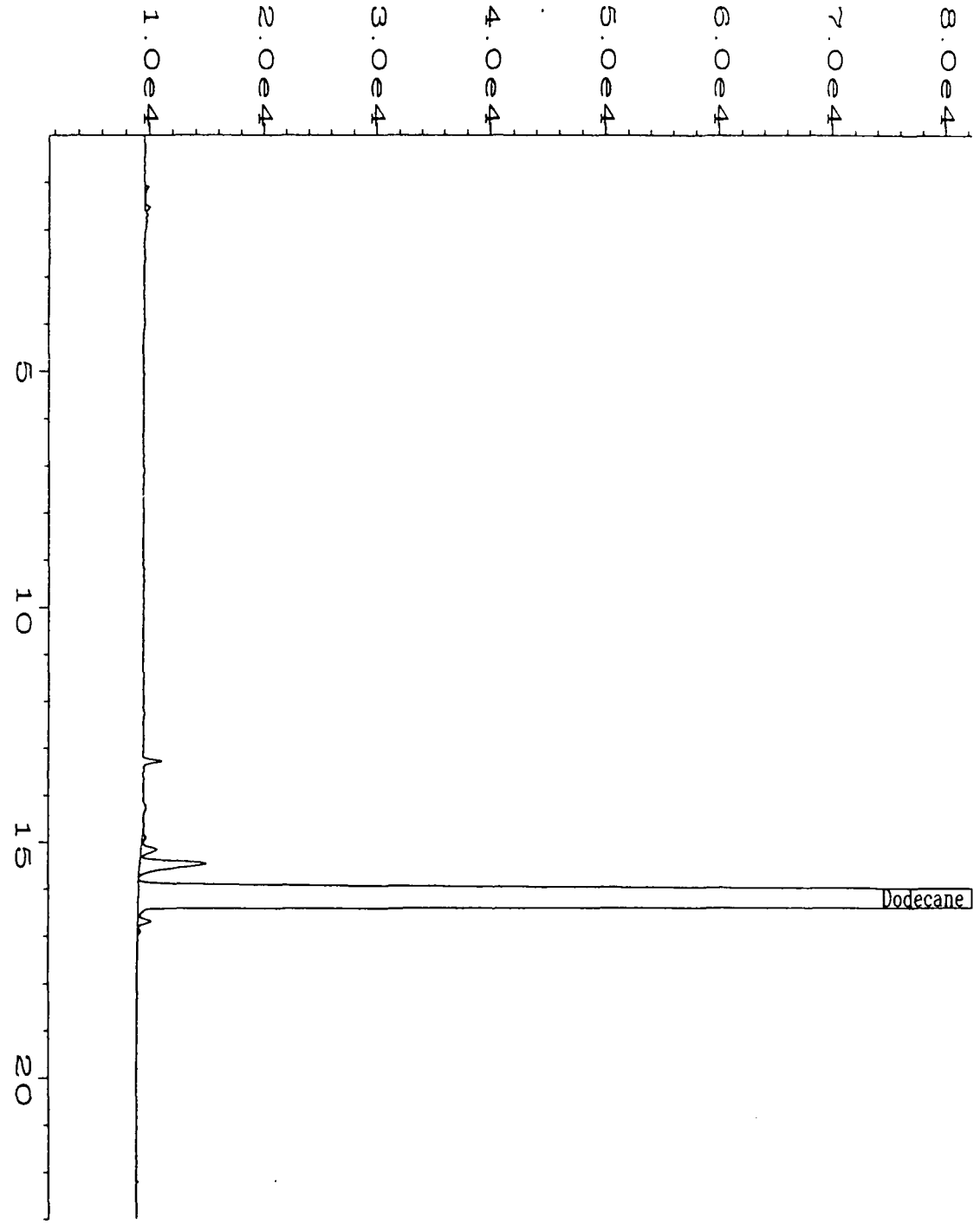
Data File Name	: E:\HPCHEM\1\DATA\TVH0413\023F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 23
Sample Name	: X05063;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Apr 95 11:24 PM	Instrument Method	: TVH1BA
Report Created on	: 17 Apr 95 09:51 AM	Analysis Method	: TVH0413.MT
Last Recalib on	: 13 APR 95 02:21 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

MD15-MW5

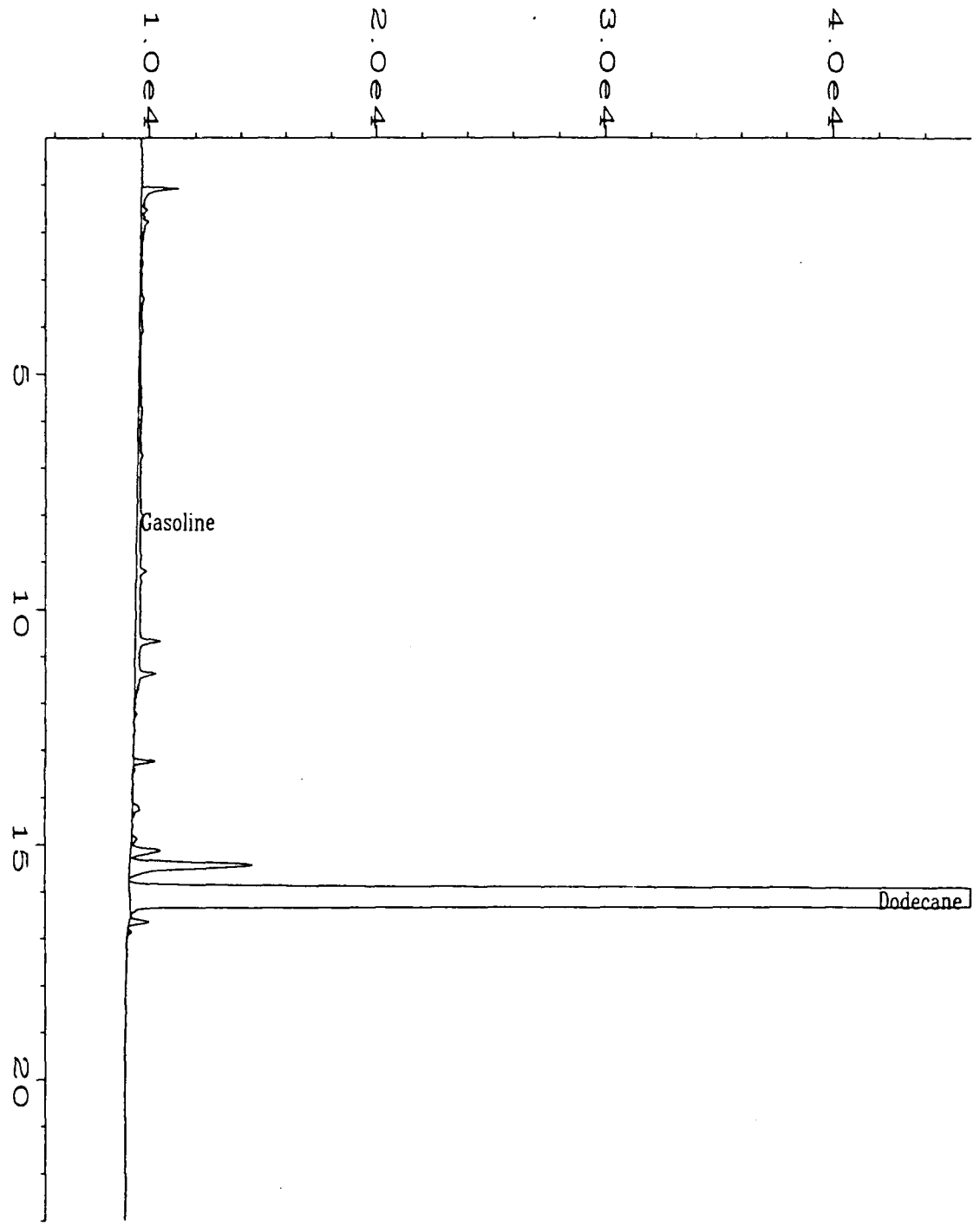


Data File Name : C:\HPCHEM\1\DATA\tvh0412\021F0101.D
Operator : Dawn N. Guildner
Instrument : TVH
Sample Name : x05066;1;5
Run Time Bar Code:
Acquired on : 12 Apr 95 01:00 PM
Report Created on: 13 Apr 95 09:37 AM
Last Recalib on : 12 APR 95 10:00 AM
Multiplier : 1
Sample Info : PROJECT # 95-1044 CLIENT # MD75-MW1 WATER

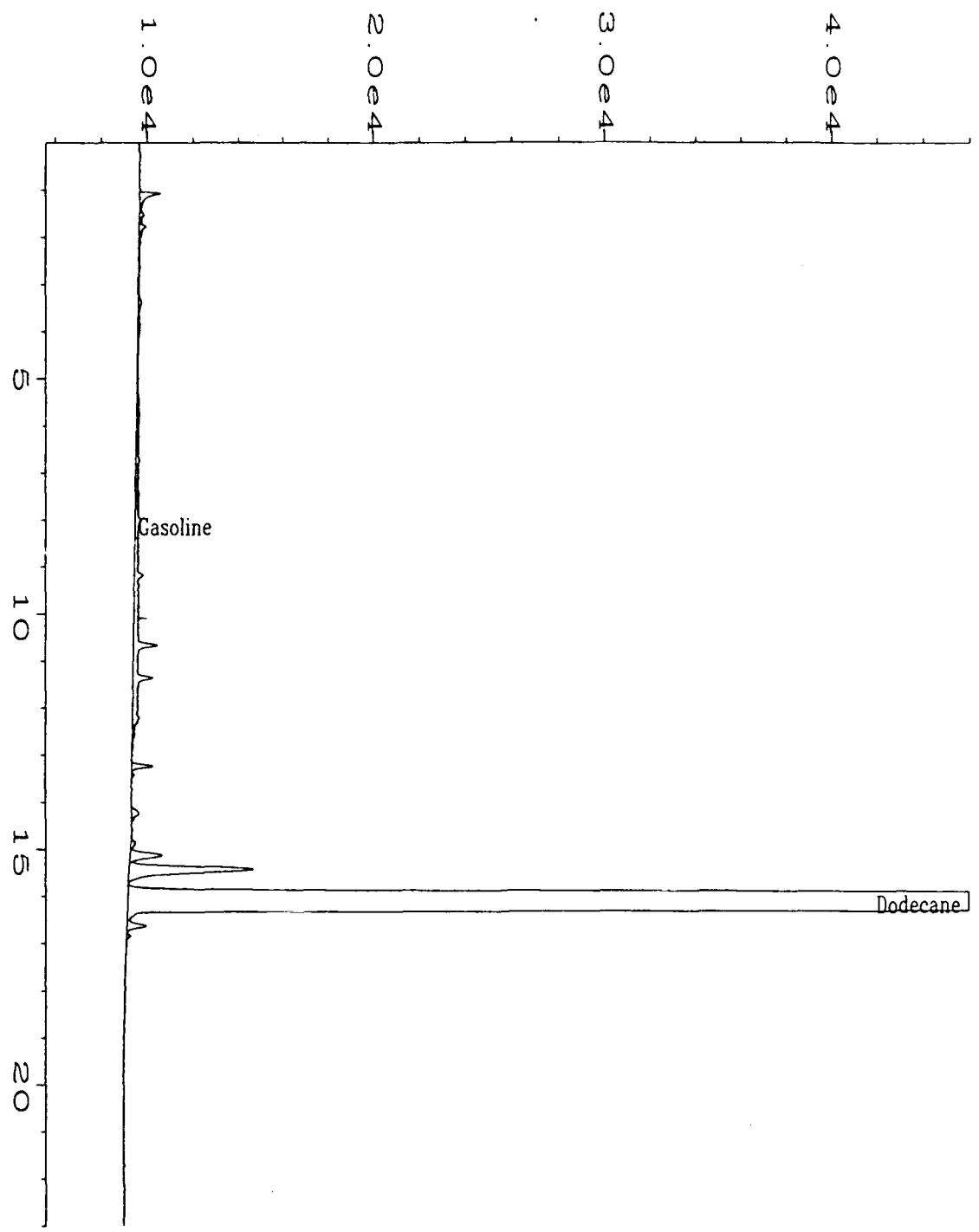
Page Number : 1
Vial Number : 21
Injection Number : 1
Sequence Line : 1
Instrument Method: TVH1BASE.MTH
Analysis Method : TVH0412.MTH
Sample Amount : 0
ISTD Amount :



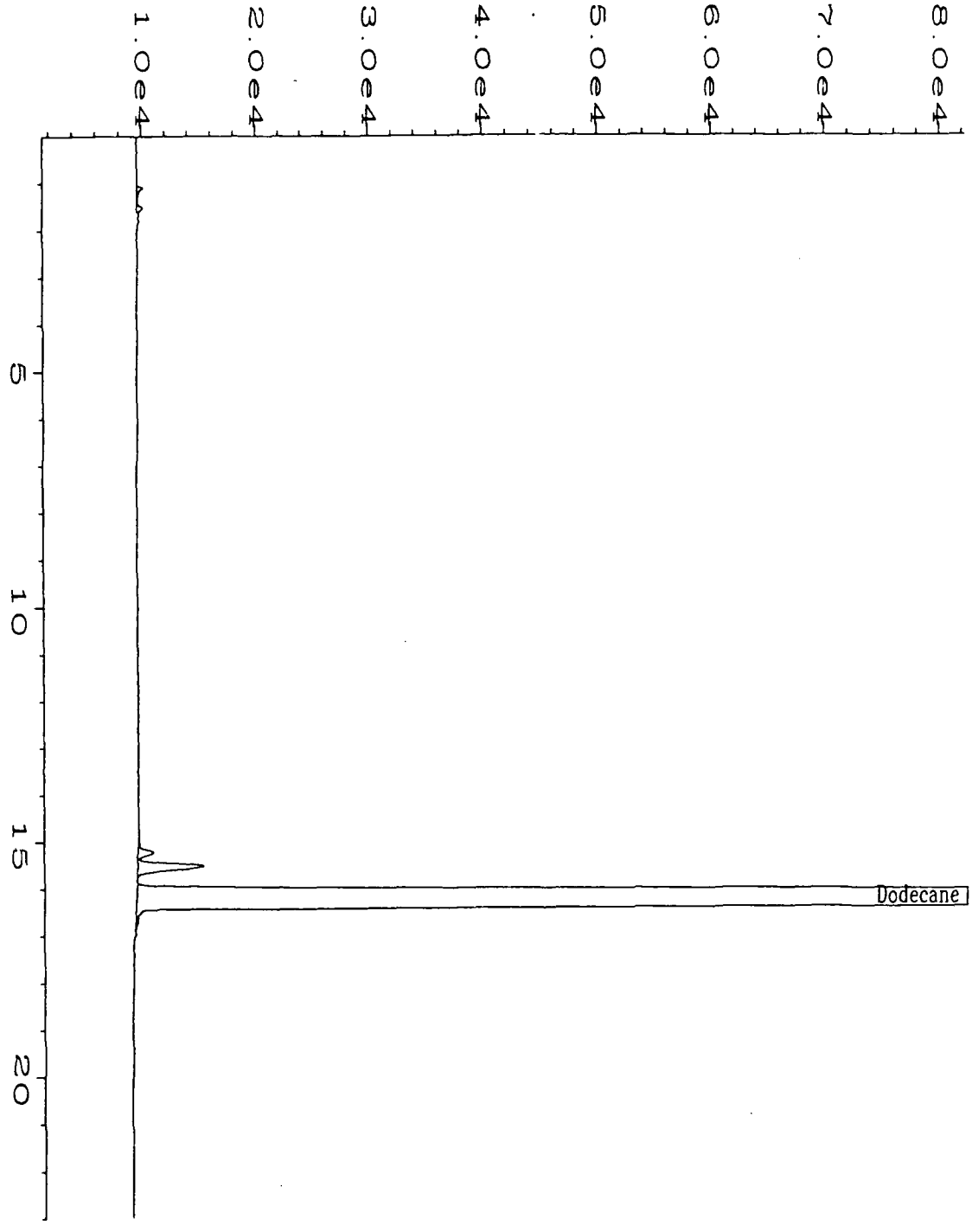
Data File Name	: C:\HPCHEM\1\DATA\tvh0412\022F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 22
Sample Name	: X05067;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 12 Apr 95 01:36 PM	Instrument Method	: TVH1BA[illegible]
Report Created on	: 13 Apr 95 09:37 AM	Analysis Method	: TVH0412.MT
Last Recalib on	: 12 APR 95 10:00 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1044 CLIENT # 75MP-5D WATER		



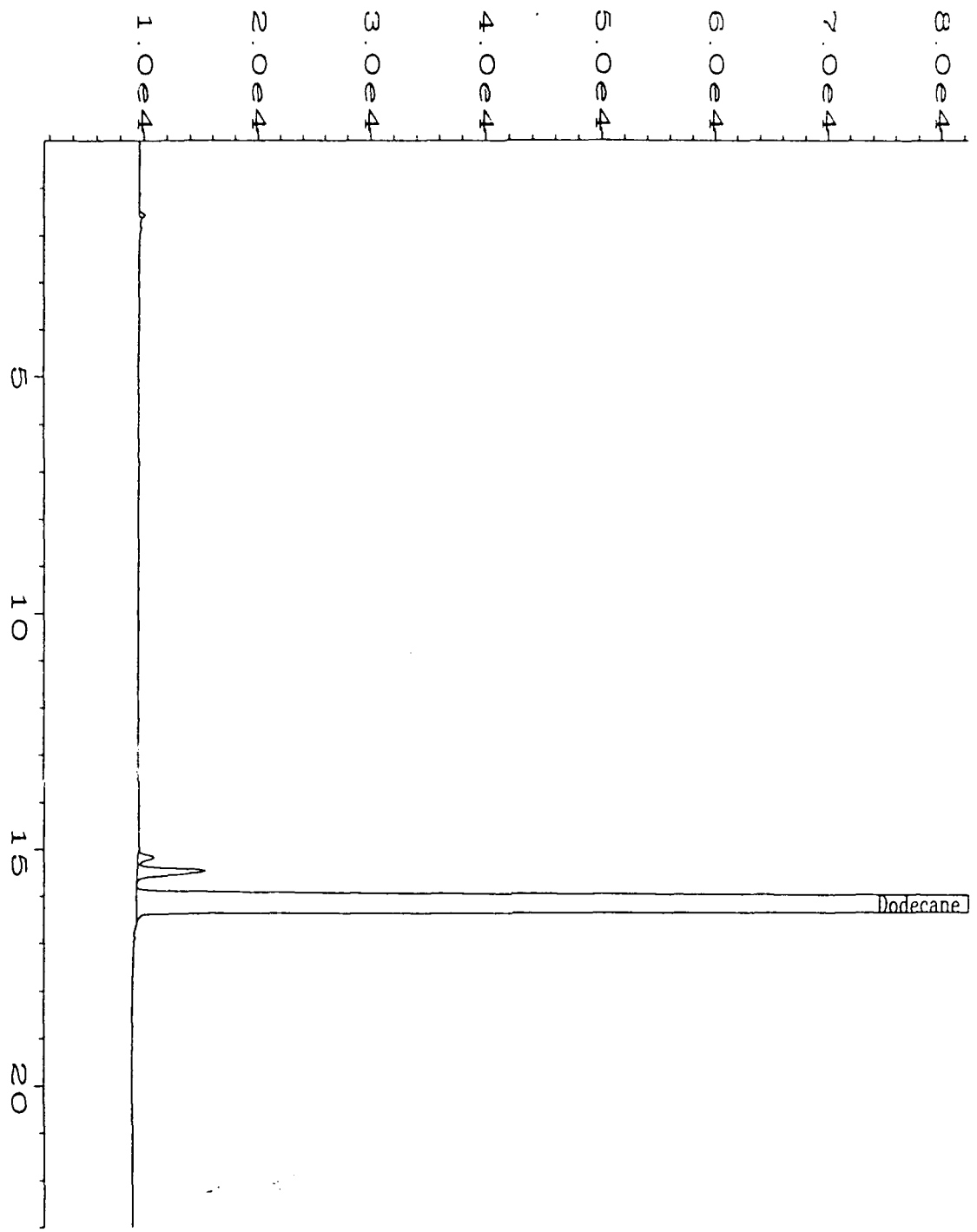
Data File Name	: C:\HPCHEM\1\DATA\tvh0413\021F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 21
Sample Name	: X05068;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
uired on	: 13 Apr 95 10:12 PM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 14 Apr 95 09:49 AM	Analysis Method	: TVH0413.MTH
Last Recalib on	: 13 APR 95 02:21 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1044 CLIENT # 75MP-6D WATER		



Data File Name	: C:\HPCHEM\1\DATA\tvh0413\022F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 22
Sample Name	: X05068 DUP	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Apr 95 10:48 PM	Instrument Method	: TVH1BA
Report Created on	: 14 Apr 95 09:50 AM	Analysis Method	: TVH0413.M
Last Recalib on	: 13 APR 95 02:21 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



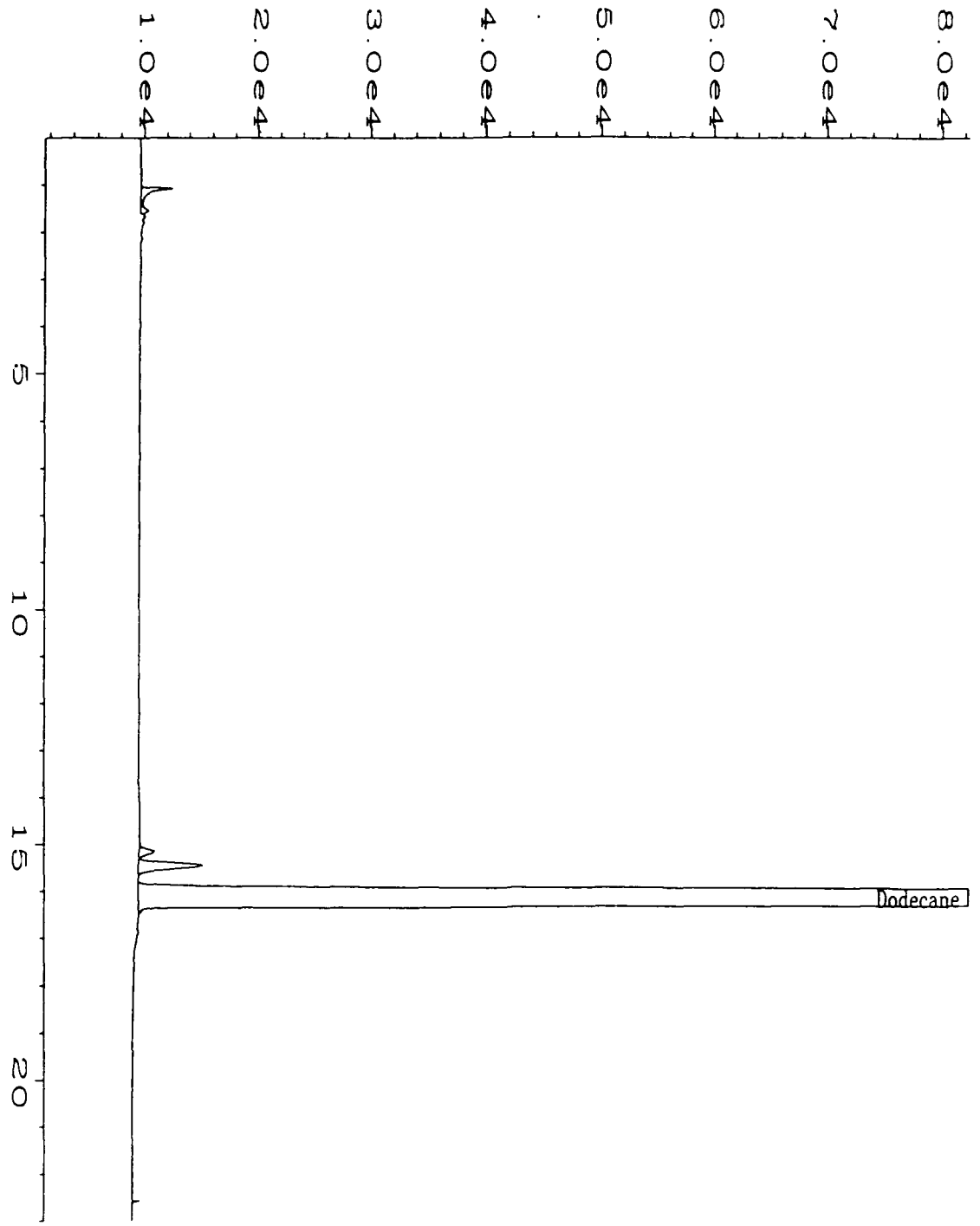
Data File Name	: C:\HPCHEM\1\DATA\tvh0412\024F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 24
Sample Name	: X05069;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 12 Apr 95 02:48 PM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 13 Apr 95 09:37 AM	Analysis Method	: TVH0412.MTH
Last Recalib on	: 12 APR 95 10:00 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1044 CLIENT # MD75-MW2 WATER		



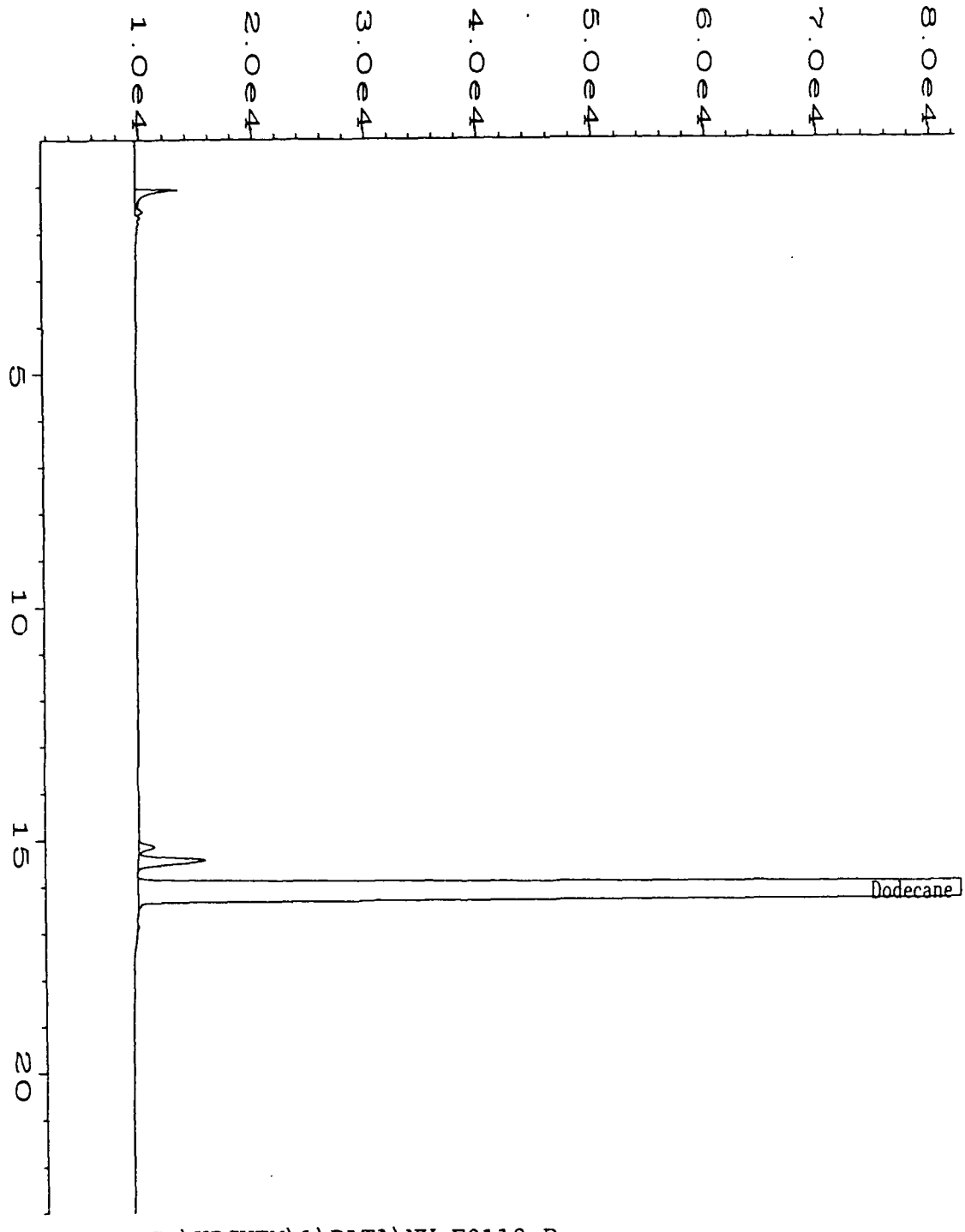
Data File Name : C:\HPCHEM\1\DATA\NV-F0114.D
Operator :
Instrument : TVH
Sample Name :
Run Time Bar Code:
Acquired on . 12 Apr 95 03:24 PM
Report Created on: 13 Apr 95 09:39 AM
Last Recalib on : 12 APR 95 10:00 AM
Multiplier : 1

Page Number : 1
Vial Number :
Injection Number :
Sequence Line :
Instrument Method: TVH1BASE
Analysis Method : TVH0412.MTH
Sample Amount : 0
ISTD Amount :

75MP-8D

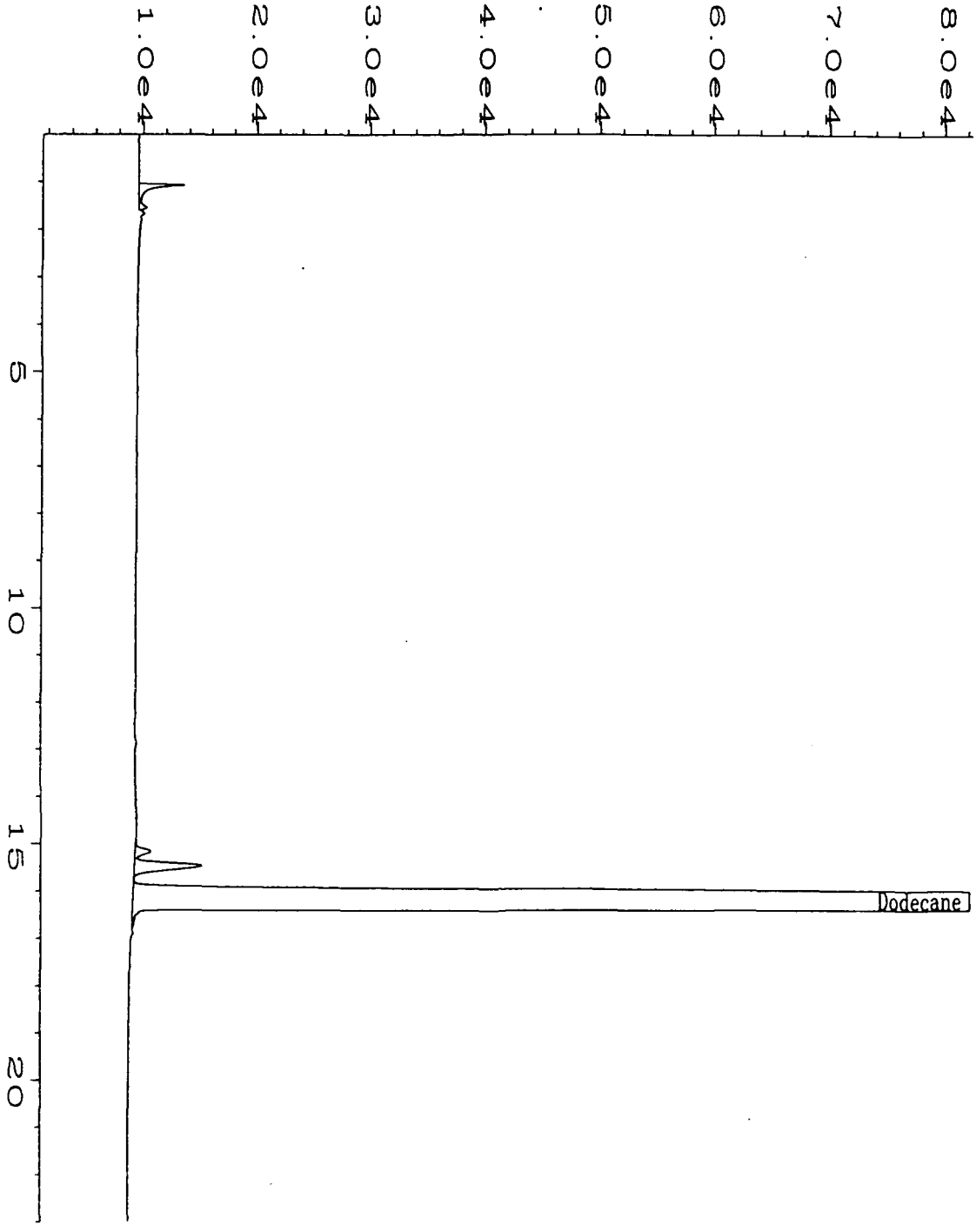


Data File Name	: C:\HPCHEM\1\DATA\NV-F0117.D		
Operator	:	Page Number	: 1
Instrument	: TVH	Vial Number	:
Sample Name	:	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 12 Apr 95 05:12 PM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 13 Apr 95 09:40 AM	Analysis Method	: TVH0412.MTH
Last Recalib on	: 12 APR 95 10:00 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



Data File Name : C:\HPCHEM\1\DATA\NV-F0118.D
Operator :
Instrument : TVH
Sample Name : 05072 DUP
Run Time Bar Code:
Acquired on : 12 Apr 95 05:48 PM
Report Created on: 13 Apr 95 09:41 AM
Last Recalib on : 12 APR 95 10:00 AM
Multiplier : 1

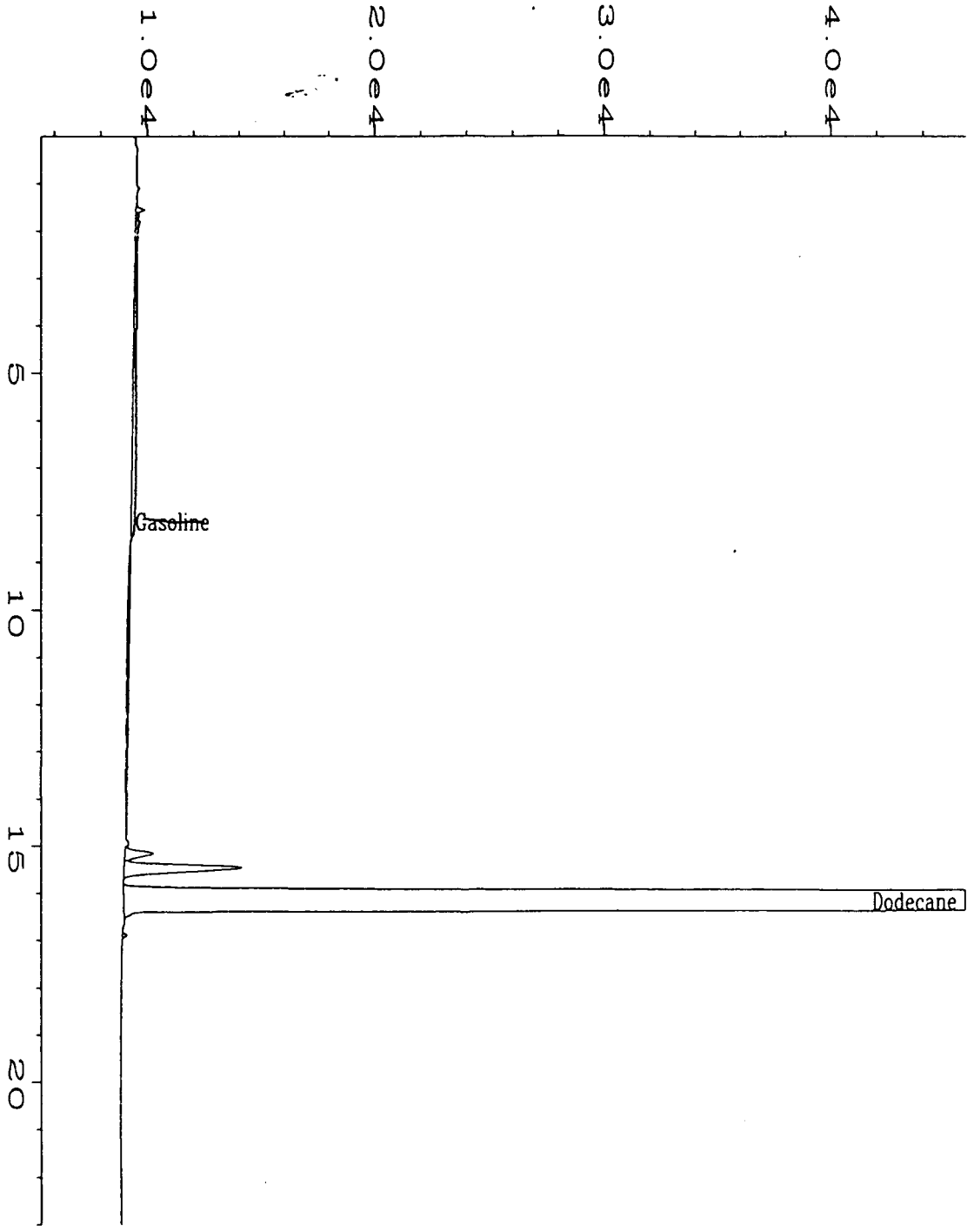
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Vial Number :
Injection Number :
Sequence Line :
Instrument Method: TVH1BA
Analysis Method : TVH0412.M
Sample Amount : 0
ISTD Amount :



Data File Name : C:\HPCHEM\1\DATA\NV-F0119.D
Operator :
Instrument : TVH
Sample Name : X05073
Run Time Bar Code:
Acquired on : 12 Apr 95 06:24 PM
Report Created on: 13 Apr 95 09:41 AM
Last Recalib on : 12 APR 95 10:00 AM
Multiplier : 1

Page Number : 1
Vial Number :
Injection Number :
Sequence Line :
Instrument Method: TVH1BASE.MTH
Analysis Method : TVH0412.MTH
Sample Amount : 0
ISTD Amount :

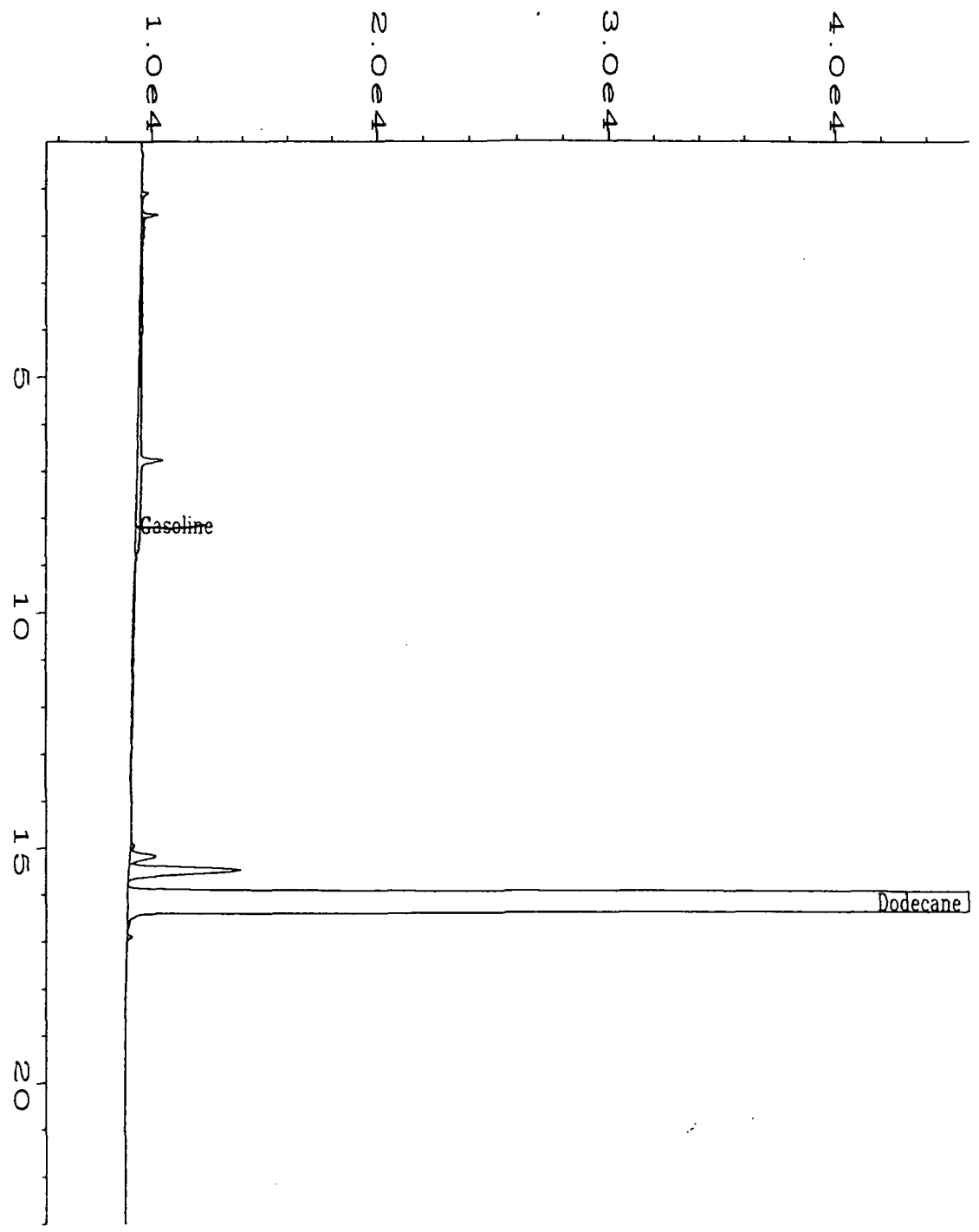
TSMP-285



Data File Name : C:\HPCHEM\1\DATA\tvh0413\014F0101.D
Operator : Dawn N. Guildner
Instrument : TVH
Sample Name : X05078;1;5
Run Time Bar Code:
Acquired on : 13 Apr 95 06:00 PM
Report Created on: 14 Apr 95 09:48 AM
Last Recalib on : 13 APR 95 02:21 PM
Multiplier : 1
Sample Info : PROJECT # 95-1044 CLIENT # 75MP-9D WATER

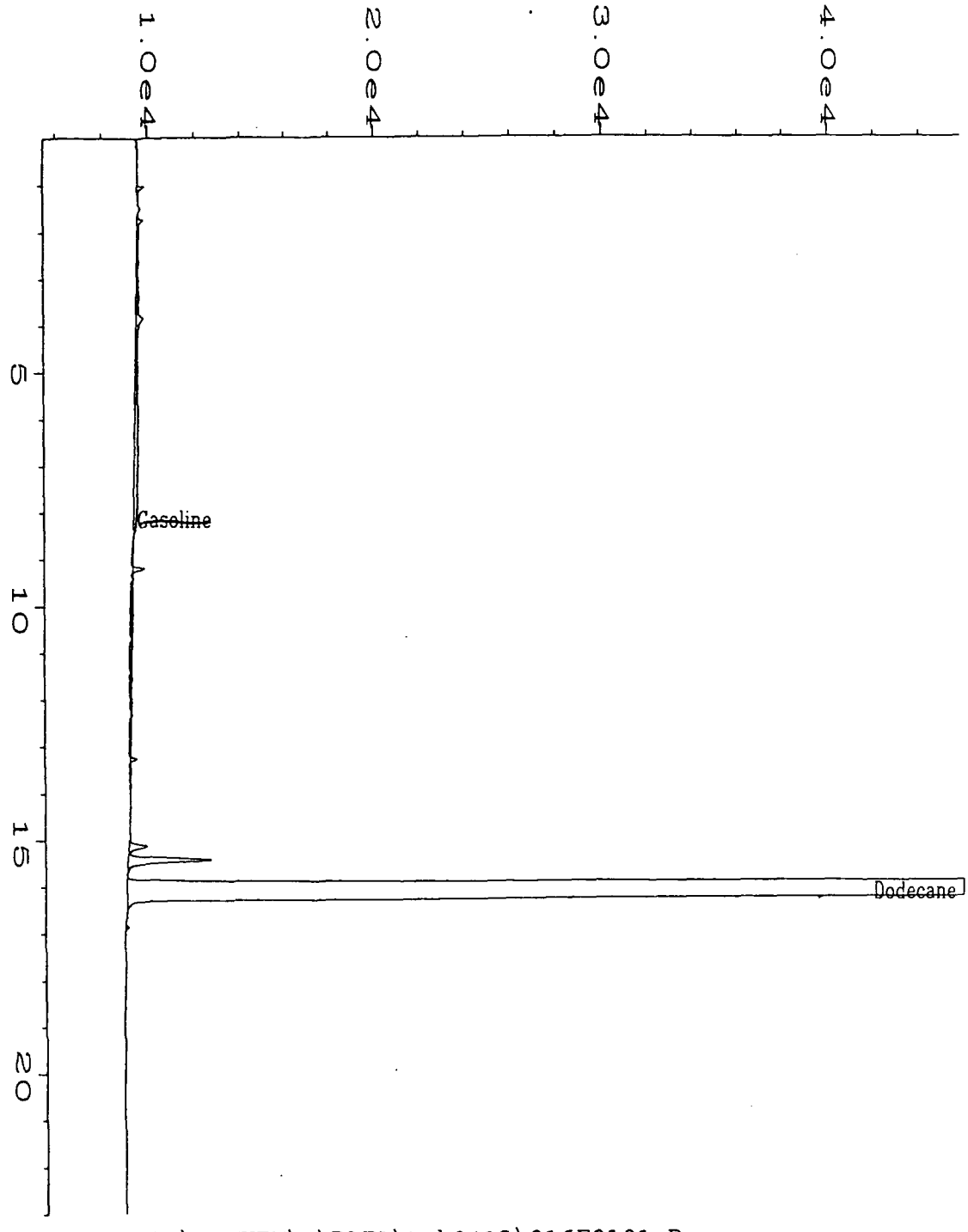
Page Number : 1
Vial Number : 14
Injection Number : 1
Sequence Line : 1
Instrument Method: TVH1BA
Analysis Method : TVH0413.M
Sample Amount : 0
ISTD Amount :

pm 4/21/95



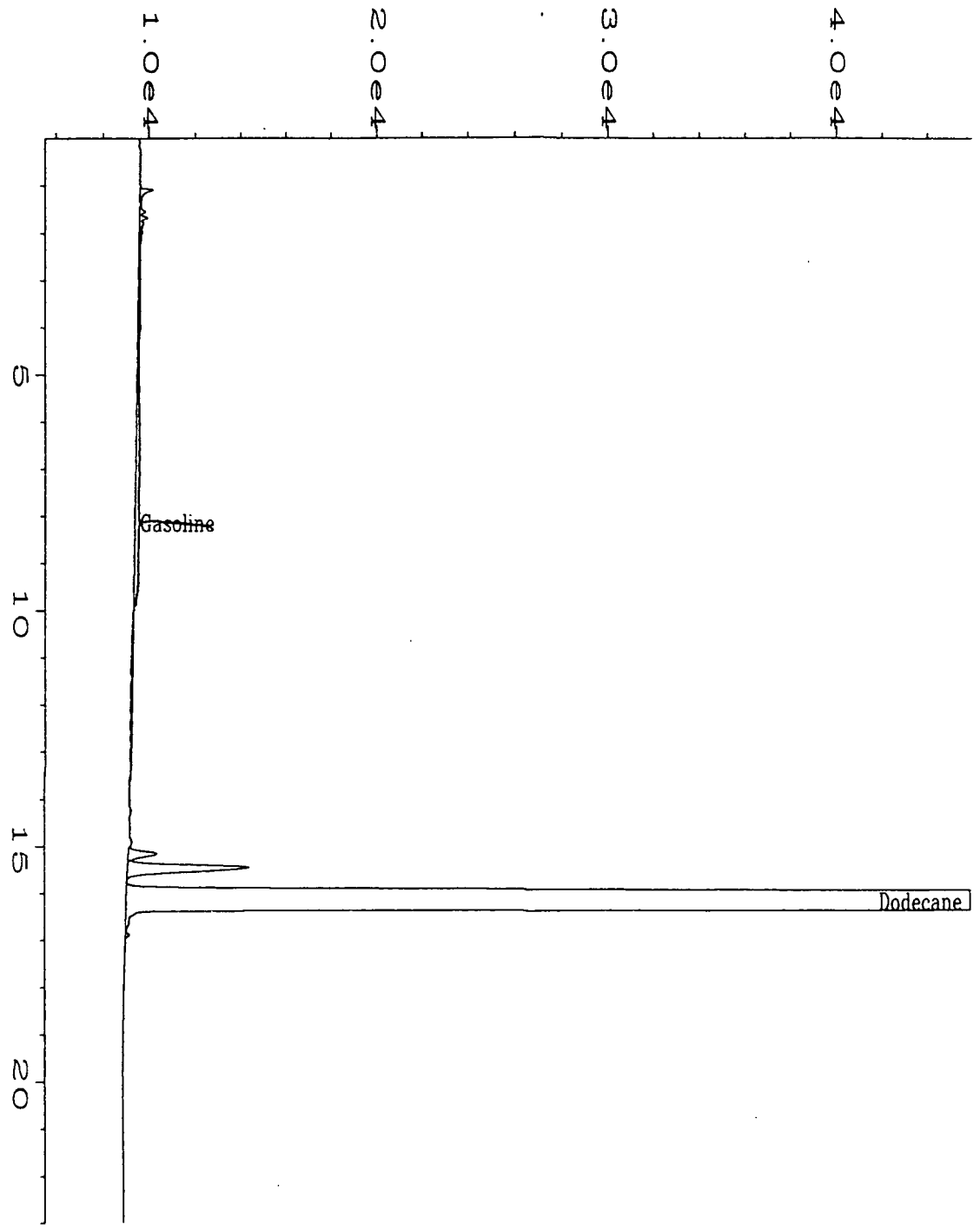
Data File Name	: C:\HPCHEM\1\DATA\tvh0413\015F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 15
Sample Name	: X05079;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Apr 95 06:36 PM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 14 Apr 95 09:48 AM	Analysis Method	: TVH0413.MTH
Last Recalib on	: 13 APR 95 02:21 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1044 CLIENT # 75MP-9S WATER		

Dwn 4/21/95



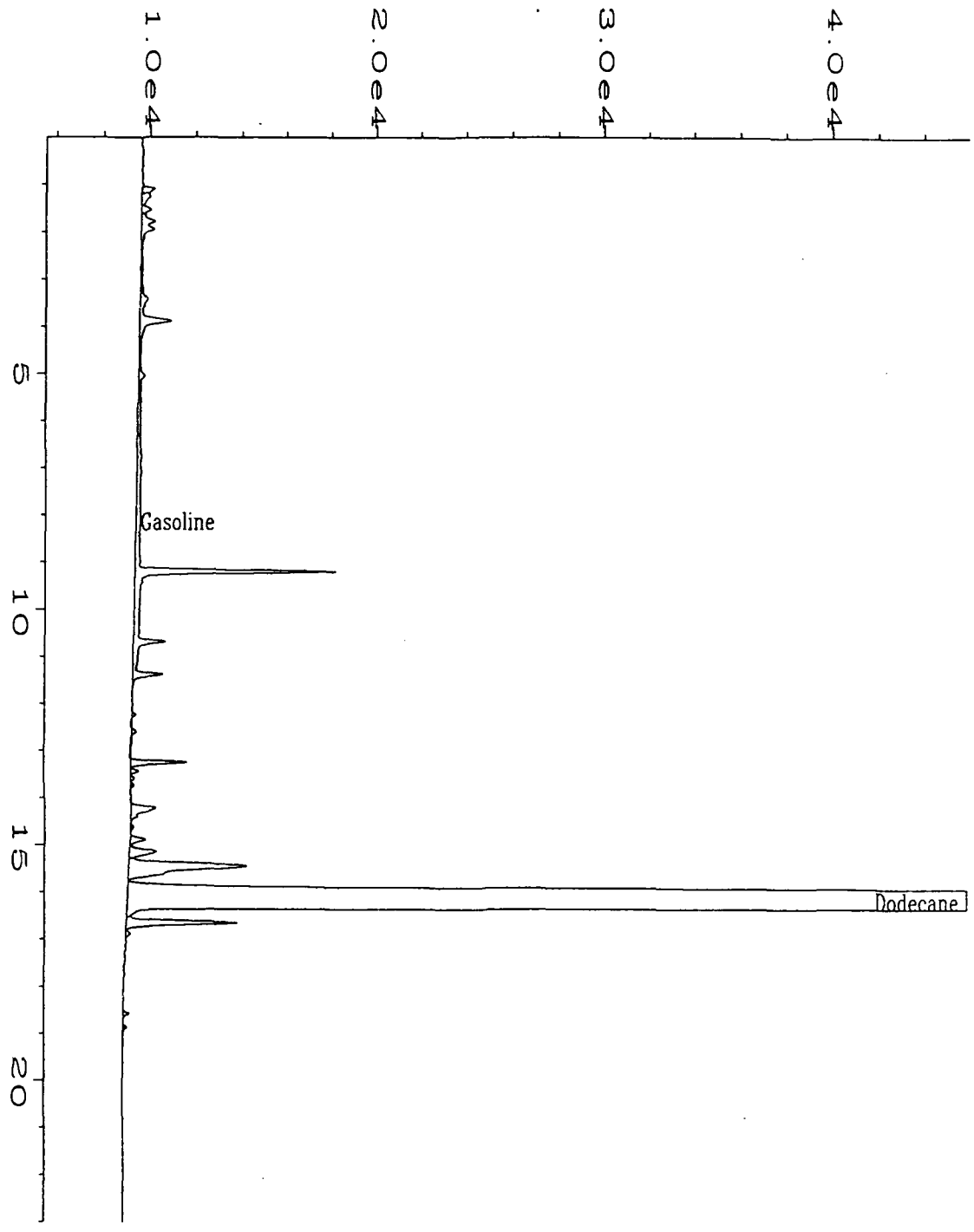
Data File Name	: C:\HPCHEM\1\DATA\tvh0413\016F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 16
Sample Name	: X05080;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Apr 95 07:12 PM	Instrument Method	: TVH1BAS
Report Created on	: 14 Apr 95 09:48 AM	Analysis Method	: TVH0413.MTH
Last Recalib on	: 13 APR 95 02:21 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1044 CLIENT # MD75-MW13 WATER		

pm 4/21/95

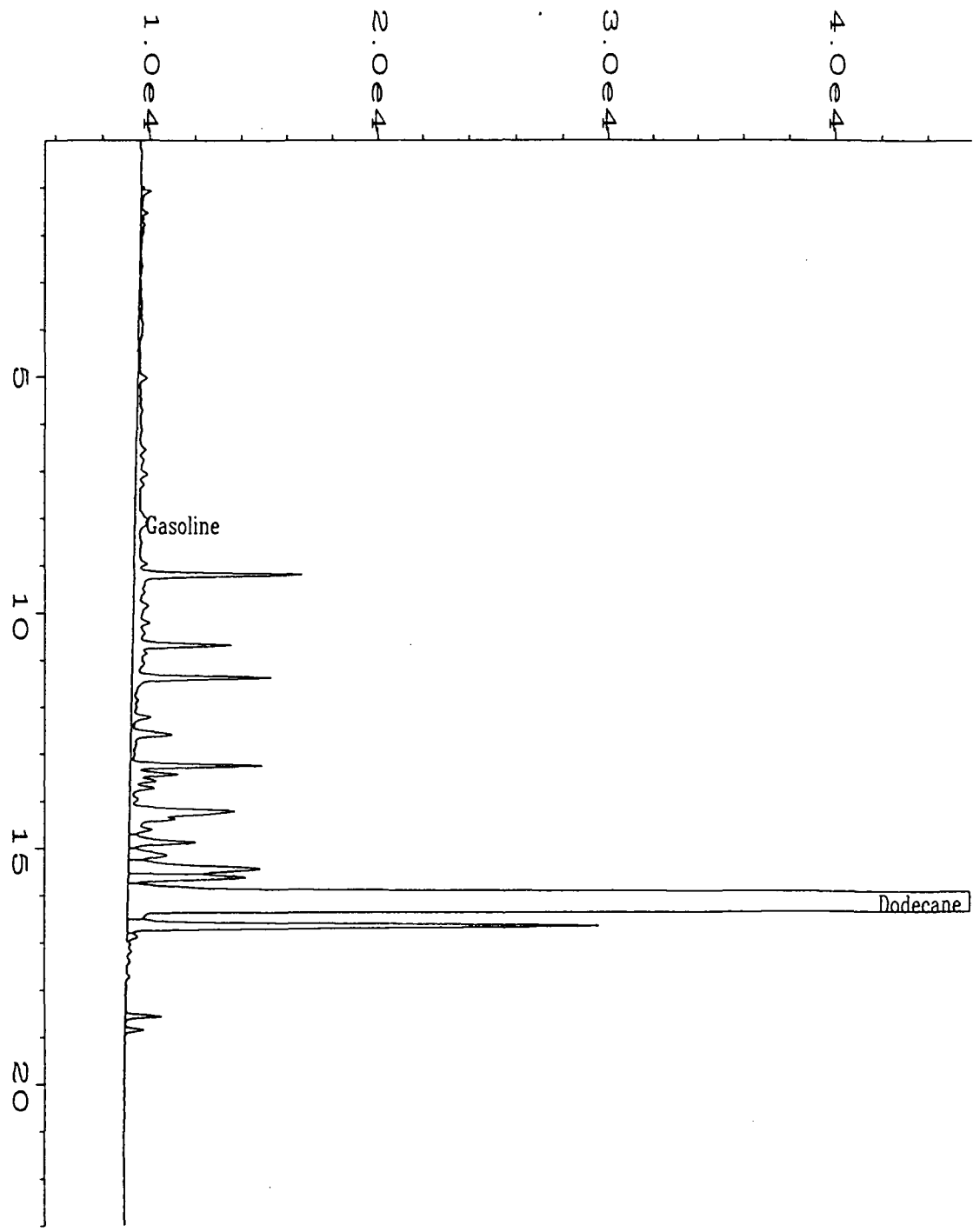


Data File Name	: C:\HPCHEM\1\DATA\tvh0413\017F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 17
Sample Name	: X05081;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Apr 95 07:48 PM	Instrument Method	: TVH1BASE.MTH
Report Created on	: 14 Apr 95 09:49 AM	Analysis Method	: TVH0413.MTH
Last Recalib on	: 13 APR 95 02:21 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1044 CLIENT # MD75-MW11 WATER		

DM 4/21/95



Data File Name	: C:\HPCHEM\1\DATA\tvh0413\018F0101.D		
Operator	: Dawn N. Guildner	Page Number	: 1
Instrument	: TVH	Vial Number	: 18
Sample Name	: X05082;1;5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Apr 95 08:24 PM	Instrument Method	: TVH1BA.
Report Created on	: 14 Apr 95 09:49 AM	Analysis Method	: TVH0413.M
Last Recalib on	: 13 APR 95 02:21 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:
Sample Info	: PROJECT # 95-1044 CLIENT # MD75-MW10 WATER		



Data File Name : E:\HPCHEM\1\DATA\TVH0413\019F0101.D
Operator : Dawn N. Guildner
Instrument : TVH
Sample Name : X05083;1;5
Run Time Bar Code:
Acquired on : 13 Apr 95 09:00 PM
Report Created on: 17 Apr 95 09:50 AM
Last Recalib on : 13 APR 95 02:21 PM
Multiplier : 1

Page Number : 1
Vial Number : 19
Injection Number : 1
Sequence Line : 1
Instrument Method: TVH1BASE.MTH
Analysis Method : TVH0413.MTH
Sample Amount : 0
ISTD Amount :

MD15-MW9

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\BX10417\020F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05083;10;0.500
Run Time Bar Code:
Acquired on : 17 Apr 95 07:18 PM
Report Created on: 17 Apr 95 07:45 PM
Last Recalib on : 10 APR 95 02:22 PM
Multiplier : 10
Sample Info : Project#: 95-1044 Client#: MD75-MW9 Water

Page Number : 1
Vial Number : 20
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10417B.MT
Analysis Method : BX10417B.MT
Sample Amount : 0
ISTD Amount :

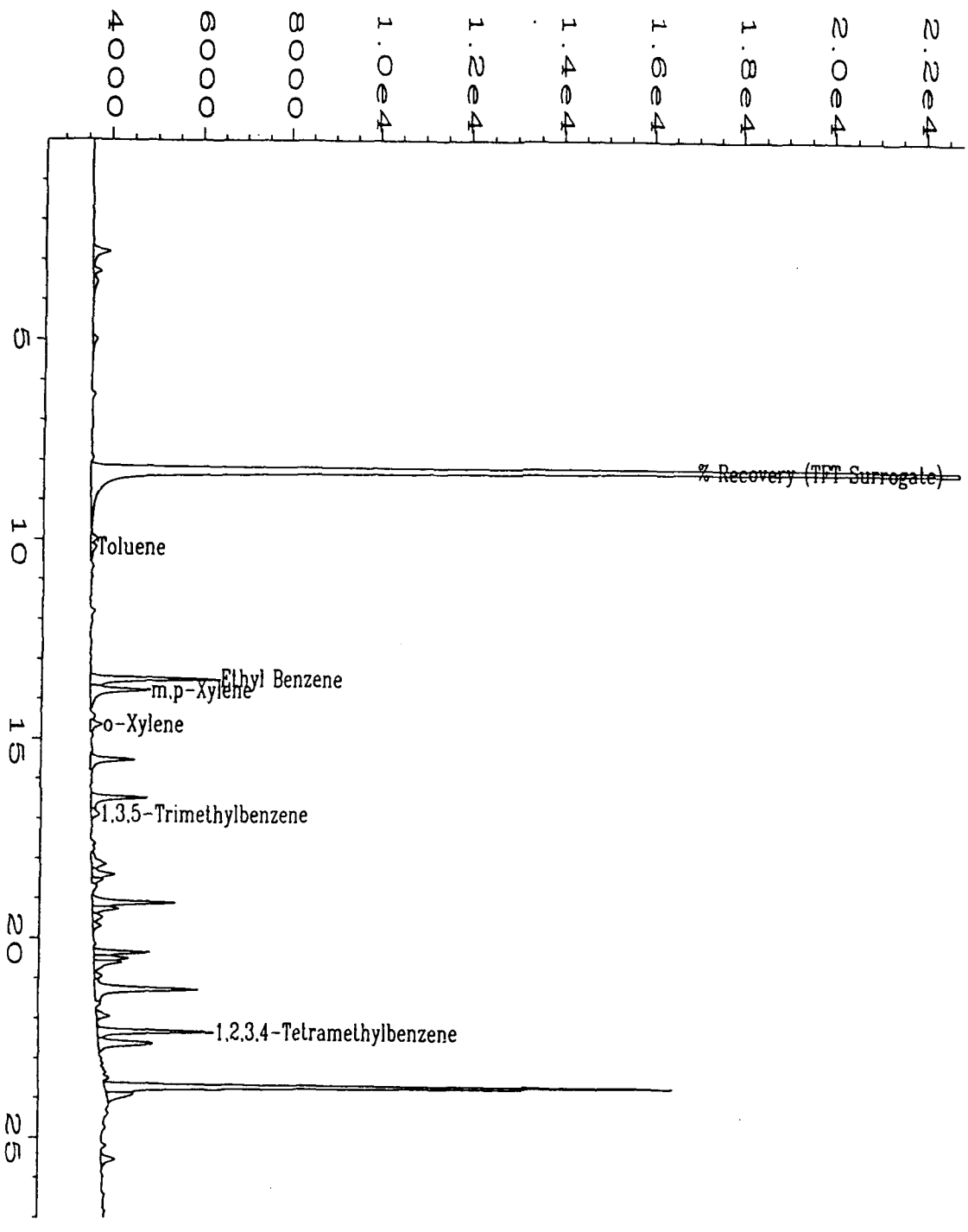
past holding time

Sig. 1 in C:\HPCHEM\1\DATA\BX10417\020F0101.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
6.390	* not found *			1		Benzene
8.234	233142	VV	0.107	1-R	758.365	% Recovery (TFT Surrogate) 76%
10.176	1840	VV	0.184	1	2.160	Toluene
13.196	* not found *			1		Chlorobenzene
13.474	17563	VV	0.093	1	24.449	Ethyl Benzene
13.753	10754	VV	0.117	1	12.135	m,p-Xylene
14.619	2304	VV	0.126	1	2.989	o-Xylene
16.869	1878	VV	0.160	1	2.100	1,3,5-Trimethylbenzene
17.775	* not found *			1		1,2,4-Trimethylbenzene
18.722	* not found *			1		1,2,3-Trimethylbenzene
22.296	14570	PV	0.088	1	29.889	1,2,3,4-Tetramethylbenzene

Time Reference Peak	Expected RT	Actual RT	Difference
2	8.275	8.234	-0.041

Not all calibrated peaks were found



Data File Name : D:\1\DATA\BX10417\020F0101.D
Operator : C.J. Cook
Instrument : BTEX1
Sample Name : X05083;10;0.500
Run Time Bar Code:
Acquired on : 17 Apr 95 07:18 PM
Report Created on: 01 May 95 12:43 PM
Last Recalib on : 17 APR 95 07:07 PM
Multiplier : 10

Page Number : 1
Vial Number : 20
Injection Number : 1
Sequence Line : 1
Instrument Method: BX10417B.MTH
Analysis Method : BX10417B.MTH
Sample Amount : 0
ISTD Amount :

External Standard Report

Data File Name : C:\HPCHEM\2\DATA\BX20413\038R0201.D
Operator : SW Tyson
Instrument : BTEX2
Sample Name : X05083;1;5
Run Time Bar Code:
Acquired on : 14 Apr 95 02:04 AM
Report Created on: 14 Apr 95 11:59 AM
Last Recalib on : 14 APR 95 00:39 AM
Multiplier : 1

Page Number : 1
Vial Number : 38
Injection Number : 1
Sequence Line : 2
Instrument Method: BX20413A.M
Analysis Method : BX20413B.M
Sample Amount : 0
ISTD Amount :

RPD 10

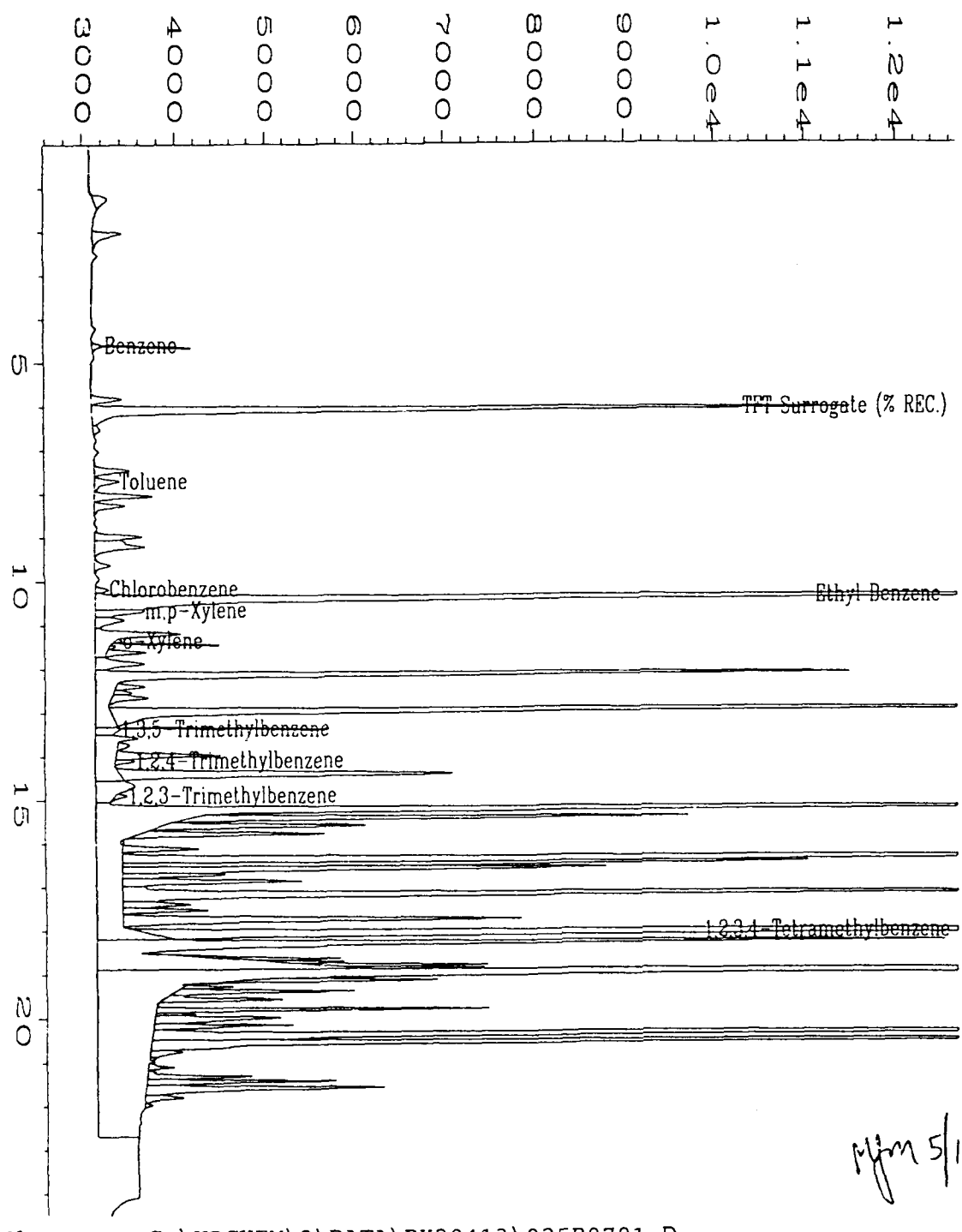
Sig. 2 in C:\HPCHEM\2\DATA\BX20413\038R0201.D

Ret Time	Area	Type	Width	Ref#	ug/L	Name
4.533	480	BB	0.089	1	0.380	Benzene
5.980	39337	VV	0.092	1-R	89.767	TFT Surrogate (% REC.) =90%
7.601	1433	VV	0.126	1	1.272	Toluene =1.3
10.047	493	PV	0.081	1	0.498	Chlorobenzene =0.5
10.262	63371	VV	0.087	1	61.300	Ethyl Benzene =61.3
10.524	2462	VV	0.124	1	2.173	m,p-Xylene =2.2
11.217	1039	VV	0.089	1	1.106	o-Xylene =1.1
13.245	* not found *			1		1,3,5-Trimethylbenzene
13.964	1953	VV	0.096	1	2.083	1,2,4-Trimethylbenzene =2.1
14.774	2145	VV	0.129	1	2.687	1,2,3-Trimethylbenzene=2.
17.938	99666	VV	0.086	1	132.716	1,2,3,4-Tetramethylbenzene =1

Time Reference Peak	Expected RT	Actual RT	Difference
2	6.002	5.980	-0.022

Not all calibrated peaks were found

past holding time



mjm 5/1/95

Data File Name : C:\HPCHEM\2\DATA\BX20413\025R0701.D
Operator : SW Tyson
Instrument : BTEX2
Sample Name : X05083;1;5
Run Time Bar Code:
uired on : 13 Apr 95 04:13 PM
port Created on: 13 Apr 95 05:54 PM
Last Recalib on : 13 APR 95 02:16 AM
Multiplier : 1

Page Number : 1
Vial Number : 25
Injection Number : 1
Sequence Line : 7
Instrument Method: BX20413.MTH
Analysis Method : BX20413.MTH
Sample Amount : 0
ISTD Amount :

MD75-MW9

APPENDIX D

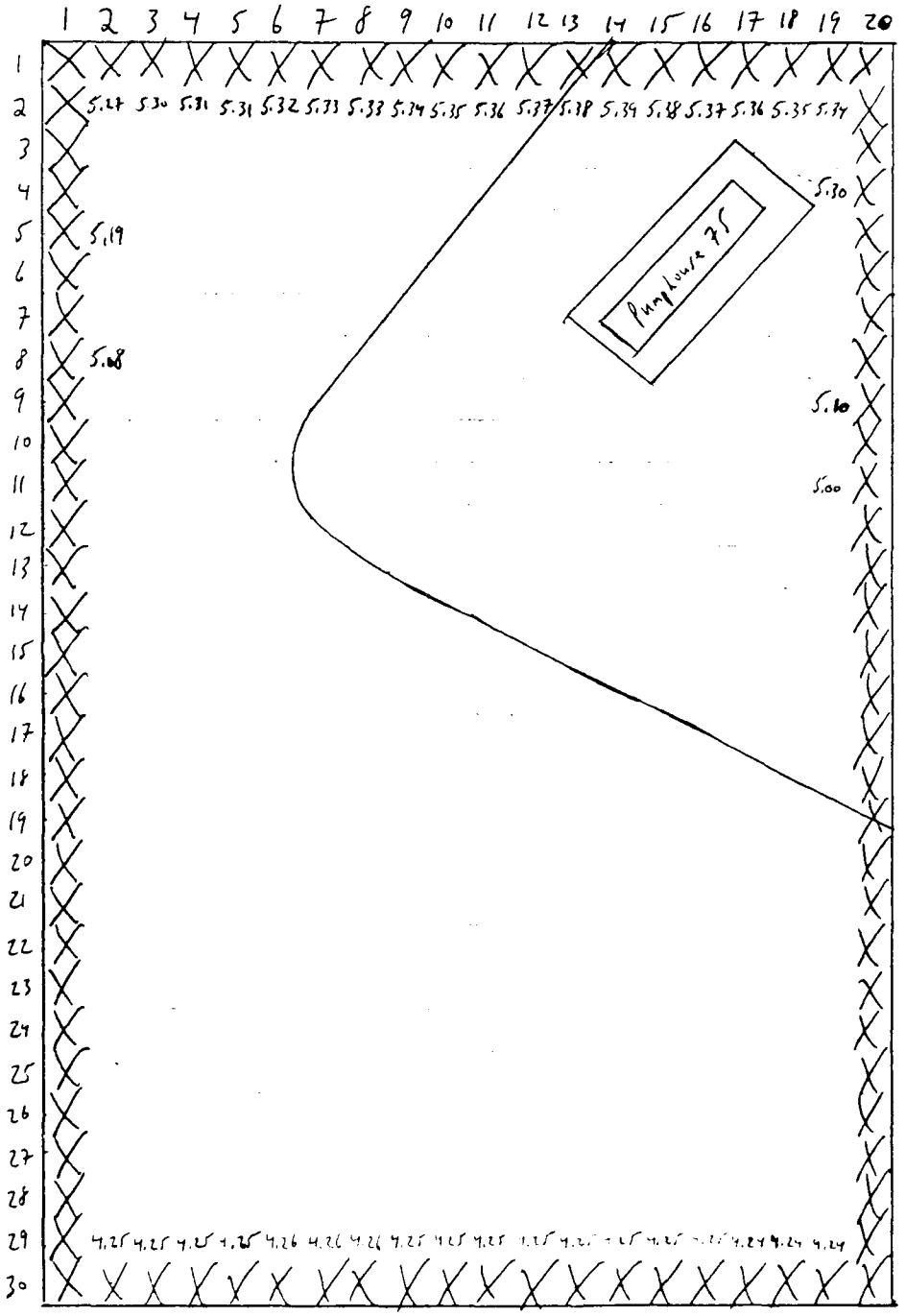
MODEL INPUT PARAMETERS, RELATED CALCULATIONS, AND *BIOPLUME MODEL MASS BALANCE ERROR* DISCUSSION

ES ENGINEERING-SCIENCE, INC.

Client AFCEE / MacDill AFB | Job No. 72250.21050 | Sheet 1 of 1

Subject Model grid with boundary conditions | By JRH | Date

Checked | Rev.



X = No-Flow Cell

5.35 = Constant Head Cell with Assigned Head Value.

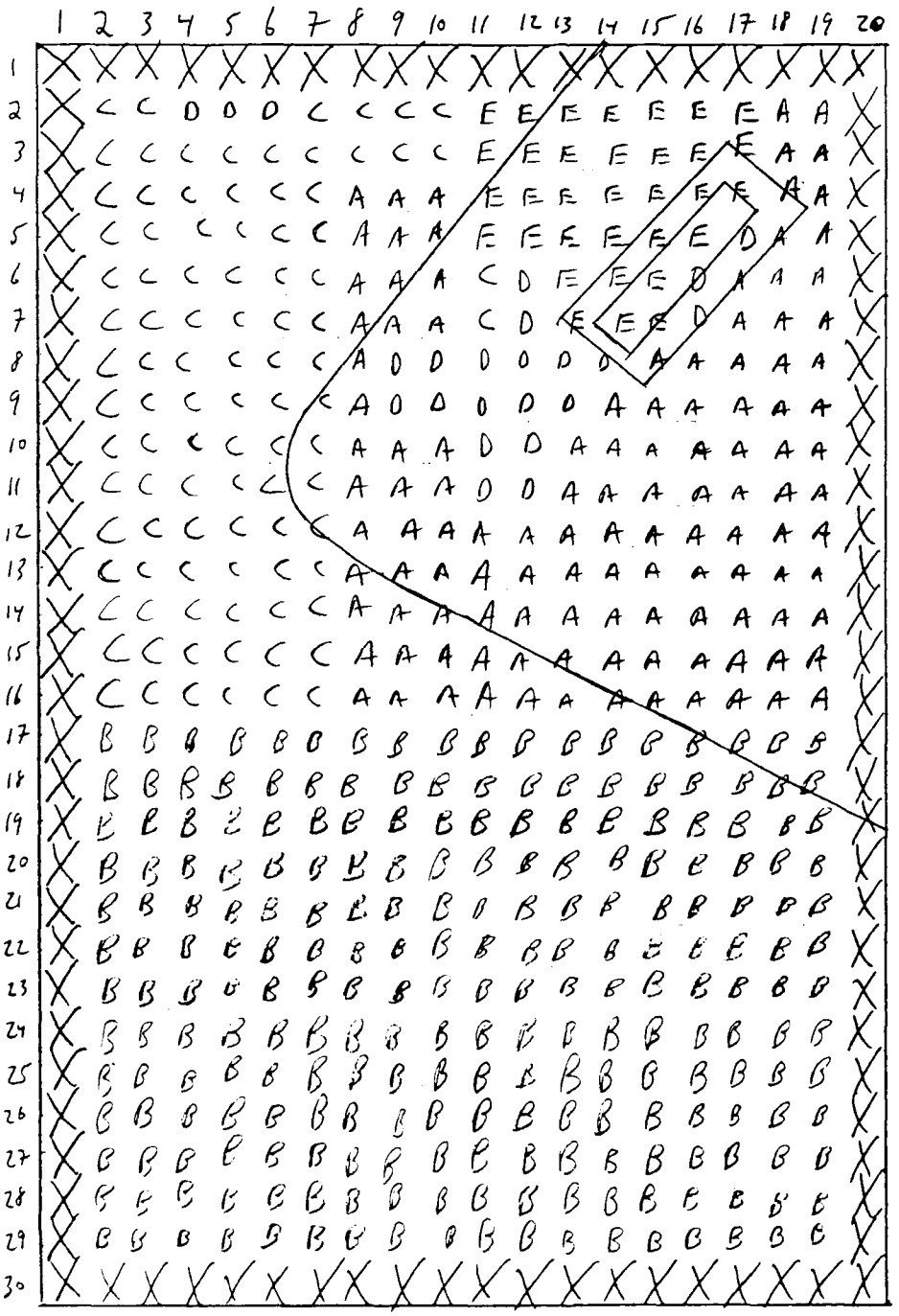
4

ES ENGINEERING-SCIENCE, INC.

Client AFCEE / MacDill AFB | Job No. 722450.21050 | Sheet 1 of 1

Subject Model Grid with Calibrated Transmissivity Array | By JRH | Date

Checked | Rev.



Values in ft^2/sec

X = No-Flow Cell

A = $3.3 \times 10^{-4} - 5.5 \times 10^{-3}$

B = $5.5 \times 10^{-3} - 1.1 \times 10^{-2}$

C = $1.1 \times 10^{-2} - 1.6 \times 10^{-2}$

D = $1.6 \times 10^{-2} - 2.1 \times 10^{-2}$

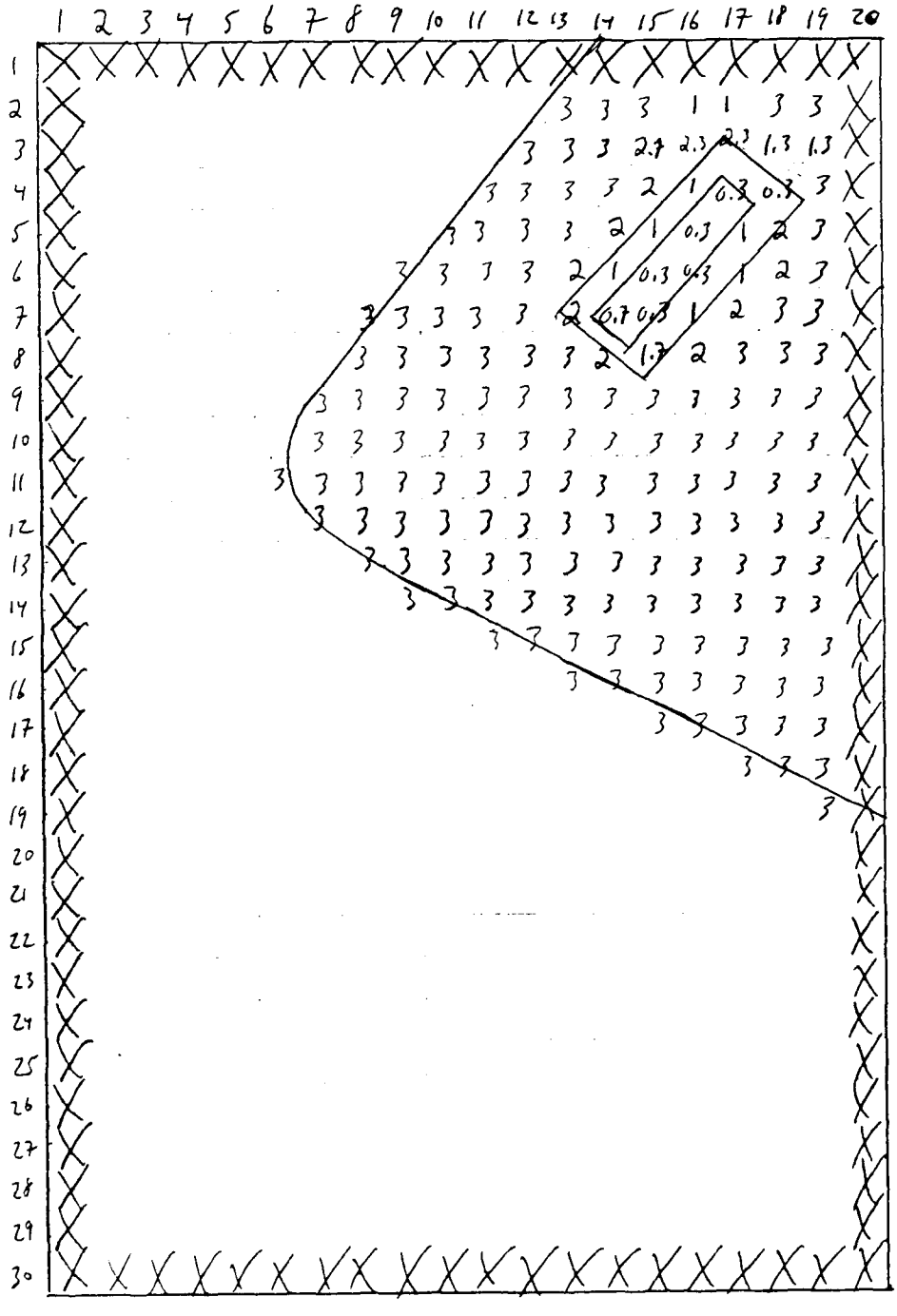
E = $2.1 \times 10^{-2} - 2.7 \times 10^{-2}$

ES ENGINEERING-SCIENCE, INC.

Client AFCEE / MacDill AFB | Job No. 72250.21050 | Sheet 1 of 1

Object Model Grid with Recharge Rates | By JRH | Date

Checked | Rev.



X = No-Flow Cell

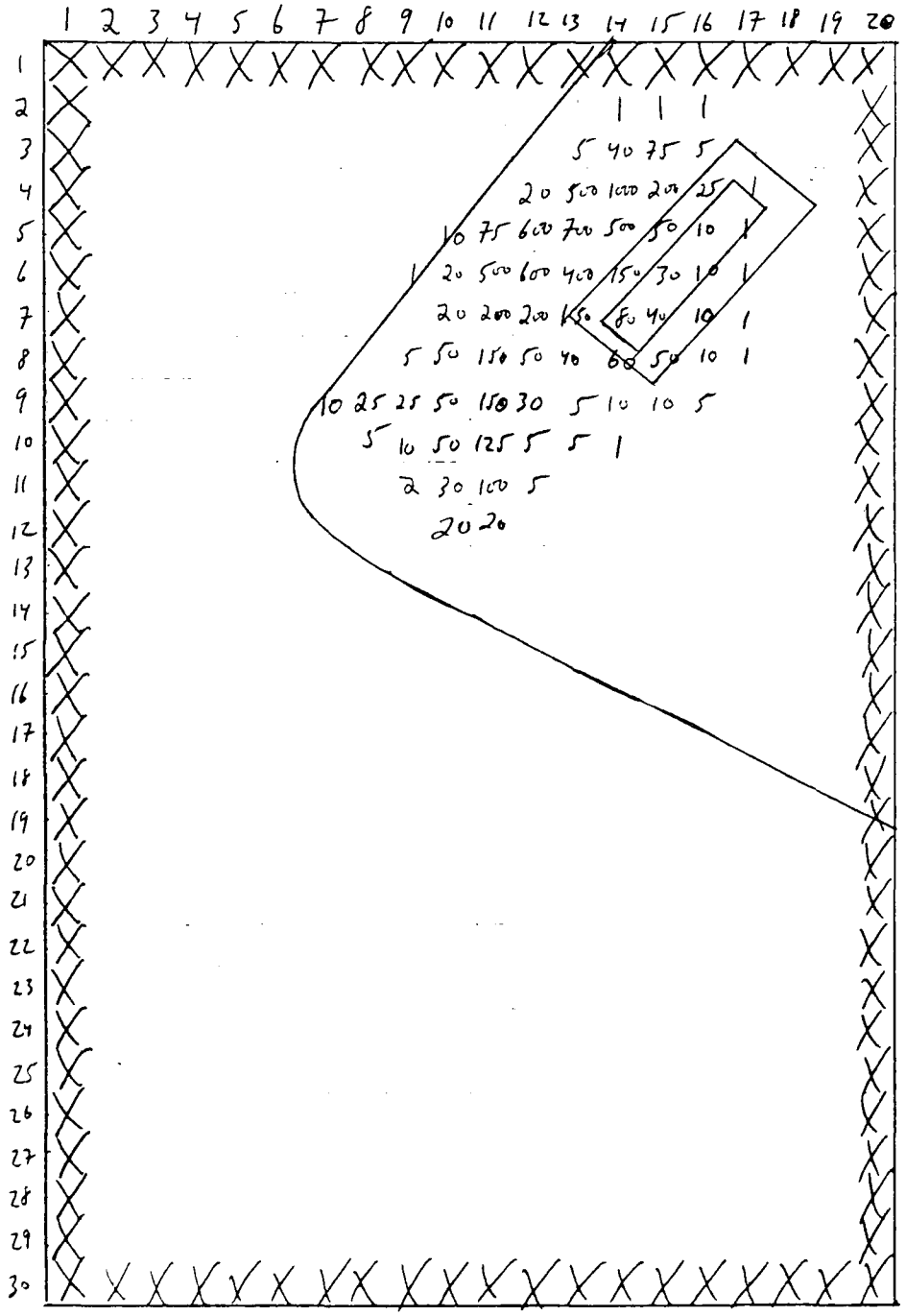
Note: Recharge rates are shown in inches/year; rates were entered into the model as ft/second

ES ENGINEERING-SCIENCE, INC.

Client AFCEE / MacDill AFB | Job No. 722450.21050 | Sheet 1 of 1

Object Model Grid with Initial BTEX Concentrations (11/94) (mg/L) | By JRH | Date

Checked | Rev.



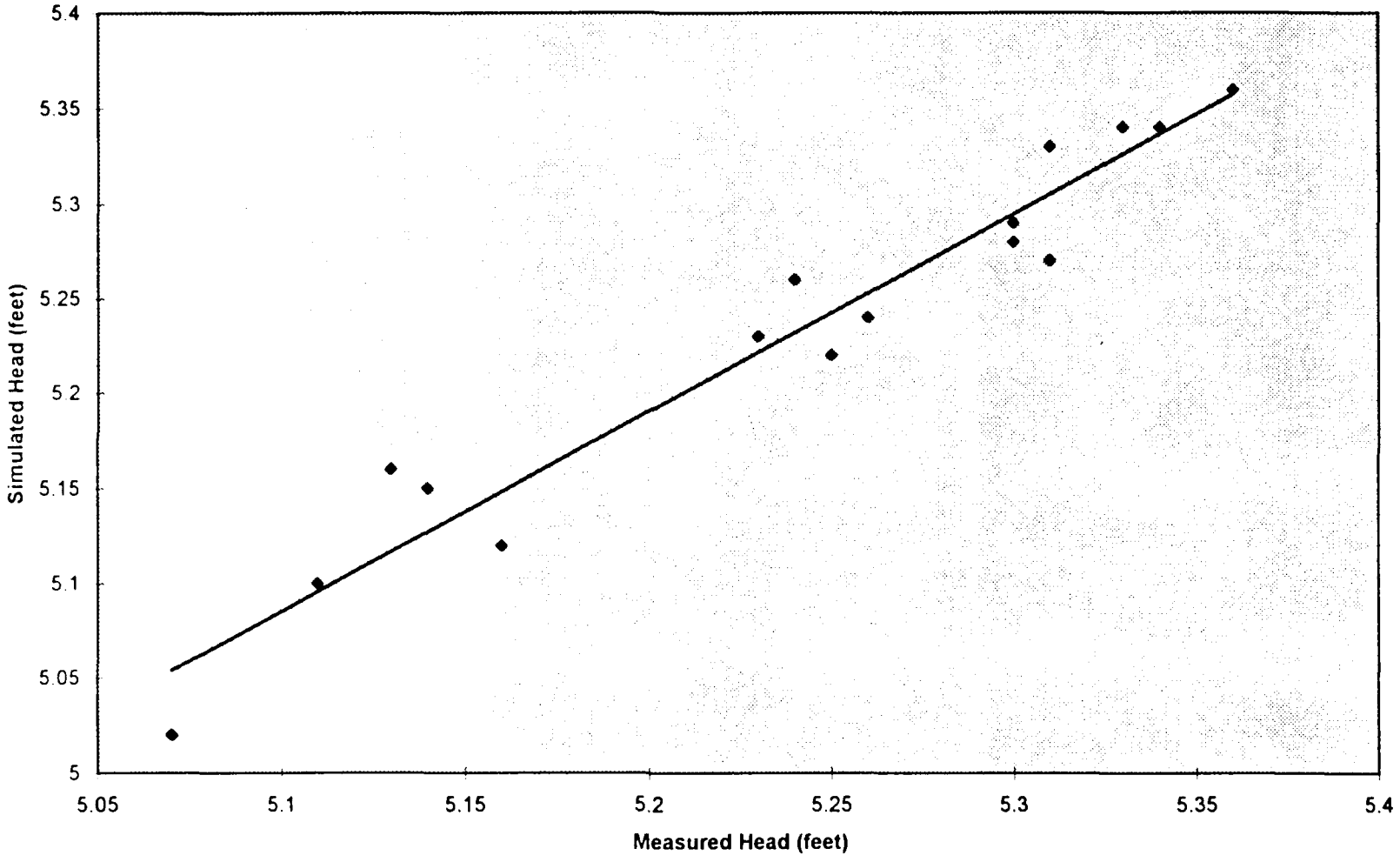
RMS calculation

OBS	X	Y	Hmeasured	Hsimulated	(Hm-Hs)^2
1	12	8	5.26	5.24	0.0004
2	15	10	5.13	5.16	0.0009
3	11	6	5.3	5.29	1E-04
4	9	10	5.14	5.15	0.0001
5	18	7	5.24	5.26	0.0004
6	9	7	5.25	5.22	0.0009
7	10	6	5.31	5.27	0.0016
8	12	4	5.31	5.33	0.0004
9	13	4	5.34	5.34	0
10	16	3	5.36	5.36	0
11	19	2	5.33	5.34	1E-04
12	14	7	5.3	5.28	0.0004
13	11	8	5.23	5.23	0
14	7	9	5.16	5.12	0.0016
15	11	12	5.11	5.1	0.0001
16	8	12	5.07	5.02	0.0025
					0.0095
		RMS		%	
		0.024367		2.1756237	

RMS = square root of average of squares of differences

% = RMS as a percentage of the head drop over the model domain.

Simulated vs. Measured Head, Calibrated Flow Model, Pumphouse 75, MacDill AFB



Derivation of values used to compute decay rate constants:

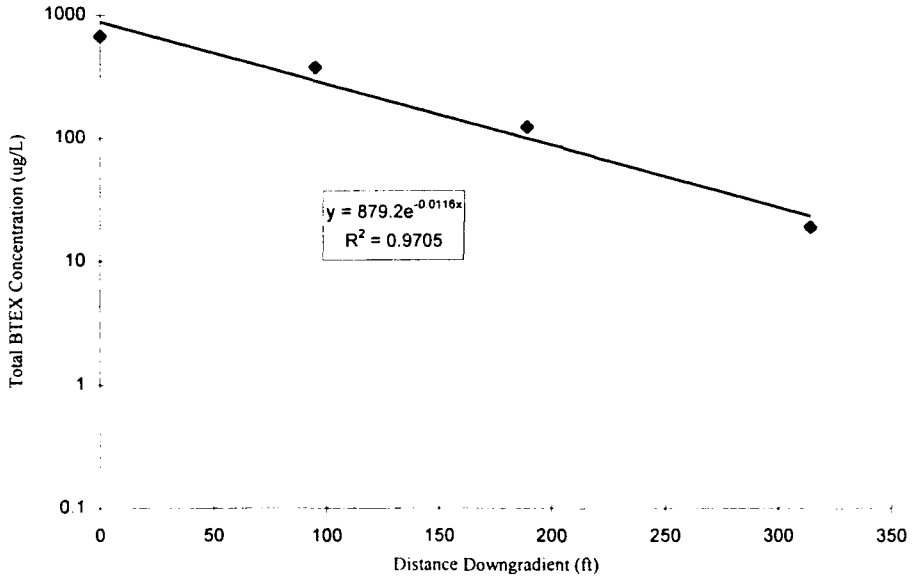
Dispersivity (α_x): The longitudinal dispersivity value of 40 feet used in the initial calibrated Bioplume II model was used. Use of a dispersivity equal to 25 feet (as used in the final calibrated model) reduces the computed decay rates by approximately 11 to 12 percent.

Contaminant Velocity (v_c): The average advective groundwater velocity of 0.06 ft/day computed in Section 3.5 was divided by the retardation coefficient used in the calibrated Bioplume II models (1.3) to compute the advective contaminant migration velocity of 0.05 ft/day.

FIRST-ORDER RATE CONSTANT CALCULATION
USING THE METHOD OF BUSCHECK AND ALCANTAR (1995)
SITE 57 (PUMPHOUSE 75)
INTRINSIC REMEDIATION TS
MACDILL AFB, FLORIDA

Point	Distance Downgradient	B, T, E, & X (µg/L) Mar-95
MD75-MW04	0	676
MD75-MW08	95	377
MD75-MW12	189	121
75MP-7S	314	18.7

PLOT OF TOTAL B, T, E, & X CONCENTRATION VERSUS DISTANCE



$$\lambda = v_c/4\alpha_x([1+2\alpha_x(k/v_x)]^2-1)$$

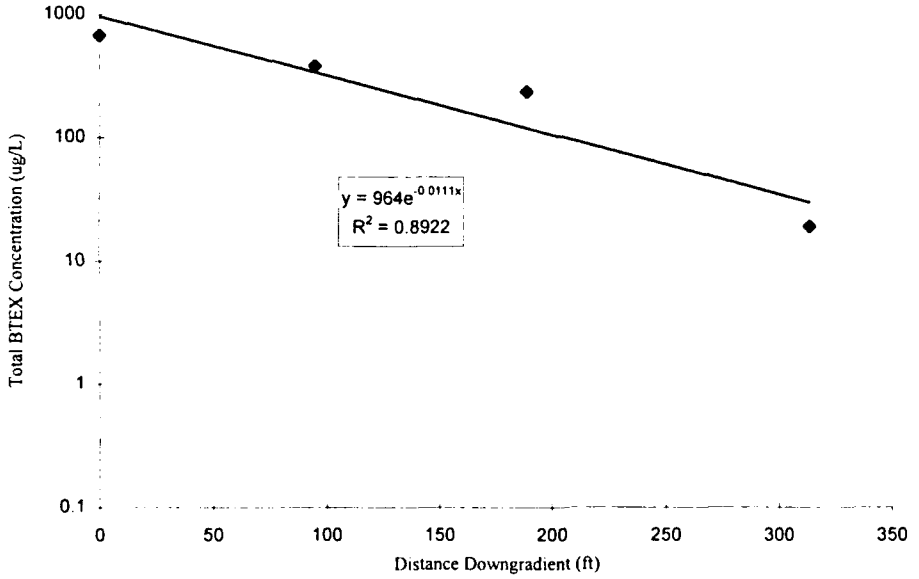
where $v_c = 0.05$
$\alpha_x = 40$
$k/v = 0.0116$

therefore $\lambda = 8.49E\text{-}04$

FIRST-ORDER RATE CONSTANT CALCULATION
USING THE METHOD OF BUSCHECK AND ALCANTAR (1995)
SITE 57 (PUMPHOUSE 75)
INTRINSIC REMEDIATION TS
MACDILL AFB, FLORIDA

Point	Distance Downgradient	B, T, E, & X (µg/L) Mar-95
MD75-MW04	0	676
MD75-MW08	95	377
75MP-2S	189	233
75MP-7S	314	18.7

PLOT OF TOTAL B, T, E, & X CONCENTRATION VERSUS DISTANCE



$$\lambda = v_c/4\alpha_x([1+2\alpha_x(k/v_x)]^2-1)$$

where $v_c = 0.05$

$\alpha_x = 40$

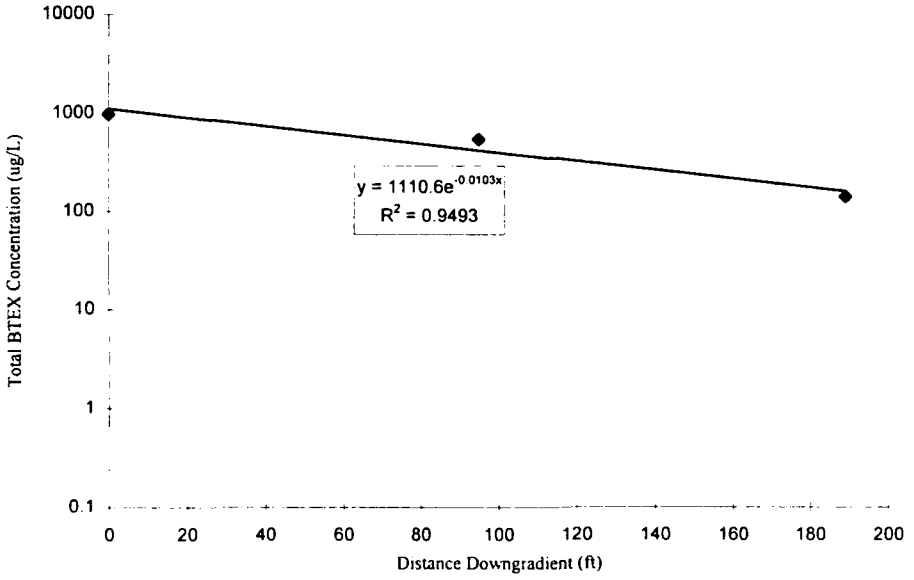
$k/v = 0.0111$

therefore $\lambda = 8.01E\text{-}04$

FIRST-ORDER RATE CONSTANT CALCULATION
USING THE METHOD OF BUSCHECK AND ALCANTAR (1995)
SITE 57 (PUMPHOUSE 75)
INTRINSIC REMEDIATION TS
MACDILL AFB, FLORIDA

Point	Distance Downgradient	B, T, E, & X (µg/L) Nov-94
MD75-MW04	0	976
MD75-MW08	95	541
MD75-MW12	189	139

PLOT OF TOTAL B, T, E, & X CONCENTRATION VERSUS DISTANCE



$$\lambda = v_c/4\alpha_x([1+2\alpha_x(k/v_x)]^2-1)$$

where $v_c = 0.05$

$\alpha_x = 40$

$k/v = 0.0103$

therefore $\lambda = 7.27E\text{-}04$

PARSONS **Calculation Sheet**

Rev	By	Date	Ck	Date	Title: Calculation of Biodegradation Rates using Conservative Tracers – Site 57, Mach. II AFB
					Author JRH Sheet 1 Of 1

From Section 5.3.5:

$$C_{i,corr} = C_{i-1,corr}\left(\frac{C_i}{C_{i-1}}\right)\left(\frac{1}{\left(1-\frac{R_c}{R_t}\left(1-\frac{T_i}{T_{i-1}}\right)\right)}\right)$$

where: $C_{i,corr}$=corrected contaminant concentration at point *i*

$C_{i-1,corr}$=corrected contaminant concentration at point *i*-1. (If point *i*-1 is the first or most upgradient point, $C_{i-1,corr}$ is equivalent to the oberved contaminant concentration.)

C_i=observed contaminant concentration at point *i*

C_{i-1}=observed contaminant concentration at point *i*-1

T_i=observed tracer concentration at point *i*

T_{i-1}=observed tracer concentration at point *i*-1

Note: This assumes that $R_t/R_c + T_i/T_{i-1} > 1$.

R_t & R_c = Coefficients of retardation for the tracer & contaminant, respectively (BTEX = 2.09, TMB = 3.98, TEMB = 24.68)

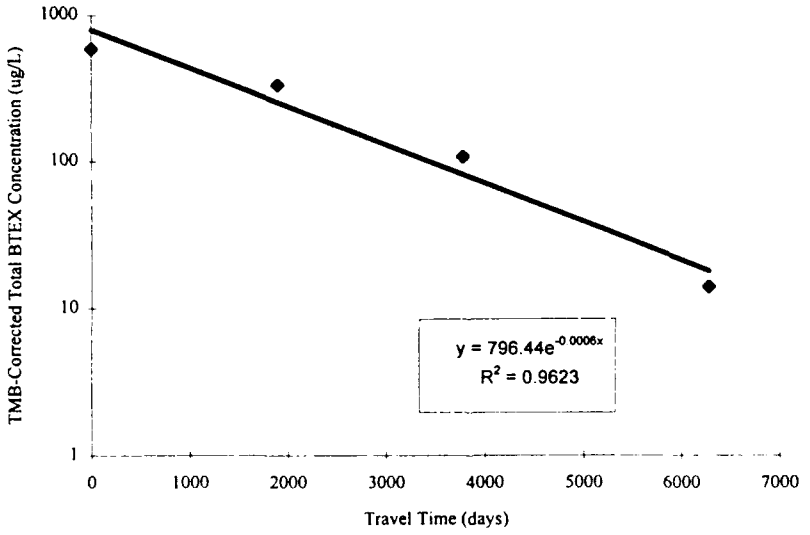
Location	Measured BTEX (mg/L)	Measured Total TEMB or TMB (mg/L)	TMB or TEMB - Corrected BTEX (mg/L)	
75mp-45	589	94	589	using TMB (trimethylbenzenes)
mo75-mw04	377	118	332	
75mp-25	233	320	108	
75mp-75	19	97	14	
mo75-mw04	676	92	676	using TEMB (tetramethylbenzene)
mo75-mw07	377	61	388	
mo75-mw12	121	41	128	
75mp-75	19	12	21	

FIRST-ORDER RATE CONSTANT CALCULATION
USING TMB AS A CONSERVATIVE TRACER
SITE 57 (PUMPHOUSE 75)
INTRINSIC REMEDIATION TS
MACDILL AFB, FLORIDA

Point	Distance Downgradient (ft)	Travel Time Between Upgradient and Downgradient Point (days)	Measured Total BTEX Concentration (µg/L)	Total Trimethylbenzene Concentration (µg/L)	Trimethylbenzene-Corrected Total BTEX Concentration (µg/L)
75MP-4S	0	0	589	94	589
MD75-MW08	95	1900	377	118	332
75MP-2S	189	3780	233	320	108
75MP-7S	314	6280	19	97	14

v_c = 0.05 ft/day (average for all BTEX compounds)

PLOT OF TMB-CORRECTED TOTAL BTEX CONCENTRATION VERSUS TIME

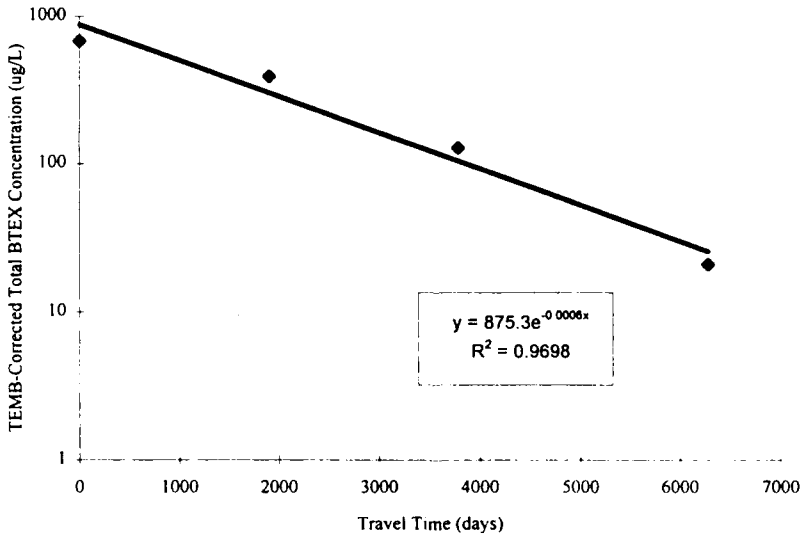


FIRST-ORDER RATE CONSTANT CALCULATION
USING TETRAMETHYLBENZENE AS A CONSERVATIVE TRACER
SITE 57 (PUMPHOUSE 75)
INTRINSIC REMEDIATION TS
MACDILL AFB, FLORIDA

Point	Distance Downgradient (ft)	Travel Time Between Upgradient and Downgradient Point (days)	Measured Total BTEX Concentration (µg/L)	Total Tetramethylbenzene Concentration (µg/L)	Tetramethylbenzene Corrected Total BTEX Concentration (µg/L)
MD75-MW04	0	0	676	92	676
MD75-MW08	95	1900	377	61	388
MD75-MW12	189	3780	121	41	128
75MP-7S	314	6280	19	12	21

v_c = 0.05 ft/day (average for all BTEX compounds)

PLOT OF TEMB-CORRECTED TOTAL BTEX CONCENTRATION VERSUS TIME



CALCULATION OF RETARDATION COEFFICIENTS
SITE 57 (PUMPHOUSE 75)
INTRINSIC REMEDIATION TS
MACDILL AIR FORCE BASE, FLORIDA

Compound	K_{oc} (L/kg [a])	Maximum Fraction Organic Carbon [b]	Minimum Fraction Organic Carbon [b]	Average Fraction Organic Carbon [b]	Distribution Coefficient K_d (L/kg) Maximum [c1]	Minimum [c2]	Average [c3]	Bulk Density (kg/L) [d]	Effective Porosity [e]	Coefficient of Retardation Maximum	Minimum	Average
Benzene	79	0.0006	0	0.0003	0.047	0.000	0.024	1.60	0.25	1.30	1.00	1.15
Toluene	190	0.0006	0	0.0003	0.114	0.000	0.057	1.60	0.25	1.73	1.00	1.36
Ethylbenzene	468	0.0006	0	0.0003	0.281	0.000	0.140	1.60	0.25	2.80	1.00	1.90
m-xylene	405	0.0006	0	0.0003	0.243	0.000	0.122	1.60	0.25	2.56	1.00	1.78
o-xylene	422	0.0006	0	0.0003	0.253	0.000	0.127	1.60	0.25	2.62	1.00	1.81
p-xylene	357	0.0006	0	0.0003	0.214	0.000	0.107	1.60	0.25	2.37	1.00	1.69
1,2,3-TMB	884	0.0006	0	0.0003	0.530	0.000	0.265	1.60	0.25	4.39	1.00	2.70
1,2,4-TMB	772	0.0006	0	0.0003	0.463	0.000	0.232	1.60	0.25	3.96	1.00	2.48
1,3,5-TMB	676	0.0006	0	0.0003	0.406	0.000	0.203	1.60	0.25	3.60	1.00	2.30
1,2,4,5-TEMB	6166	0.0006	0	0.0003	3.700	0.000	1.850	1.60	0.25	24.68	1.00	12.84

NOTES:

[a] From technical protocol (Wiedemeier *et al.*, 1995) and Montgomery (1996) (for TEMB).

[b] From laboratory analyses of site soil samples

[c1] K_d = Maximum Fraction Organic Carbon x K_{oc}

[c2] K_d = Minimum Fraction Organic Carbon x K_{oc}

[c3] K_d = Average Fraction Organic Carbon x K_{oc}

[d] From laboratory analyses of moisture content, and assumed porosity and specific gravity.

[e] Literature value.

DISCUSSION OF MASS BALANCE ERRORS, MODEL PH75A

Relatively substantial contaminant mass balance errors were obtained during the PH75A simulation. For example, the mass balance error after 5 years of simulation time was approximately 40 percent. Experimentation revealed that a primary cause of these errors appears to be the introduction of oxygen into the model domain via precipitation-induced recharge. The reason for this introduction having such a substantial effect on the mass balance is not known. In order to check the effects of this error on the accuracy of the predictions derived from the simulations, a second model which does not incorporate oxygen recharge was run. The anaerobic decay coefficient in this second model was increased from 0.0005 day^{-1} to 0.0008 day^{-1}, which is the value obtained using the method of Buscheck and Alcantar (1995) (see Section 5.3.5). The decay coefficient was increased to balance the effects of deleting oxygen recharge from the model. The second model was identical to model PH75A in all other respects. The results of this model were very similar to those of PH75A, both in the temporal variation of maximum BTEX concentrations and in the magnitude of BTEX concentrations leaving the model domain. In addition, the contaminant mass balance error was substantially improved, equaling 0.2 percent after 5 years of simulation time. The results of this confirmation model indicate that the excessive mass balance errors obtained with model PH75A do not adversely affect the validity of the simulations.

APPENDIX E

MODEL INPUT AND OUTPUT FILES

APPENDIX F

REMEDIAL ALTERNATIVE COST CALCULATIONS

Alternative 1: Long-Term Monitoring and Institutional Controls

Standard Rate Schedule — YEARS 1 THROUGH 4

Billing Category Cost Code/(Billing Category)	Billing Rate	Task 1 (hrs)	Install New LTM/POC Wells ($)	Task 2 (hrs)	Sampling ($)	Task 3 (hrs)	Reporting & PM ($)
Word Processor 88/(15)	$30	0	$0	0	$0	20	$600
CADD Operator 58/(25)	$47	0	$0	0	$0	20	$940
Technician 42/(50)	$40	5	$200	34	$1,360	30	$1,200
Staff Level 16/(65)	$57	45	$2,565	34	$1,938	60	$3,420
Project Level 12/(70)	$65	8	$520	5	$325	40	$2,600
Senior Level 10/(80)	$85	2	$170	1	$85	5	$425
Principal 02/(85)	$97	0	$0	0	$0	0	$0
Total Labor (hrs|$)		60	$3,455	74	$3,708	175	$9,185
ODCs							
Phone			$20		$10		$40
Photocopy			$10		$5		$100
Mail			$100		$200		$50
Computer			$100		$0		$400
CAD			$0		$0		$200
WP			$0		$0		$200
Travel			$200		$200		$0
Per Diem			$100		$200		$0
Eqpt. & Supplies			$700		$1,000		$0
Total ODCs			$1,230		$1,615		$990
Outside Services							
LTM/POC Well Installation Costs			$12,750		$0		$0
Laboratory Fees			$0	15 wells	$3,000		$0
Other: Maintain Institutional Controls			$0		$0		$5,000
Total Outside Services			$12,750		$3,000		$5,000

Proposal Estimate	Task 1	Task 2	Task 3
Labor	$3,455	$3,708	$9,185
ODC's	$1,230	$1,615	$990
Outside Services	$12,750	$3,000	$5,000
Total by Task	$17,435	$8,323	$15,175

Total Labor	$16,348
Total ODCs	$3,835
Total Outside Services	$20,750
Total Project	$40,933

See attached sheet for well installation details.

Lab fees assume offsite analysis of 11 wells/yr for BTEX and methane. Analysis of 5 QC samples/yr for BTEX is also assumed

Alternative 1: Long-Term Monitoring and Institutional Controls

Standard Rate Schedule — YEARS 5 THROUGH 18

Billing Category Cost Code/(Billing Category)	Billing Rate	Task 1 (hrs)	Install New LTM/POC Wells ($)	Task 2 (hrs)	Sampling ($)	Task 3 (hrs)	Reporting & PM ($)
Word Processor 88/(15)	$30	0	$0	0	$0	20	$600
CADD Operator 58/(25)	$47	0	$0	0	$0	20	$940
Technician 42/(50)	$40	0	$0	40	$1,600	30	$1,200
Staff Level 16/(65)	$57	0	$0	40	$2,280	60	$3,420
Project Level 12/(70)	$65	0	$0	5	$325	40	$2,600
Senior Level 10/(80)	$85	0	$0	1	$85	5	$425
Principal 02/(85)	$97	0	$0	0	$0	0	$0
Total Labor (hrs|$)		0	$0	86	$4,290	175	$9,185
ODCs							
Phone			$0		$10		$40
Photocopy			$0		$5		$100
Mail			$0		$200		$50
Computer			$0		$0		$400
CAD			$0		$0		$200
WP			$0		$0		$200
Travel			$0		$200		$0
Per Diem			$0		$200		$0
Eqpt. & Supplies			$0		$1,000		$0
Total ODCs			$0		$1,615		$990
Outside Services							
LTM/POC Well Installation Costs			$0		$0		$0
Laboratory Fees			$0	15 wells	$4,000		$0
Other: Maintain Institutional Controls			$0		$0		$5,000
Total Outside Services			$0		$4,000		$5,000

Proposal Estimate	Task 1	Task 2	Task 3
Labor	$0	$4,290	$9,185
ODC's	$0	$1,615	$990
Outside Services	$0	$4,000	$5,000
Total by Task	$0	$9,905	$15,175

Total Labor	$13,475
Total ODCs	$2,605
Total Outside Services	$9,000
Total Project	$25,080

Lab fees assume offsite analysis of 15 wells/yr for BTEX and methane.
Analysis of 5 QC samples/yr for BTEX is also assumed

MacDill AFB Calculations

Alternatives 1 and 2: Long-term Monitoring

Misc calculations		
Number of shallow LTM wells:		
Number of wells:	6	
Depth each:	12	ft

Cost calculations

Description	Unit	Qty.	Unit Price	Subtotal	Total	Source (If applicable)
Well Installation					$ 5,800	
Mobilization	ea	1	$ 1,000	$ 1,000		
Well Installation	ln ft	72	$ 50	$ 3,600		
Soil Disposal	drum	4	$ 100	$ 400		
Soil Samples	ea	4	$ 200	$ 800		

Note: Soil samples analyzed for BTEX, TPH, reactivity, and corrosivity for disposal purposes.

Alternatives 1 and 2: Long-term Monitoring

Misc calculations		
Number of deep LTM wells:		
Number of wells:	3	
Depth each:	24	ft

Cost calculations

Description	Unit	Qty.	Unit Price	Subtotal	Total	Source (If applicable)
Well Installation					$ 6,940	
Mobilization	ea	1	$ 1,000	$ 1,000		
Well Installation	ln ft	72	$ 70	$ 5,040		
Soil Disposal	drum	3	$ 100	$ 300		
Soil Samples	ea	3	$ 200	$ 600		

Note: Soil samples analyzed for BTEX, TPH, reactivity, and corrosivity for disposal purposes.

PARSONS

Calculation Sheet

Rev	By	Date	Ck	Date	Title
			SLC	1/24/97	Pumphouse 75, MacDill AFB Alternative 1 Present Worth Costs
					Author JRH Sheet 1 Of 1

Assume Annual Inflation factor = 7%

Sampling Cost for 4th year 1 → 4 = $8,323 (attached spreadsheet)

Present Worth factor (4 yrs) = (PWF) $\frac{(1+0.07)^4 - 1}{(0.07)(1+0.07)^4} = 3.39$

($8,323)(3.39) = $28,215 (11 wells)

For 15 wells, the cost for years 1 → 4 = ($9,905)(3.39) = $33,578

$77,578 (15 wells, 4 years)
− 28,215 (11 wells, 4 years)
$5,363 = difference between 11 wells & 15 wells

For 15 wells, the cost for years 1 → 16 = ($9,905)(10.06)
= $99,644

[PWF for 16 yrs = $\frac{(1+0.07)^{16} - 1}{(0.07)(1+0.07)^{16}} = 10.06$]

$99,644 − $5,363 = $94,281 = Sampling cost assuming 11 wells for yrs 1 → 4 & 15 wells for years 5 → 16.

Maintain Institutional Controls: PW = (10.06)(5,000) = $50,300
Install new wells: PW = (17,775)(0.93) = $16,215
GW Sampling: PW = $94,281
Reporting/pm: PW = ($10,175)(10.06) = $102,361

Total PW = **$263,157**

Assumptions:

- 180-ft long horizontal bioventing / SVE / biosparging well
- Power available at Pumphouse 75, 100' away.
- Well installed in 4' deep trench
- 4 vapor monitoring points installed
- Base provides daily 10-minute check during system operation
- SVE performed for 2 months prior to air injection
- Internal Combustion Engine used for SVE – no emissions control devices / systems required.

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS
AMPAD

CAPITAL COSTS

Trench Construction (180' x $85/ft) + (100' x $70/ft) (includes backfill, repaving)	$22,300
Well Installation	2,000
Blower, Blower House, Manifold, piping, fittings	2,500
Monitoring Points (4)	1,000
3 Internal Combustion Engine for SVE ($6000/month rental x 2 months) + $1,000 supplemental fuel	13,000
System Installation Oversight	
Labor (1 person x 150 hr x $60/hr)	$9,000
ODCs	2,000
SVE System Optimization	
Labor (1 person x 50 hr x $60/hr)	$3,000
(1 person x 40 hr x $50/hr) – Local Trainee	2,000
ODCs	2,500
Soil Gas Sampling & Analysis during SVE operation	
Labor (1 person x 70 hr x $50/hr)	3,500
Analytical (10 BTEX @ $90 ea)	900
Misc ODCs	650
Total	$64,350

round to $65K

PARSONS

Calculation Sheet

Rev	By	Date	Ck	Date	Title
			SLC	1/21/97	Pumphouse 75, MacDill AFB Alternative 2 Present Worth Cost
					Author JRH Sheet 1 Of 1

Annual Costs: Extended Testing (see attached table) =

Assume 7% inflation (discount) factor $15,435

$$PWF(3\,yr) = \frac{(1+0.07)^3 - 1}{(0.07)(1+0.07)^3} = 2.62 \text{ for SVE/bioventing system}$$

① $PW(SVE/bioventing) = (\$60{,}000) + (2.62)(15{,}435) = \$105{,}440$

② For LTM/Institutional Controls (12 years)

$$PWF(12\,yr) = \frac{(1+0.07)^{12} - 1}{(0.07)(1+0.07)^{12}} = 7.94$$

$PW = \$17{,}435 + [(7.94)(\$9{,}905) - \$5{,}363] +$ (see Alternatives 1 Calculations)

$(7.94)(\$15{,}175) = \$211{,}207$

Total PW = $105,440 + $211,207 = **$316,647**

Alternative 2

Option One
Extended Testing of Existing Bioventing Systems, Cost Per Site
Title 1 A Services (For Work Completed in 1994 - 1997)

20-Jul-94
c:\biovent\option1.wk4

Task Description	Labor Hours					Total Hours	Total Cost
Task 1: Administration	6	6	6	6	8	32	$824.34
Task 2: Extended Testing	2	8	60	20	15	105	$2,339.66
Task 3: Letter Report Preparation	4	12	8	8	10	42	$1,033.00
Total Labor Hours	12	26	74	34	33	179	
Labor Hourly Rates (CY 1996)	$43.75	$30.02	$23.39	$17.83	$16.80		$4,197.00
Total Labor Costs	$525.00	$780.52	$1,730.86	$606.22	$554.40		

A Direct Labor Cost	$4,197.00
B Home Office Overhead Including Fringe 139.61%	$5,859.43
C Total Labor Cost	$10,056.43
D Other Direct Costs	$3,726.00
E Total C and D	$13,782.43
F Profit on Item E at 11.99%	$1,652.51
Total Cost (CONUS)	$15,434.95
Total Cost (AK/HI/Johnston Atoll)	$19,758.88