Behaviour of Oxygenates and Aromatic Hydrocarbons in Groundwater from Gasoline Residuals

By

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I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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ABSTRACT

This study focuses on the dissolution and near-source attenuation of oxygenated gasoline hydrocarbons in groundwater from two gasoline residual sources: one containing gasoline with 9.8% methyl tert butyl alcohol (MTBE) and 0.2% tert-butyl alcohol (TBA) (GMT source) and the other containing gasoline with 10% ethanol (E10 source). The sources were injected into a shallow sand aquifer, leaving a residual plume to dissolve under natural gradient conditions.

The MTBE plume (from the GMT source) and the ethanol plume (from the E10 source) were compared with predictions by the BIONAPL numerical model assuming ideal source dissolution and no biodegradation of the oxygenates or aromatic hydrocarbons. While the complete mass of injected MTBE appeared to pass row 2, little MTBE was found further downgradient. This mass loss was considered to be an artifact of the monitoring system and of possible biodegradation. The ethanol mass flux was better captured in the E10 gate. Essentially all the ethanol from the E10 source also passed row 2, but, the ethanol mass flux decreased somewhat from row 2 to row 4. The better mass recovery may reflect that the ethanol plume remained more in the center of the monitoring network as compared to the MTBE plume some of which may have bypassed the monitoring fence. MTBE, TBA, and ethanol in the model were assumed to dissolve at equilibrium. The MTBE and TBA concentration breakthrough curves are generally consistent with equilibrium dissolution. However, the mass flux values suggest non ideal dissolution. The ethanol concentration breakthrough curves and mass flux are consistent with equilibrium dissolution. Also, the observed concentrations were often higher than predicted at later times. These features could be due to non-equilibrium (kinetically-limited) dissolution However, non-ideal source

conditions may have arisen due to most of the oxygenates being dissolved into the water injected along with the gasolines thus distributing the residual gasoline in a non-uniform manner. The concentrations of aromatics are higher than expected from the BIONAPL model and are consistent with tailing expected with non-equilibrium dissolution. However, the probable complexity of the source concentration distribution likely account for much of the concentrations variability.

There were insufficient electron acceptors to support complete mineralization of either the oxygenates or the BTX-TMB compounds. Although, evidence of weak MTBE biodegradation was found, the major mass loss seemed to be related to the uncertainties in the monitoring network. Some ethanol mass loss could be attributed to fermentation to organic acids (which were not sought in the field experiment). The persistence of BTX-TMB through the gates seemed to be slightly greater in the presence of ethanol.

The field study was also used to test the Ratio Mass Estimation (RME) method of estimating the initial NAPL mass in the source from downgradient contaminant concentrations. The method was found reasonably reliable if the downgradient concentrations were collected close to the source where biodegradation was minor.

Acknowledgments

I have to thank in a special way to my supervisor, Dr. Jim Barker, whose continuous support has been close to me like a guardian angel. His tenacity and openness in directing my steps from the very beginning to the very end, gave me a life model. His passion in delivering his knowledge to others is uncommon and bears the seal of a great heart.

I also thank my committee members for their continuous support and for sharing their knowledge. Dr. Bob Gillham provided support and advice related to the hydraulic conductivity changes due to the presence of the NAPL phase. Dr. Ramon Aravena gave me the insight regarding the use of isotopes in recognizing the MTBE biodegradation. Dr. John Molson provided advice and help in usage of the BIONAPL3D model, he developed.

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Chapter 1

INTRODUCTION

1.1 Background

One of the remaining critical issues related to transport and fate of dissolved petroleum hydrocarbons in groundwater is the impact of oxygenate chemicals added to gasoline such as methyl-*tert*-butyl-ether (MTBE). MTBE is used as an additive to gasoline to enhance combustion and consequently improve air quality. However, it is recognized to be very mobile and persistent in groundwater (Johnson et al., 2000). From a groundwater perspective, the rate of dissolution of oxygenated hydrocarbons from a gasoline NAPL source as well as natural attenuation processes including biodegradation is of great interest. With MTBE's high solubility and resistance to biodegradation (Schmidt et. al., 2004), MTBE can form long and persistent plumes (Schirmer et al., 1998). Often MTBE biodegradation produces *tert*-butyl-alcohol (TBA) but not much is known about TBA's toxicity and persistence (Schmidt et al., 2004; EPA, 2004).

For these and other reasons, ethanol is gradually replacing MTBE as the preferred gasoline oxygenate throughout the U.S. and Canada. Ontario Regulation 535/05 proposed an annual average of five per cent of ethanol in gasoline, beginning in January 2007. In the USA, over 35 states have gasoline stations that deliver gasoline containing up to 85% ethanol. Previous laboratory studies (Hunt et al., 1997; Corseuil et al., 1998; Da Silva and Alvarez, 2002) show that the biodegradation rates of BTEX decrease in the presence of ethanol having a higher persistence. It was shown (Molson et al.,2002) that 10 % ethanol in gasoline have the potential to increase the length of benzene travel distance by up to 50%.

Due to the high remediation costs related to NAPL plumes and potential for relatively rapid BTEX biodegradation, the dissolved hydrocarbon plumes are often left to natural attenuation. However, the addition of gasoline oxygenates compromises this approach (EPA, 2004) and therefore new information on the groundwater behaviour of modern oxygenated fuels is urgently required.

1.2 Objectives

The objective of the current research is to improve the understanding of 1) how the MTBE and ethanol groundwater plumes develop, 2) how oxygenates are attenuated in groundwater, and 3) what impact these oxygenates have on the behaviour of petroleum hydrocarbons in the subsurface. Specifically, the first objective of this study is to assess dissolution of the oxygenates (MTBE, TBA, and ethanol) and of benzene, toluene, o-xylene, and 1,2,3-tri-methyl benzene (BTX-TMB) from gasoline residuals. The second objective of this study is to assess the bioattenuation of dissolved oxygenates especially to evaluate the potential for MTBE biotransformation into another oxygenate, tert-butyl-alcohol (TBA). The third objective is to document the impact of the MTBE and ethanol on the persistence of the BTX-TMB plumes.

1.3 Approach

Three gasoline-oxygenate mixtures were prepared and emplaced below the watertable to create three residual contaminated zones: a gasoline source with 9.8% methyl-tert-butyl ether (MTBE) and 0.2% tert-butyl-alcohol (TBA) (GMT source), a gasoline with 10 % ethanol (E10 source), and a gasoline with 95% ethanol (E95 source). In all three mixtures, American Petroleum Institute gasoline was used (API 94-01). However, due to time constraints, in the present study only the plumes containing MTBE and 10% ethanol were assessed. Jose Zoby is using the field information from the E95 and E10 sources in his Ph D research at the University of Sao Paulo. TBA was included in the GMT source because it is usually present in commercial gasoline and can be produced by biodegradation of MTBE (Schirmer et. al., 2003) so the research was also assessing the capability of chemical and isotopic tools to indicate if there is a production of TBA and consequently a MTBE degradation process.

About 51L of the gasoline mixtures were emplaced below the water table while 2260 L of groundwater was also injected to counteract the buoyancy rise and to spread the gasoline phase. The development and behaviour of the plumes was examined by measuring the flux of chemicals emanating from the source at a few designed multilevel monitoring well fences rather than by measuring the three dimensional distribution of components. This "fence" approach is becoming more accepted (Einarson & Mackay, 2001) for receptors where the contaminant flux is more relevant than maximum, local concentration. The components monitored in each row were: MTBE, TBA, BTX-TMB as well as two electron acceptors: oxygen, sulphate, and two reduced biotransformation products: ferrous iron and methane. This study will address the research objectives by considering four "issues" within the field experiment:

1. The development of the dissolved plumes of BTX-TMB, MTBE and TBA in relation to BIONAPL model predictions derived in part, by assuming equilibrium partitioning of solutes between NAPL and groundwater. The BIONAPL model (Molson et al. 2002) was chosen because it had been previously tested in the Borden aquifer for a variety of NAPL and dissolved phase plumes and had shown a good agreement with the field data with respect to equilibrium dissolution, migration and attenuation (Frind et al., 1999).

2. The extent of natural attenuation of the MTBE, TBA and BTX-TMB plumes, again relative to predictions with BIONAPL.

3. The relationship of TBA and MTBE in a plume derived from a NAPL containing both chemicals.

4. A test of the method proposed by Devlin and Barbaro, (2001) for estimating the NAPL source mass from downgradient groundwater concentrations.

Issue 1.

While previous experiments at Borden found that dissolution of NAPL was well matched by models assuming attainment of equilibrium between NAPL and passing groundwater (Frind et al., 1999; Broholm et al.2005), large lab model experiments by Rixey and Joshi (1999) found dissolution to be slower than that predicted by the assumption of equilibrium partitioning of gasoline components between the water and NAPL phases Non-equilibrium dissolution models suggest that mass transfer limitations may exist in some field settings (Priddle and MacQuarrie, 1994). Slow mass transfer rate can be due to several factors including kinetic limitations of water-NAPL partitioning, the presence of NAPL pools, or aquifer heterogeneities that can trap NAPL in low permeability zones slowing the mass transfer rate. The controlled injection of the gasoline mixture in the Borden sand aquifer likely excludes the creation of a NAPL pools. Therefore, this case study was sought as an opportunity to test the hypothesis of mass transfer rate limitations due to heterogeneities. The rate of dissolution of oxygenates and aromatic hydrocarbons from the E10 and the GMT sources will be examined by measuring and comparing the chemical concentrations and mass fluxes at the closest downgradient monitoring fence (row 2). The adequacy of the usually equilibrium partitioning assumption will be tested. Because of their high solubility and the anticipated thorough contact between the injected gasoline and injected water, the oxygenates are expected to partition rapidly into groundwater as predicted by equilibrium dissolution models. Similarly, slower dissolution of BTX-TMB is anticipated to also be well predicted with an equilibrium partitioning assumption.

With the anticipated dispersed distribution of the residual gasoline and a large effective contact area between residuals and groundwater dissolution of hydrocarbons at essentially equilibrium between gasoline and groundwater is anticipated. The BIONAPL model prediction for this particular case assumes equilibrium dissolution and no biodegradation. Therefore, if the equilibrium dissolution model is appropriate, a good match between the field and the BIONAPL predicted concentration breakthrough curves at least with respect to the duration of the oxygenate “slugs” is anticipated. Non-homogeneous initial distribution of the oxygenates in the source is anticipated and, along with dispersion during groundwater transport, may lead to concentrations at many row 2 points being lower than anticipated by uniform dissolution of oxygenates into the 2200 L of injected water. However, the total injected mass of oxygenates should pass row 2 quickly as predicted by BIONAPL as long as biodegradation of oxygenates near the source is minimal. For BTX-TMB, it is anticipated that equilibrium partitioning between well-dispersed residual NAPL and passing groundwater will produce longer duration concentration breakthrough curves and mass passing curves at row 2 that are well anticipated by the BIONAPL modeling, again, as long as biodegradation is minimal. However, a complex distribution of contaminants in the source may make it difficult to identify the effect of non-equilibrium dissolution.

Issue 2.

The migration of MTBE, TBA and BTX-TMB will be assessed by examining oxygenate and hydrocarbon concentration breakthrough curves and mass passing at rows 2, 3, and 4 and then comparing to BIONAPL predictions. Of particular interest is the retardation of solutes and the potential for facilitated transport of hydrocarbons by ethanol or MTBE cosolvent. The attenuation of solutes via biodegradation will be evaluated by calculating the flux of organics and electron acceptors at each row over the one year experiment. These fluxes will be used to define the mass biotransformed during groundwater transport and to determine the "balance" between the mass of electron acceptors used, reduced products generated and organics lost. For comparison, the BIONAPL model will be used to anticipate the flux of oxygenates and hydrocarbons without their biodegradation. Reduction of mass flux relative to the BIONAPL anticipation should reflect biotransformation.

Issue 3.

The MTBE/TBA concentration ratios will also help identify the relationship between MTBE and TBA in contaminated groundwater (third issue). In this study the dissolution of TBA from the NAPL and the possible production of TBA from MTBE biotransformation were examined.

In general the field evidence of MTBE biotransformation is often contradictory (Schmidt et al., 2004). It is known that MTBE can aerobically biodegrade to TBA in the Borden aquifer as was demonstrated in lab microcosms (Schirmer et. al., 2003). It was also shown that TBA was more readily degraded than MTBE in Borden sand microcosms (reference). In the current experiment, TBA in the GMT plume could be simply the TBA injected, but it could also be a product of in situ MTBE biodegradation. Degradation of MTBE will produce an increase in TBA. However, if the TBA biodegradation rate is higher than that of MTBE, the TBA will not accumulate and an increase in TBA will not be seen.

The possible transformation of MTBE to TBA will be assessed through monitoring the TBA/MTBE concentration ratio and their mass fluxes downgradient of the source. The stable carbon ($^{13}C/^{12}C$) isotope ratio method will be used to detect significant TBA derived from MTBE (Hunkeler et al., 2001; Kuder et al., 2004). The hydrogen ($^{2}H/^{1}H$) isotopic ratio was not employed due to a technical limitation.

Issue 4.

The fourth issue involves the estimation of a residual NAPL composition from groundwater concentrations. According to previous studies (Devlin and Barbaro, 2001; Broholm et al., 2004) the composition of a simple NAPL can be estimated from changing ratios of concentrations of dissolved constituents. This method will be applied using the BIONAPL model in order to check the accuracy of the approach for hydrocarbon-oxygenate NAPLs without biodegradation. The technique will also be applied to field gasoline hydrocarbons data, where the changes in concentration ratio of the dissolved NAPL components are expected to be also affected by their different biodegradation rates, thus negating the assumption of conservative behaviour in this approach.. The cumulative effect of a different degradation rate of the NAPL components is expected to be higher at a higher distance from the source. The residual NAPL mass will be estimated from data at row 2 and at row 4 and the results compared.

Chapter 2

SITE DESCRIPTION

2.1 Location, Geology and Physical Properties

The field experiment took place at Canadian Force Base Borden, located about 130 km NNE of Waterloo, near Alliston, Ontario, Canada. The University of Waterloo has used the Borden facility for groundwater research since 1978. The present experiment was carried out in the Sand Pit area where the terrain is relatively flat, and during the summer the surface is covered by a sparse layer of vegetation. The three gates were emplaced in the sand pit area at the location indicated in Figure 2.1.1.

The unconfined shallow sand aquifer was formed in a glaciofluvial depositional environment (Bolha, 1986). The aquifer is composed of fine to medium grain sand, which is clean and well sorted. At the macroscale the formation is reasonably homogeneous but at the microscale there is heterogeneity (Sudicky et al., 1983) with horizontal lenses of silty clay and coarse sand (Sudicky et al., 1986). The sand is a mixture of 58% quartz, 19% feldspar, 14% carbonates, 7 % amphiboles, and 2% chlorite (Mackay et al., 1986). The clay-size fraction was found to be 0.4% (Ball et al., 1990). The background organic carbon concentration was found to vary between 0.02% and 0.09% with a mean of 0.035% (Mackay et al., 1986) or 0.021% (Ball et al., 1990). In this work, the low fraction of organic carbon was considered to produce insignificant sorption of oxygenates and BTX-TMB and therefore organic solute retardation was considered to be zero.

The water table is located at about 100 cm below the ground surface (bgs) but varies from 50 cm to 165 cm bgs due to seasonal changes in the amount of precipitation. During storm events and snow melt, the water table often rises to ground surface. The underlying aquitard is 8 m thick (Morrison, 1998) and is located approximately 11 m bgs.

Mean total precipitation averages 82.8 cm/year, of which 58.67 cm is in the form of rain, and 24.13 cm is snow (Gartner Lee Associates Ltd., 1977). The groundwater flow direction can vary seasonally from N11W to N50E with a predominant direction of N21E (Martin, 2004). A summary of the physical aquifer properties at the Borden site are provided in Table 2.1.1.

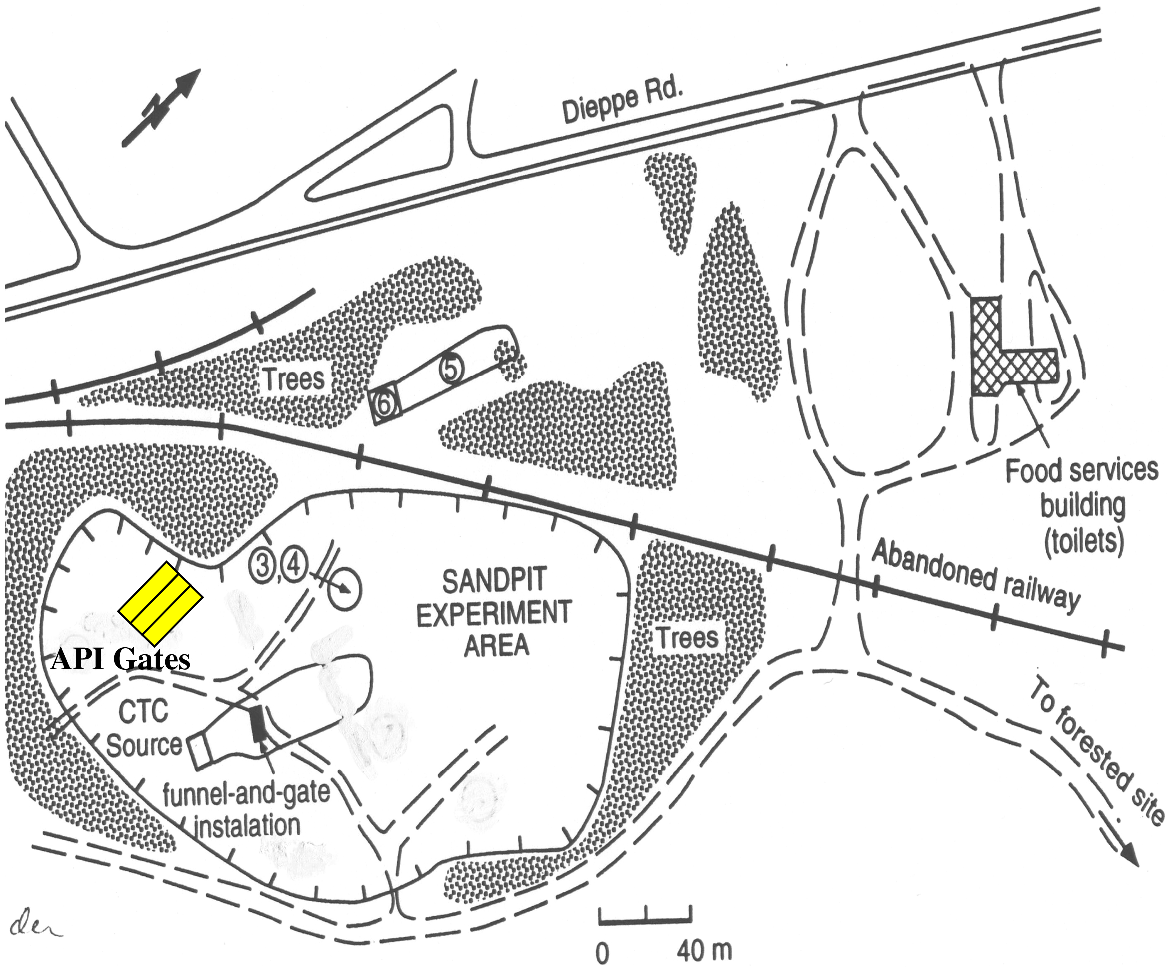

Figure 2.1.1 The location of the sand pit area with the location of the three gates (API Gates) highlighted.

Table 2.1.1. Physical properties of the Borden aquifer.

Property	Value	Source
Porosity (-)	0.33	Mackay et al. , 1986
Average groundwater velocity (m/day)	0.09	Mackay et al. , 1986
Hydraulic conductivity (m/s)	7×10^{-5} 1.04×10^{-4} 7.17×10^{-5} $4 \times 10^{-5} - 9 \times 10^{-5}$	Mackay et al., 1986 Schirmer et al.,1998 Sudicky, 1986 Laukonen et. al., 2001
Apparent dispersivity (m)	$\alpha_L = 0.36$ $\alpha_{TH} = 0.03$ $\alpha_{TV} = 0.00$	Sudicky, 1983
Diffusion Coefficient (m^2/day)	7.4×10^{-5}	Hubbard et al., 1994
Groundwater temperature (^{o} C)	8.5 – 14	Direct measurements during summer
Hydraulic gradient	0.0065(spring)- 0.0034(summer)	Sudicky, 1986
Median grain size d_{50} (mm)	0.15	Frind et al., 1999
Specific storage (m^{-1})	0.001	Frind et al., 1999
Residual water saturation (%)	0.07	Frind et al., 1999

2.2 Groundwater Chemistry

The major ions present in Borden groundwater are calcium (50-160 mg/l), sulphate (3-20 mg/l), and bicarbonate (150-770 mg/l) (Barker et al., 1998). The average temperature of the aquifer is about 10^{o}C with seasonal variations from 6^{o}C to 15^{o}C (Mackay et al., 1986). The pH values are near neutral, ranging from 7.2 to 7.8 (Agertved et al., 1992). A major change in concentration was expected to be seen for dissolved oxygen, sulphate, and iron, as possible electron acceptors utilized. The range and the average background concentrations of the key components are captured in Table 2.2.1. All background measurements were made at row 1 at about 2.5 m upgradient of each emplaced source (see Figure 2.2.1).

Table 2.2.1 The background groundwater concentrations of the key components

Parameter	Concentration Range (mg/L)			Average Concentration (mg/L)		
	GMT	E10	E95	GMT	E10	E95
Dissolved Oxygen	2.8-7.5	2.1-7.5	0.8-6.0	4.2	4.8	3.1
Sulphate	0.73-23.5	2.56-17.1	10.3-19.1	12	13	14
Iron	0.010-0.071	0.007-0.060	0.009-0.054	0.030	0.040	0.026

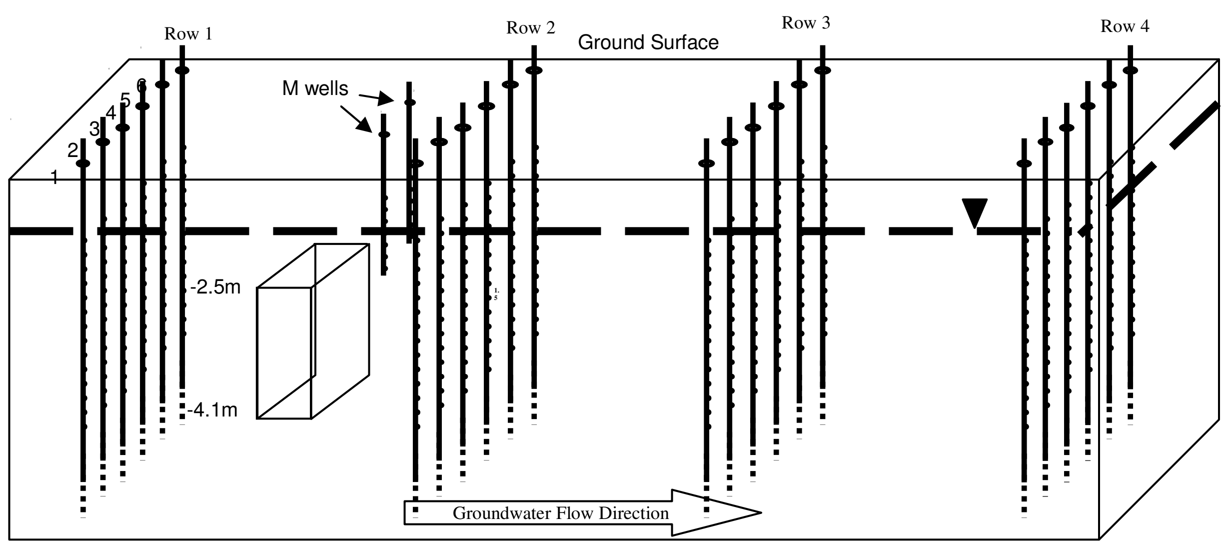

Figure 2.2.1 The arrangement of the source and monitoring wells for each gate.

Chapter 3

THE FIELD SETUP AND SOURCE EMPLACEMENT

3.1 The Field Set Up

The surface area occupied by the three gates (Figure 3.1.1) is about 21 m long and 22m wide. Steel sheet piling walls, driven to 7m depth, separate the gates which are each about 7 m wide. The groundwater flow direction is from row 1 to row 4.

The monitoring network for each gate contains a total of 26 multilevel monitoring wells arranged in four rows (or fences) of 6 multilevel monitoring wells which were placed 6 meters apart. Row 1 is located at the upgradient end of the gate and row 4 is located at the downgradient end of the gate. The multilevel monitoring wells within each row are spaced 1.2 m apart. Each monitoring well has 14 sampling points spaced 18 cm apart vertically, with point 1 at 1.5m and point 14 at 3.84 meters below ground surface (Figure 3.1.2). Each PVC center stalk was screened from 4.84 m to 5.34 meters below ground surface. The upper end of the screened length was considered to be sampling point 15.

In order to check the position of the plume relative to the watertable immediately downgradient of the source, two shallow multilevel monitoring wells were installed in each gate. These are referred to as the M wells. Each M well has 6 sampling ports spaced at 30 cm from 60 to 210 cm b.g.s.

In each gate, the source was emplaced using a network of 15, 5 cm (2 in) inner diameter PVC injection wells arranged in two rows (Figure 3.1.3) spaced at 30 centimeters. The distance between the two rows and the distance between each pair of consecutive wells in each row was set to 30 centimeters. Each injection well was screened from 2.25 m to 4.5 m b.g.s. and had a rise pipe from 2.25m b.g.s. to the surface.

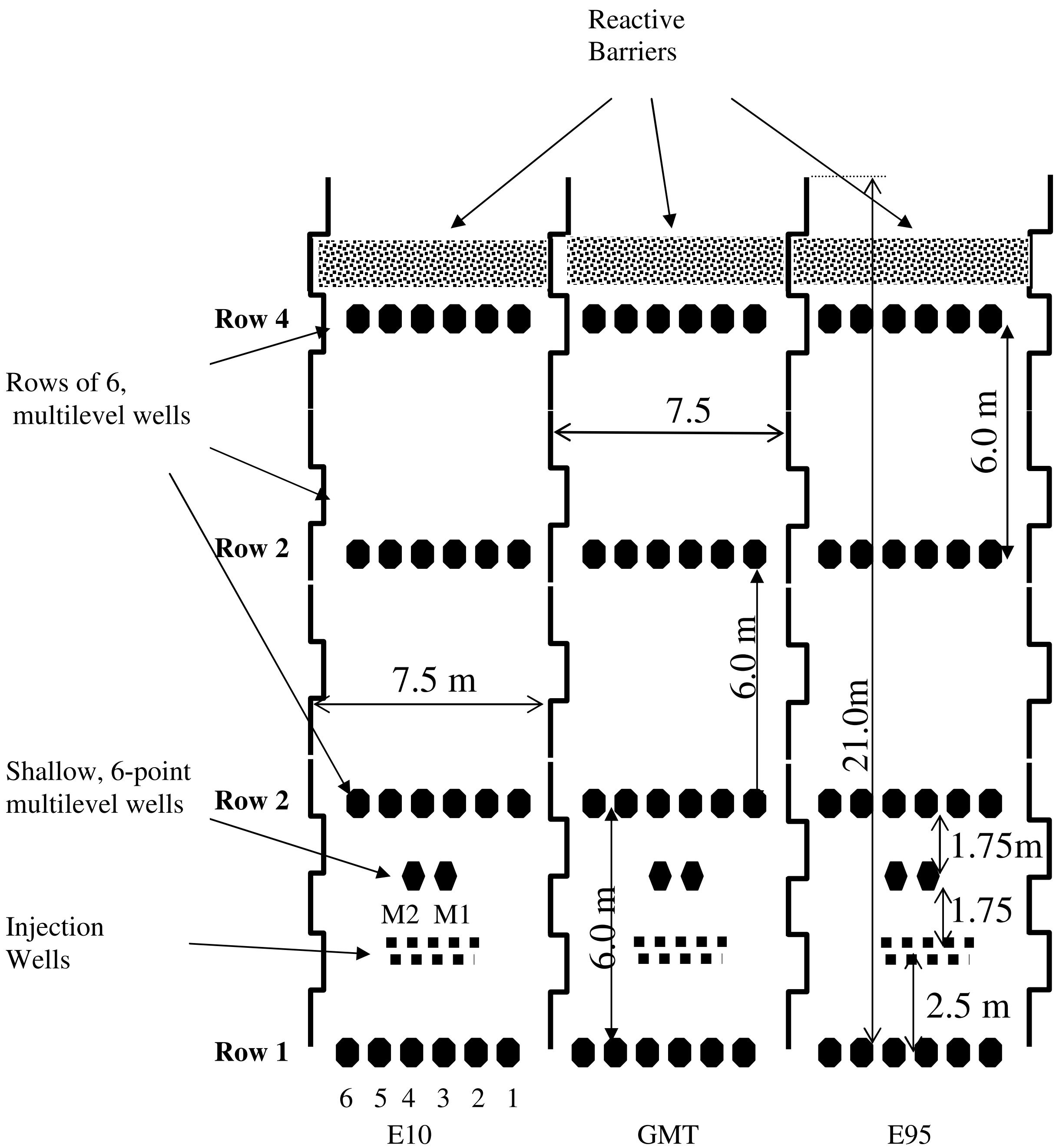

Figure 3.1.1 The field setting of the three gates. The groundwater flow direction is from row 2 to row 4.

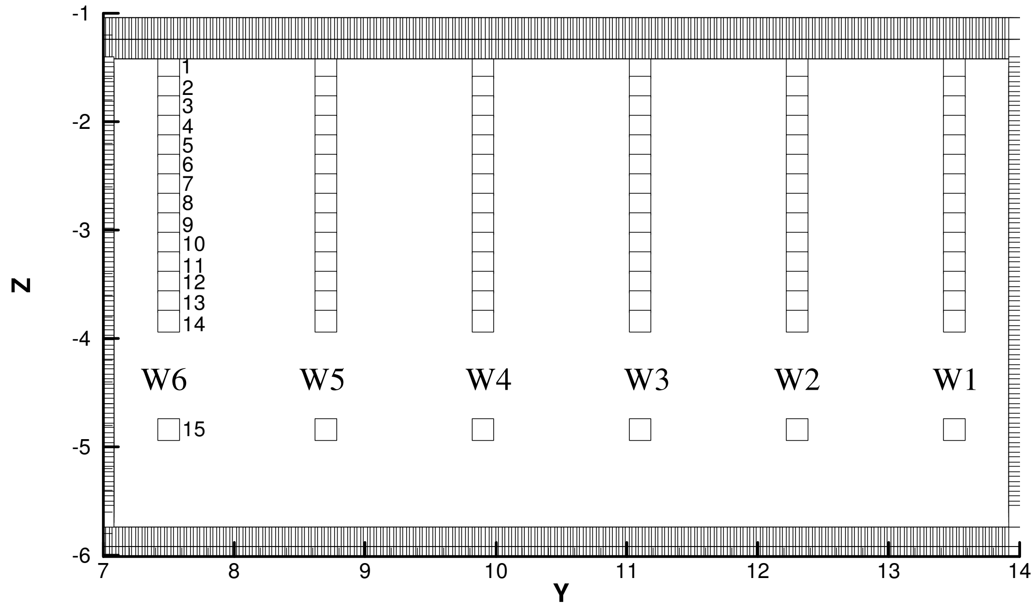

Figure 3.1.2 A vertical cross section looking downgradient through a row of monitoring wells showing the distribution of the sampling wells (W1 to W6) and of the sampling points (from 1 to 15) in each well.

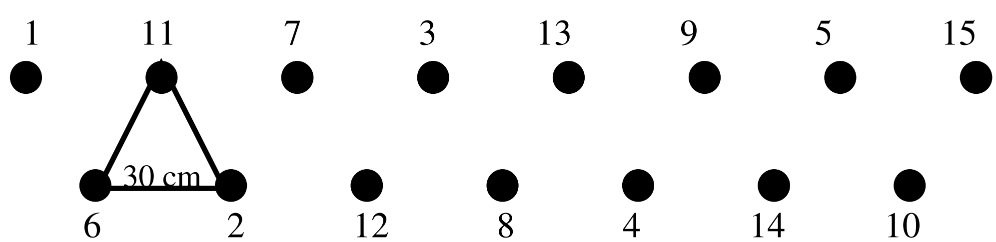

Figure 3.1.3 The spatial arrangement of the source injection wells.

3.2 Source Emplacement

The source emplacement was completed between the 8th and 13th of October 2004. The sources were emplaced beneath the watertable through an injection system described below. The injection system had an above ground (Surface Injection System) and a below ground (Underground Injection System) component.

A diagram of the Surface Injection System is provided in Figure 3.2.1. The peristaltic pumps (PP) operated at 600 rpm, with pressure gages (M), valves (V), and Teflon tubing used to manage the movement of the gasoline mixture through the surface system. A closed stainless steel cylinder was used to contain and measure each portion of the injected gasoline mixture.

To measure the fluid volume in the cylinder, a transparent exterior supplementary Teflon tubing pipe was linked at the top and at the bottom of the stainless steel cylinder. The stainless steel cylinder was calibrated in the lab and marked from 0 to 1.5 litres. A centrifugal pump (CP) was used to inject water above and below the gasoline mixture. A pressure gage (M2) and a flow meter were used to monitor the water injection pressure and injection rate.

The underground injection system is represented by the packer system (Figure 3.2.2). This is linked to the Surface Injection System through five flexible Teflon tubing lines. Four inflatable packers compose the packer system. They were machined from solid PVC bars to easily slide into the 2” injection wells. The inflatable packer side consisted of rubber tied at the edges with linen cord strings. The 20 cm long packer was placed at the very bottom of the system to facilitate positioning the system into the injection well. The outer diameter of the packers was 4.5 cm. The packers were spaced at 5 cm from each other and were held together by a central 1 cm (3/8”) threaded iron rod. The couplings between the packers and lines, as well as the valves, were made from stainless steel with no rubber parts to prevent sorption to the material during manipulation of the mixture through the injection system.

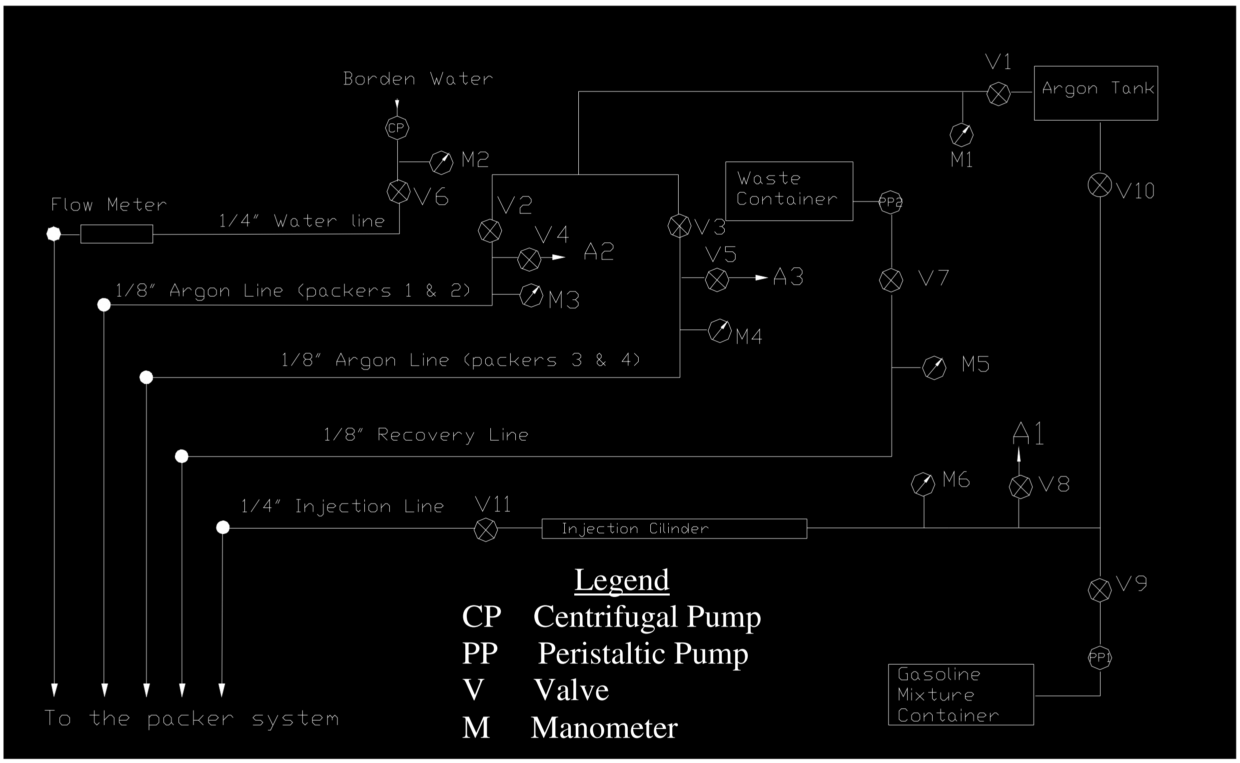

Figure 3.2.1 Diagram of the surface injection system.

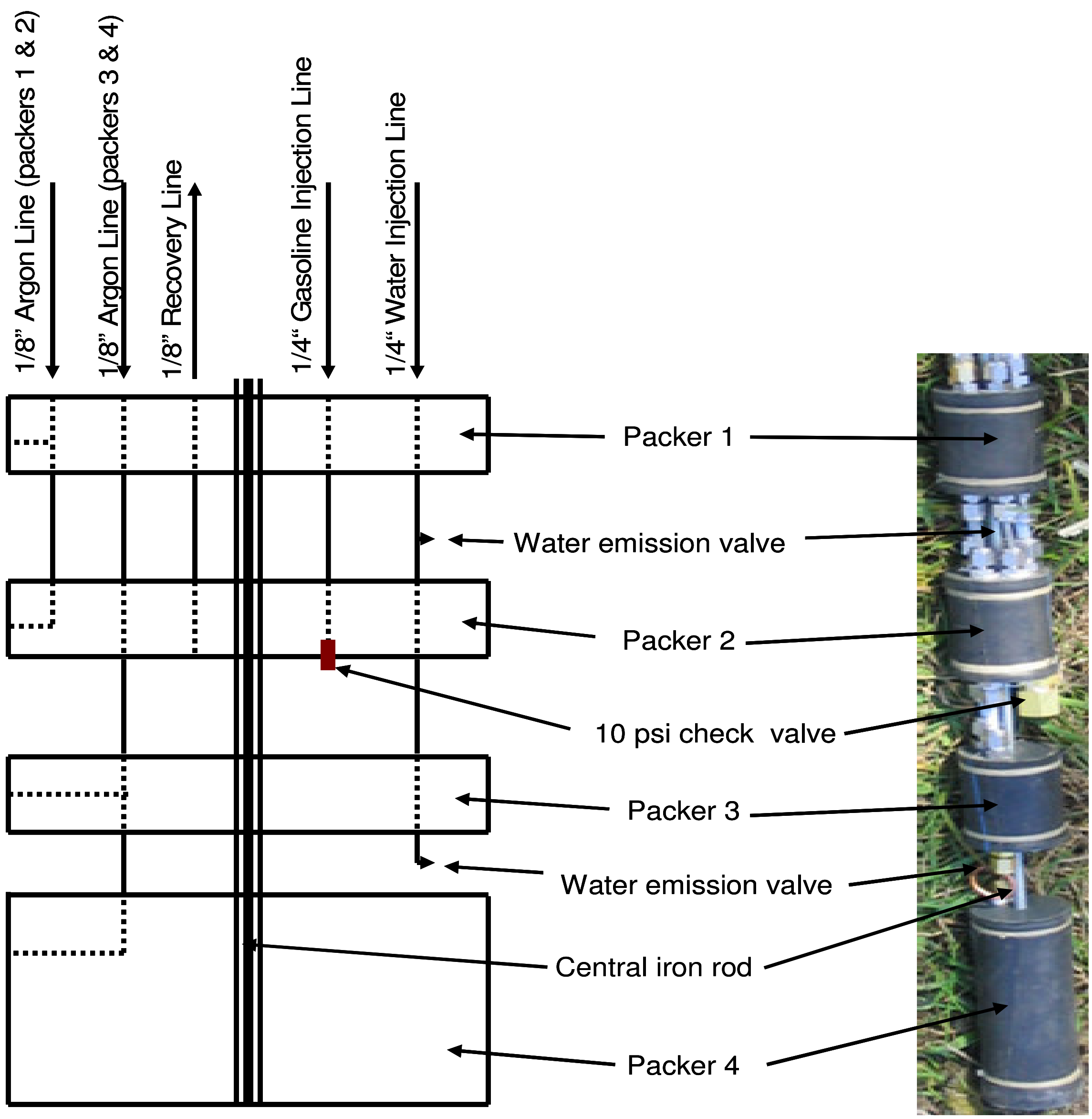

Figure 3.2.2 Diagram and photograph of the underground injection system.

The gasoline mixtures were placed at least one meter below the water table by using the packer system. For each of the three injection well groups, the injection depths are as summarized in Table 3.2.1. To prevent major loss of the volatile organic compounds, the surface injection system was designed to minimize the contact between the gasoline mixture and the atmosphere during preparation and injection of the gasoline mixture. An 80 L, high-density plastic container was used to prepare the gasoline mixtures for the three sources.

Table 3.2.1 The depths of mixture injection in a three-well group.

Well 1	4.0 m	3.5 m	3.0 m
Well 2	4.1 m	3.6 m	3.1 m
Well 3	3.9 m	3.4 m	2.9 m

After the three mixtures of gasoline and oxygenates were prepared, they were transported to the site in 40 L canisters expressly designed to store gasoline. As was noted before, three injection points were used in each injection well. The pressure of 1.5 atm inside the packers was monitored using pressure gages M3 and M4. At each injection depth in each injection well, 1.13 L of gasoline mixture was injected, under a pressure of 3 - 4 atm, from the stainless steel cylinder to the well screen level between the middle packers. The pressure necessary to push the gasoline from the surface cylinder to the packer was created using argon with a purity of 99.99%. The injected gasoline mixture occupied a total volume of 3.4 L of the aquifer material around the injection well screen. The 0.7 atm bottom-passing valve prevented the gasoline mixture from returning back into the surface injection system after the applied pressure was stopped. After the entire gasoline mixture allocated to the injection point was placed into the well at its screened interval, the centrifugal pump (CP) started to inject water above and below the gasoline mixture. The water flow rate was controlled visually with a calibrated 20 L/min flowmeter. After water injection was completed, a peristaltic pump, operating at 600 rpm, was used to recover the gasoline mixture that remained between the well injection screen and the middle packers. The process was repeated at three different depths for each of the injection wells. Each injection well received a volume of about 150 L of water.

In estimating the dimensions of a source, a number of factors were considered. It was assumed that the source fluids would have a maximum volume equivalent to the total volume of injected water (2260L) and gasoline (50L) in each gate. The total source volume is then 7000 L of porous media, given a porosity of 0.33.

In the vertical direction, it was considered that the source extends 1.7 m from the deepest (4.1 m) to the shallowest (2.9 m) injection point, with 0.5 m added to account for the potential rising of the gasoline mixture after injection. The width of the source (3.5m) was considered to be equal to the distance of the two extreme injection wells (Well 1 and Well15) or about 3 m, extended by 50 cm to account for the spreading of the gasoline mixture from the well screen. The third dimension of 1.2 m in the direction of groundwater flow was calculated to accommodate the total bulk volume of 7000L resulted from the total injected water and gasoline mixture and taking into consideration the porosity of the aquifer.

The injection started from well 1 and continued to well 15 as shown in Figure 3.1.3. This pattern was chosen to minimize flow of the emplaced gasoline back into the adjacent wells. A lab experiment was conducted (Appendix A) to estimate the water injection rate necessary to spread the gasoline mixture 15 cm from the screen. The water injection rates that were used are summarized below (Table 3.2.2).

The total volume of injected water approximated from the flow meter readings in each gate was about 2260L. During the water injection, however, a high variation in the flow rate was noticed. These variations appeared to be related to the variations in electrical power. During the injection period, the electrical power failed several times, likely due to local network overloading. The variable flow rates could have produced a variation in the amount of injected water with direct impact on the dimensions of the sources and consequently on the initial concentrations of the sources.

Table 3.2.2 The water injection rate for each injection depth.

Depth (m)	Water Injection rate (L/min)	Water Injection time (minutes)
3.9; 4.0; 4.1	5.5	11
3.4; 3.5; 3.6	4.7	
2.9; 3.0; 3.1	3.5	

Chapter 4

METHODOLOGY

4.1 Groundwater Analysis Method

Samples for oxygenates and organics were collected in 40 ml glass containers fitted with Teflon-lined septa caps. Each vial was filled so that there was no headspace and each was immediately preserved by adding 0.4 ml of 10% sodium azide solution (v/v). The samples were stored for up to two weeks at 4 ^{0}C and then analyzed using a 7673 HP Autosampler Gas Chromatograph (GC) equipped with a flame ionization detector and a 10 ft. length by 0.125 in. inner diameter column packed with packed with 3% SPI500 on Carbopack B (80/100 mesh).

The analysis for monoaromatics and oxygenates was performed at the Organic Chemistry Laboratory, Department of Earth Sciences, University of Waterloo. For oxygenate analysis, a 2 ml aliquot of the aqueous solution was transferred to an auto-sampler vial and placed in the GC for chromatographic analysis. Calibration standards were prepared by adding 2-50µL samples of pure compound to 100mL organic-free water in a glass flask. The concentrations were calculated from peak areas with a HP 3395 integrator. A full description of the method, as was provided by the lab, is available in Appendix C.

The analysis for monoaromatics was performed by solvent extraction followed by gas chromatography. The method is described in detail by Patrick (1985). The method detection limits (MDL) for the oxygenates and the analyzed aromatics are summarized in Table 4.1.1.

Samples for inorganic analyses were collected in 200ml plastic bottles closed with plastic caps. The first sampling round, from November 2004, was analyzed at UW's Chemical Engineering Analytical Services. The "Ion Chromatography" method was used for nitrate and sulfate analysis and the "Direct Current Plasma Emission Spectroscopy" method was used for manganese and iron analysis. The detection limits were 0.022 mg/L for NO_3^- , 0.030 mg/L for SO_4^{2-}, 0.003 mg/L for manganese, and 0.007 mg/L for Iron. The next sampling rounds of analysis were done with a Portable Spectrophotometer DR/2400. For iron analysis the FerroVer method was used and for sulfate analysis the SulfaVer method was used. Both the FerroVer Method and the SulfaVer Method were adapted from *Standard Methods for the Examination of Water and Wastewater* (Franson et al., 1985). For iron, the procedure was approved by the USEPA as described in the *Federal Register,* June 27, 1980 whereas for sulfate the procedure is equivalent to the USEPA method 375.4 for wastewater. The quantification range for iron extends from 0.02 mg/L to 3.00 mg/L and for sulfate extends from 2mg/L to 70mg/L. The methods are fully described in *The Handbook – DR/2400 Portable Spectrophotometer manual.*

The stable carbon isotopic analysis of MTBE was performed at the Environmental Isotope Laboratory of the University of Waterloo. The results are reported in δ (delta) notation as ratio deviation per mill (‰). The range of uncertainty in isotopic analyses is approximately 0.5 $^{o}/_{oo.}$

Relative standard deviation (RSD) values of the measured concentrations express the maximum uncertainty associated to a certain concentration. The RSD values were given by the lab together with the measured concentrations. The concentration values were used for the mass flux calculation. A higher impact on the mass flux is given by the higher concentrations. Therefore, the RSD values from Table 4.1.2 were for concentrations higher than 500 ug/L.

Table 4.1.1 The Method Detection Limit (MDL) for the oxygenates (mg/L) and aromatics (µg/L).

	Ethanol	TBA	MTBE	Benzene	Toluene	O-Xylene	1,2,3-Trimethyl Benzene
MDL	0.05	0.025	0.069	1.28	1.35	1.34	1.00

Table 4.1.2 Relative standard deviation (RSD) for the oxygenates and aromatics (%) for concentrations > 500 ug/L.

	Ethanol	TBA	MTBE	Benzene	Toluene	O-Xylene	1,2,3-Trimethyl Benzene
RSD	1.8	0.4	0.4	5	3	1.5	3.6

4.2 Groundwater Sampling Frequency

The sampling campaigns (Table 4.2.1) to estimate flux through rows 2, 3 and 4 were carried out at intervals aimed to capture the front, the body, and the tail of the mass flux profile assuming an average groundwater velocity of 0.09 m/day. Sampling each complete row in each gate required collection of 270 samples. Because of financial limitations, the sampling and analyses for dissolved oxygen, inorganics and methane was less frequent (Table 4.2.2 to Table 4.2.4). Approximately two out of every five points per row were selected to develop breakthrough curves and were used as an aid to determine when the oxygenate chemicals were reaching each row. Samples were generally collected twice per week as the oxygenates were expected to arrive and then the time between the sampling events increased after the oxygenate concentrations began to decline.

Table 4.2.1 The sampling campaigns for oxygenates and BTX and TMB.

Row2 (date)	**Row 3 (date)**	**Row 4 (date)**	**Row2 (days)**	**Row 3 (days)**	**Row 4 (days)**
Nov. 2004	x	x	40	x	x
Dec. 2004	x	x	66	x	x
Feb. 2005	Feb. 2005	x	113	113	x
Apr. 2005	Apr. 2005	Apr. 2005	189	175	183
June. 2005	June. 2005	June. 2005	238	236	231
Nov. 2005	Aug. 2005	Aug. 2005	395	306	306
x	Nov. 2005	Nov. 2005	x	397	408

Table 4.2.2 The sampling campaigns for dissolved oxygen.

Row 1 (date)	**Row 2 (date)**	**Row 3 (date)**	**Row 4**	**Row 1 (days)**	**Row 2 (days)**	**Row 3 (days)**	**Row 4 (days)**
Nov. 2004	Nov. 2004	x	x	40	40	x	x
x	Dec. 2004	x	x	x	66	x	x
x	June 2005	June 2005	June 2005	x	238	236	231

Table 4.2.3 The sampling campaigns for inorganics.

Row 1 (date)	**Row 2 (date)**	**Row 3 (date)**	**Row 4 (date)**	**Row 1 (days)**	**Row 2 (days)**	**Row 3 (days)**	**Row 4 (days)**
Nov. 2004	Nov. 2004	x	x	40	40	x	x
x	Dec. 2004	x	x	x	66	x	x
May 2005	May 2005	x	x	210	210	x	x
x	x	June 2005	June 2005	x	x	236	231

Table 4.2.4 The sampling campaigns for methane.

Row 2	**Row 3 (date)**	**Row 4 (date)**	**Row 2 (days)**	**Row 3 (days)**	**Row 4 (days)**
Nov. 2004	x	x	40	x	x
Dec. 2004	x	x	66	x	x
Jun. 2005	June 2005	June 2005	238	236	231

4.3 The Mass Flux Calculation Method

In order to calculate the mass flux at the fence, the cross sectional area was divided into subareas or "blocks" as described in the API Groundwater Remediation Strategies Tool (2003).

In the present study the sampling points were distributed over the cross sectional area in a line of 6 multilevel piezometers. The block interpolation method consists of assigning to each sampling point of the network a certain area (A_i), a certain concentration (C_i), and a certain specific discharge or Darcy flux (q) in order to calculate the mass flux that passes the fence at a certain moment. The Darcy flux (0.03 m/day) and each area associated to a sampling point were assumed constant over the cross sectional profile. The area associated to the extreme points (the first and the last sampling events) was calculated as the mass flux times the semi-distance between the extreme point and its neighbor. The total contaminant mass flux (MF) across transect is calculated as follows:

$$MF = \sum_{i=1}^{i=n} q_i \ C_i \ A_i \qquad \text{(Eq. 4.3.1.a)}$$

where:

q_i – the Darcy flux associated to sampling point i (L/T)

C_i – the concentration associated to sampling point i (M/L^3)

A_i – the area associated to sampling point i (L^2)

The Darcy flux was considered to be constant in time, with a value of 0.03 m/day for all the sampling points.

4.4 The Values of the Instantaneous Mass Flux Calculated from Field Data

For each sampling event, a value for the mass flux was calculated by integrating the concentrations over the cross sectional area using the block method. Day zero (Oct. 10, 2004) of the plume monitoring period is considered to coincide with source emplacement. The results for all of the gates are summarized below.

Table 4.4.1 The GMT source. The mass flux values (g/day) detected at row 2.

Date	Day	TBA	MTBE	Benzene	Toluene	Xylene	TMB
10-Oct-04	0						
20-Nov-04	40	0.2	7.7	0.3	0.6	0.1	0.002
16-Dec-04	66	1.0	29.10	0.9	2.0	0.2	0.009
03-Feb-05	113	0.2	14.88	0.8	2.3	0.3	0.021
19-Apr-05	189	0.0	0.3	0.6	2.1	0.4	0.058
08-Jun-05	238	0.0	0.0	0.2	1.9	0.4	0.038
15-Nov-05	395	0.0	0.0	0.1	0.9	0.3	0.031

Table 4.4.2 The GMT source. The mass flux values (g/day) detected at row 3.

Date	Day	TBA	MTBE	Benzene	Toluene	Xylene	TMB
10-Oct-04	0						
03-Feb-05	113	0.06	2.6	0.14	0.22	0.02	0.001
05-Apr-05	175	0.04	1.7	0.10	0.38	0.07	0.004
06-Jun-05	236	0.00	0.14	0.08	0.56	0.16	0.014
16-Aug-05	306	0.00	0.01	0.04	0.50	0.18	0.016
17-Nov-05	397	0.00	0.00	0.01	0.16	0.09	0.013

Table 4.4.3 The GMT source. The mass flux values (g/day) detected at row 4.

Date	Day	TBA	MTBE	Benzene	Toluene	Xylene	TMB
10-Oct-04	0						
13-Apr-05	183	0.01	2.1	0.12	0.12	0.01	0.000
01-Jun-05	231	0.05	2.0	0.48	1.6	0.19	0.005
16-Aug-05	306	0.00	0.34	0.14	0.40	0.15	0.010
28-Nov-05	408	0.00	0.00	0.05	0.33	0.20	0.019

Table 4.4.4 The E10 source. The mass flux values (g/day) detected at row 2.

Date	Day	Ethanol	Benzene	Toluene	Xylene	TMB
10-Oct-04	0					
20-Nov-04	40	63	0.29	0.42	0.02	0.0
11-Dec-04	61	56	0.62	1.1	0.10	0.004
03-Feb-05	113	0.24	0.84	1.8	0.22	0.015
19-Apr-05	189	0.0	0.23	0.62	0.09	0.007
08-Jun-05	238	0.0	0.16	0.90	0.15	0.013
15-Nov-05	395	0.0	0.06	0.64	0.13	0.004

Table 4.4.5 The E10 source. The mass flux values (g/day) detected at row 3.

Date	Day	Ethanol	Benzene	Toluene	Xylene	TMB
10-Oct-04	0					
03-Feb-05	113	27	0.19	0.29	0.02	0.0001
05-Apr-05	175	6.1	0.41	0.85	0.09	0.0021
06-Jun-05	236	0.0	0.39	1.1	0.15	0.0096
16-Aug-05	306	0.0	0.25	1.4	0.24	0.016
17-Nov-05	397	0.0	0.11	0.68	0.14	0.012

Table 4.4.6 The E10 source. The mass flux values (g/day) detected at row 4.

Date	Day	Ethanol	Benzene	Toluene	Xylene	TMB
10-Oct-04	0					
13-Apr-05	183	13	0.33	0.53	0.04	0.0
02-Jun-05	232	5.3	0.54	1.1	0.10	0.002
16-Aug-05	306	0.0	0.38	1.2	0.16	0.008
28-Nov-05	408	0.0	0.19	0.96	0.19	0.013

4.5 The Total Mass Flux Calculation Method

To quantify the extent of the mass loss along the gates, a comparison of the total mass captured by the sampling network compared to the predicted mass flux and with the initial mass placed into the system was made at row 2, 3 and 4. The total mass of oxygenates and BTX-TMB that passes a row is calculated as the sum of the area under each mass flux value as shown in Figure 4.5.1. The area associated to each mass flux value for each sampling event assumes the detected value extends half the way from the previous sampling event to the next sampling event. The areas associated with the extreme points (the first and the last sampling events) were calculated as the mass flux times the semi-distance between the extreme point and its neighbor.

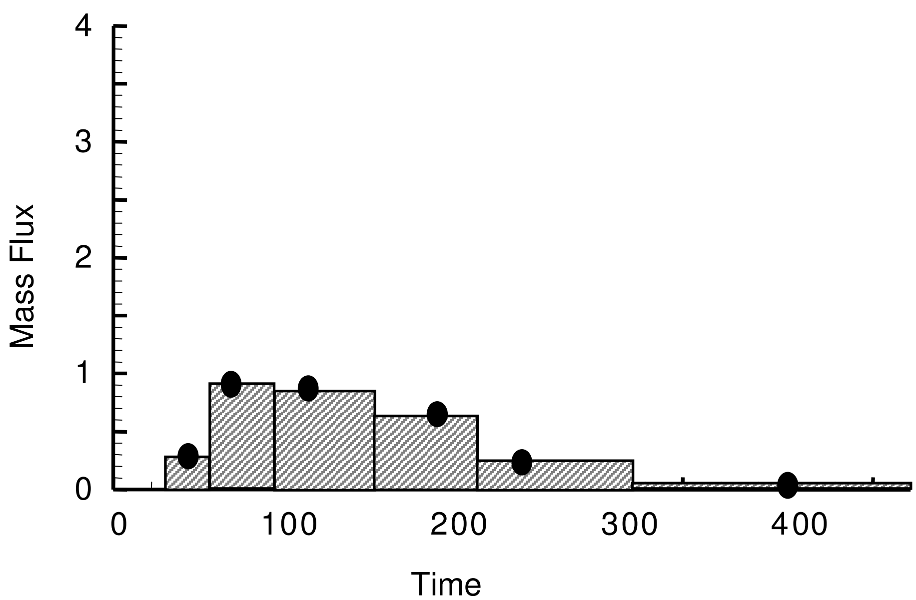

Figure 4.5.1 The calculation method of the mass passing the fence. The instantaneous mass fluxes are represented by black dots. The total mass flux that passed a row is calculated as the sum of the areas obtained from multiplication of the instantaneous mass flux by the semi distance between two consecutive sampling events to the right and to the left. The areas from the two ends do not extend beyond the sampling time event.

4.6 The BIONAPL Model

The BIONAPL model (Molson, 2005) was used in this study to simulate equilibrium dissolution of the emplaced gasoline residual sources and fate of the dissolved plumes. The model has been tested against other models and has been proven for a variety of field-scale groundwater contamination problems including dissolution of DNAPLs (Frind et al., 1999) as well as LNAPLs (Molson et al., 2002). It includes modules for 3D groundwater flow, dissolution of multi-component NAPLs, advective-dispersive transport, biodegradation, and microbial growth in porous media. In this work, the BIONAPL model was used to calculate the mass flux and emerging concentrations from the gasoline sources assuming no mass loss due to biodegradation. The simulated behaviour of the dissolved components was then compared to the observed field values.

4.6.1 Model Details

The BIONAPL model is a fully coupled density-dependent flow and mass transport model for either steady state or transient conditions. The domain can be heterogeneous and anisotropic; the source can be in the aqueous phase or can be a dissolving NAPL mixture with the relative permeability of the source related to changes in source composition over time. BIONAPL can simulate multi-contaminant species and biodegradation with multi-electron acceptors. Outputs can be as breakthrough curves, 1D, 2D, or 3D sections through the plume. A more detailed description by Molson can be found at http://www.science.uwaterloo.ca/~molson. In this study, the fluids are assumed to be incompressible and the domain fully saturated. Also, the NAPL phase is considered immobile at residual saturation or less. The porous medium is considered to be non-fractured and volatilization and gas transport is not considered. The model is based on the advection-dispersion equation for reactive transport within a porous medium:

$$\frac{\partial C^{\alpha}}{\partial t}R = \frac{\partial}{\partial x_i}\left[D_{ij}\frac{\partial C^{\alpha}}{\partial x_j}\right] - v_i\frac{\partial C^{\alpha}}{\partial x_i} + \lambda_{DIS}^{\alpha}\left(C_s - C^{\alpha}\right) - \lambda_{BIO}^{\alpha}C \qquad \text{(Eq. 4.6.1.a)}$$

where:

C^{α} = contaminant concentration for organic component α (kg/m^3)

t = time (days)

R = linear retardation coefficient (-)

D = hydrodynamic dispersion coefficient (m^2/day)

x_i = spatial dimension, distance from the source traveled by the contaminant i in time t

v_i = average groundwater velocity (m/day)

The NAPL dissolution rate term λ_{DIS} (T^{-1}) of component α is expressed as:

$$\lambda_{DIS}^{\alpha} = \frac{ShD^{\alpha}}{\left(d_{50}\right)^2}\left(\frac{f^{\alpha}S_n}{S_{no}}\right)^{\beta} \qquad \text{(Eq. 4.6.1.b)}$$

(after Frind et al., 1999) where:

Sh = Sherwood number (-)

f^{α} = local volume fraction of NAPL component α

S_{no} = initial NAPL saturation

S_n = the NAPL saturation

d_{50} = median grain size diameter (mm)

β = the empirical number that incorporates the complex phenomenon of differing degrees of accessibility to dissolution of the different NAPL components

and where

$$C_s = (C_o^{\alpha} X^{\alpha}) \qquad \text{(Eq. 4.6.1.c)}$$

represents the effective solubility of component α according to Raoult's Law (Mackay et al., 1991) and where

C_0^{α} = aqueous solubility of the pure compound α

X^{α} = mole fraction of the component α in the NAPL mixture

Another important feature that is incorporated in the BIONAPL model is that it accounts for the effect of changing NAPL source saturation on the relative permeability according to (Corey, 1986):

$$k_{rw} = \left(\frac{S_w - S_n}{1 - S_n} \right)^4 \qquad \text{(Eq. 4.6.1.d)}$$

where:

k_{rw} = relative permeability

S_w = saturation with respect to water

S_n = saturation with respect to the NAPL phase

The saturations are related by

$$S_w + S_n = 1 \qquad \text{(Eq. 4.6.1.e)}$$

BIONAPL uses a Picard iterative approach to solve equation 3.6.1a where the mole fractions, effective solubilities and relative permeability are updated within each time step. The equation is discretized in space using 3D rectangular brick elements. Further details on the numerical approach are provided in Molson (2005) and Frind et al. (1999).

4.6.2 Assumptions

The aquifer was considered to be homogeneous, isotropic, and the flow system was assumed at steady state. Spatial variability of the porous medium with respect to the hydraulic conductivity or flow direction was not taken into consideration. Also, the steady-state condition implies that the flow is laminar and thus Darcy's equation is applicable. In all three gates, the gasoline mixture is assumed to have dissolved at equilibrium during the injection of 2260L of groundwater. The emplacement of the three sources by injecting water with the gasoline mixture pushed the source mixtures away from the well screen. As the LNAPL departed from the well screen, some residuals remained trapped in the pore spaces behind the bulk mixture zone. Also, when the water injection stopped, we assumed that the remaining gasoline started to migrate upward until all the gasoline mixture was trapped as residuals below the water table. The dissemination of the LNAPL into the pore space created a large contact area between the gasoline mixture and groundwater thus promoting rapid, equilibrium dissolution of the oxygenates, as was observed for a solvent source by Frind et al., 1999, for example. As was shown by other studies (Cline et al., 1991) Raoult's Law can be considered valid for gasoline mixtures. In summary, the following assumptions have been made:

- The dissolution of the oxygenates and aromatic hydrocarbons obeys Raoult's Law.
- The aquifer is water saturated.
- The residual gasoline source is immobile under the background flow gradient.
- Interfacial tension remains the same in all GMT, E10, and E95 sources.
- Sorption due to the presence of organic carbon in the matrix was neglected due to an insignificant fraction of organic carbon in the porous medium.
- Biodegradation is not significant

4.6.3 Domain Setup

The BIONAPL model was run for each source on a grid representing the respective gate. To shorten the processing time, the plume was assumed to be symmetrical along the central longitudinal plane. Each gate was thus represented by a 3D rectangular domain 20 m long (along the x axis), 3.5 m wide (along the y axis) and 5 m deep (along the z direction). The model domain width of 3.5m thus represented one-half of the true 7m gate width. The physical properties of the aquifer material used in the simulations are summarized in Table 4.6.3.1.

Table 4.6.3.2 summarizes the properties of the gasoline components and oxygenates used in the model. The 'bulk' component represents a lumped pseudo-component representing all remaining gasoline components not included as separate components. A Sherwood number of 1.0 was assumed for all components which was sufficiently high to ensure equilibrium dissolution. The essentially infinite solubility and instantaneous dissolution of ethanol was represented in the model with the same Sherwood number Sh=1.0 but with the gradient (C_S - C^{α}) in equation 3.6.1a maximized by setting C^{α} =0 in the model.

Table 4.6.3.1 Physical properties of aquifer material used in simulations.

Property	Value
Hydraulic conductivity, (m/s)	10^{-4}
Porosity (-)	0.33
Hydraulic gradient (-)	0.0034
Median grain size (mm)	3×10^{-4}

Table 4.6.3.2 Emplaced source LNAPL properties. The values are obtained from Syracuse Research Corporation at http://esc.syrres.com/interkow/webprop.exe. NA = not applicable.

LNAPL component	Density (kg/m^3)	Sherwood number (-)	Molecular weight (kg/mol)	Log K_{ow} (-)	Aqueous solubility (kg/m^3)	Diffusion coefficient (m^2/s)	GMT half-source mass (moles)	E10 half-source mass (moles)
Benzene	878.6	1.0	0.078	2.13	1.78	7.7×10^{-10}	5.66	3.81
Toluene	867.0	1.0	0.092	2.65	0.53	6.2×10^{-10}	13.25	8.82
o-Xylene	880.0	1.0	0.106	3.12	0.18	6.2×10^{-10}	4.09	2.72
1,2,3-TMB	894.0	1.0	0.120	3.66	0.08	6.2×10^{-10}	0.81	0.53
TBA	790.0	1.0	0.074	0.94	59	11.5×10^{-10}	0.4	NA
MTBE	740.0	1.0	0.088	0.35	48	11.5×10^{-10}	21.01	NA
Ethanol	775.0	-1.0	0.046	-0.31	infinite	11.5×10^{-10}	NA	34.24
Bulk	890.0	1.0	0.09	NA	0.02	11.5×10^{-10}	209.1	154.2

Each gate was discretized using a uniform grid of 3D rectangular prism elements. The grid cell size has to satisfy the Peclet (P) and Courant (C) criteria. The Peclet criterion controls numerical dispersion while the Courant criterion controls numerical oscillations through the time step. The Peclet condition requires that $\Delta x < 2\alpha_L$ where Δx represents the grid cell size in the x direction and α_L represents the longitudinal dispersivity. Therefore, the grid size in the x direction should be no more than $2 \times 0.36\text{m} = 0.72\text{m}$. If we assume that the lateral and vertical movement of groundwater is negligible, and because of the sheet piling sides the groundwater is forced to flow only along the x direction, there is no Peclet constraint in the y and z directions. For this grid discretization, the corresponding Courant condition is satisfied with a time step $\Delta t = C\ \Delta x/v = 8$ days. However, for a better resolution of the sources, to ensure rapid convergence during the partitioning of oxygenates into groundwater, and to improve the accuracy of the final results, a finer discretization of Δx = 0.2m, Δy = 0.1m, Δz = 0.1m were used. Thus, the final symmetric grid was composed of 100×35×50 elements in the x, y and z directions, respectively. The value of the time step Δt was increased from 1e-5s after source emplacement to Δt =1 day after 100 days following source emplacement.

The flow system within each gate was simulated by assigning fixed heads of 5.0688 and 5.000 at the upgradient and downgradient faces, respectively, by assigning a recharge of 200 mm/yr across the top watertable surface, and by assuming impermeable (no-flow) boundaries along the base and lateral boundaries. All transport boundaries were assigned a zero-gradient condition. The gasoline source for each gate was represented as an initial condition of residual phase NAPL, allowed to dissolve naturally with the flowing groundwater, in accordance with the above assumptions regarding Raoult's Law. Initial background concentrations of all components were assigned C^{α} =0.

4.6.4 Contaminant Distribution in the Source

The "ideal source" would be a residual gasoline source totally below the watertable. In order to prevent buoyancy forces from forcing the gasoline upward to the watertable, water was injected immediately above the gasoline injection elevation. To facilitate gasoline migration away from the injection well and to create a relatively low-saturation residual phase, a second water pulse was injected below the gasoline injection level. In this way, the gasoline was prevented from rising towards the watertable and was sufficiently dispersed to create a residual phase. The injection of water along with gasoline was done by using 45 injection points in each source. Although most of the oxygenates were rapidly dissolved into the injected water, it is likely that this injection created a complex initial distribution of the water-soluble oxygenates. At each injection point, oxygenates were dissolved rapidly in the injected water and were pushed to the front of the injected water volume. Essentially all the oxygenates could have been transferred to the injected water during and immediately following emplacement.

Two gasoline-oxygenate mixtures with concentrations noted in Table 4.6.4.1 were prepared and emplaced below the watertable to create two residual contaminated zones: gasoline with 9.8% MTBE and 0.2% TBA (GMT), and gasoline with 10 % ethanol (E10). In both mixtures, API 94-01 gasoline was used. For each source a volume of 51 L of mixture was prepared. However, not all of the prepared mixture that was transferred to the wells became residuals within the porous medium. After the emplacement of the sources in each gate, free phase was detected in some injection wells. The free phase recovered from the injection wells totaled: 10.86L from the E10 gate and 3.28L from the GMT gate. The mass of aromatics contained in the recovered free phase was subtracted from the initial mass that was injected. The concentrations of the aromatics measured in the recovered free phase (Table 4.6.4.4) as well as the gasoline volume recovered from the injection wells were used to calculate the mass of each aromatic that was recovered. For modelling purposes, the unanalyzed components of the mixture were considered insoluble. The recovered mass was subtracted from the initial injected mass and so the mass of chemicals in each source is considered to be as shown in Table 4.6.4.2 and Table 4.6.4.3. Because of its effectively infinite solubility and practically instantaneous partitioning to the injected water, the ethanol was used for model calibration. During the calibration of the model with the field data, it was noticed that the dimension of the source required for acceptable calibration was different than that initially assumed (Chapter 3). Therefore, the final dimensions of the sources used in modelling were considered those providing the best model calibration: in the groundwater flow direction (x), 1m; in the vertical direction (z), 1.7 m; and in the transverse direction(y), 3.2 m. This corresponds to a bulk volume of 5440 L and to an injected volume of water and gasoline mixture of about 1795 L. Thus, the volume of injected water was considered to be equal to 1795L from which was subtracted the gasoline volume within the source. The gasoline volume within the source was calculated as the difference between the injected gasoline volume and the recovered volume of the free phase.

Table 4.6.4.1 Initial concentrations of oxygenates (mg of component/L of mixture) and BTX-TMB (µg of component/L of mixture) in the mixtures before emplacement of the sources beneath the watertable.

	Benzene	Toluene	O-xylene	1,2,3-TMB	TBA	MTBE	Ethanol
GMT	19900	54900	19500	4340	1240	77500	NA
E10	20300	55500	19700	4390	NA	NA	78500

Table 4.6.4.2 The estimated composition of the GMT source after emplacement below the watertable and removal of 3.3L of free phase.

Mass	Benzene	Toluene	O-xylene	1,2,3-TMB	TBA	MTBE	Others	Total
(g)	883	2440	867	193	59	3700	37600	45800
(moles)	11.9	27.4	8.5	1.7	0.8	42.0	418	510

Table 4.6.4.3 The estimated composition of the E10 source after emplacement below the watertable and removal of 10.9L of free phase.

Mass	Benzene	Toluene	O-xylene	1,2,3-TMB	Ethanol	Others	Total
(g)	594	1620	577	128	3150	27800	33800
(moles)	9.5	19.4	6.4	1.3	68.4	308	413

Table 4.6.4.4 Average concentrations of the BTX and TMB components measured in the recovered free phase (ug/L).

	Benzene	Toluene	O-xylene	1,2,3-TMB	Recovered volume of free phase (L)
GMT	5480	29000	8930	1680	3.3
E10	7020	40800	10700	1870	10.9

In this study, the BIONAPL model is applied under the assumption of equilibrium dissolution for all the NAPL components. Equilibrium dissolution is expected to produce higher concentrations in the case of ethanol (because of its infinite solubility) compared to MTBE (solubility of 48000 mg/L). Therefore, lower equilibrium concentrations are expected for MTBE compared with ethanol.

For each source, 45 injection points were used to inject and spread the gasoline. Therefore, the distribution of the dissolved oxygenates in the source would be highly heterogeneous and difficult to assign a regular shape. On the other hand, during the injection, most of the hydrocarbons initially remained in the residual gasoline phase because of their low solubility. Also, the residual phase would not have been pushed by the injected water as far as the oxygenates, therefore the residual hydrocarbons would likely have smaller dimensions. The distribution of the residual hydrocarbons would also be complex and defining exact shapes for the source would not be possible. The initial source of oxygenates would also not correspond in volume or shape with the initial source of hydrocarbons. However, both would be non-uniform which could be one of the reasons of such a wide range of concentrations was subsequently seen at the downgradient monitoring points. The likelihood of two sources (dissolved oxygenates and hydrocarbon residuals) of different and unknown shape and dimensions with complex distributions of the contaminants adds significant uncertainty to the interpretation of downgradient concentrations.

4.7 Estimation of the Initial NAPL Mass using Plume Information

4.7.1 Description of the Method

For site assessment and for assessing the progress of chemical removal, it is important to have an estimate of the initial NAPL mass in the source. Devlin and Barbaro, (2001) as well as Broholm et al., (2005) proposed a method of estimating the total mass of the original multicomponent NAPL source using the ratio mass estimation (RME) method described by Equation 4.7.1.b below . Because the method is based on changing ratios of concentration of dissolved NAPL components, it is expected that any cosolubility and biodegradation would compromise the critical assumptions. Therefore, a better estimate of NAPL mass is expected to be seen closer to the source.

The method is based on the assumption of Raoult's Law (Equation 3.7.1.a) which states that the effective solubility (C_s) of any component of a NAPL can be calculated from the mole fraction (X^{α}, dimensionless) of the component in the NAPL, and its pure phase solubility in water (C^{α}_{o}, M/L^3),

$$C_s = (C_o^{\alpha} X^{\alpha}) \qquad \text{(Equation 4.7.1.a)}$$

The RME approach is based on the equation:

$$\ln\left(\frac{C_i}{C_j}\right) = \ln(A) - \frac{QB}{K}t \qquad \text{(Equation 4.7.1.b)}$$

where:

Ci, Cj – components measured concentrations (M/L^3)

Q – the flow rate through the NAPL contaminated source (L^3/T)

t – the period of time from the breakthrough curve considered for the slope calculation

K – the total moles of NAPL components in the source

and where:

$$A = \frac{M_{oi} S_i MW_j}{M_{oj} S_j MW_i} \qquad \text{(-)}$$

$$B = \frac{S_i}{MW_i} - \frac{S_j}{MW_j} \qquad \text{(mole/L)}$$

where:

M_{oi}, M_{oj} – the initial mass of component i and j

S_i, S_j – the pure phase liquid solubilities of the two compounds

MW_i, MW_j – the molecular weight of the two components

The estimated NAPL mass in grams is obtained by multiplying the mass in moles (K) by the average molecular weight of the gasoline mixture. In our case the average molecular weight of the mixture is assumed to be 95 g/mole (Motor Fuels Technical Review Manual).

The concentrations generated by the BIONAPL model and stored in the "brkfence.out" file will be used first in order to evaluate the potential of the above method to estimate residual mass in the GMT gasoline source. Secondly, the present field concentrations will be used to test the method with actual data. Practically, in order to estimate the initial NAPL mass in the source, we have to measure concentrations of two NAPL components and calculate their ratios for a period of time t. The ratio of the two components is plotted on a time versus log concentration scale. Where the natural logarithm of the ratio line is increasing and is relatively straight, a trend line of the best fit through the data is created (Figure 4.7.1.1). The flow rate (Q) through the contaminated portion, the cross-sectional contaminated area, and the B term from above are calculated by the BIONAPL model and are stored in the "bionapl.lst" file. In order to estimate the initial number of moles (K) in the NAPL phase, the slope of this line is used in equation 4.7.1.b. Finally, the number of moles is multiplied by the average molecular weight (also calculated by the model) with the final result of the estimated mass provided in grams.

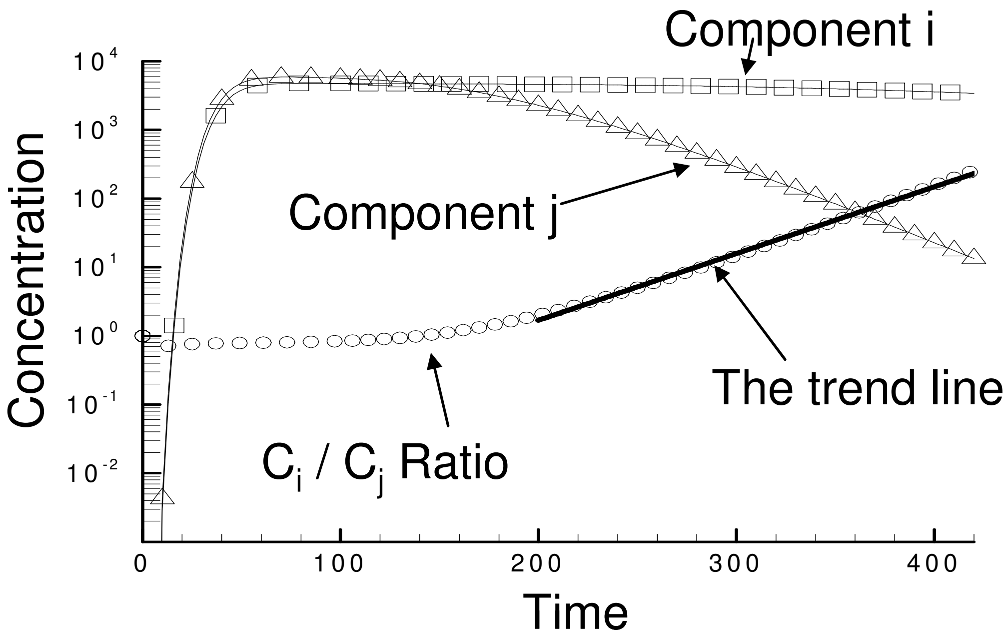

Figure 4.7.1.1 Log plot of concentrations C_i and C_j and the ratio C_i/C_j plotted against time together with the linear best fit line through the data. The ratio of the two components i and j is calculated from concentrations generated by the BIONAPL model.

Chapter 5

FIELD DATA LIMITATIONS AND ADJUSTMENTS

Next, we explore limitations of the monitoring network as possible reasons for the apparent loss of solutes along both the GMT and the E10 gates. Three possibilities are considered:

1. The density of the sampling points across the cross-section profile was insufficient to capture the total mass flux precisely.
2. Significant mass flux was not accounted for because the core of the solute plume sank below the monitoring network.
3. Due to the temporally-sparse sampling of rows 2, 3, 4, significant mass flux passed between sampling events.

5.1 The Density of Sampling Points across the Cross-section Profile

A source of error could be the low density of sampling points in the monitoring rows. In her MSc thesis (2006), Michelle Fraser evaluated the precision or uncertainty in estimating mass flux as a function of the density of the sampling points on a cross-section.

Her evaluation was for a cross-section of multilevel wells in the Borden aquifer adjacent to the gates used in the current research. Her findings are presented in Figure 5.1. In our case, 90 sampling points distributed over an area of 25.4 m^2 yields a density of 3.5

sampling points per square meter. This corresponds to a likely uncertainty in the mass flux estimate of about 50%. This error could be negative or positive and therefore this does not help us to understand the origin or magnitude of the suggested negative error in mass flux nor does it help to apply a correction to the mass flux values.

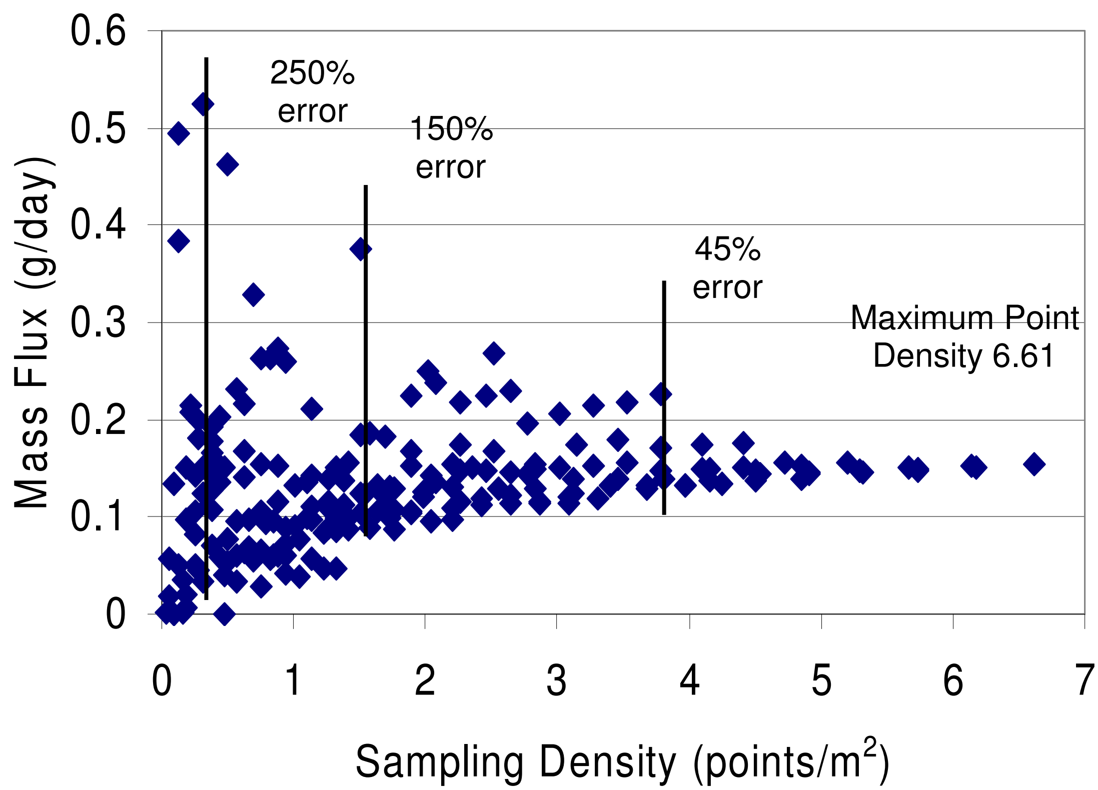

Figure 5.1 Relationship between the sampling point density (points per square meter) and the mass flux error (from Fraser, 2006, in progress).

5.2 The MTBE and TBA Plumes, GMT gate

5.2.1 Positioning of plumes relative to the sampling network and mass flux adjustments

The field mass flux values (Chapter 4) are calculated from the observed field concentrations during the sampling events on the cross-section profiles. Thus, the position of the plumes relative to the sampling network is of great interest in assessing the representativeness of the collected data.

The MTBE and TBA, Row 2, GMT gate

The position of the level-14 sampling points (at about 3.84 m below ground surface) relative to the lowest depth of injection, namely 3.9, 4, and 4.1 meters below ground surface (Figure 5.2.1.1) indicates that from the outset of the experiment, 33% of the initial mass was injected immediately below point 14 between sampling points 14 and 15 as shown in Figure 5.2.1.1. However, upon examination of the distribution of the MTBE concentrations over the cross-sectional profile at row 2 after 40 days, it was observed that the core of the plume, which was found in sampling wells 3 and 4, was apparently at the level-9 sampling points and was well captured within points 5 to 11 (Table 5.2.1.1). The transverse cross-section through the plume interpolated from the concentrations (Table 5.2.1.1) is shown in Figure 4.2.1.3. Sampling wells 1 and 6, in which the MTBE concentrations were below the detection limit, are not shown. The concentrations at points 14 are below the detection limit but there are measurable concentrations at the level-15 points. The presence of MTBE at point 15 indicates that a part of the plume reached that depth. The fact that the MTBE concentrations at point 14 were undetectable could be due to a split of the plume into different horizontal levels, as can be seen later at day 66 (Figure 5.2.1.4).

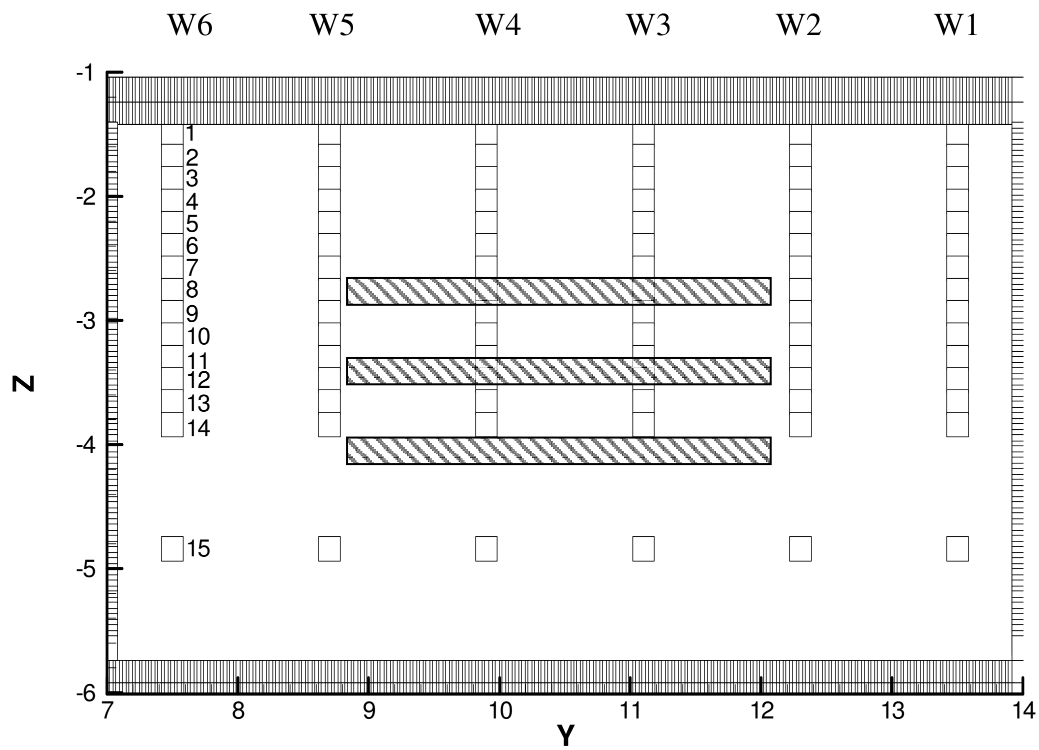

Figure 5.2.1.1 Position of the injection zones (hatched zones) relative to the monitoring network. The small squares numbered from 1 to 15 represent the monitoring points as overlayed on the multilevel sampling wells (W1 to W6). Dimensions are in meters.

Table 5.2.1.1 MTBE concentration distribution on the cross-section profile along monitor row 2 at day 40.

Sampling Point	Sampling Well 2	Sampling Well 3	Sampling Well 4	Sampling Well 5
1	0	0	1	0
2	0	2	11	0
3	0	2	1	0
4	0	2	18	0
5	0	14	89	0
6	0	30	105	0
7	0	50	1	0
8	0	226	231	0
9	0	408	410	0
10	5	176	5	0
11	0	3	324	0
12	2	1	1	0
13	0	0	0	0
14	0	0	0	0
15	37	26	2	0

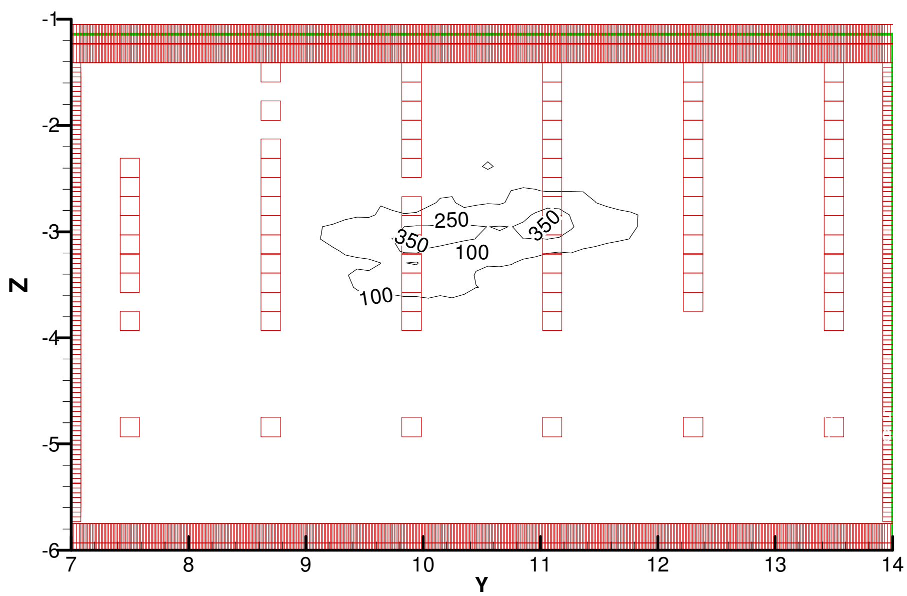

Figure 5.2.1.3 MTBE distribution at Row 2, GMT gate, day 40 (November 2004). Dimensions are in meters.

Table 5.2.1.2 MTBE concentration distribution on the cross-section profile at row 2, at day 66.

Sampling Point	Sampling Well 2	Sampling Well 3	Sampling Well 4	Sampling Well 5
1	0	0	0	0
2	0	1	1	0
3	0	1	0	0
4	0	0	0	0
5	0	0	1	0
6	0	16	1	0
7	0	17	1	0
8	0	275	1017	0
9	0	24	10	0
10	1	63	31	0
11	7	222	241	0
12	9	1328	16	0
13	369	420	791	0
14	47	16	32	0
15	1	0	0	0

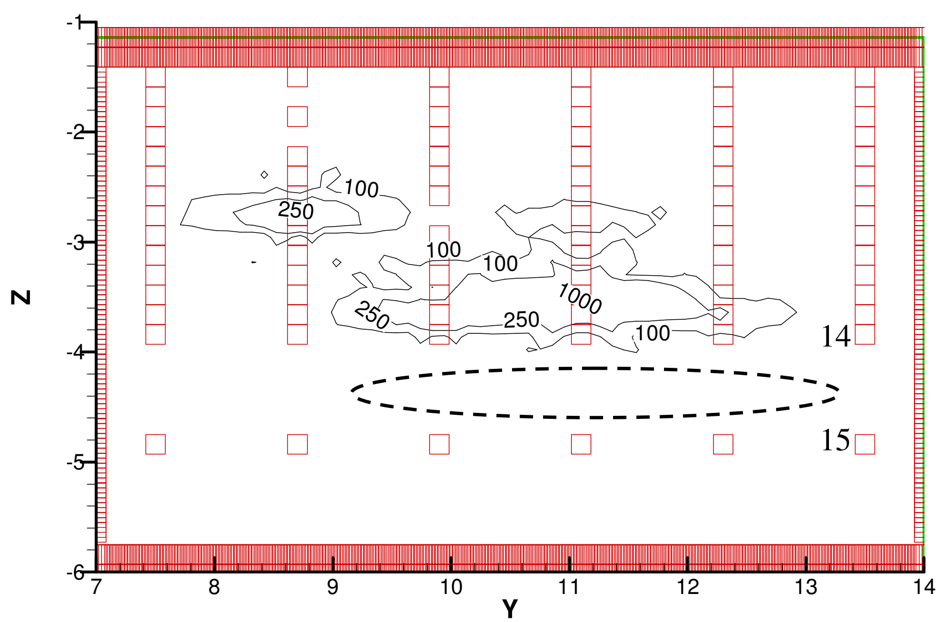

Figure 5.2.1.4 MTBE distribution at Row 2, GMT gate, day 66 (December 2004). The dashed oval represents a possible position of the lower portion of the MTBE plume injected below points 14 and undetected in sampling points 14 and 15.

Table 5.2.1.3 MTBE concentration distribution on the cross-section profile at row 2, day 113.

Sampling Point	Sampling Well 2	Sampling Well 3	Sampling Well 4	Sampling Well 5
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	1	65	0
9	0	1	0	0
10	0	1	0	0
11	0	19	12	0
12	0	7	1	0
13	13	292	321	0
14	199	584	785	0
15	0	0	0	0

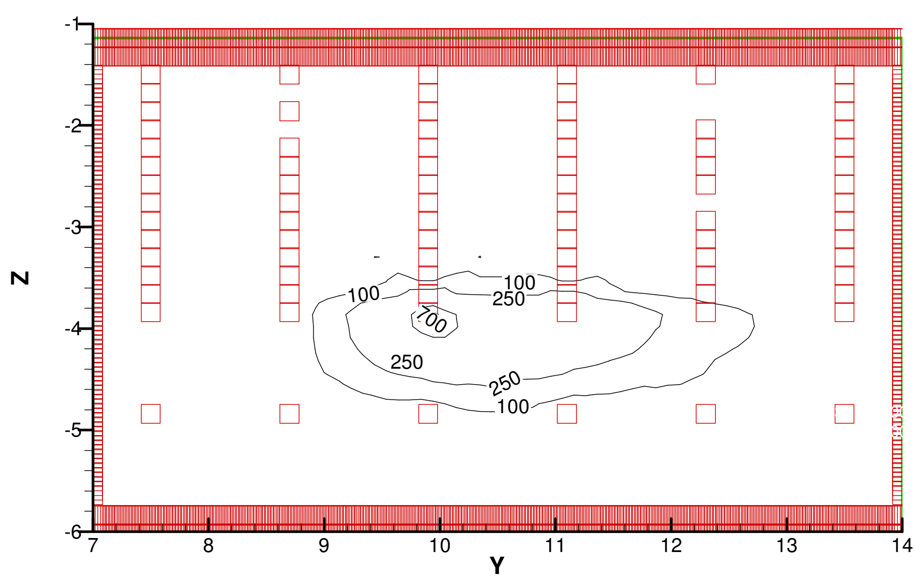

Figure 5.2.1.5 MTBE distribution at Row 2, GMT gate, day 113 (February 2005).

An additional loss of the mass flux could be due to the apparent sinking of the MTBE plume observed in later snapshots. Comparing the vertical position of the core of the plume on the cross-section after 40 days (Figure 4.2.1.3), 66 days (Figure 5.2.1.4) and 113 days (Figure 5.2.1.5) it appears that the center of the plume mass is sinking over time.

It is possible, however, that significant mass of MTBE exists between points 14 and 15 and perhaps even below point 15 on day 66 and especially on day 113. On day 66 the highest mass appears above point 14 and so the interpolated concentrations between points 14 and 15 are likely reasonably representative. However, on day 113 the highest concentrations and highest mass flux may have been between sampling points 14 and 15 (Table 5.2.1.3 and contours in Figure 5.2.1.5). The highest concentration after 113 days was detected at point 14 of the sampling wells 3 and 4 (Table 5.2.1.3).

Three cases can be identified with respect to the observed concentration values at point 14 and 15.

Case 1.

If significant concentrations are found at points 2 – 13 and concentrations at point 14 are very low, the data can be considered of good quality and no adjustments were done to the mass flux. Table 5.2.1.1 contains concentrations representative for this case.

Case 2.

The second case is when there are some low concentrations in point 14 but much lower in 15. In this case the linear interpolation between point 14 and 15 is considered less precise compared to case 1 (Table 5.2.1.2 and Figure 5.2.1.4). Because when the source was emplaced, about 1/3 of the source was injected just below points 14, a correction of 33% was added to the field mass flux in this case.

Case 3.

The third case is when there are high concentrations in points 14 or 15 and so a large proportion of the mass may lie between points 14 and 15 (Table 5.2.1.3). The positioning of the core of the plume between sampling points 14 and 15 with the fringe of the plume at sampling points 14 and 15 would result in the low concentrations in sampling points 14 and 15. Also, because the mass flux is calculated using linear interpolation between sampling points 14 or 15, the actual flux could be greatly underestimated, depending on the concentration values in the high-concentration core.

To estimate the possible magnitude of the missing mass flux at day 113, a hypothetical symmetrical plume was generated with Tecplot from the real data on day 113 at row 2 of the GMT gate. This plume was assumed to have its high concentration core midway between points 14 and 15. The highest concentration detected in this sampling event was 785 mg/L and appeared at point 14. This value was used for the core of the generated plume. The generated plume might appear as in Figure 5.2.1.6.

By integrating these hypothetical concentrations using linear interpolation, we obtained a possible MTBE mass flux of 24 g/day. This is about 60% greater than the originally interpolated mass flux of about 15 g/day at day 113 (Table 5.2.1.4). If this “correction” is applied where the observed concentrations on the cross-sectional area suggests that a major part of the plume is below point 14, the value of the mass flux will increase by 60% and consequently the total mass that passed the fence will also increase.

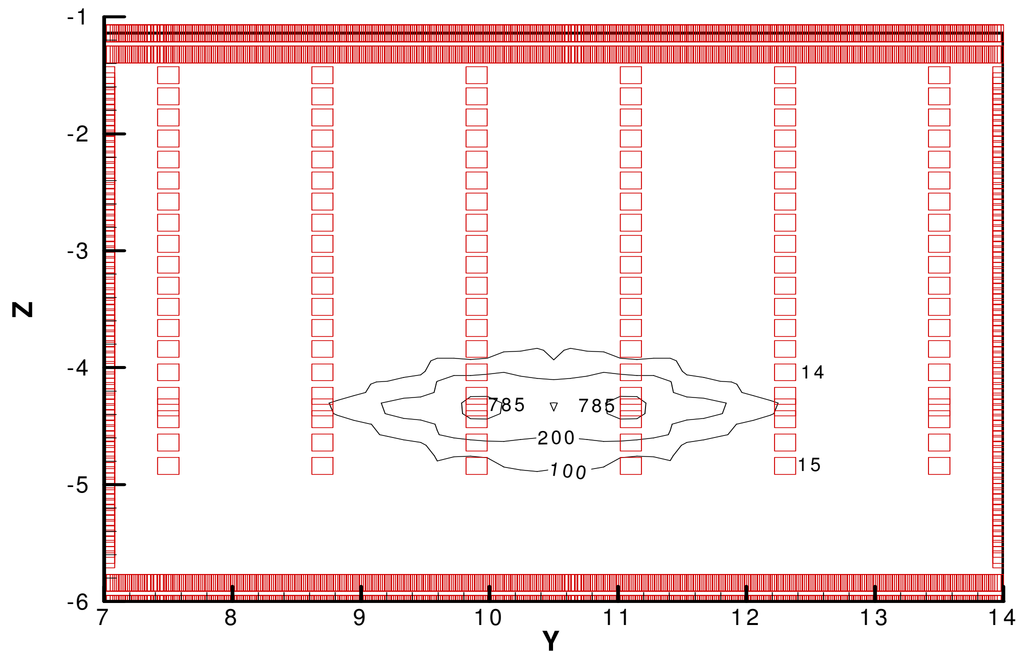

Figure 5.2.1.6 Hypothetical position of the plume at row 2 having core concentrations of 785 mg/L at day 113.

The next section will evaluate, by using the procedure described above for MTBE, the total seemingly reasonable mass flux for other chemical components dissolving from the source. The resultant adjusted mass flux represents the maximum plausible mass flux and it is not asserted to be the true mass flux. The true mass flux is likely between the unadjusted and adjusted values.

An example of the initial and the final value of the mass flux at different times is given below. The calculations are made for MTBE and TBA at row 2. As presented above, "case 1" does not need adjustments (Table 5.2.1.4). Case 2 and 3 need adjustments of 33%

(Table 5.2.1.5) and 60% respectively (Table 5.2.1.6). The values of the MTBE and TBA mass flux obtained after these corrections are depicted with empty dashed circles in Figure 5.2.1.7 and Figure 5.2.1.8. The black dots represent the initial values before correction and the results are compared with the BIONAPL model simulations which don't consider biodegradation.

Table 5.2.1.4 The initial calculated mass flux for TBA and MTBE with no adjustments at row 2 (a Case 1 situation).

Date	Day	TBA	MTBE
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
20-Nov-04	40	0.2	7.7
16-Dec-04	66	1.0	29.10
03-Feb-05	113	0.2	14.88
19-Apr-05	189	0.0	0.3
08-Jun-05	238	0.0	0.0
15-Nov-05	395	0.0	0.0

Table 5.2.1.5 The mass flux of TBA and MTBE after an increase by 33% of the initial calculated mass flux values at row 2 (a Case 2 situation).

Date	Day	TBA	MTBE
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
20-Nov-04	40	0.2	10.19
16-Dec-04	66	1.3	38.66
03-Feb-05	113	0.3	19.79
19-Apr-05	189	0.0	0.4
08-Jun-05	238	0.0	0.0
15-Nov-05	395	0.0	0.0

Table 5.2.1.6 The mass flux of TBA and MTBE at row 2 after an increase by 60% for day 113 (a Case 3 situation).

Date	Days	TBA	MTBE
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
20-Nov-04	40	0.2	10.19
16-Dec-04	66	1.3	38.66
03-Feb-05	113	0.4	28.72
19-Apr-05	189	0.0	0.4
08-Jun-05	238	0.0	0.0
15-Nov-05	395	0.0	0.0

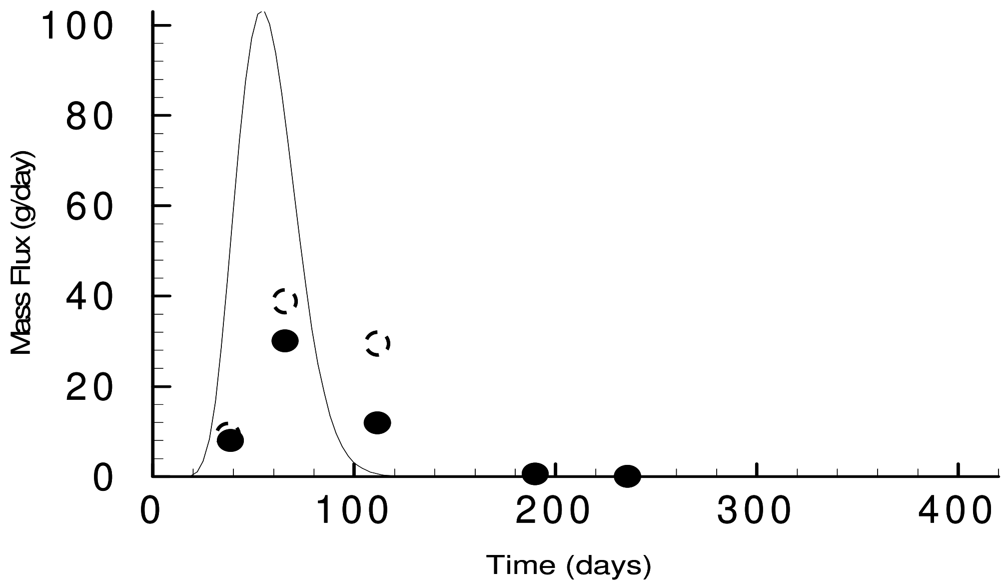

Figure 5.2.1.7 The mass flux of MTBE at row 2 before (black dots) and after (dashed empty circles) adjustments in relation to the model prediction, assuming no biodegradation (continuous line).

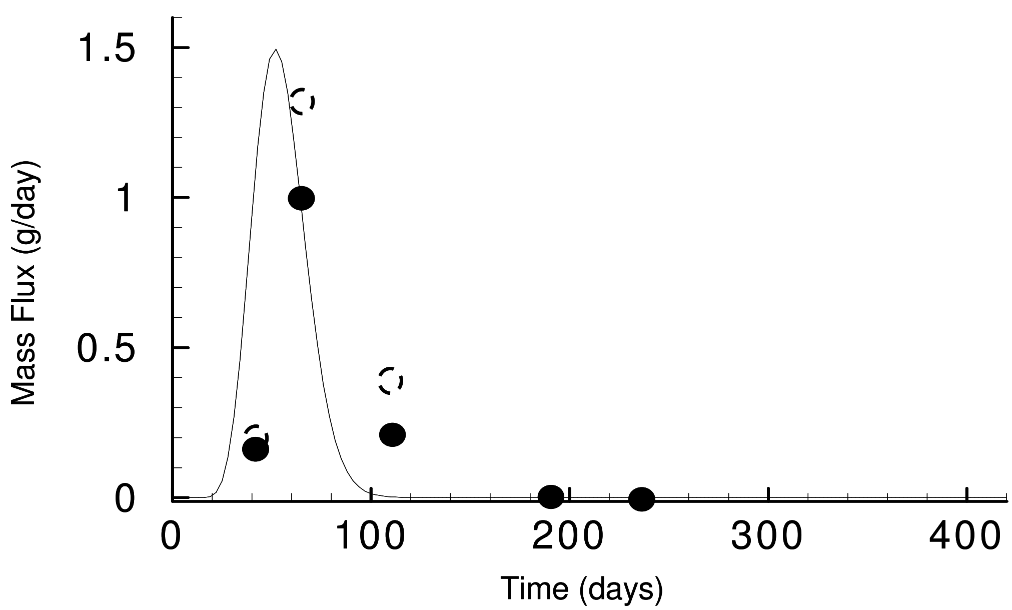

Figure 5.2.1.8 The mass flux of TBA at row 2 before (black dots) and after (dashed empty circles) adjustments in relation to the model prediction assuming no biodegradation (continuous line).

The comparison of model predictions and the field mass flux values suggests that it is possible that the sampling events did not capture the maximum flux values. In section 5.2.2 this possibility will be analyzed.

The MTBE and TBA, Row 3, GMT gate

The MTBE mass flux at row 3 (Figure 5.2.1.13) was adjusted by increasing the observed mass flux by 60% at day 113 (Figure 5.2.1.9) and 175 (Figure 5.2.1.10). The observed TBA (Figure 5.2.1.14) mass flux was increased by 33% at day 113 (Figure 5.2.1.11) and by 60% at day 175 (Table 5.2.1.12). Even after adjustments, the apparent oxygenate mass flux represents only a small portion of the injected mass, which was predicted to have passed row 3 by day 200. The adjusted mass flux values for row 3 are summarized in Table 5.2.1.7 and Table 5.2.1.8.

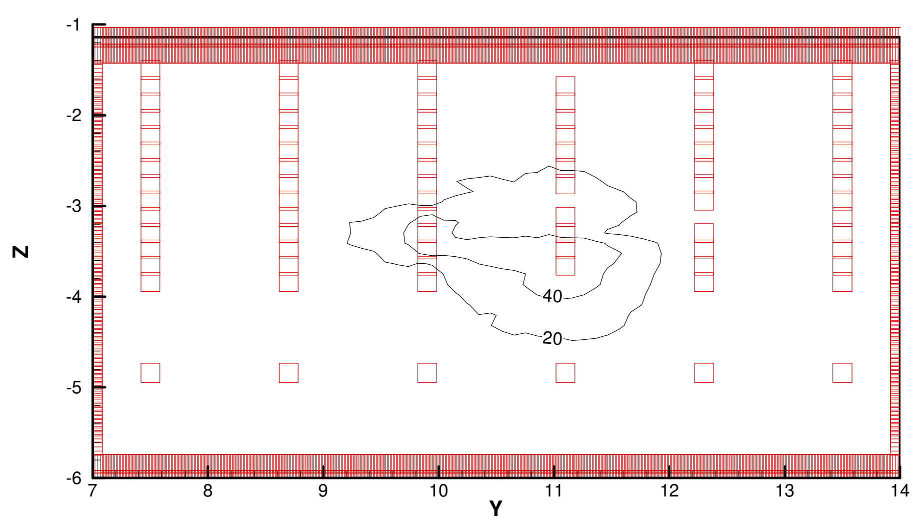

Figure 5.2.1.9 MTBE distribution at row 3, GMT gate, day 113 (3 February 2005).

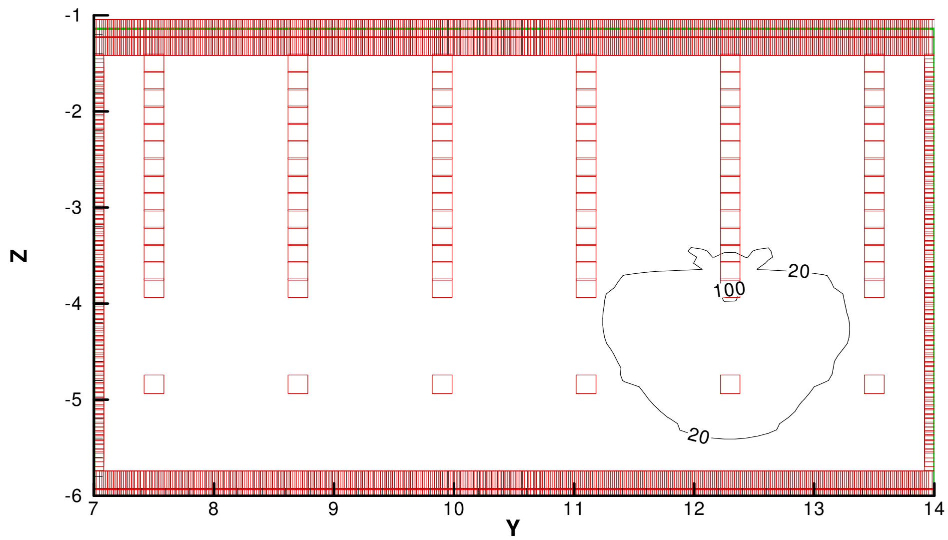

Figure 5.2.1.10 MTBE distribution at row 3, GMT gate, day 175 (5 April 2005).

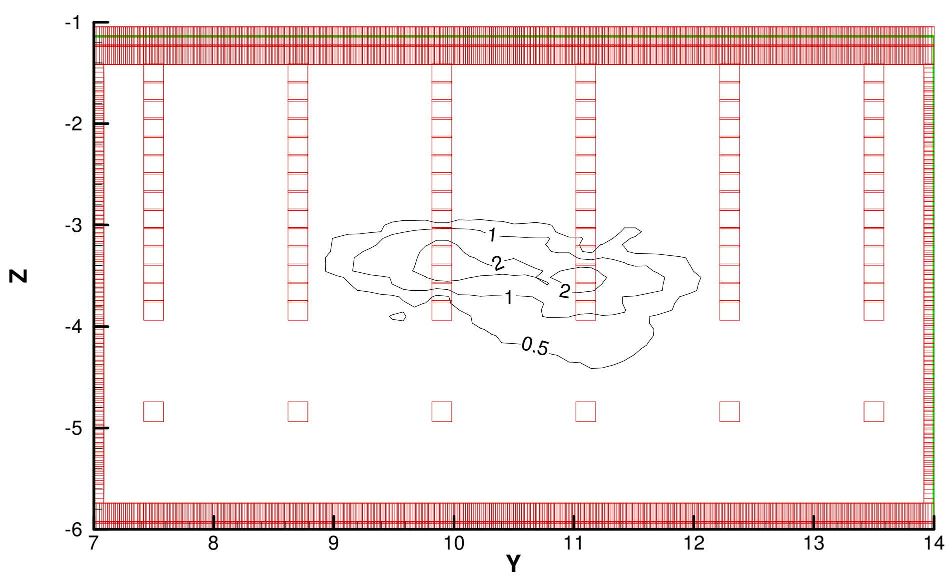

Figure 5.2.1.11 TBA distribution at row 3, GMT gate, day 113 (3 February 2005).

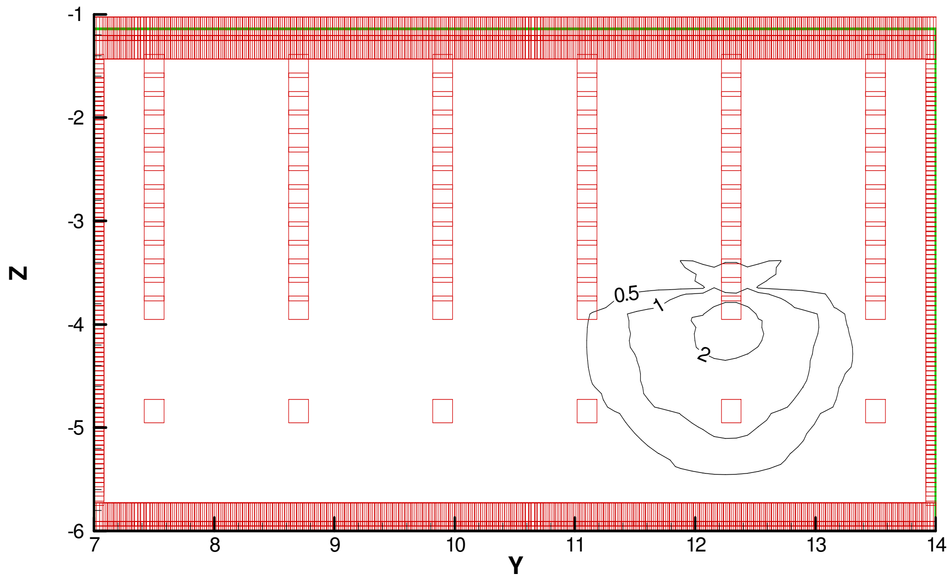

Figure 5.2.1.12 TBA distribution at row 3, GMT gate, day 175 (5 April 2005).

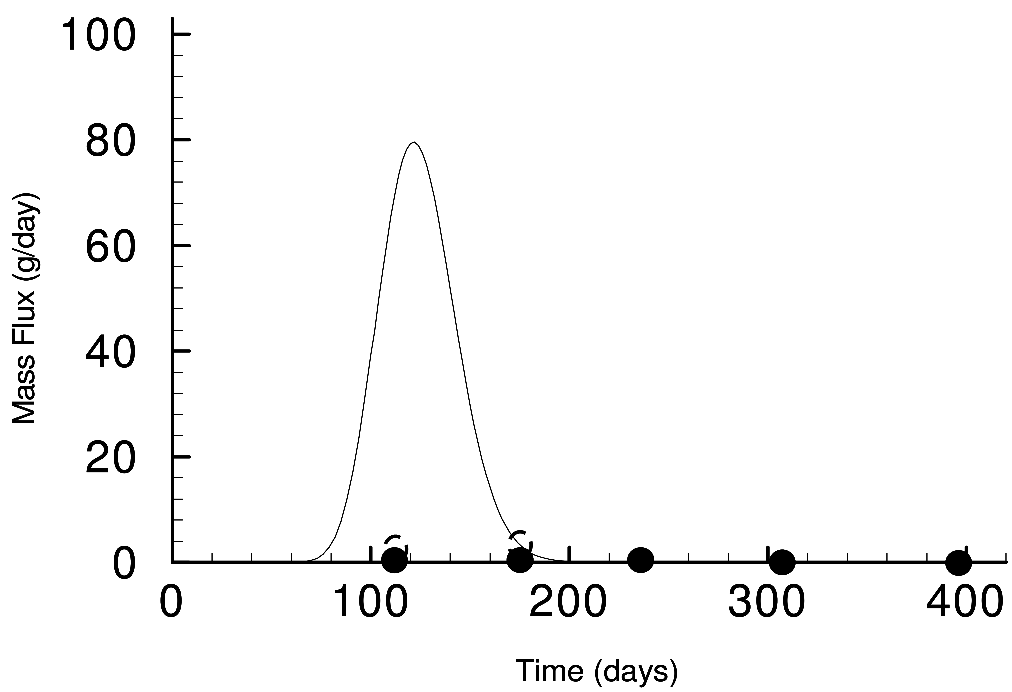

Figure 5.2.1.13 The MTBE initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 3 in the GMT gate.

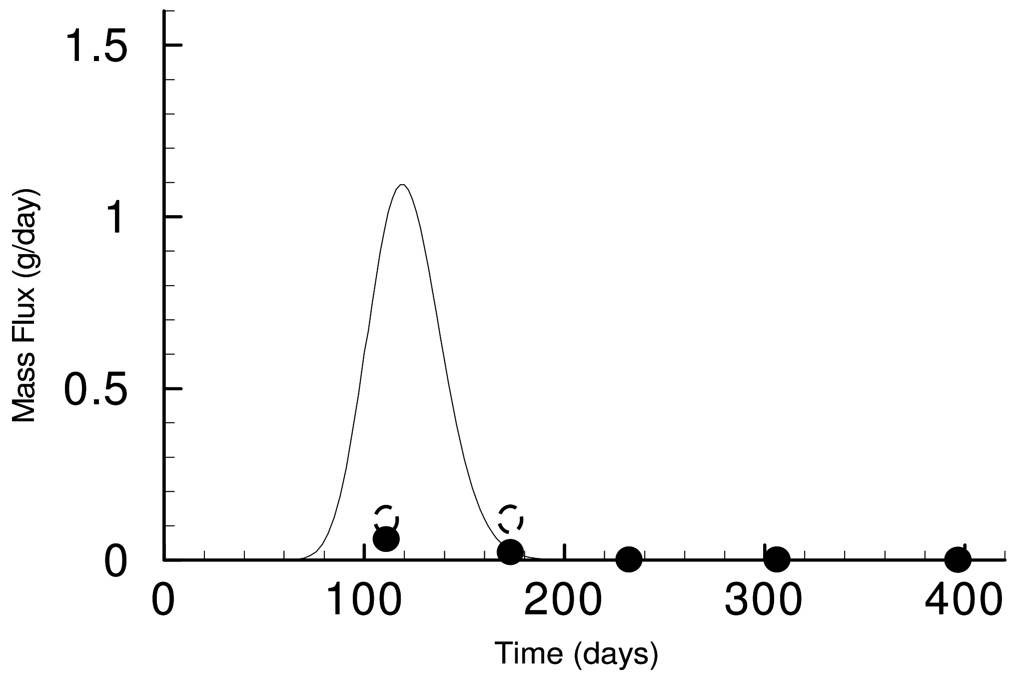

Figure 5.2.1.14 The TBA initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 3 in the GMT gate.

Table 5.2.1.7 The mass flux values of MTBE before and after adjustments at row 3.

Date	Days	MTBE Unadjusted	MTBE Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
22-Jan-05	102		
03-Feb-05	113	2.57	4.11
05-Apr-05	175	1.70	2.72
06-Jun-05	236	0.1	0.2
16-Aug-05	306	0.0	0.0
17-Nov-05	397	0.0	0.0

Table 5.2.1.8 The mass flux values of TBA before and after adjustments at row 3.

Date	Days	TBA Unadjusted	TBA Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
22-Jan-05	102		
03-Feb-05	113	0.06	0.07
05-Apr-05	175	0.04	0.06
06-Jun-05	236	0.00	0.00
16-Aug-05	306	0.00	0.00
17-Nov-05	397	0.00	0.00

The MTBE and TBA, Row 4, GMT gate

The MTBE mass flux (Table 5.2.1.9) at day 183 (Figure 5.2.1.15 and Figure 5.2.1.19) and 231 (Figure 5.2.1.16) were not adjusted. The TBA mass flux (Table 5.2.1.10) was adjusted by 33% at day 231 (Figure 5.2.1.18 and Figure 5.2.1.20). Following the adjustments, the MTBE and TBA field mass fluxes remain well below the model prediction.

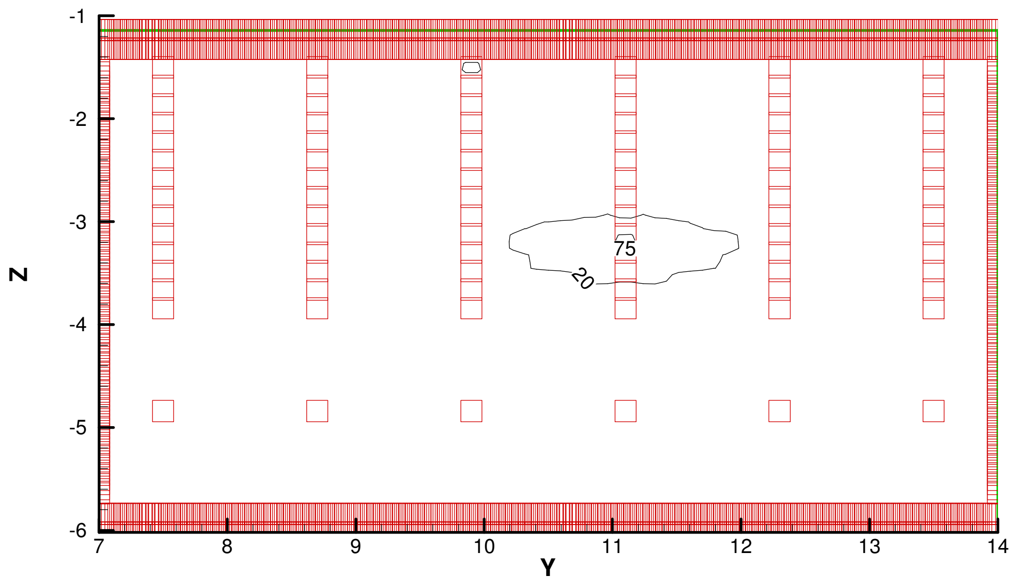

Figure 5.2.1.15 MTBE distribution at row 4, GMT gate, day 183 (13 April 2005).

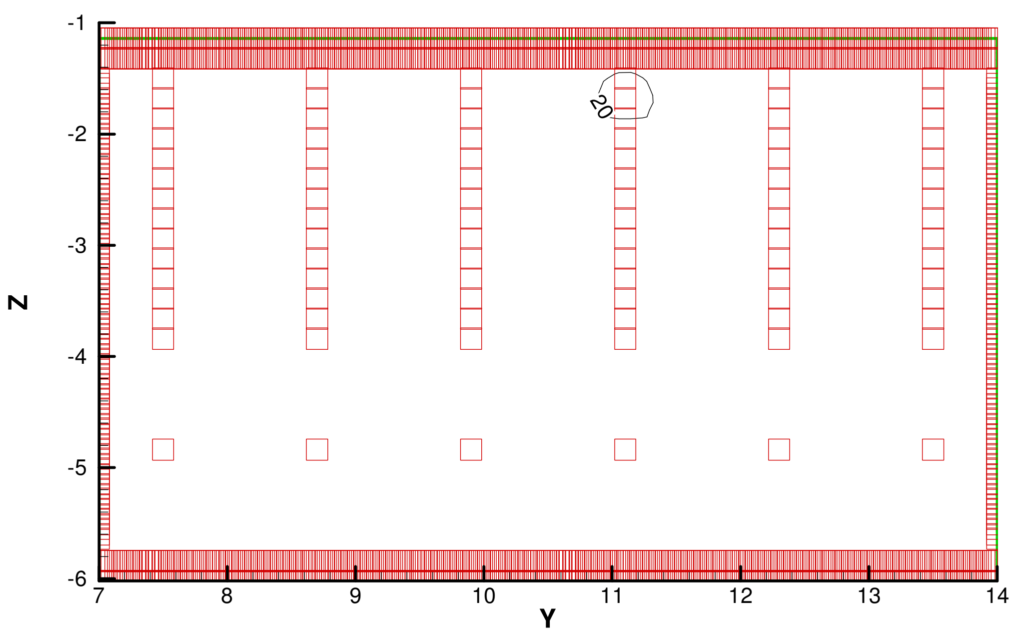

Figure 5.2.1.16 MTBE distribution at row 4, GMT gate, day 231 (1 June 2005).

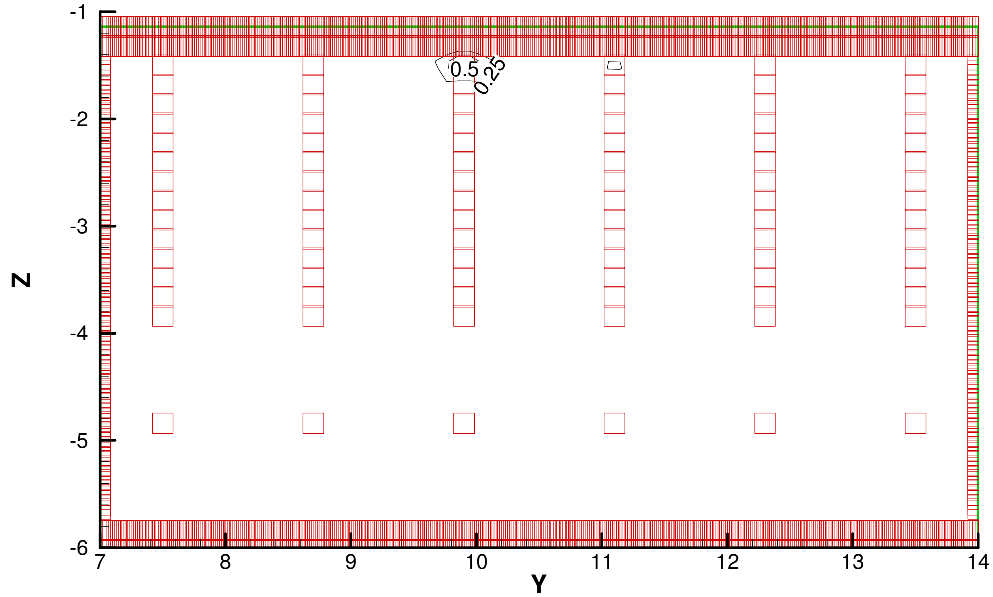

Figure 5.2.1.17 TBA distribution at row 4, GMT gate, day 183 (13 April 2005).

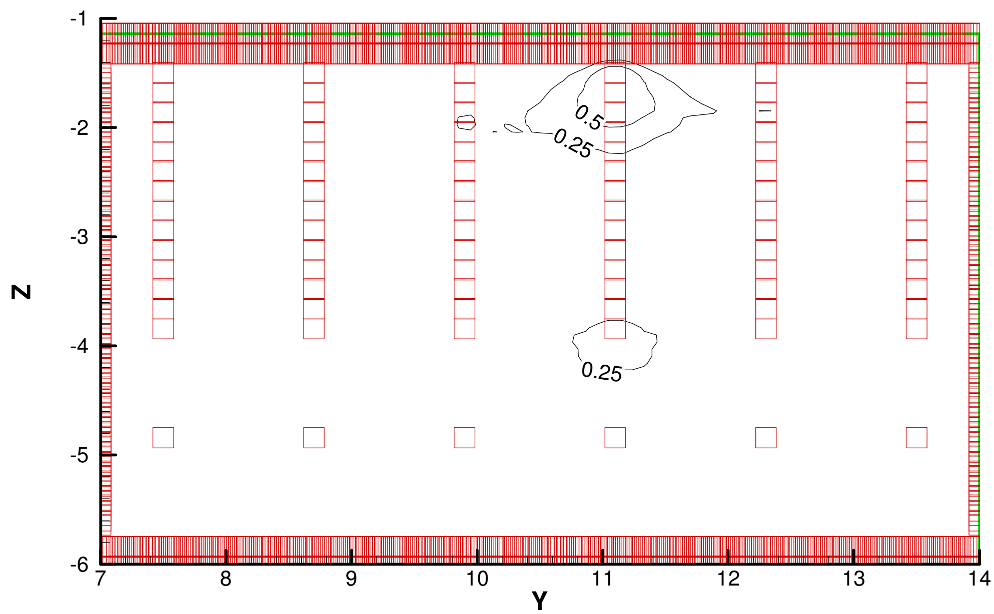

Figure 5.2.1.18 TBA distribution at row 4, GMT gate, day 231 (1 June 2005).

Table 5.2.1.9 The mass flux values of MTBE before and after adjustments at row 4.

Date	Days	MTBE Unadjusted	MTBE Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
13-Apr-05	183	2.11	2.11
01-Jun-05	231	2.01	2.01
16-Aug-05	306	0.3	0.3
28-Nov-05	408	0.00	0.0

Table 5.2.1.10 The mass flux values of TBA before and after adjustments at row 4.

Date	Days	TBA Unadjusted	TBA Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
13-Apr-05	183	0.01	0.01
01-Jun-05	231	0.05	0.07
16-Aug-05	306	0.00	0.00
28-Nov-05	408	0.00	0.00

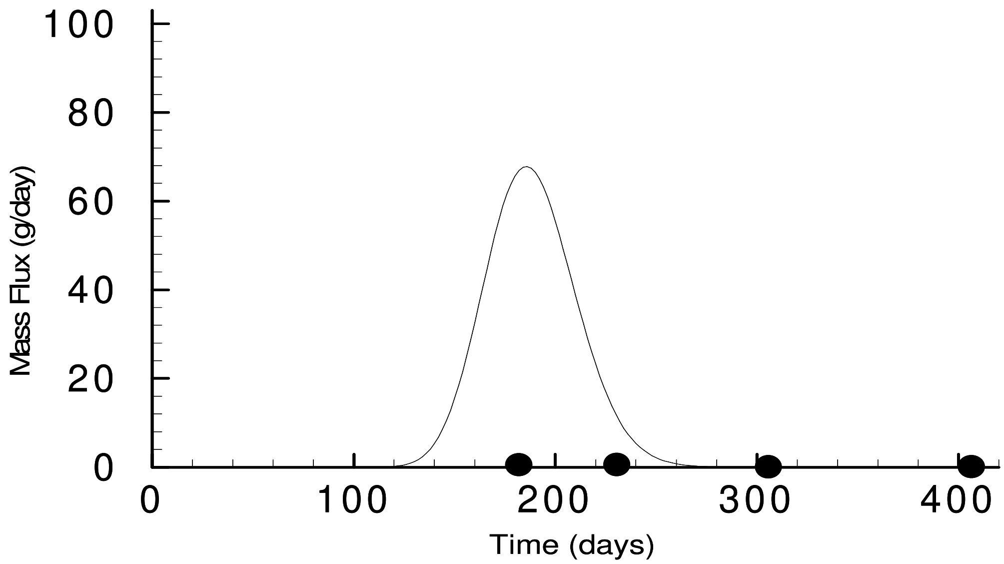

Figure 5.2.1.19 The MTBE initial (black dots) and the adjusted (dashed empty circles hidden within the black dots) mass flux values in relation to prediction (the continuous line) at row 4 in the GMT gate.

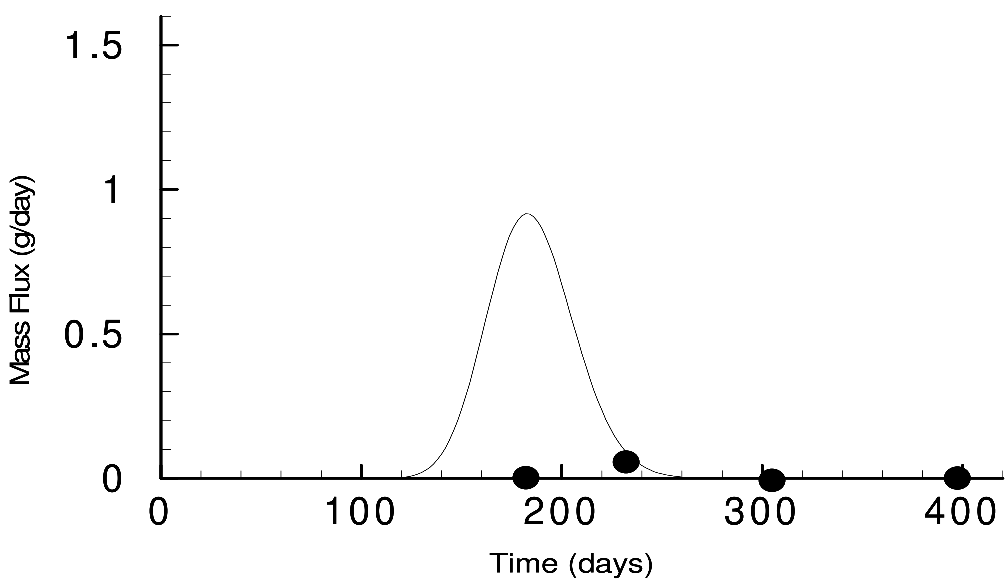

Figure 5.2.1.20 The TBA initial (black dots) and the adjusted (dashed empty circles hidden within the black dots) mass flux values in relation to prediction (the continuous line) at row 4 in the GMT gate.

5.2.2 The cross-section sampling frequency

The cross-section sampling frequency would not be an issue for the monoaromatics given the long time of dissolution. However, a negative bias in the MTBE mass flux estimates could have occurred if a significantly higher mass flux passed the sampling rows between the sampling events. We will use the plots of mass flux of oxygenates over time at rows 2, 3 and 4 to evaluate mass loss, however only a few estimates of oxygenate mass flux were made at each row, given time and resource constraints. To assess this possibility, the mass flux data are examined along with the breakthrough curves, with the concentrations detected on cross-sections during the mass flux monitoring events, and with the model mass flux curves derived from the BIONAPL model (without biodegradation).

At row 2, only the first three sampling events were likely to encounter significant oxygenates. The higher than predicted MTBE concentrations at the second and third sampling events at row 2 (Figure 5.2.2.1) could indicate that the peak mass flux of the MTBE plume arrived at the fence later than predicted. Figure 5.2.2.15 and Figure 5.2.2.16 show the predicted mass flux distribution of MTBE and TBA respectively for a groundwater velocity of 6.5 cm/day, about 30% lower than the anticipated 9 cm/day. The field data are perhaps more consistent with this prediction, however, the points are sparse. Therefore, it is possible that between the second and the third sampling event even higher concentrations could have passed the monitor row, and therefore a high mass of MTBE and TBA could have been missed. It is also possible that a very heterogeneous source of oxygenates was established by the co-injection of water. In that case, even shorter, high-concentration “slugs” of oxygenates could have been passing row 2, with most of the slugs passing between the sampling times. However, examining breakthrough curves for MTBE and TBA at row 2 (e.g., Figures 5.2.2.2

and 5.2.2.5) and downgradient rows 3 and 4 (Appendix 3) provides no support for such short, high concentration slugs.

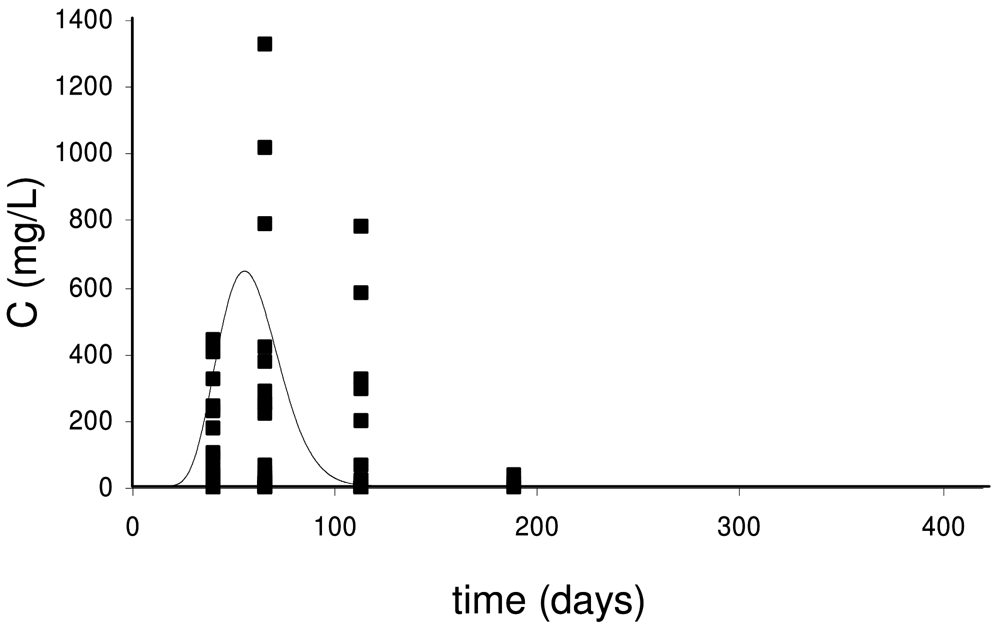

Figure 5.2.2.1 Field and model-predicted concentrations of MTBE detected in cross-section sampling events at row 2.

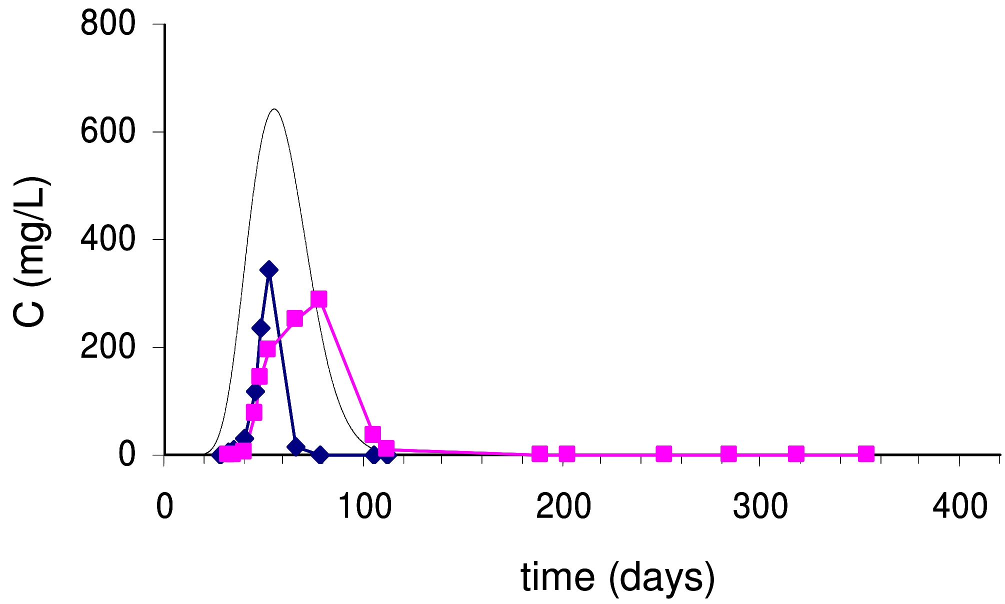

Figure 5.2.2.2 MTBE concentration prediction from BIONAPL (solid black line), and field breakthrough at row 2 (R2-3-6 in blue, R2-4-11 in red).

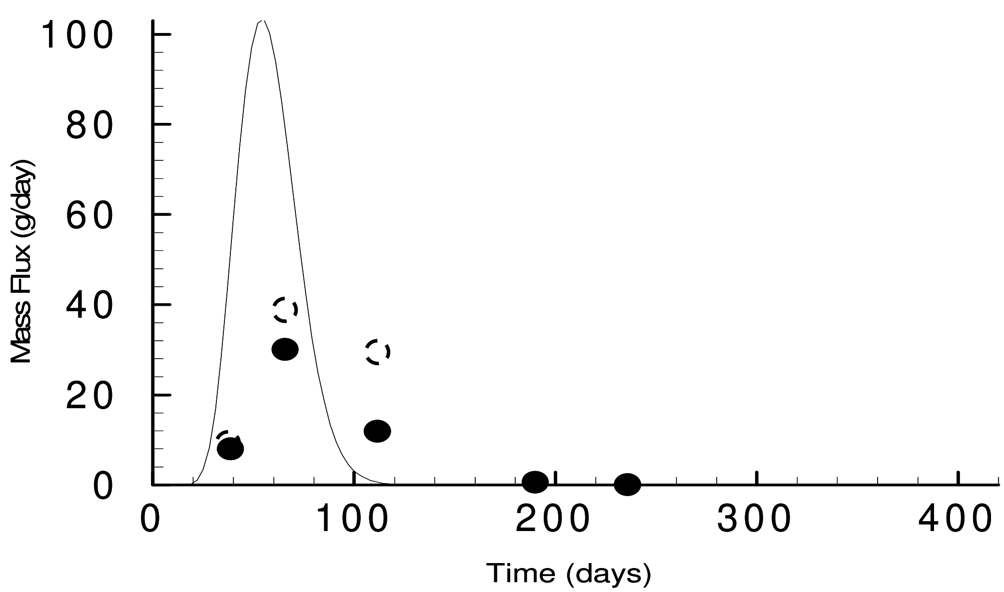

Figure 5.2.2.3 The MTBE mass flux prediction, before (black dots) and after (dashed empty circles) adjustments in relation to prediction (continuous line) at row 2.

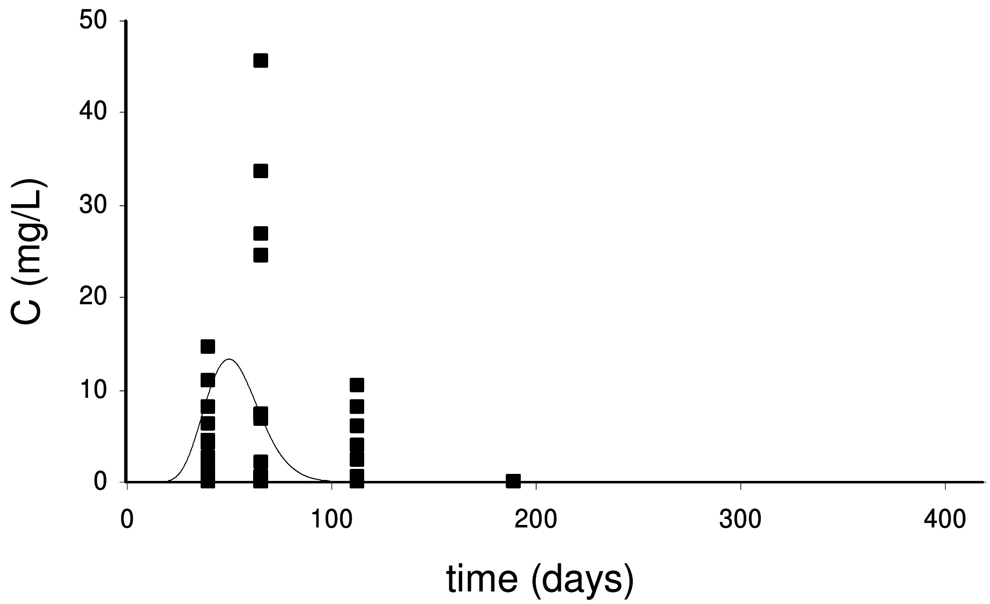

Figure 5.2.2.4 Field and model-predicted concentrations of TBA detected in cross sampling events at row 2.

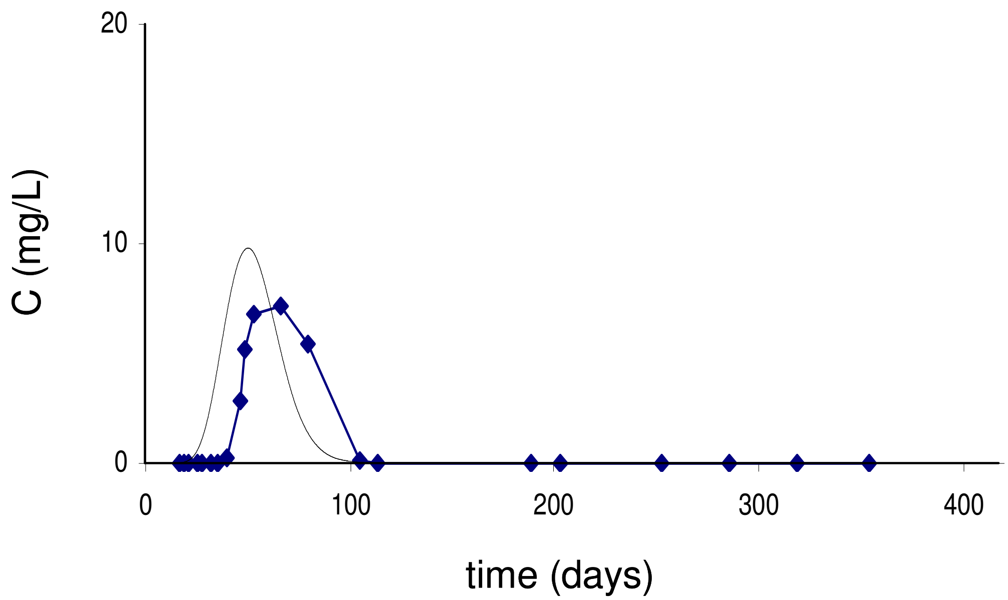

Figure 5.2.2.5 TBA concentrations prediction from BIONAPL (solid black line), and field breakthrough at row 2 (R2-4-11).

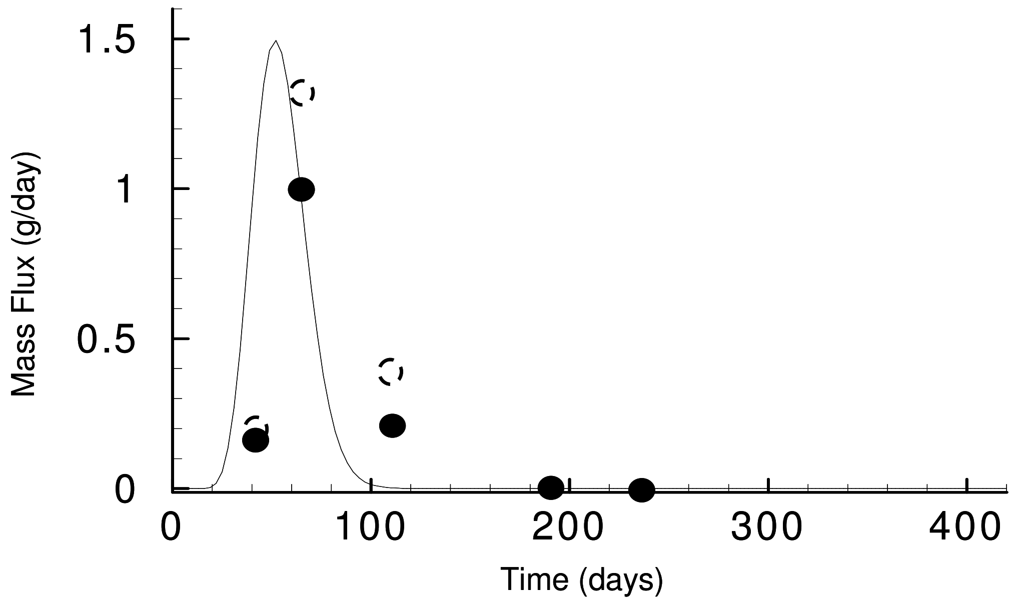

Figure 5.2.2.6 The TBA mass flux prediction, before (black dots) and after (dashed empty circles) adjustments in relation to prediction (continuous line) at row 2.

At row 2, both MTBE and TBA cross-section concentrations and breakthrough curves suggest that the major mass breakthrough could have passed sometime between the second and the third sampling event. Hence, an important percentage of the passing mass flux may not have been sampled.

At rows 3 and 4, the cross-section sampling events for MTBE (Figure 5.2.2.11 and Figure 5.2.2.12) and for TBA (Figure 5.2.2.13 and Figure 5.2.2.14) indicate that the initial breakthrough of the mass flux was likely missed and, more significantly, that only two sampling dates were likely to have encountered significant oxygenate mass flux. Thus it is again probably that considerable mass flux is not represented within the field data.

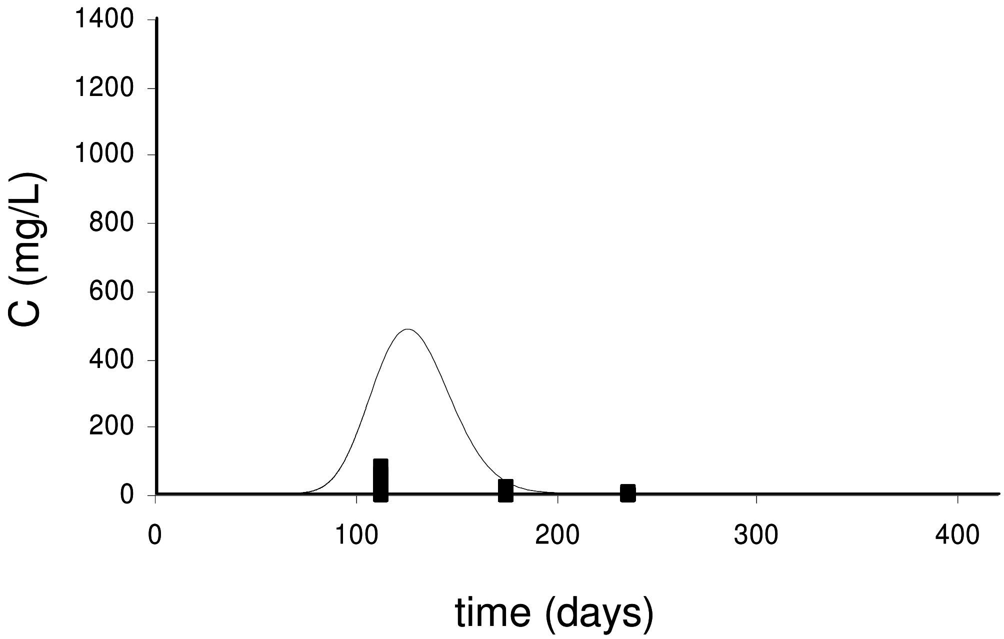

Figure 5.2.2.7 Field and predicted breakthrough curves together with the concentrations of MTBE detected in cross sampling events at row 3.

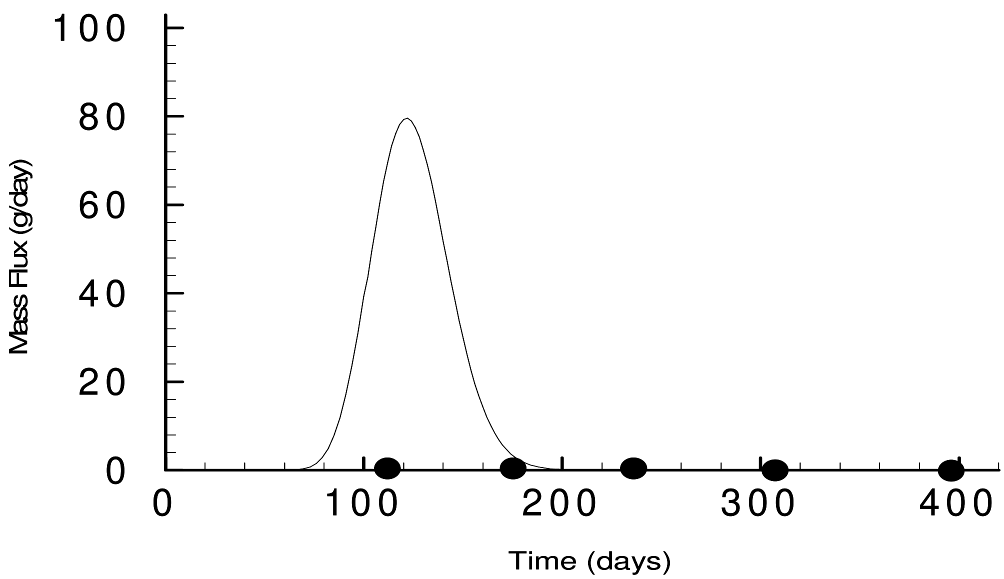

Figure 5.2.2.8 Mass flux prediction (continuous line) and the unadjusted field data (black dots) for MTBE at row 3.

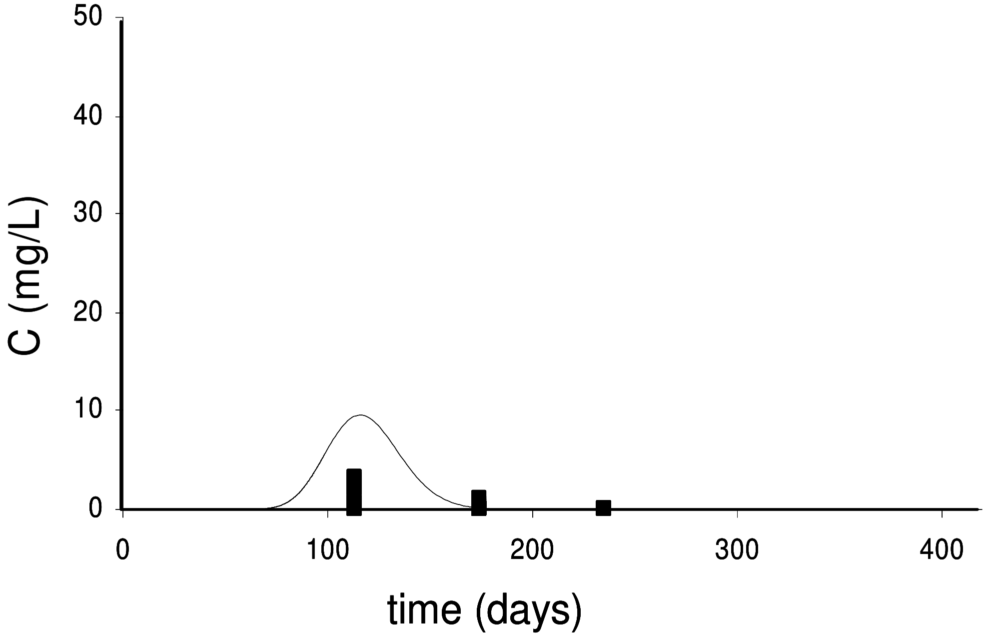

Figure 5.2.2.9 Field and predicted breakthrough curves together with the concentrations of TBA detected in cross-section sampling events at row 3.

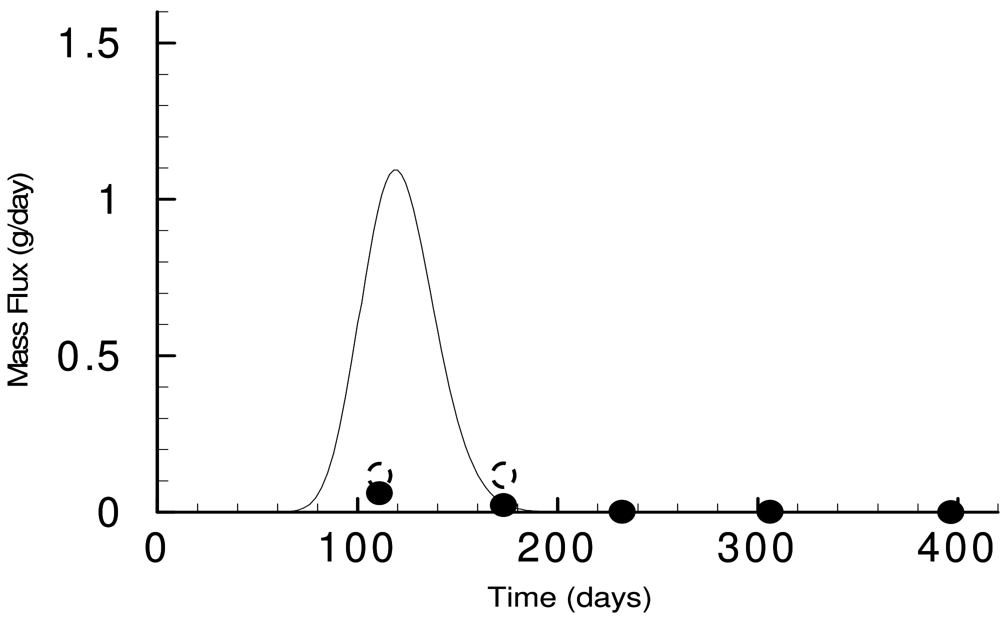

Figure 5.2.2.10 Mass flux prediction (continuous line) and the unadjusted field data (black dots) for TBA at row 3.

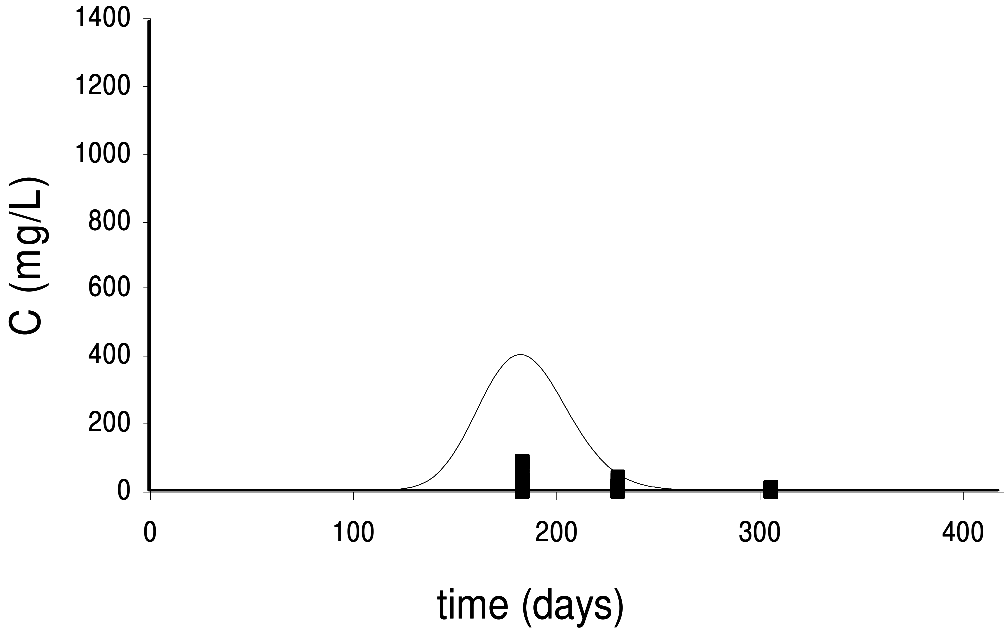

Figure 5.2.2.11 Field and predicted breakthrough curves together with the concentrations of MTBE detected in cross sampling events at row 4.

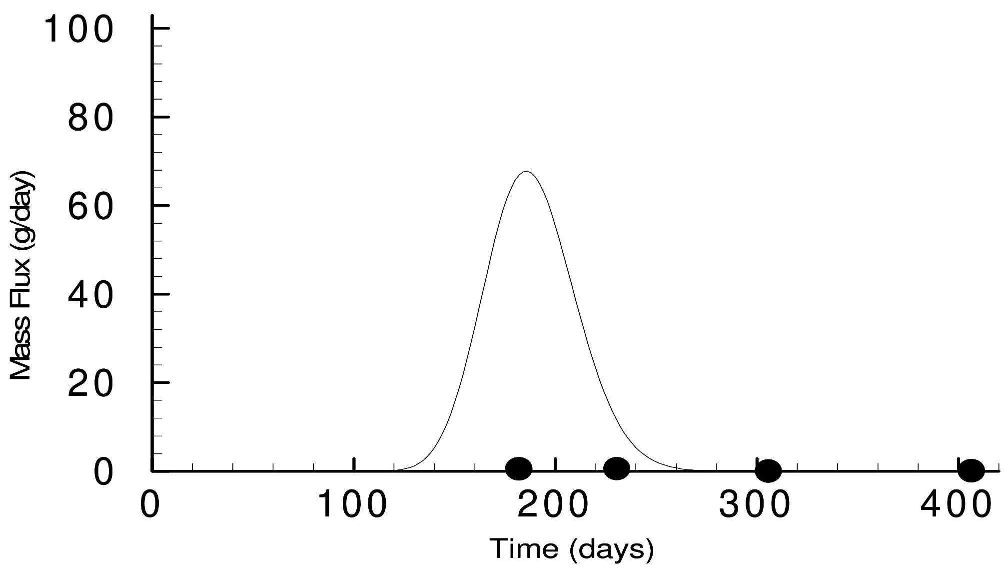

Figure 5.2.2.12 Mass flux prediction (continuous line) and the unadjusted field data (black dots) for MTBE at row 4.

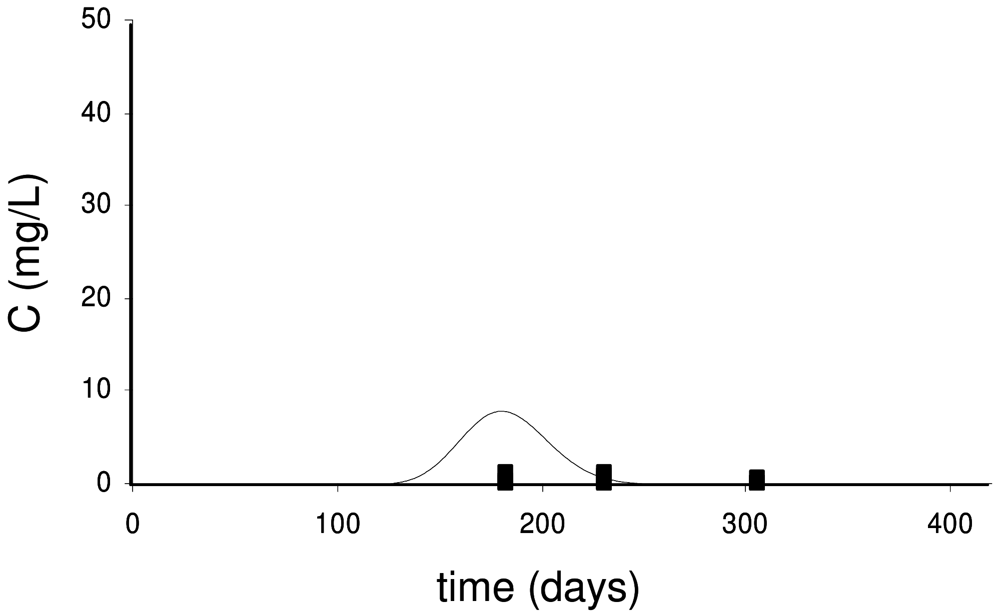

Figure 5.2.2.13 Field and predicted breakthrough curves together with the concentrations of TBA detected in cross sampling events at row 4.

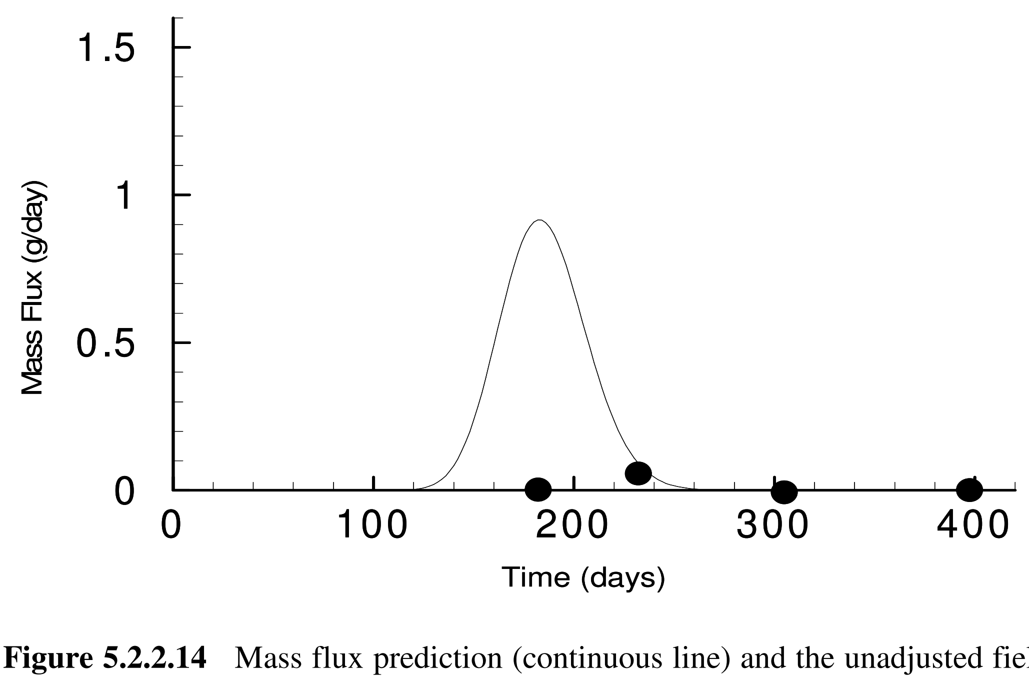

Figure 5.2.2.14 Mass flux prediction (continuous line) and the unadjusted field data (black dots) for TBA at row 4.

Assuming a different groundwater velocity, as suggested by the MTBE and TBA mass flux values at row 2, the mass flux frequency at row 2, 3 and 4, indicates that is possible that the high mass flux could have been missed (Figure 5.2.2.15 to Figure 5.2.2.20).

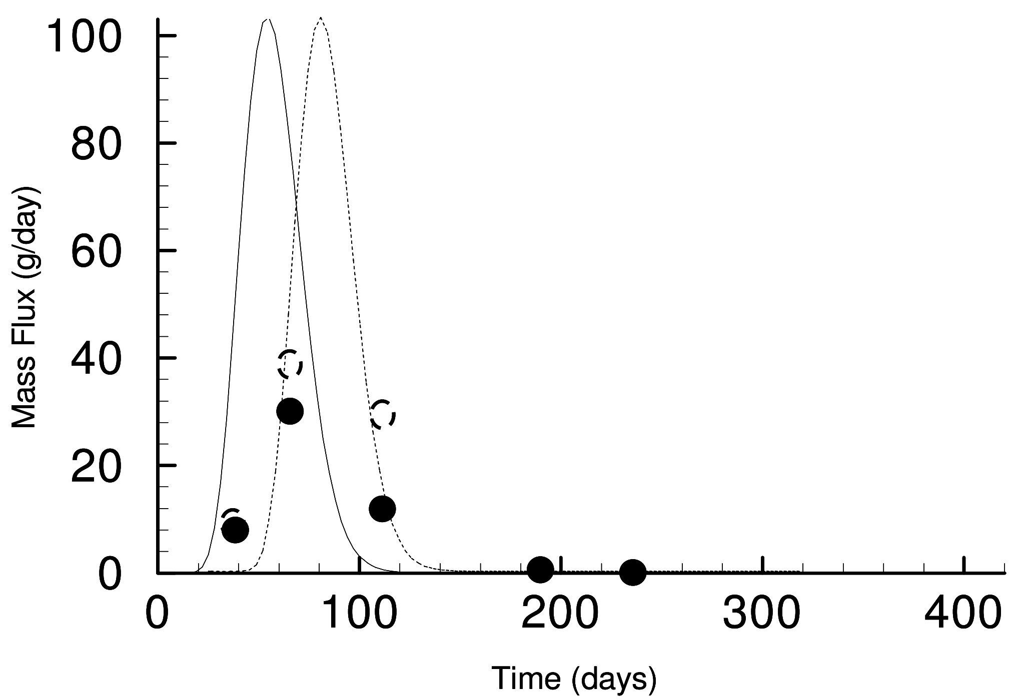

Figure 5.2.2.15 The MTBE initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to the predicted (the continuous line) and suggested mass flux (dashed line) at row 2 in the MTBE (GMT gate) plume.

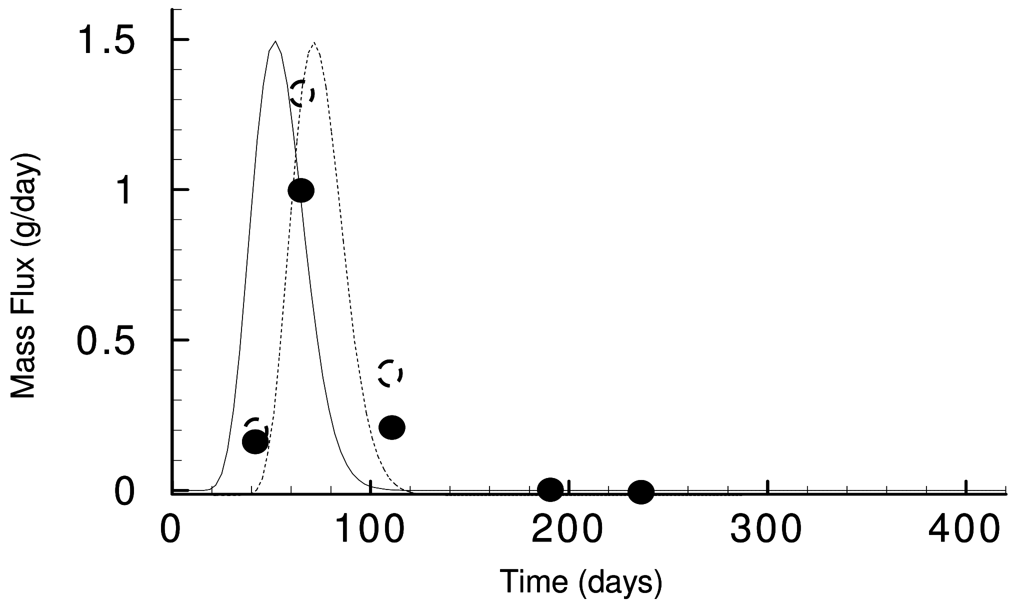

Figure 5.2.2.16 The TBA initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to the predicted (the continuous line) and suggested mass flux (dashed line) at row 2 in the MTBE (GMT gate) plume.

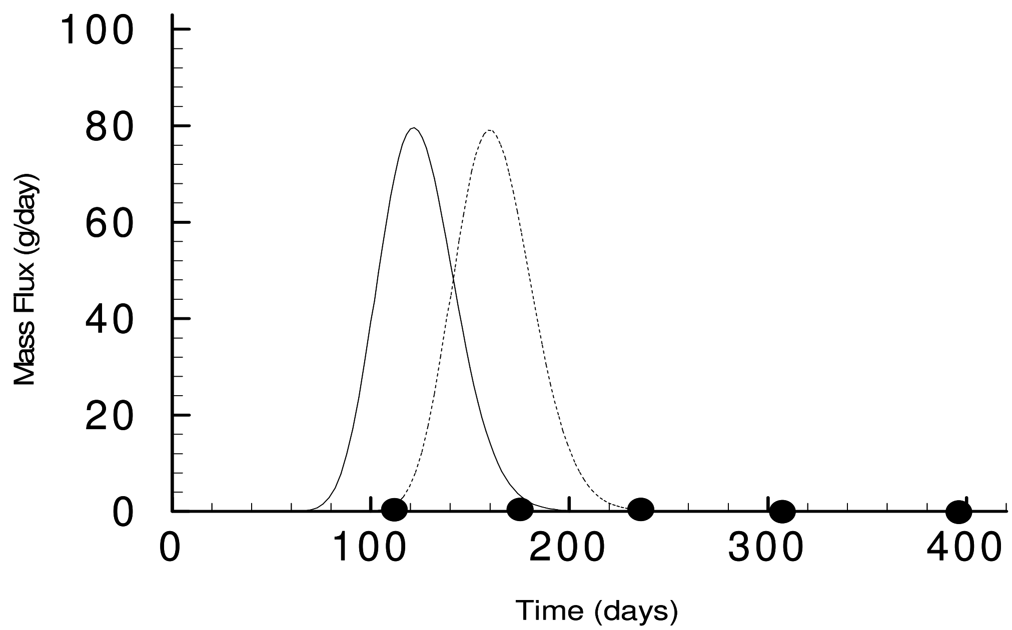

Figure 5.2.2.17 The MTBE initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to the predicted (the continuous line) and suggested mass flux (dashed line) at row 3 in the MTBE (GMT gate) plume.

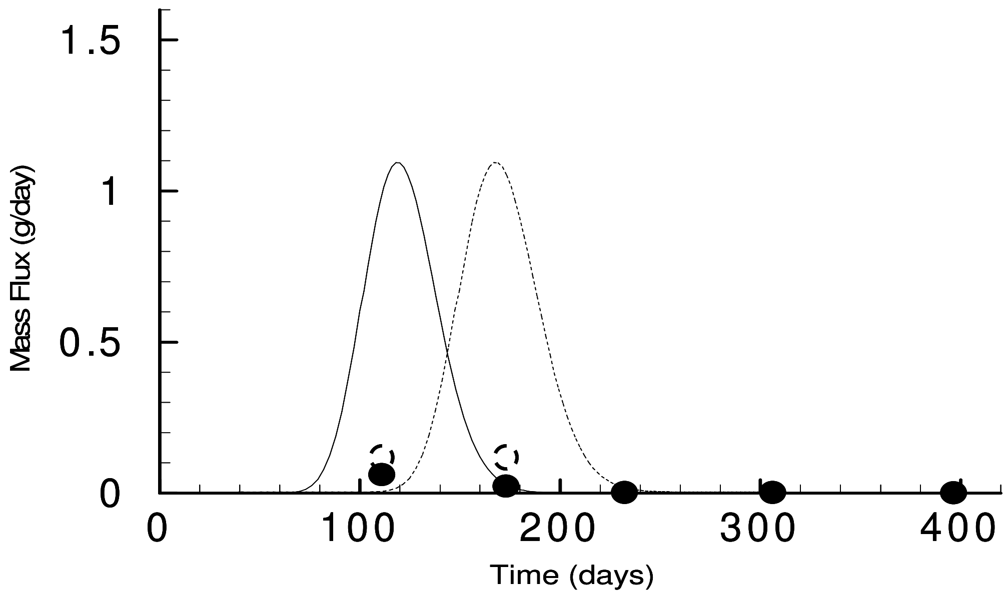

Figure 5.2.2.18 The TBA initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to the predicted (the continuous line) and suggested mass flux (dashed line) at row 3 in the MTBE (GMT gate) plume.

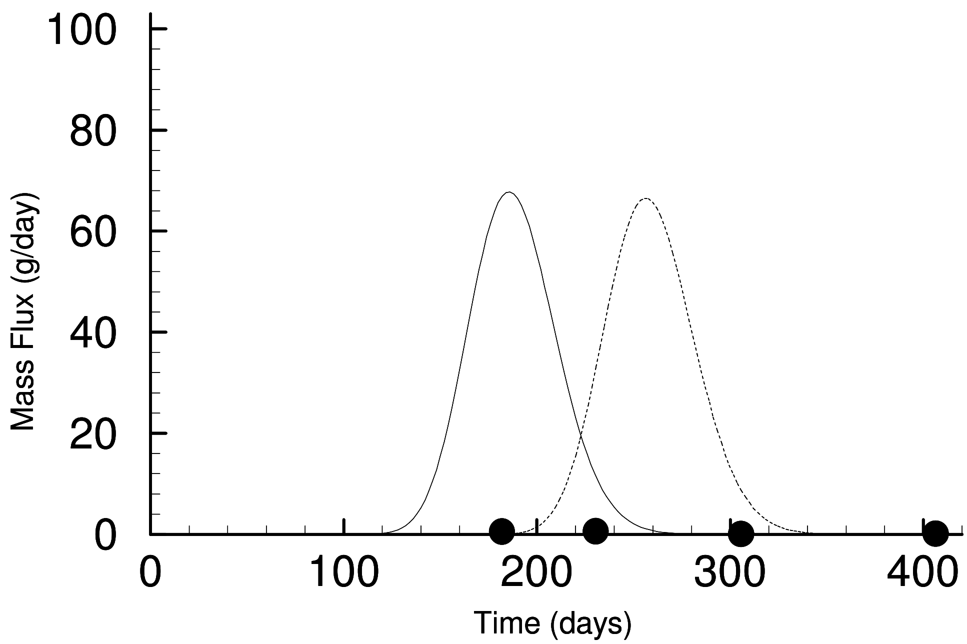

Figure 5.2.2.19 The MTBE initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to the predicted (the continuous line) and suggested mass flux (dashed line) at row 4 in the MTBE (GMT gate) plume.

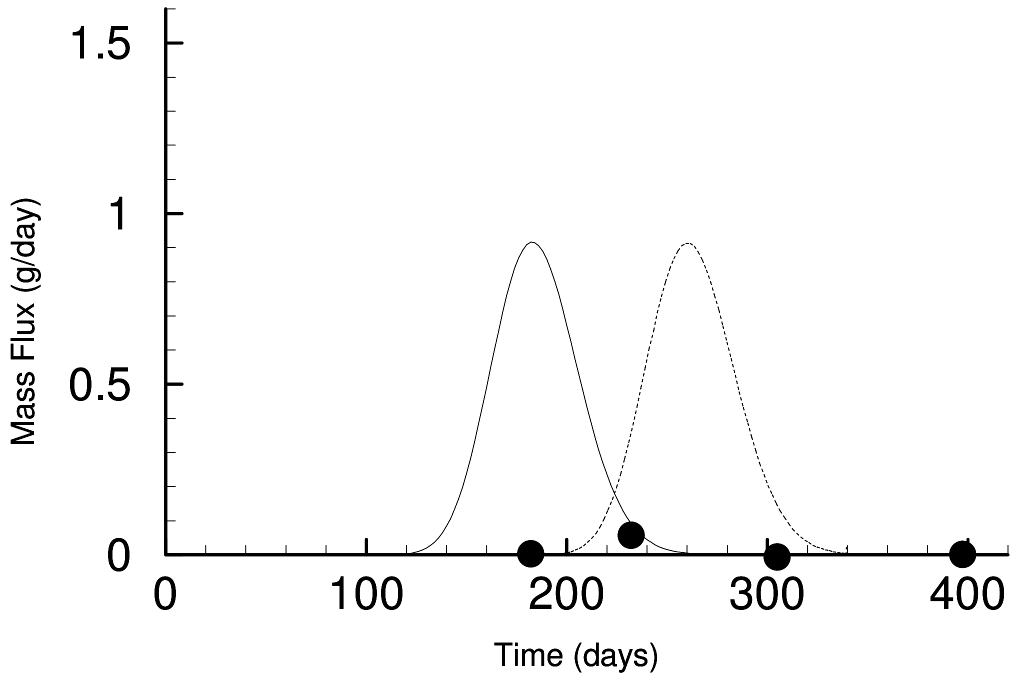

Figure 5.2.2.20 The TBA initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to the predicted (the continuous line) and suggested mass flux (dashed line) at row 4 in the MTBE (GMT gate) plume.

5.2.3 Benzene, Toluene, o-Xylene, and 1,2,3-Trimethylbenzene (BTX-TMB) in the GMT gate

If we acknowledge that the apparent loss of mass of MTBE and TBA could be due to the monitoring limitations discussed in Section 5.2.1 and 5.2.2, a similar anomalous loss of mass is expected in the case of benzene, toluene, o-xylene and 1,2,3-TMB (BTX-TMB). It was assumed that their plumes would have been at similar locations and therefore would be similarly affected by the monitoring network uncertainties. The field benzene plume was used to represent the spatial distribution of the other BTX-TMB plumes. The spatial distribution of benzene in the monitoring network at rows 2, 3, and 4 was examined and corrections to the calculated mass flux were applied as was done for MTBE and TBA. The adjustments applied to benzene were also applied to the other components of BTX-TMB.

The BTX-TMB, Row 2, GMT gate

A comparison of the benzene mass flux before and after adjustments at row 2 is shown in Table 5.2.3.1 and is depicted in Figure 5.2.3.4. Even after the applied adjustments, the benzene mass flux values suggest that barely a half of the total benzene mass can be accounted for. This difference is similar to the 50% uncertainty described by Fraser (MSc. thesis in progress).

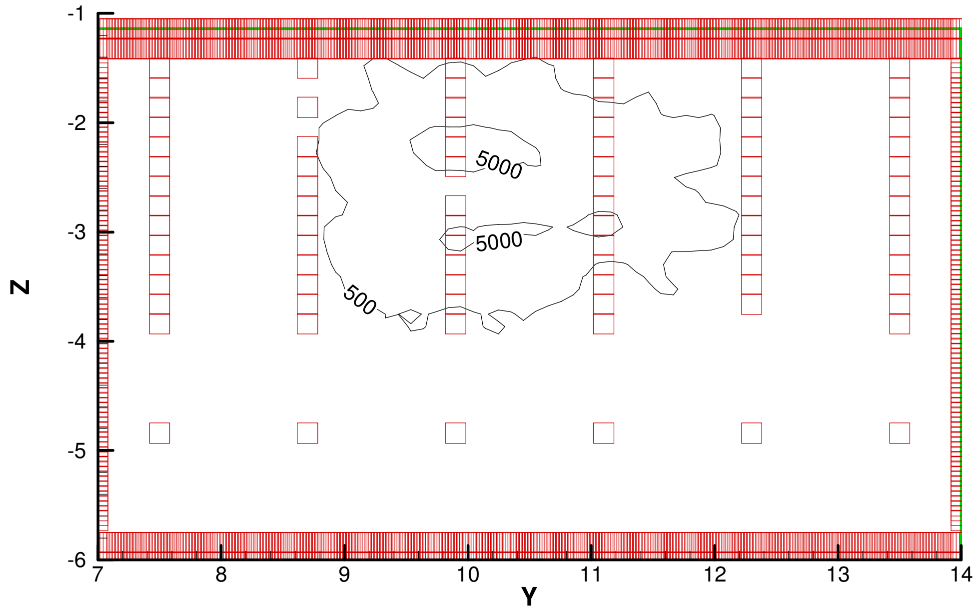

Figure 5.2.3.1 Benzene distribution at row 2, GMT gate, day 40 (November 2004).

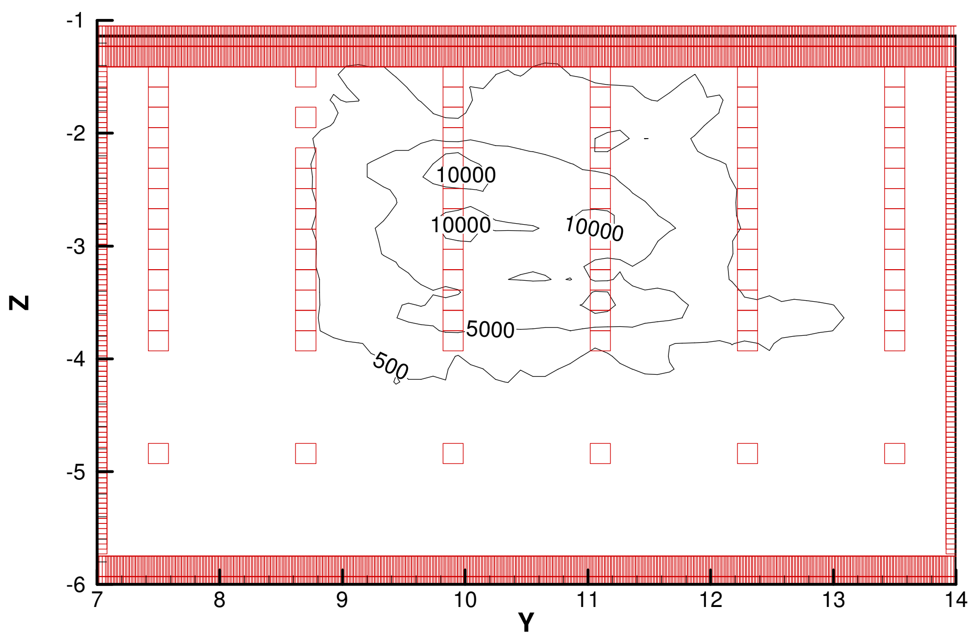

Figure 5.2.3.2 Benzene distribution at row 2, GMT gate, day 66 (December 2004).

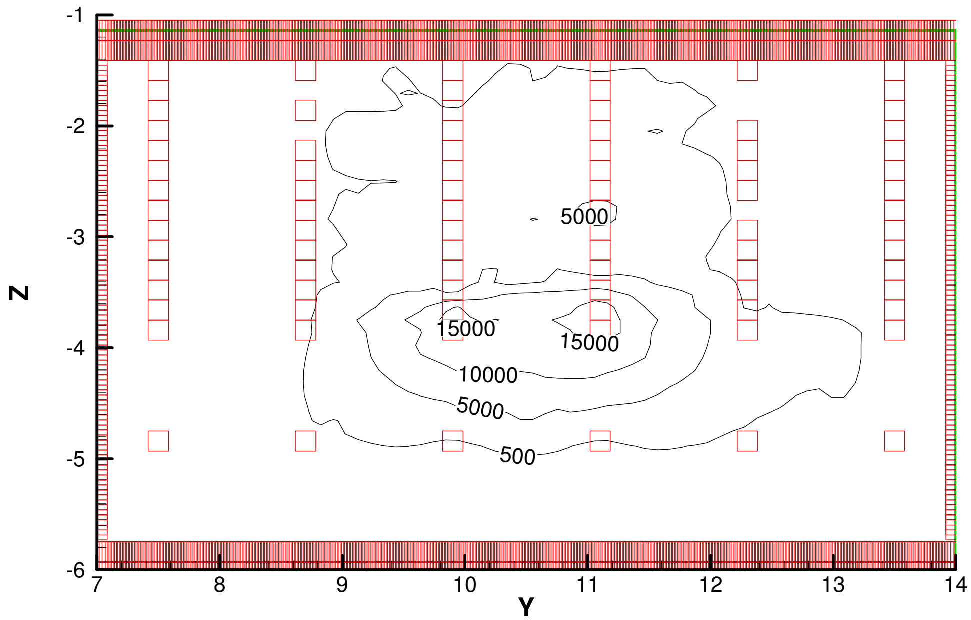

Figure 5.2.3.3 Benzene distribution at row 2, GMT gate, day 113 (February 2005).

Table 5.2.3.1 The mass flux values of benzene before and after adjustments at row 2, GMT gate.

Date	Days	Benzene Unadjusted	Benzene Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
20-Nov-04	40	0.3	0.4
16-Dec-04	66	0.9	1.21
03-Feb-05	113	0.8	1.22
19-Apr-05	189	0.7	0.9
08-Jun-05	238	0.2	0.4
15-Nov-05	395	0.0	0.1

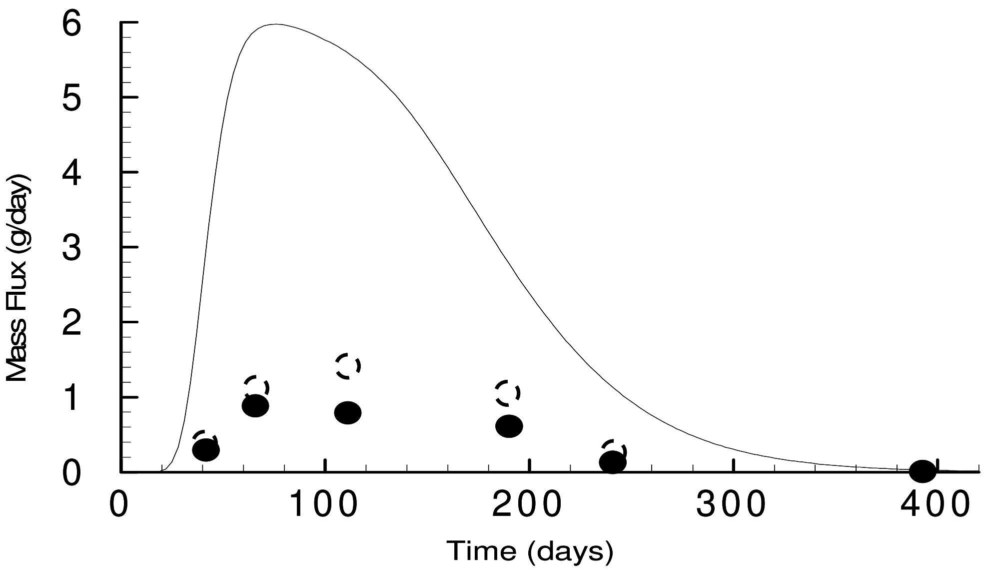

Table 5.2.3.4 The benzene initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 2 in the MTBE (GMT gate) containing plume.

Similar adjustments and comparisons were made for toluene, o-xylene, and 1,2,3 TMB. The values of the initial calculated and the adjusted values of the mass flux in grams per day are given in Table 5.2.3.2 to Table 5.2.3.4. After applying the adjustments, the toluene mass flux still remains much lower than predicted (Table 5.2.3.2). For o-xylene (Table 5.2.3.3) and TMB (Table 5.2.3.4) the mass flux correction suggests a good agreement with the predicted mass flux at least for a period of time.

Table 5.2.3.2 The mass flux values of toluene before and after adjustments at row 2.

Date	Days	Toluene Unadjusted	Toluene Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
20-Nov-04	40	0.58	0.77
16-Dec-04	66	1.98	2.64
03-Feb-05	113	2.34	3.74
19-Apr-05	189	2.11	3.37
08-Jun-05	238	1.88	3.00
15-Nov-05	395	0.89	1.42

Table 5.2.3.3 The mass flux values of o-Xylene before and after adjustments at row 2.

Date	Days	o-Xylene Unadjusted	o-Xylene Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
20-Nov-04	40	0.05	0.06
16-Dec-04	66	0.20	0.26
03-Feb-05	113	0.30	0.48
19-Apr-05	189	0.40	0.64
08-Jun-05	238	0.39	0.62
15-Nov-05	395	0.25	0.40

Table 5.2.3.4 The mass flux values of 1,2,3 tri-methyl benzene before and after adjustments at row 2.

Date	Days	TMB Unadjusted	TMB Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
20-Nov-04	40	0.00	0.00
16-Dec-04	66	0.01	0.01
03-Feb-05	113	0.02	0.03
19-Apr-05	189	0.06	0.09
08-Jun-05	238	0.04	0.06
15-Nov-05	395	0.03	0.05

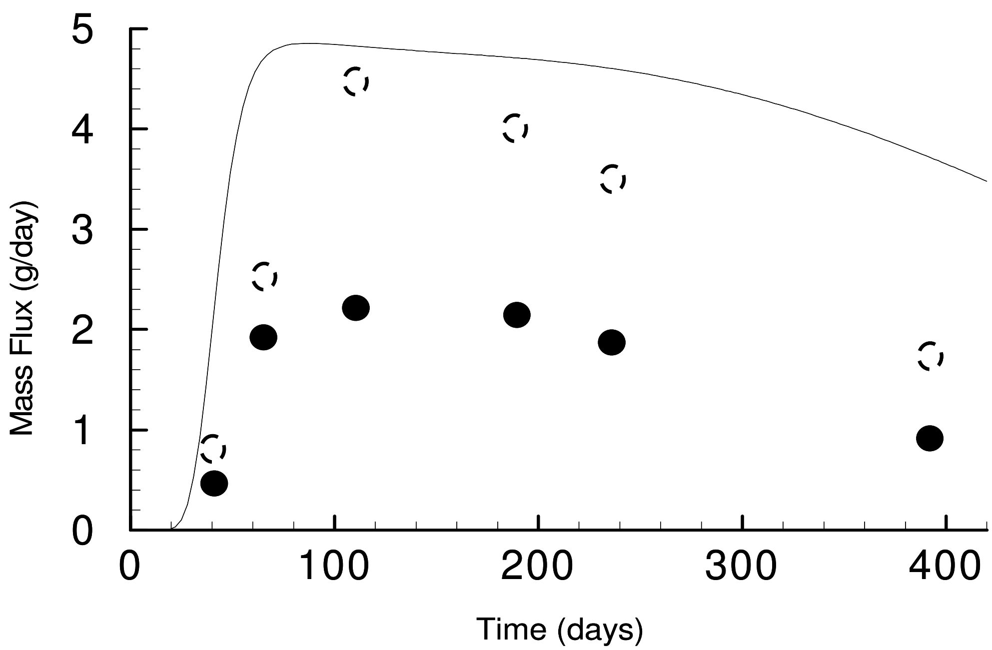

Figure 5.2.3.5 The toluene initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 2 in the MTBE (GMT gate) containing plume.

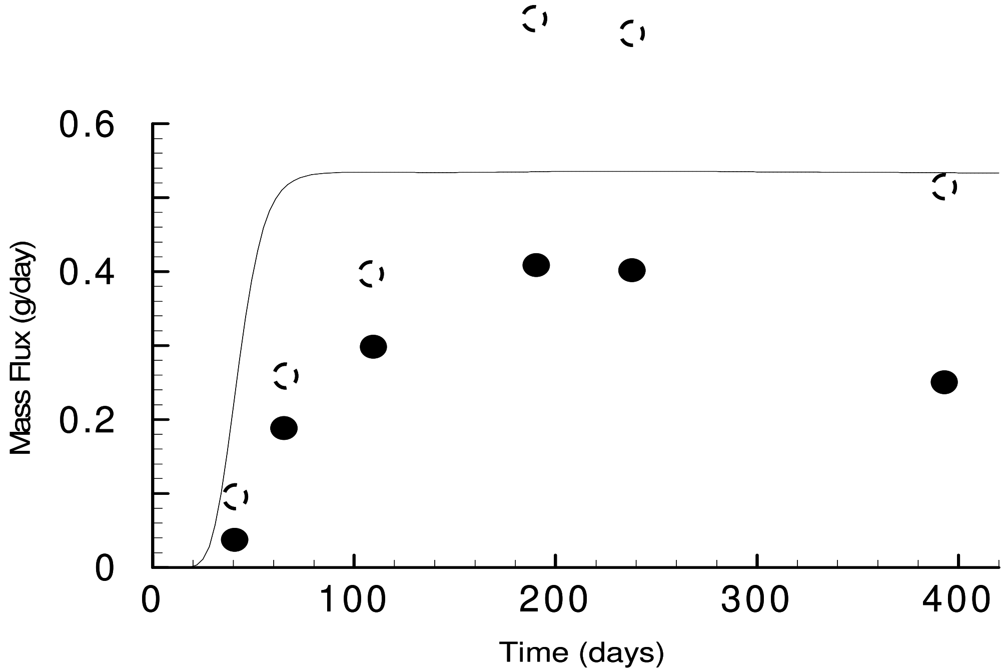

Figure 5.2.3.6 The o-Xylene initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 2 in the MTBE (GMT gate) containing plume.

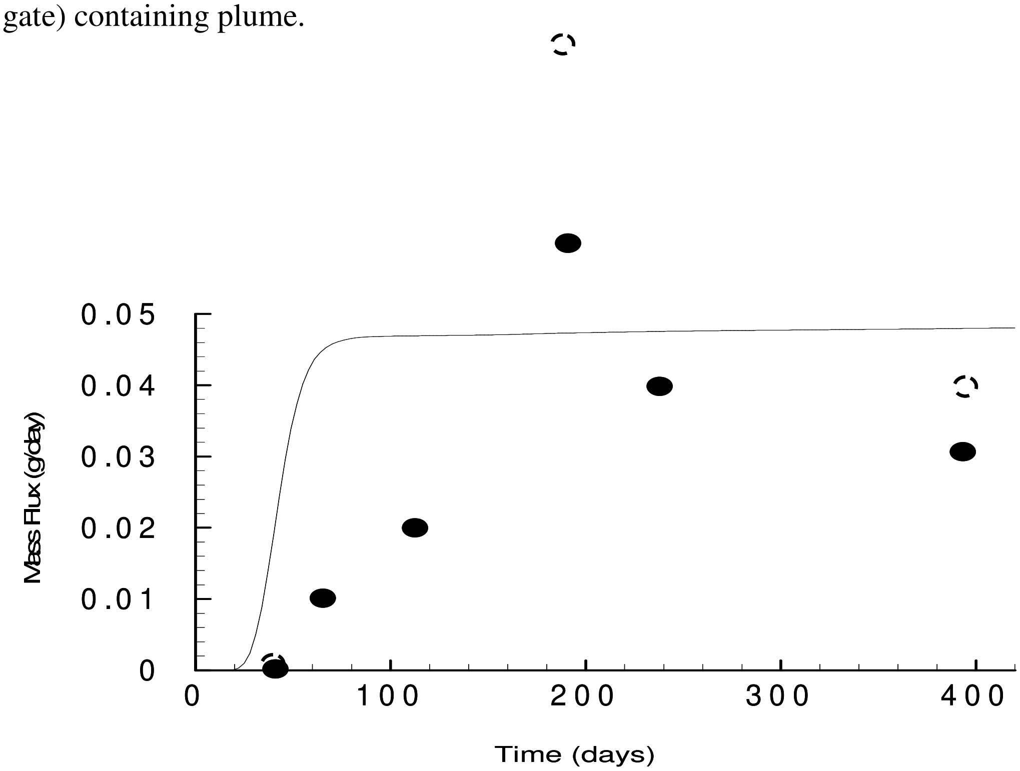

Figure 5.2.3.7 The 1,2,3-TMB initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 2 in the MTBE (GMT gate) containing plume.

The BTX-TMB, GMT gate, Row 3

The benzene (Table 5.2.3.5) and toluene (Table 5.2.3.6) mass flux (Figure 5.2.3.12 and 5.2.3.13) was adjusted applying a 60% adjustment at day 113, 175, and 236. No adjustment was applied to benzene and toluene for 306 and 397 as well as for the o-Xylene (Figure 5.2.3.14) and 1,2,3-TMB (Figure 5.2.3.15). Even after adjustments, the benzene and toluene mass flux represent no more than about 10% of the predicted mass flux, assuming no biodegradation.

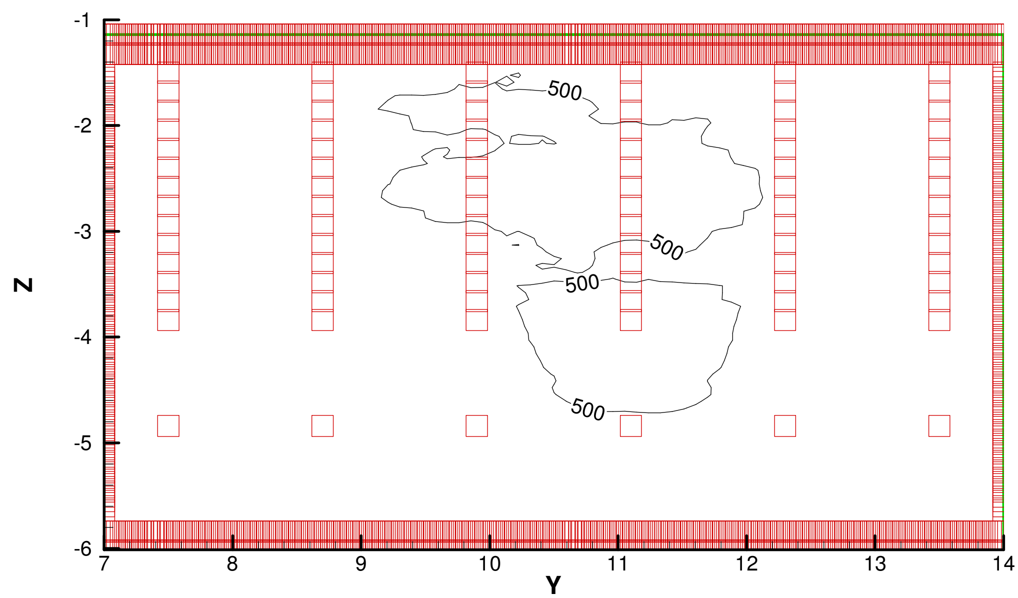

Figure 5.2.3.8 Benzene distribution at row 3, GMT gate, day 113 (3 February 2005).

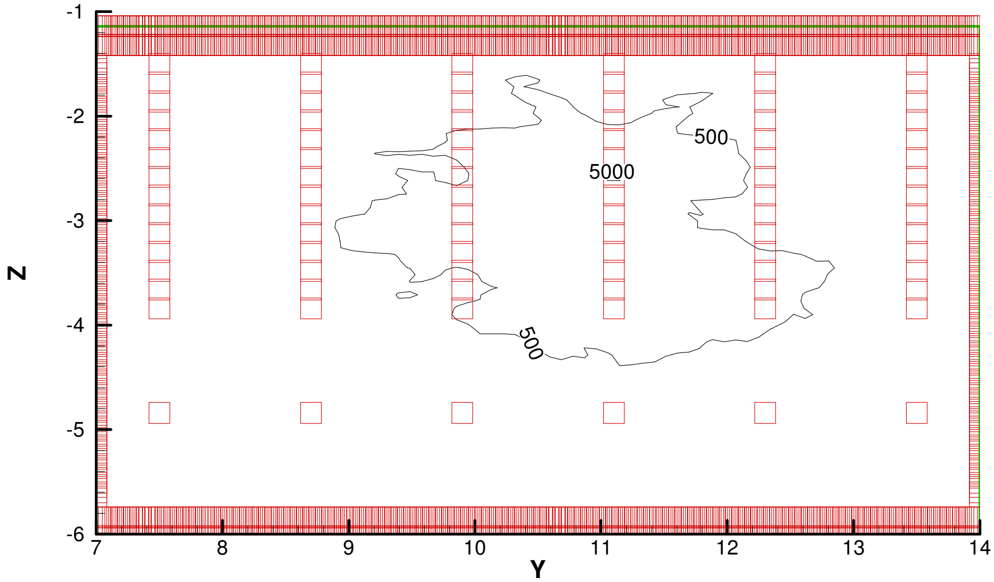

Figure 5.2.3.9 Benzene distribution at row 3, GMT gate, day 175 (5 April 2005).

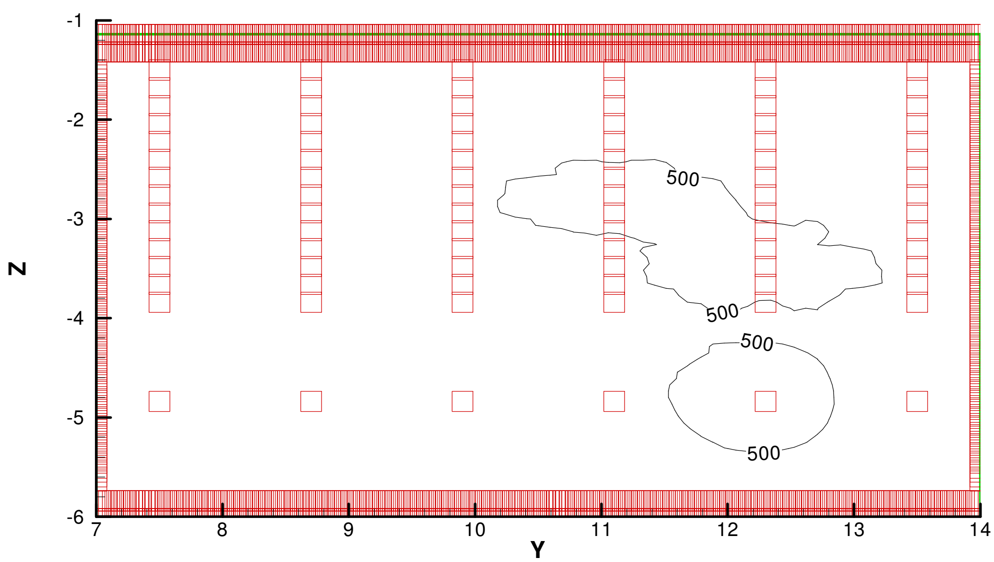

Figure 5.2.3.10 Benzene distribution at row 3, GMT gate, day 236 (6 June 2005).

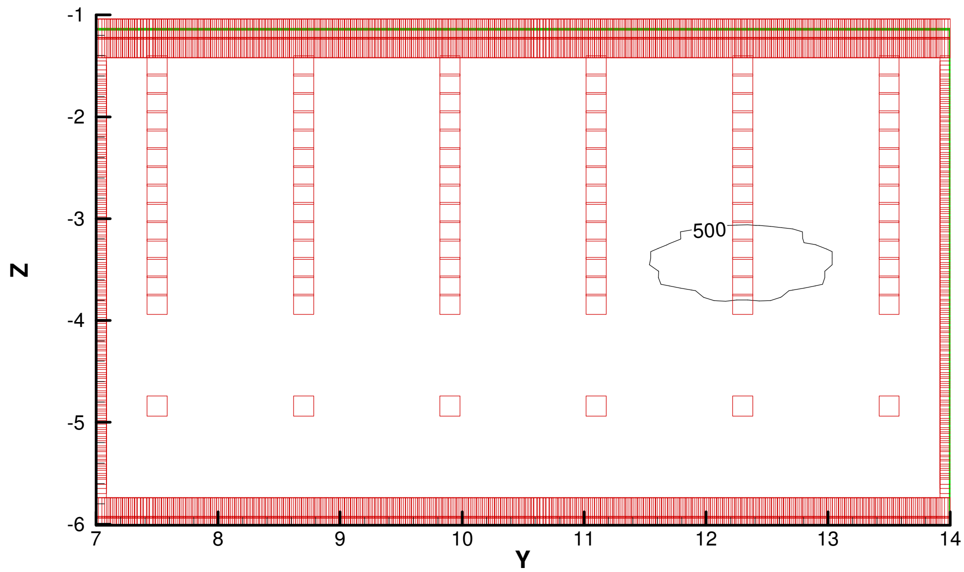

Figure 5.2.3.11 Benzene distribution at row 3, GMT gate, day 306 (16 August 2005).

Table 5.2.3.5 The mass flux values of benzene before and after adjustments at row 3.

Date	Days	Benzene Unadjusted	Benzene Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
22-Jan-05	102		
03-Feb-05	113	0.14	0.22
05-Apr-05	175	0.10	0.13
06-Jun-05	236	0.08	0.11
16-Aug-05	306	0.04	0.04
17-Nov-05	397	0.01	0.01

Table 5.2.3.6 The mass flux values of toluene before and after adjustments at row 3.

Date	Days	Toluene Unadjusted	Toluene Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
22-Jan-05	102		
03-Feb-05	113	0.22	0.35
05-Apr-05	175	0.38	0.60
06-Jun-05	236	0.56	0.89
16-Aug-05	306	0.49	0.49
17-Nov-05	397	0.16	0.16

Table 5.2.3.7 The mass flux values of o-Xylene before and after adjustments at row 3.

Date	Days	o-Xylene Unadjusted	o-Xylene Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
22-Jan-05	102		
03-Feb-05	113	0.02	0.03
05-Apr-05	175	0.07	0.11
06-Jun-05	236	0.16	0.25
16-Aug-05	306	0.18	0.18
17-Nov-05	397	0.09	0.09

Table 5.2.3.8 The mass flux values of 1,2,3 tri-methyl benzene before and after adjustments at row 3.

Date	Days	TMB Unadjusted	TMB Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
22-Jan-05	102		
03-Feb-05	113	0.001	0.002
05-Apr-05	175	0.004	0.007
06-Jun-05	236	0.014	0.022
16-Aug-05	306	0.016	0.016
17-Nov-05	397	0.013	0.013

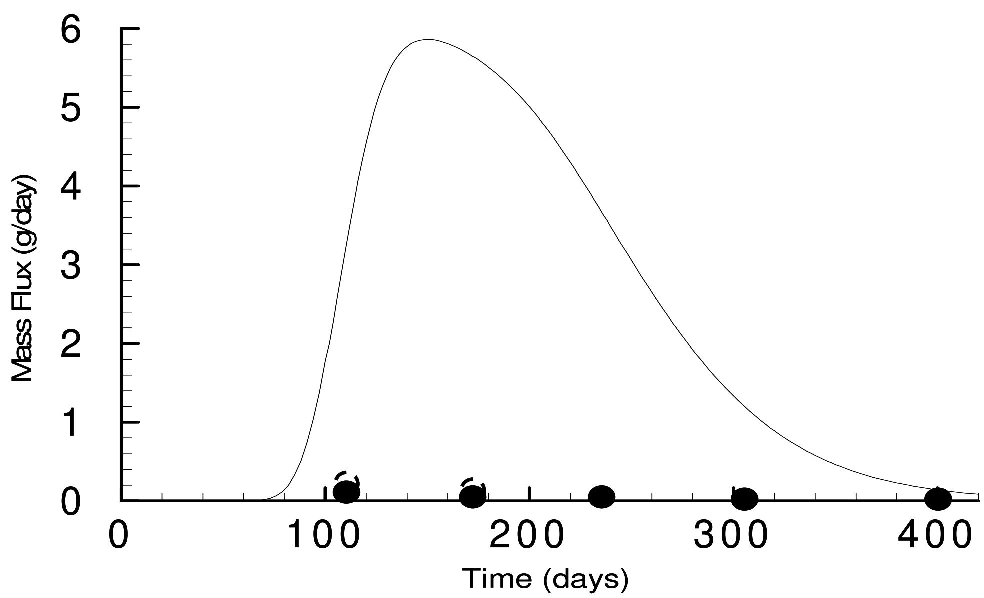

Figure 5.2.3.12 The benzene initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 3 in the MTBE (GMT gate) containing plume.

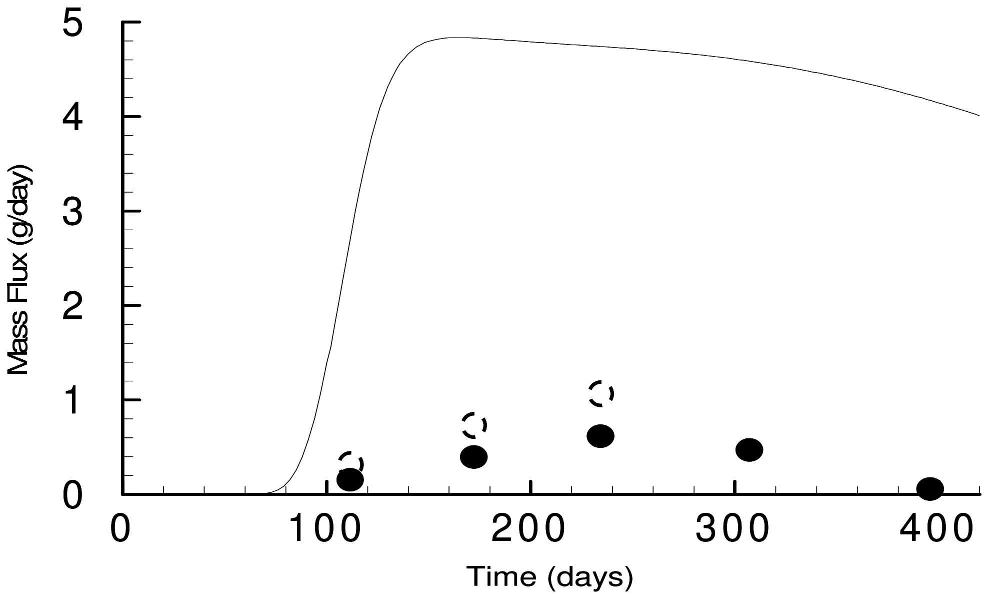

Figure 5.2.3.13 The toluene initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 3 in the MTBE (GMT gate) containing plume.

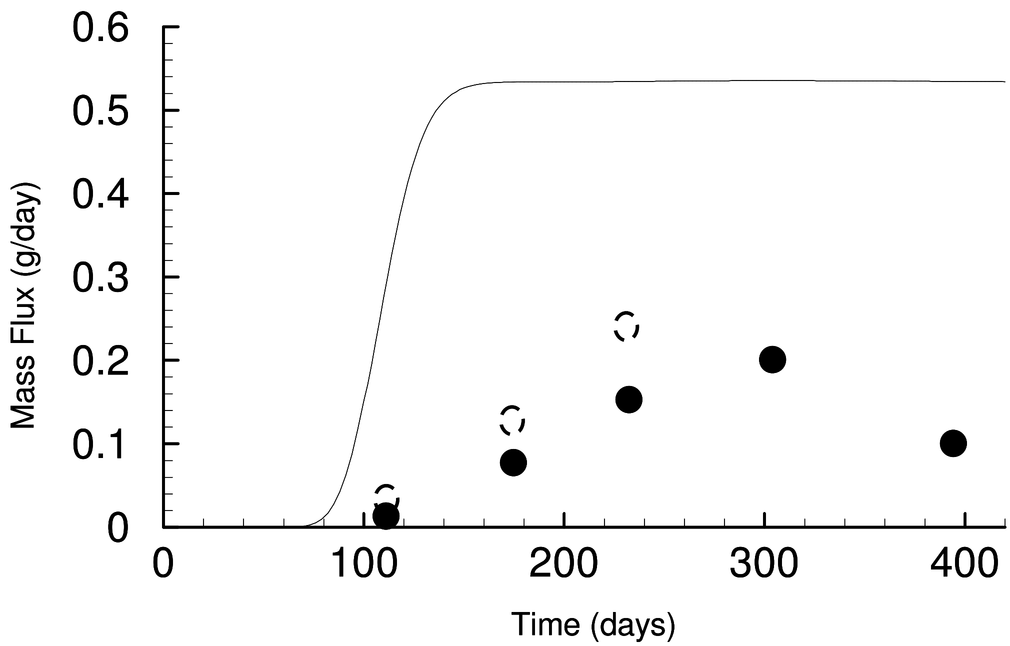

Figure 5.2.3.14 The o-Xylene initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 3 in the MTBE (GMT gate) containing plume.

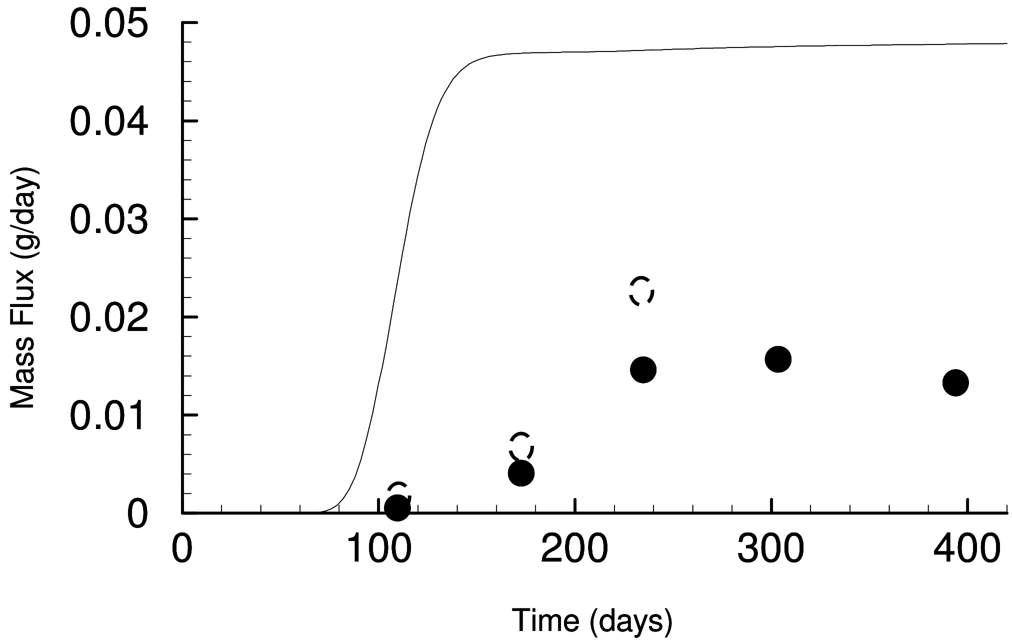

Figure 5.2.3.15 The 1,2,3-tri-methyl benzene initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 3 in the MTBE (GMT gate) containing plume.

The BTX-TMB, GMT gate, Row 4

No adjustment was deemed necessary for the cross-sections for day 183 (Figure 5.2.3.16). The BTX-TMB compounds were adjusted by 60% for days 231 (Figure 5.2.3.17), 306 (Figure 5.2.3.18), and 408 (Figure 5.2.3.19). The unadjusted and adjusted values are summarized in Table 5.2.3.9 to Table 5.2.3.12. However, given the suggested position of the plume after day 183, the calculated and adjusted mass fluxes contain such a high uncertainty that the values of the mass flux cannot be considered reliable.

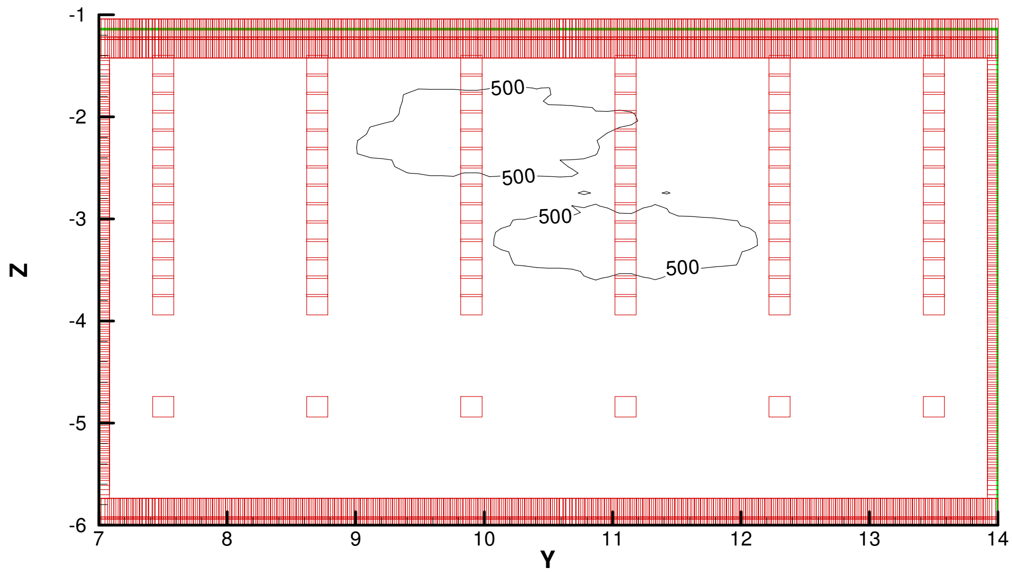

Figure 5.2.3.16 Benzene distribution at row 4, GMT gate, day 183 (13 April 2005).

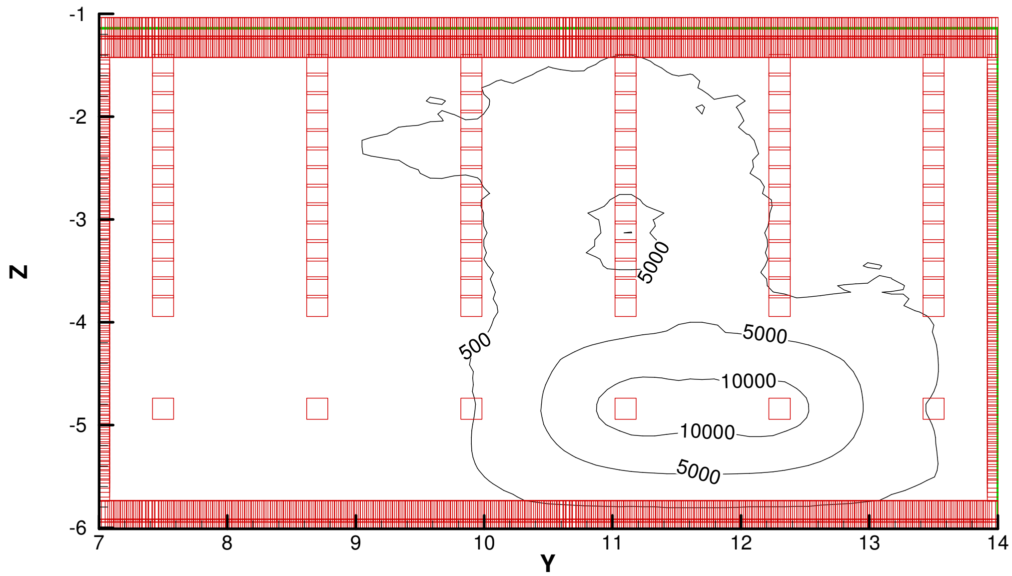

Figure 5.2.3.17 Benzene distribution at row 4, GMT gate, day 231 (1 June 2005).

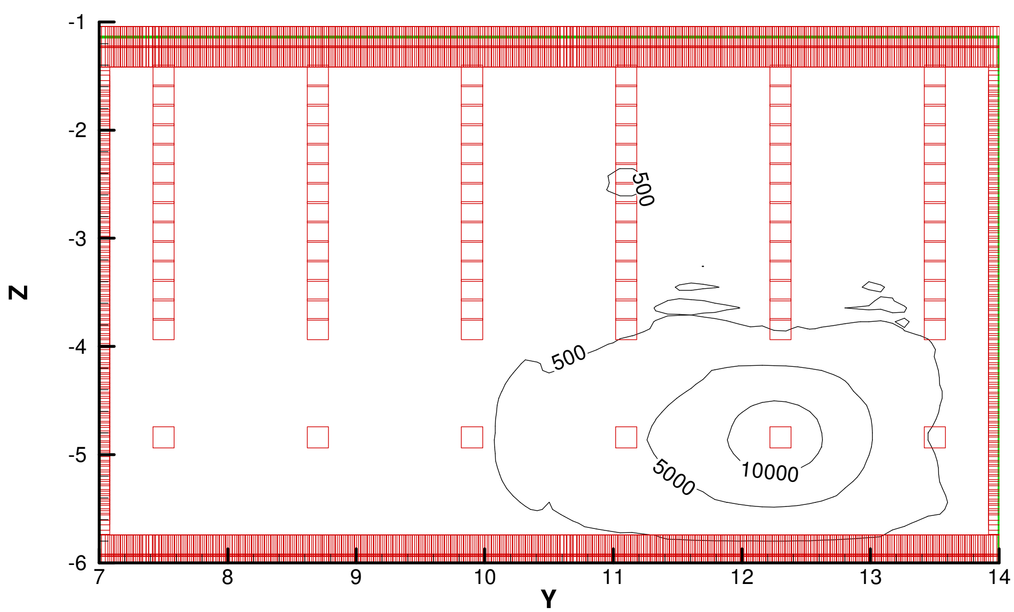

Figure 5.2.3.18 Benzene distribution at row 4, GMT gate, day 306 (16 August 2005).

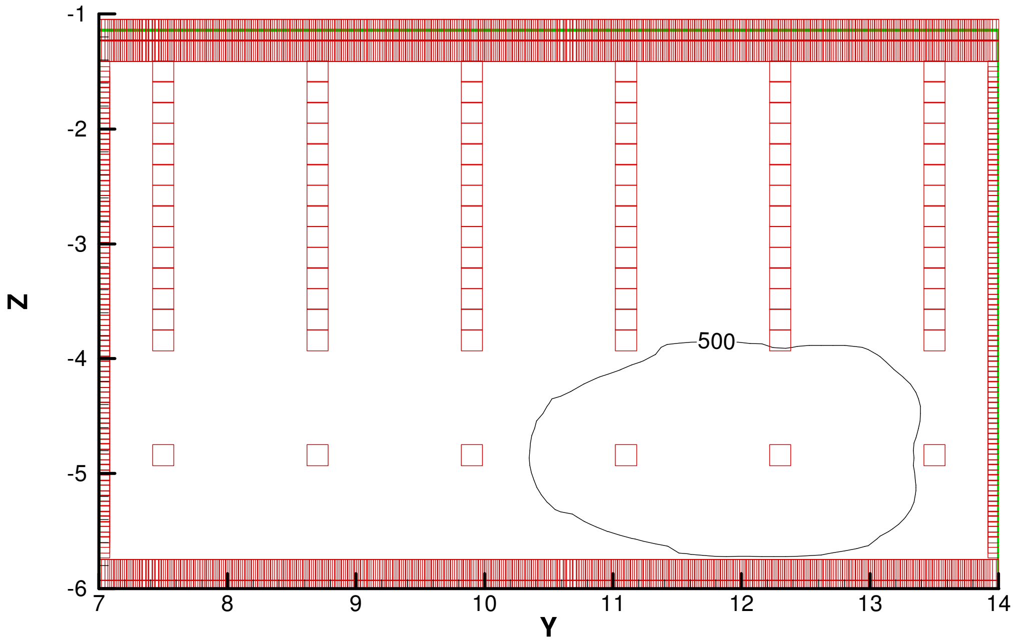

Figure 5.2.3.19 Benzene distribution at row 4, GMT gate, day 408 (28 November 2005).

Table 5.2.3.9 The mass flux values of Benzene before and after adjustments at row 4.

Date	Days	Benzene Unadjusted	Benzene Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
13-Apr-05	183	0.12	0.12
01-Jun-05	231	0.48	0.77
16-Aug-05	306	0.14	0.22
28-Nov-05	408	0.05	0.08

Table 5.2.3.10 The mass flux values of Toluene before and after adjustments at row 4.

Date	Days	Toluene Unadjusted	Toluene Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
13-Apr-05	183	0.12	0.12
01-Jun-05	231	1.57	2.51
16-Aug-05	306	0.40	0.64
28-Nov-05	408	0.33	0.53

Table 5.2.3.11 The mass flux values of o-Xylene before and after adjustments at row 4.

Date	Days	o-Xylene Unadjusted	o-Xylene Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
13-Apr-05	183	0.01	0.01
01-Jun-05	231	0.19	0.30
16-Aug-05	306	0.15	0.24
28-Nov-05	408	0.20	0.32

Table 5.2.3.12 The mass flux values of 1,2,3 tri-methyl benzene before and after adjustments at row 4.

Date	Days	TMB Unadjusted	TMB Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
13-Apr-05	183	0.000	0.000
01-Jun-05	231	0.005	0.008
16-Aug-05	306	0.010	0.016
28-Nov-05	408	0.019	0.030

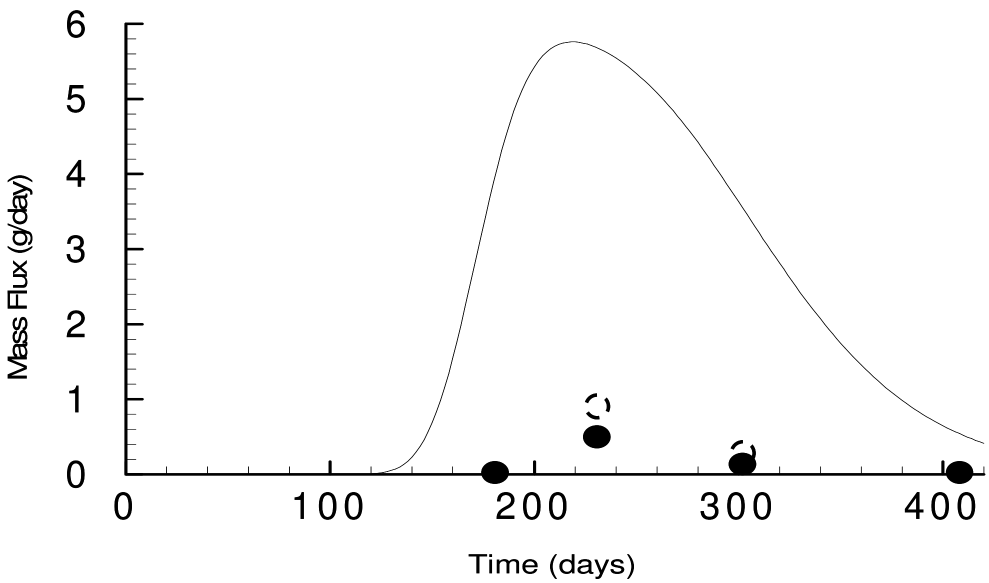

Figure 5.2.3.20 The benzene initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 4 in the MTBE containing plume.

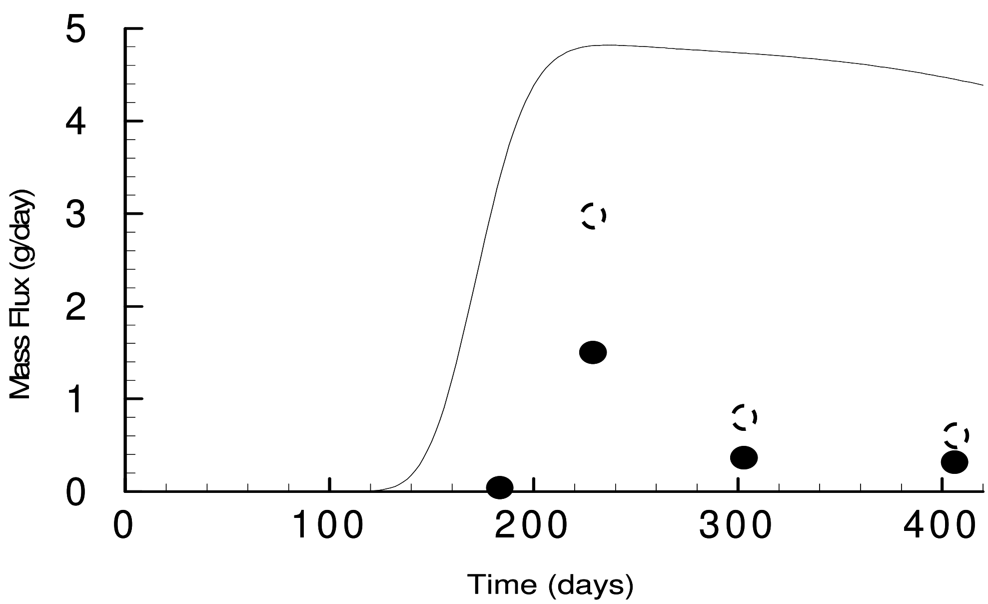

Figure 5.2.3.21 The toluene initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 4 in the MTBE containing plume.

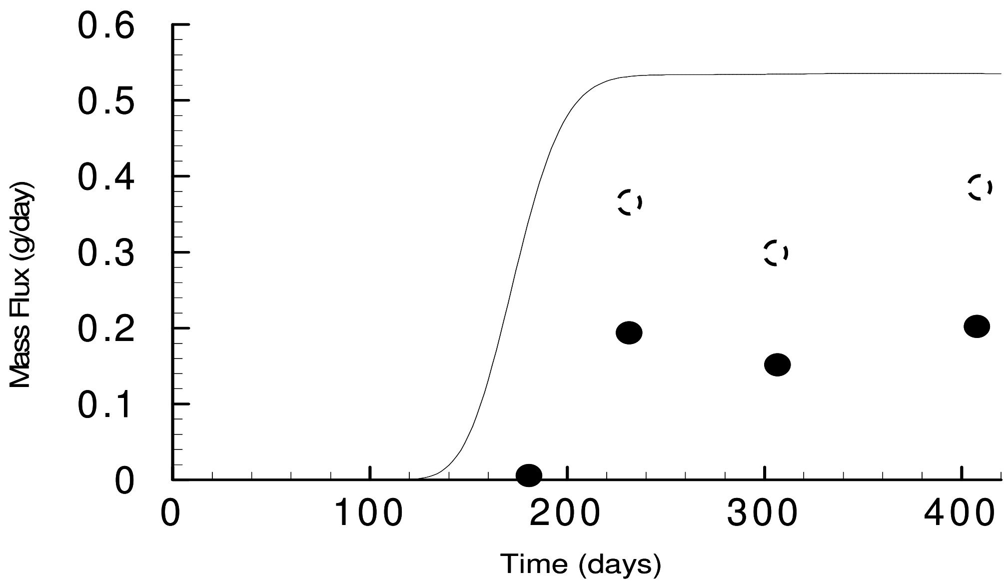

Figure 5.2.3.22 The o-Xylene initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 4 in the MTBE containing plume.

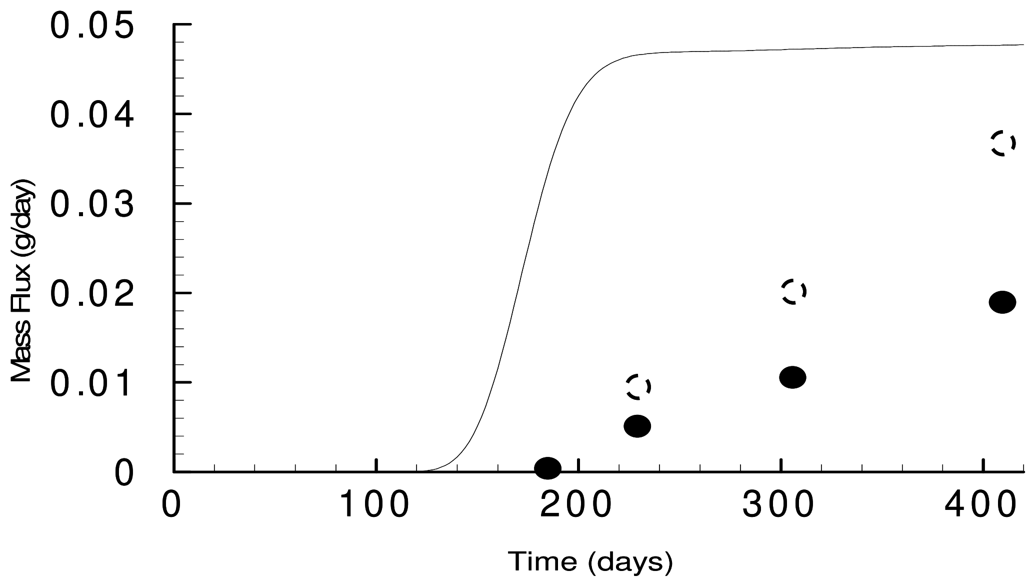

Figure 5.2.3.23 The 1,2,3-tri-methyl benzene initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 4 in the MTBE containing plume.

5.3 The Ethanol Plume from the E10 gate

5.3.1 Positioning of plumes relative to the sampling network and mass flux adjustments

The Ethanol, Row 2

The position of the ethanol plume (Figure 5.3.1.1 and Figure 5.3.1.2) emanating from the E10 source is well captured by the monitoring network at row 2 and did not need adjustments. The calculated values of the ethanol mass flux at row 2 are presented in Table 5.3.1.1. The field mass flux agrees well with the no-biodegradation prediction (Figure 5.3.1.3).

Table 5.3.1.1 The ethanol field mass flux values at row 2.

Date	Days	Ethanol (g/day)
10-Oct-04	0	
20-Nov-04	40	62.80
11-Dec-04	61	56.40
03-Feb-05	113	0.24
19-Apr-05	189	0.00
08-Jun-05	238	0.00
15-Nov-05	395	0.00

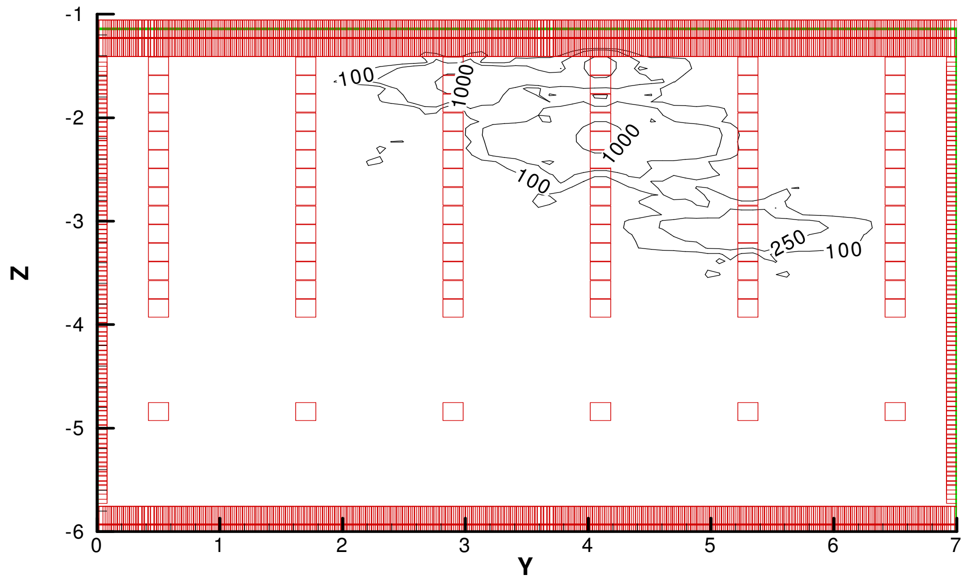

Figure 5.3.1.1 Ethanol distribution at row 2, E10 gate, day 40 (20 Nov. 04).

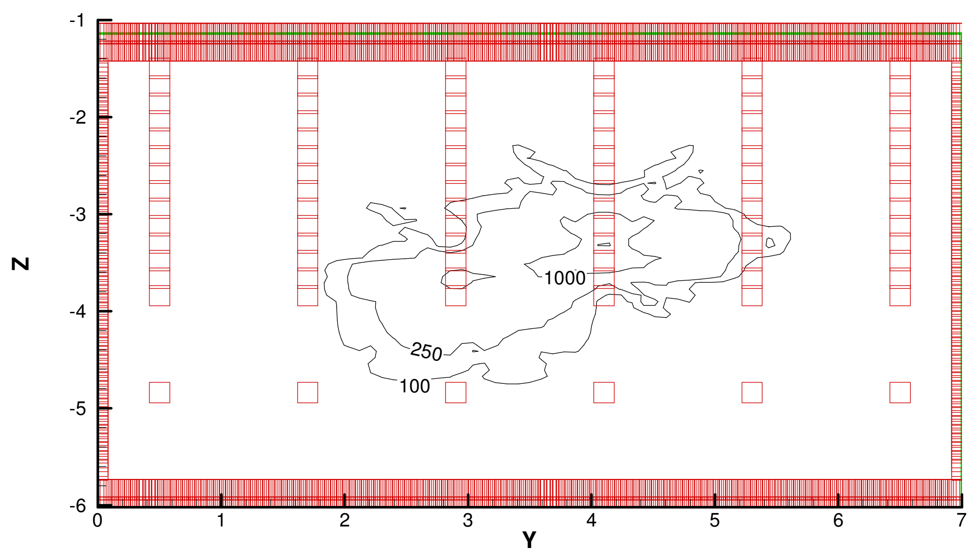

Figure 5.3.1.2 Ethanol distribution at row 2, E10 gate, day 61 (11 Dec. 04).

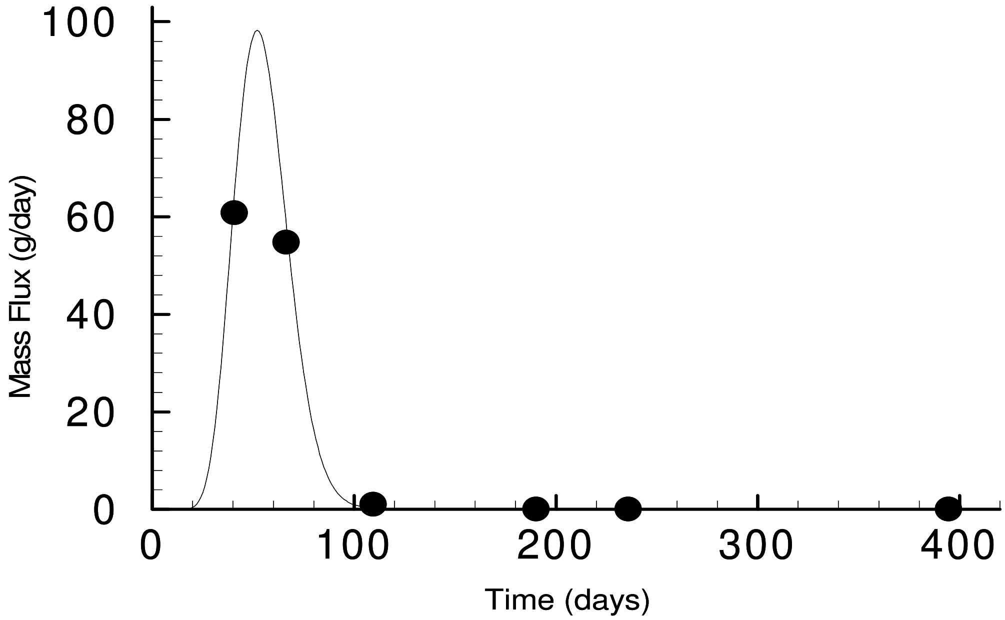

Figure 5.3.1.3 The mass flux of ethanol at row 2 (black dots) in relation to prediction (continuous line).

The Ethanol, Row 3

The ethanol mass flux was adjusted by 60% at day 113 (Figure 5.3.1.4) and by 33% at day 175 (Figure 5.3.1.5). The adjusted mass flux values for ethanol suggest a good agreement with the prediction (Figure 5.3.1.6).

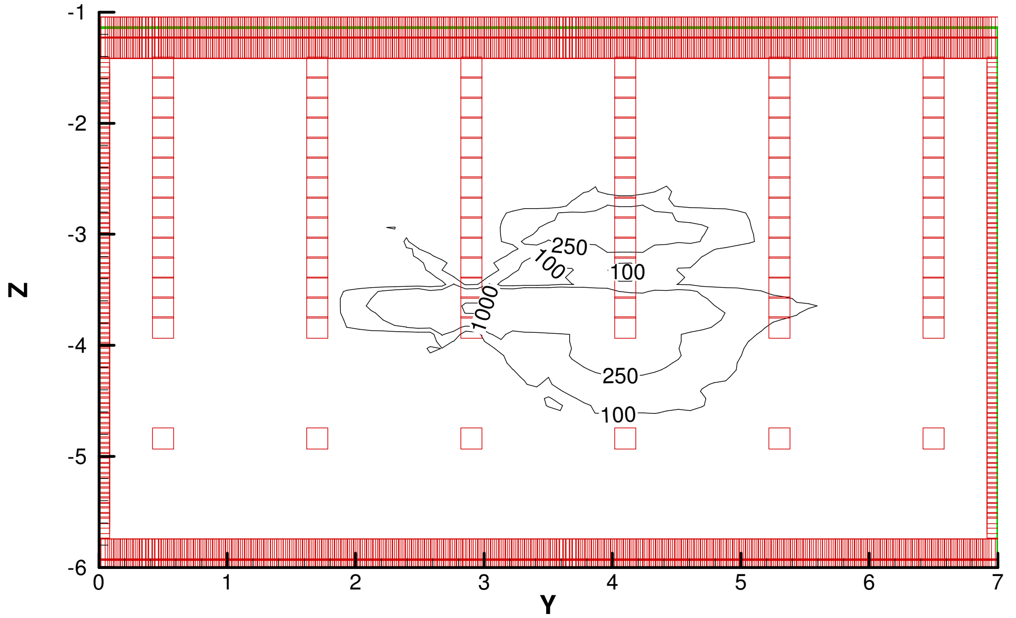

Figure 5.3.1.4 Ethanol distribution at row 3, E10 gate, day 113 (3 February 2005).

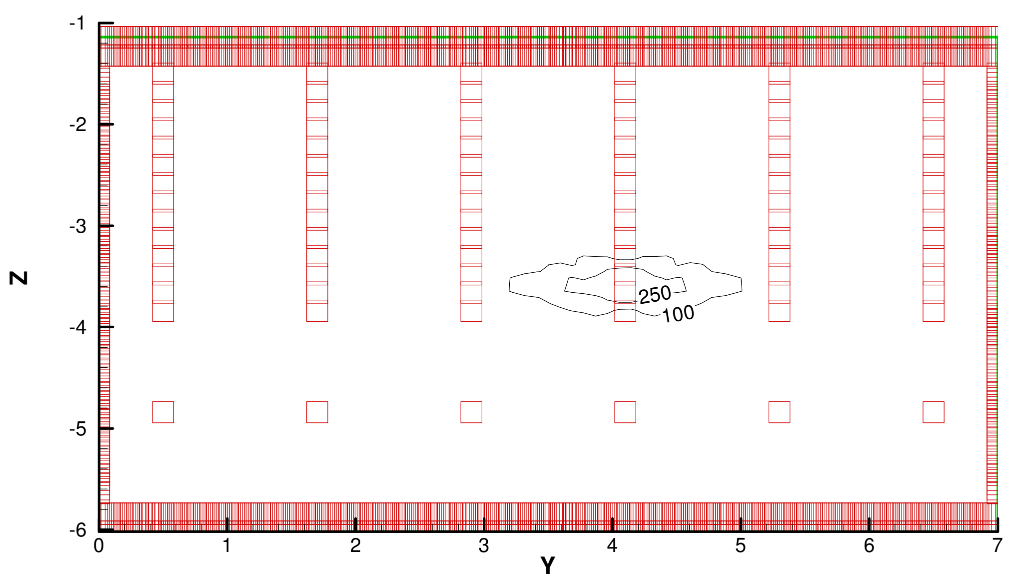

Figure 5.3.1.5 Ethanol distribution at row 3, E10 gate, day 175 (5 April 2005).

Table 5.3.1.2 The mass flux values of ethanol before and after adjustments at row 3, E10 gate.

Date	Days	Ethanol unadjusted	Ethanol adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
03-Feb-05	113	27	43
05-Apr-05	175	6	8
06-Jun-05	236	0	0
16-Aug-05	306	0	0
17-Nov-05	397	0	0

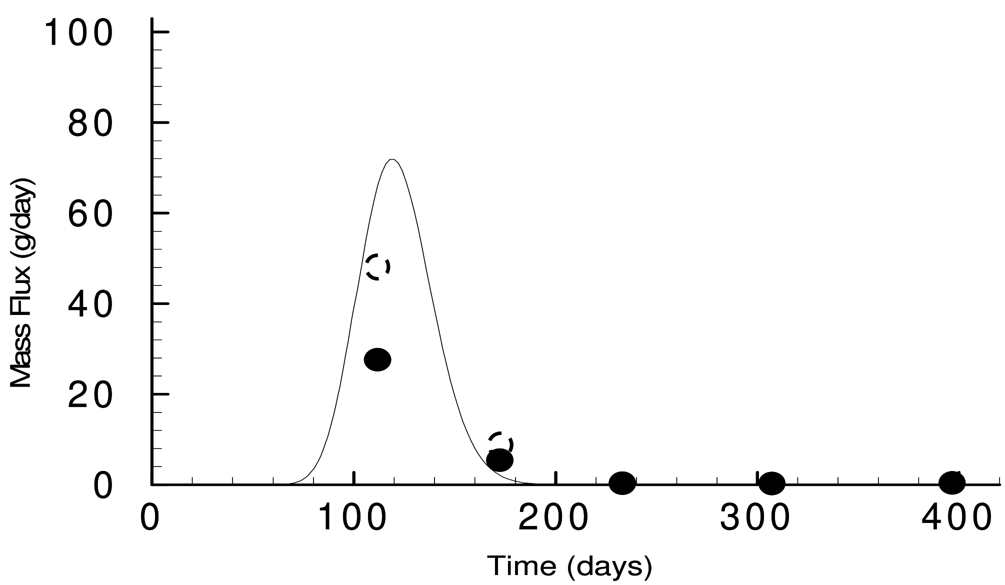

Figure 5.3.1.6 The ethanol initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to the prediction (the continuous line) at row 3 in the ethanol (E10) containing plume.

The Ethanol, Row 4

The ethanol mass flux at row 4 was increased applying an adjustment of 60% at day 183 (Figure 5.3.1.7) and was not adjusted for day 232 (Figure 5.3.1.8). However, the mass flux remains under predicted.

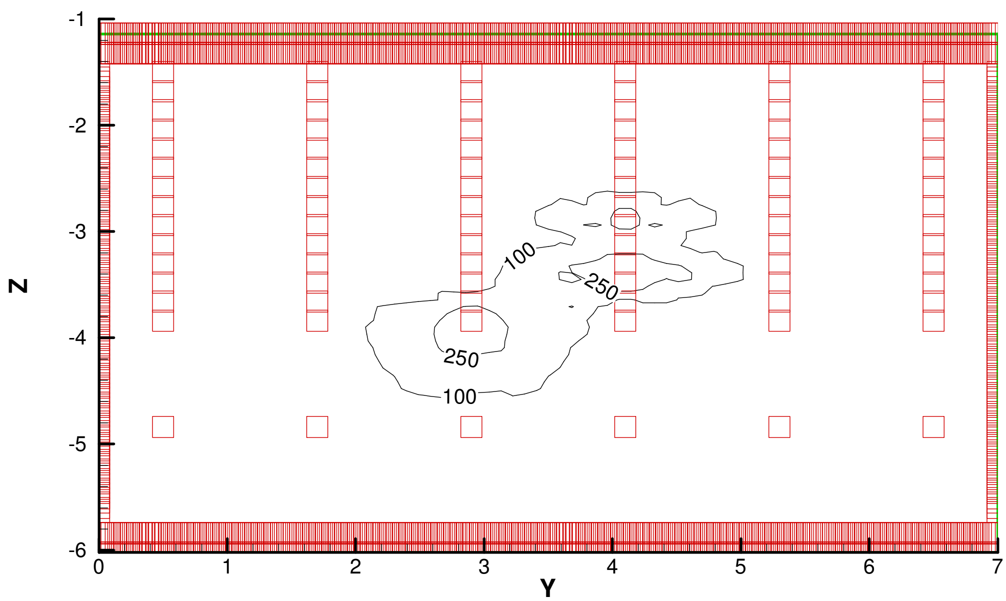

Figure 5.3.1.7 Ethanol distribution at row 4, E10 gate, day 183 (13 April 2005).

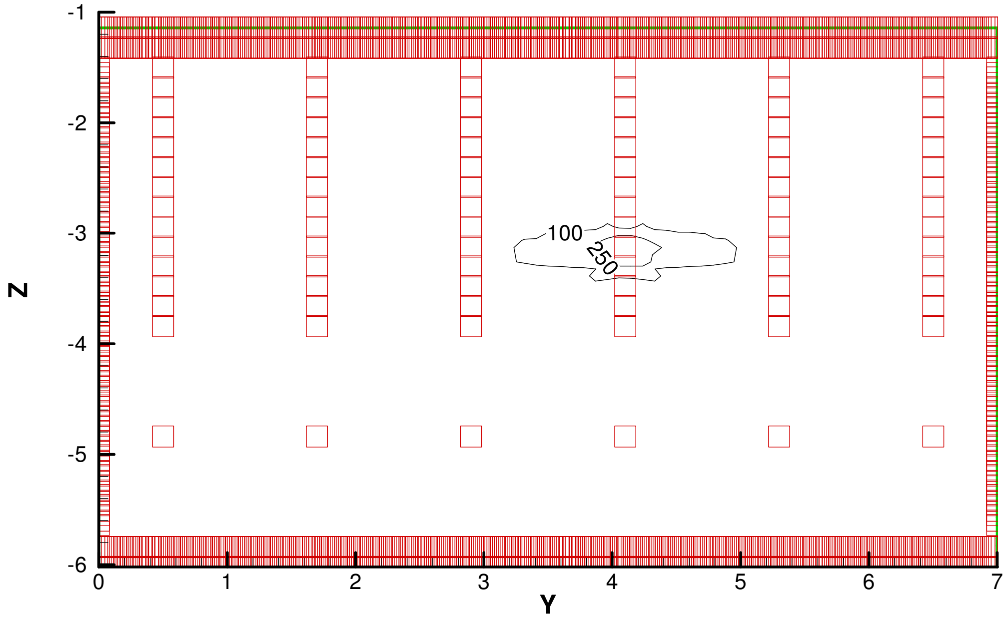

Figure 5.3.1.8 Ethanol distribution at row 4, E10 gate, day 232 (2 June 2005).

Table 5.3.1.3 The mass flux values of ethanol before and after adjustments at row 4, E10 gate.

Date	Days	Ethanol unadjusted	Ethanol adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
22-Jan-05	102		
08-Apr-05	178		
13-Apr-05	183	13	21
02-Jun-05	232	5	5
16-Aug-05	306	0	0
28-Nov-05	408	0	0

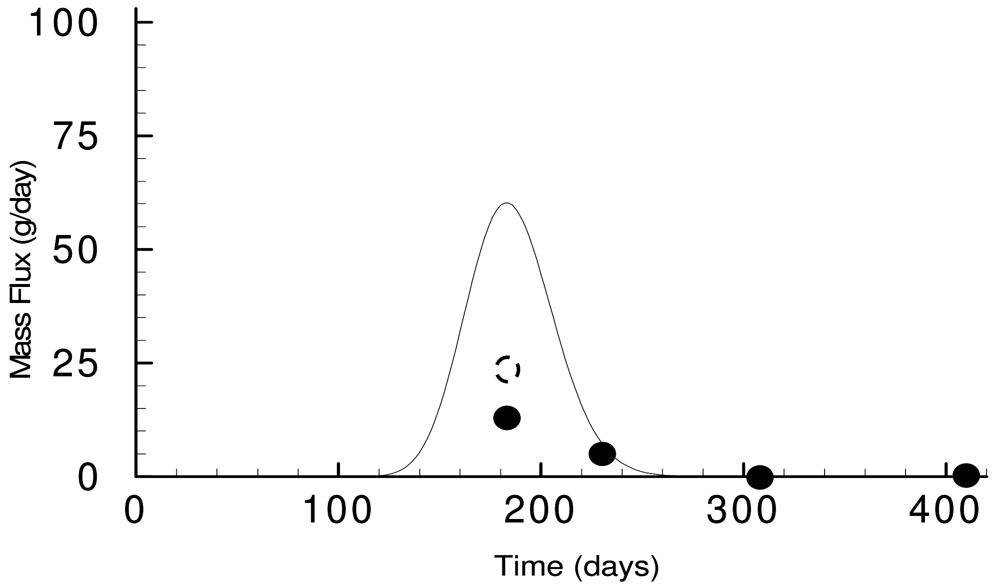

Figure 5.3.1.9 The ethanol initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 4 in the ethanol (E10) containing plume.

5.3.2 The cross-section sampling frequency

As in the case of MTBE and TBA, the effect of sampling event timing was assessed for the ethanol from the E10 source.

At row 2, the concentrations across the cross-section profile (Figure 5.3.2.1), the breakthrough curves (Figure 5.3.2.2), and the values of the mass flux (Figure 5.3.2.3) suggest that the ethanol (E10) mass flux values are well represented by the model. However, only two mass flux sampling events had a significant chance of finding ethanol flux.

At row 3 only two sampling events could have encountered significant ethanol mass (Figure 5.3.2.4 to Figure 5.3.2.6) but at least the adjusted mass flux curve was consistent with the BIONAPL prediction.

At row 4 (Figure 5.3.2.7 to Figure 5.3.2.9) only two events captured significant ethanol flux. The front of the ethanol plume was missed and the mass flux was lower than the predicted mass flux.

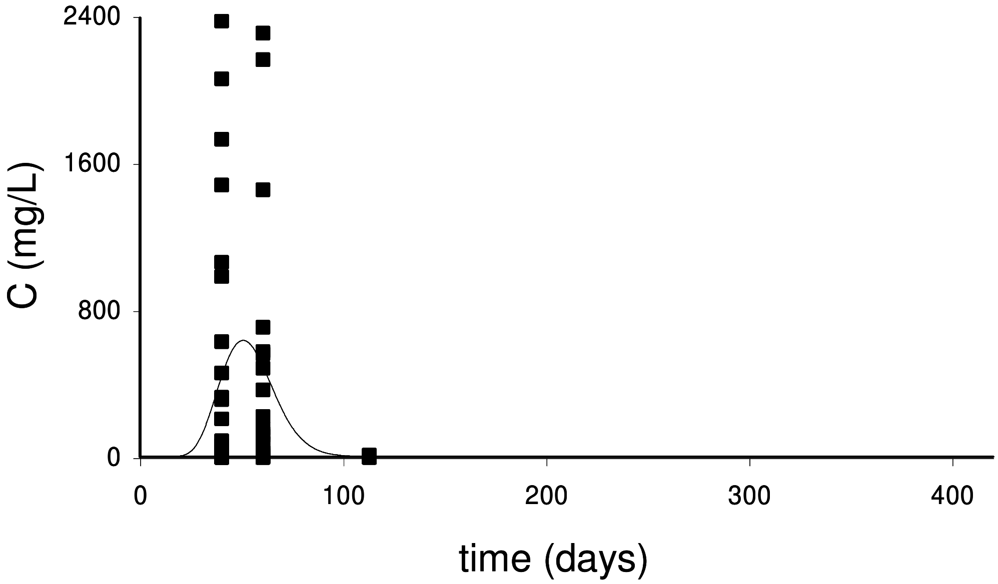

Figure 5.3.2.1 Field and model-predicted concentrations of ethanol detected in cross-section sampling events at row 2.

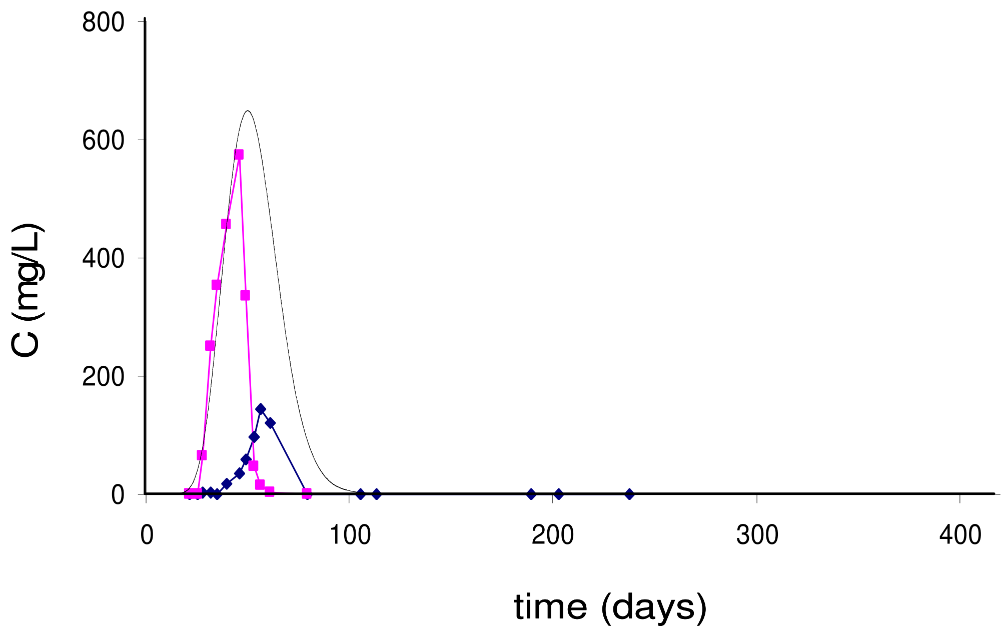

Figure 5.3.2.2 Ethanol (E10) concentration prediction from BIONAPL (solid continuous black line), and 3 field breakthrough curves at row 2 (R2-4-11 in red, R2-2-10 in blue).

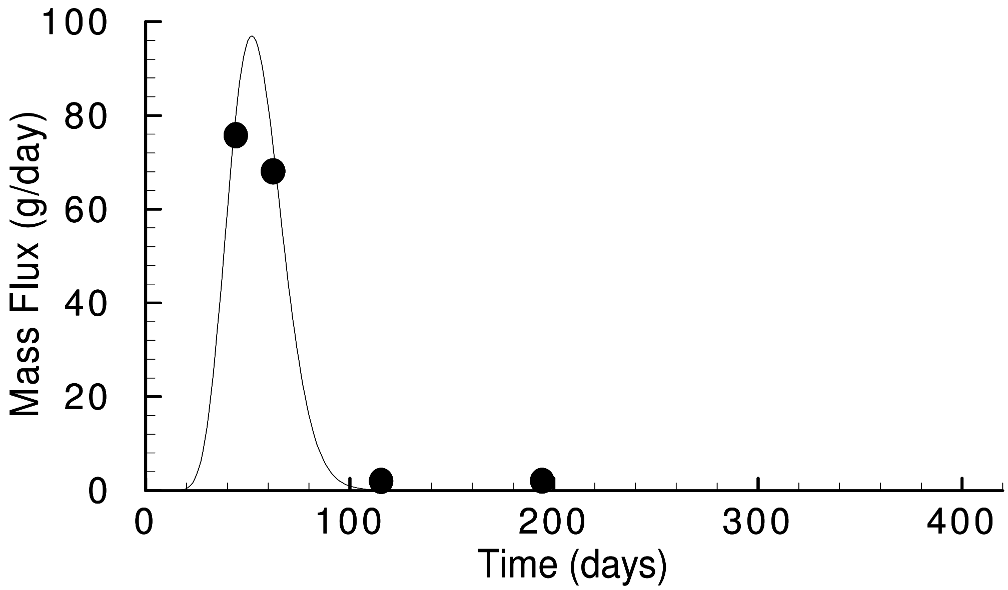

Figure 5.3.2.3 The ethanol mass flux values (black dots) in relation to the prediction (the continuous line) at row 2 in the ethanol (E10 gate) containing plume. No adjustments were necessary for the mass flux values.

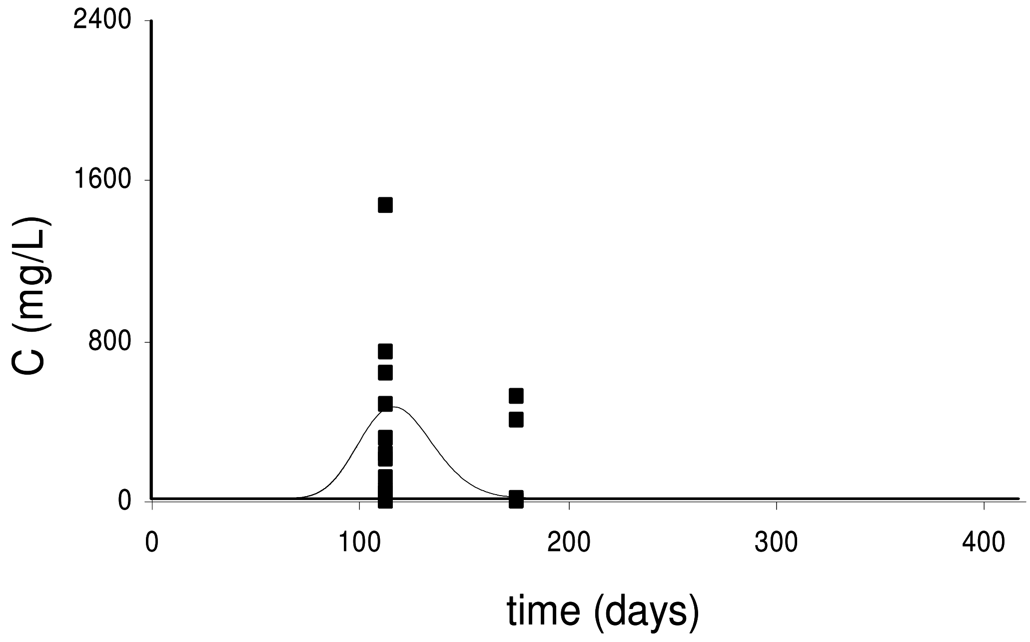

Figure 5.3.2.4 Field and model-predicted concentrations of Ethanol detected in cross-section sampling events at row 3.

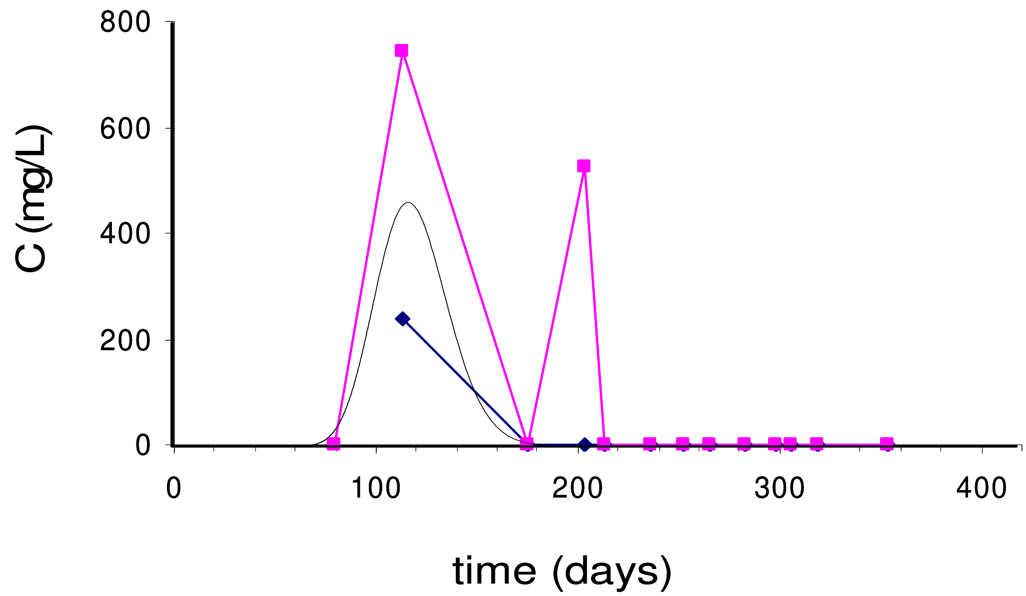

Figure 5.3.2.5 Ethanol (E10) concentration prediction from BIONAPL (solid black line) and field breakthrough curves at row 3.

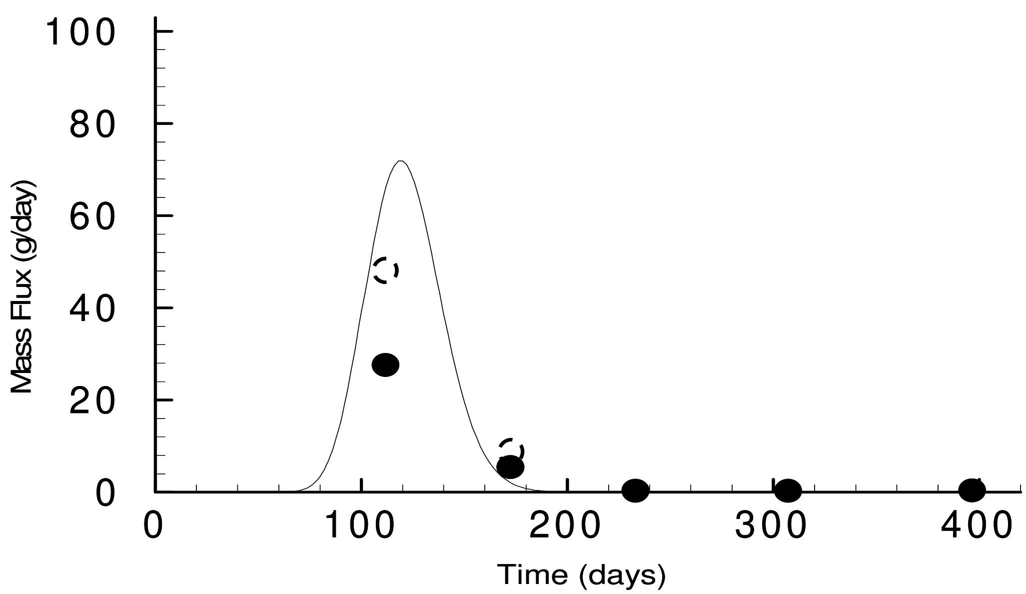

Figure 5.3.2.6 The ethanol mass flux values (black dots) in relation to prediction (the continuous line) at row 3 in the ethanol (E10 gate) containing plume. No adjustments were necessary for the mass flux values.

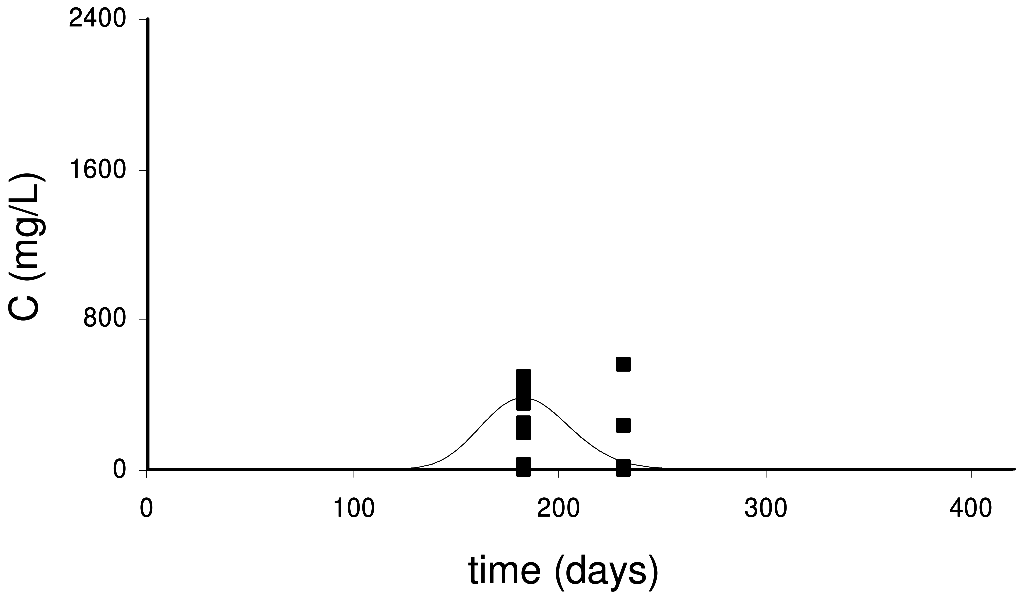

Figure 5.3.2.7 Field and model-predicted concentrations of ethanol detected in cross-section sampling events at row 4.

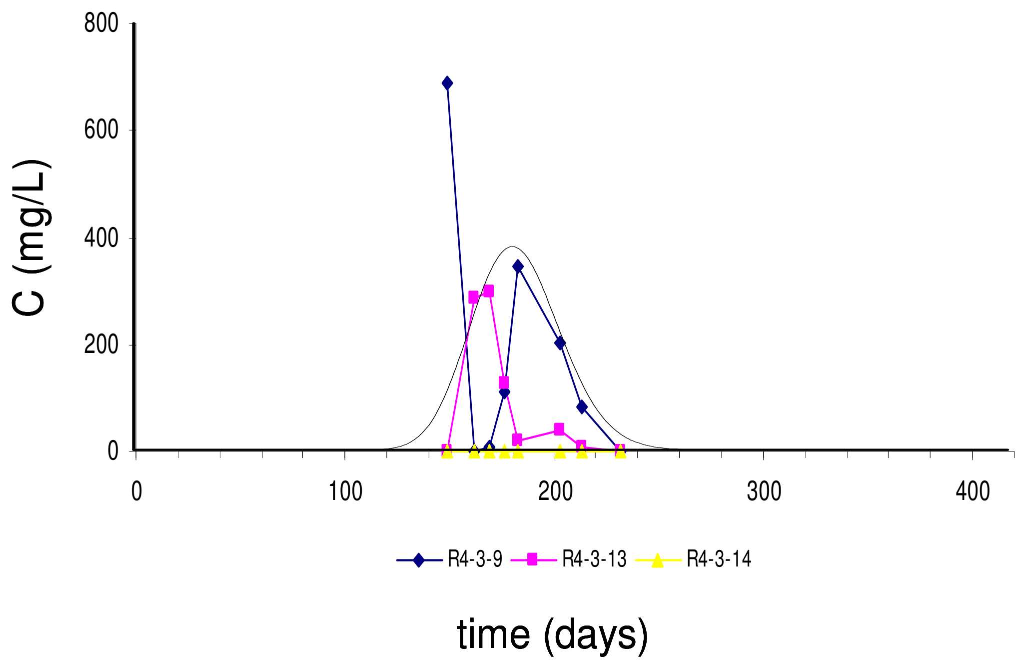

Figure 5.3.2.8 Ethanol (E10) concentration prediction from BIONAPL (solid black line) and 3 field breakthrough curves at row 4.

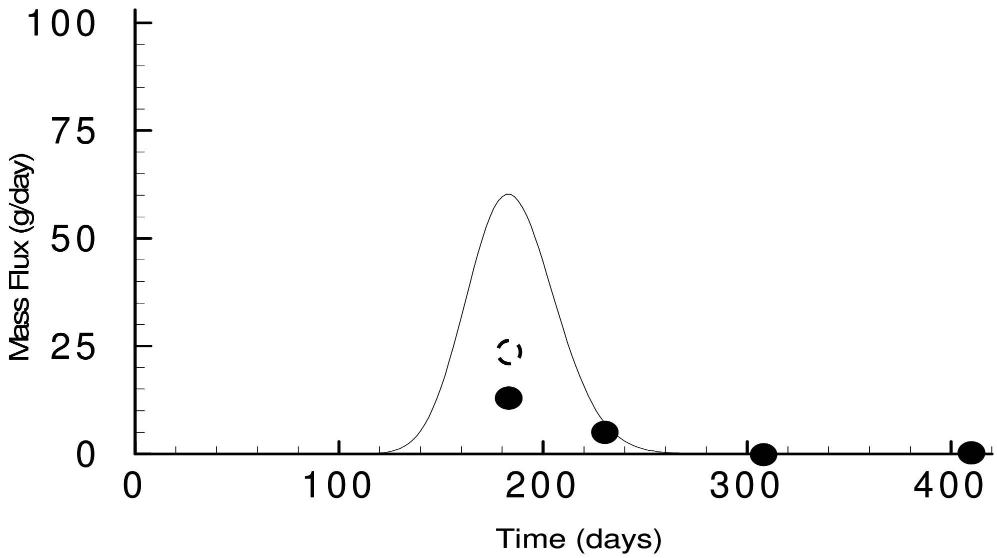

Figure 5.3.2.9 The ethanol mass flux values (black dots) in relation to prediction (the continuous line) at row 4 in the ethanol (E10 gate) containing plume. No adjustments were necessary for the mass flux values.

5.3.3 Benzene, Toluene, o-Xylene, and 1,2,3-Trimethylbenzene (BTX-TMB) in the E10 gate

A similar approach as for the MTBE emanating plume was taken for the ethanol plume from the E10 source when the position of the BTX-TMB was assessed.

The BTX-TMB, E10 gate, Row 2

Adjustments of 33% and 60% to the initial benzene (Table 5.3.3.1) mass flux were applied as required by the benzene plume position relative to the sampling network (Figure 5.3.3.1 to Figure 5.3.3.6). At day 40 (Figure 5.3.3.1), 61 (Figure 5.3.3.2), and 113 (Figure 5.3.3.3), both adjustments were applied while later (Figure 5.3.3.4 to Figure 5.3.3.6) only the 33% of the initial mass flux value adjustment was applied. Even after adjustment, the values of the observed benzene mass flux can account only for approximately 50% of the mass passing when compared to the prediction (Figure 5.3.3.7).

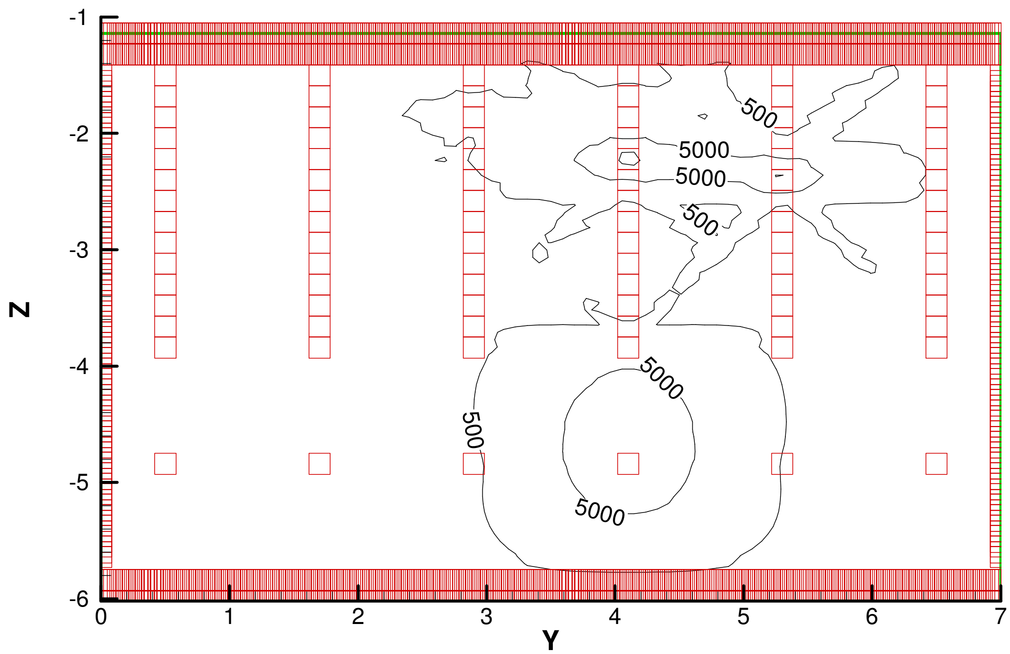

Figure 5.3.3.1 Benzene distribution at row 2, E10 gate, day 40 (20 November 2004).

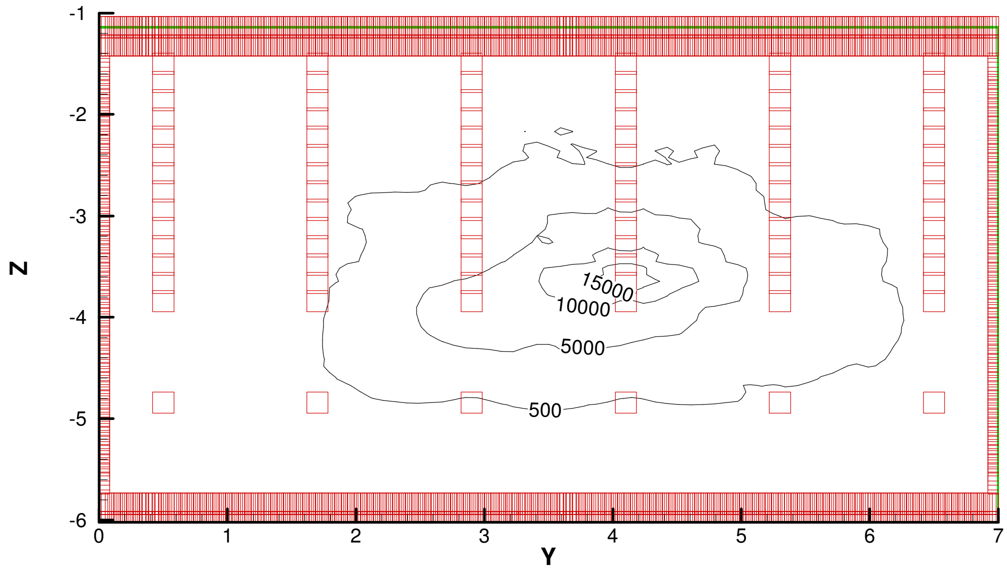

Figure 5.3.3.2 Benzene distribution at row 2, E10 gate, day 61 (11 December 2004).

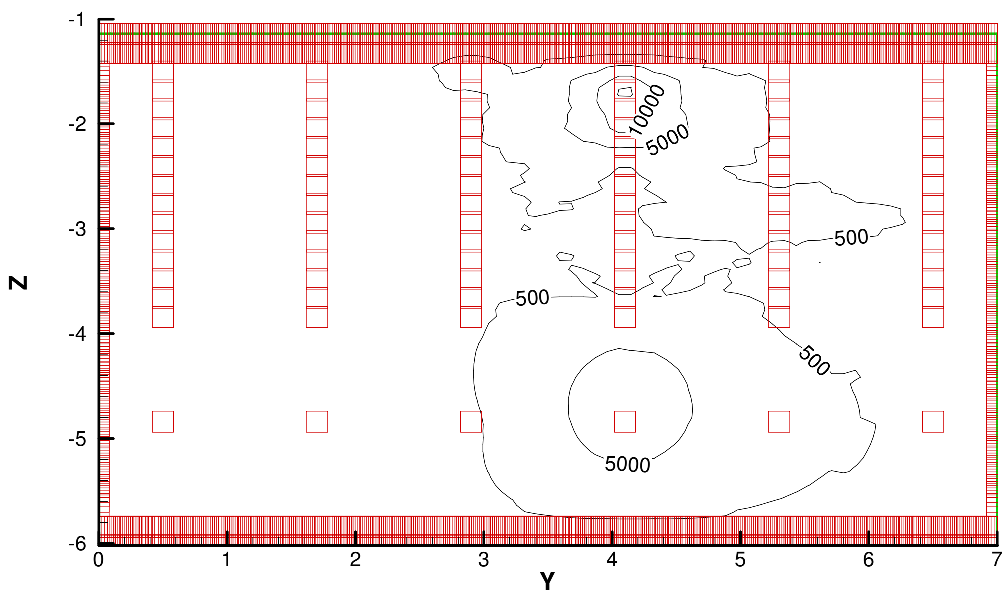

Figure 5.3.3.3 Benzene distribution at row 2, E10 gate, day 113 (February 2005).

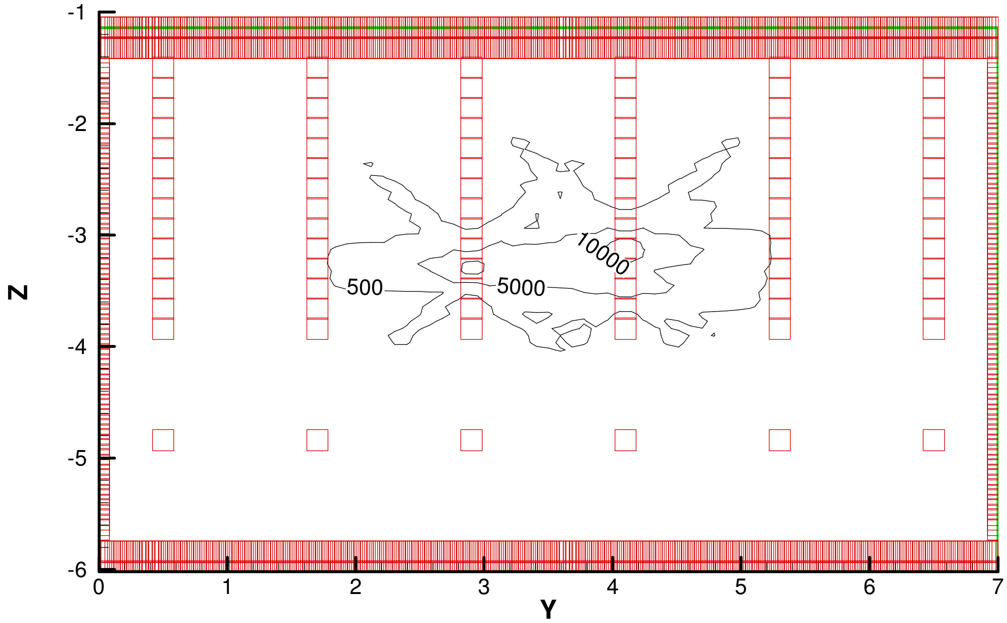

Figure 5.3.3.4 Benzene distribution at row 2, E10 gate, day 189 (19 April 2005).

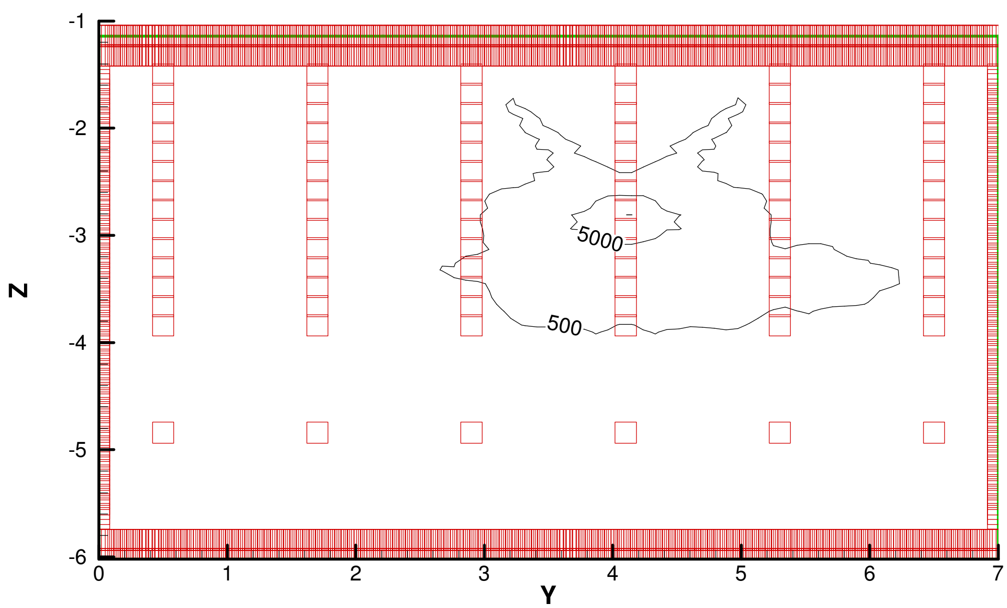

Figure 5.3.3.5 Benzene distribution at row 2, E10 gate, day 238 (8 June 2005).

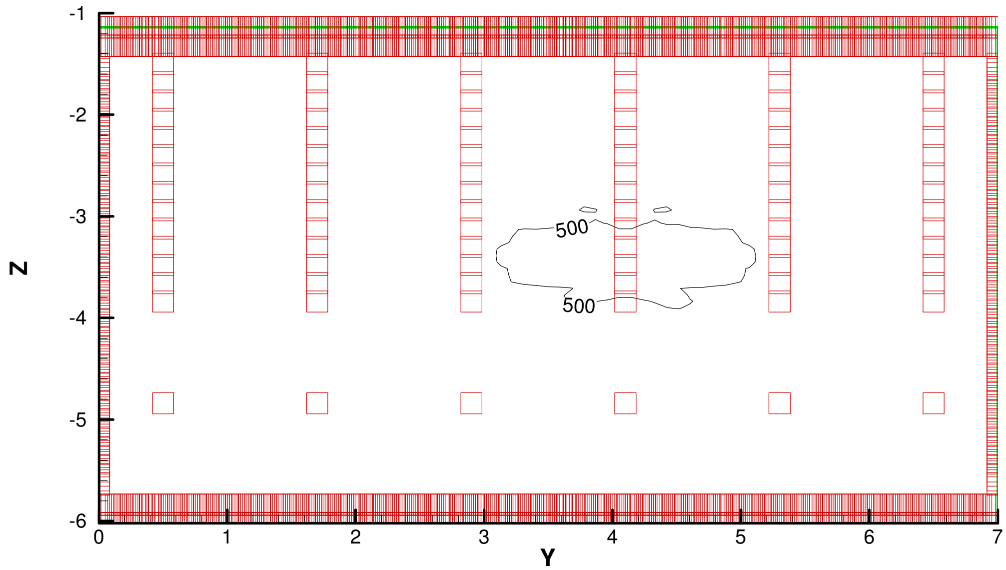

Figure 5.3.3.6 Benzene distribution at row 2, E10 gate, day 395 (15 November 2005).

Table 5.3.3.1 The mass flux values of benzene before and after corrections at row 2, E10 gate.

Date	Days	Benzene Unadjusted	Benzene Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
20-Nov-04	40	0.29	0.46
11-Dec-04	61	0.62	0.99
03-Feb-05	113	0.84	1.34
19-Apr-05	189	0.23	0.30
08-Jun-05	238	0.16	0.22
15-Nov-05	395	0.06	0.08

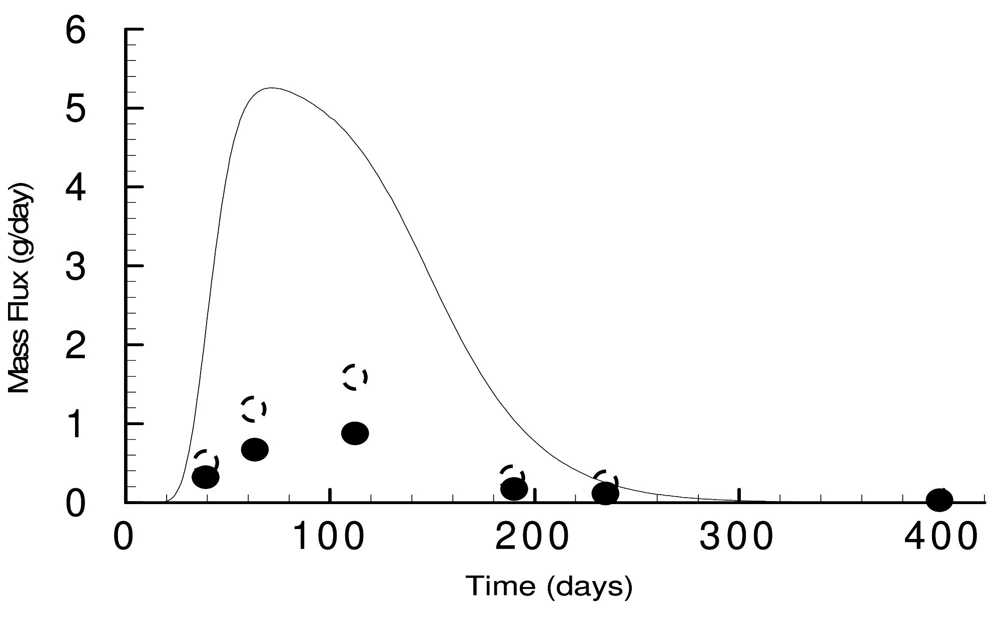

Figure 5.3.3.7 The benzene initial (black dots) and the adjusted (dashed empty circles) mass flux values in relation to prediction (the continuous line) at row 2 in the Ethanol (E10) containing plume.

The adjusted values of the toluene, o-Xylene, and 1,2,3 tri-methyl benzene mass flux presented in Table 5.3.3.2 to Table 5.3.3.4. The mass flux values for toluene, o-Xylene, and 1,2,3 tri-methyl benzene remain more than 50% less than the predicted values.

Table 5.3.3.2 The mass flux values of toluene before and after adjustments at row 2.

Date	Days	Toluene Unadjusted	Toluene Adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
20-Nov-04	40	0.42	0.67
11-Dec-04	61	1.10	1.70
03-Feb-05	113	1.80	2.90
19-Apr-05	189	0.62	0.99
08-Jun-05	238	0.90	1.20
15-Nov-05	395	0.64	0.85

Table 5.3.3.3 The mass flux values of o-Xylene before and after adjustments at row 2.

Date	Days	o-Xylene unadjusted	o-Xylene adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
20-Nov-04	40	0.02	0.03
11-Dec-04	61	0.10	0.16
03-Feb-05	113	0.22	0.35
19-Apr-05	189	0.09	0.12
08-Jun-05	238	0.15	0.21
15-Nov-05	395	0.13	0.17

Table 5.3.3.4 The mass flux values of 1,2,3 tri-methyl benzene before and after adjustments at row 2.

Date	Days	TMB unadjusted	TMB adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
20-Nov-04	40	0.000	0.000
11-Dec-04	61	0.004	0.006
03-Feb-05	113	0.015	0.024
19-Apr-05	189	0.007	0.010
08-Jun-05	238	0.013	0.017
15-Nov-05	395	0.004	0.005

The BTX-TMB, Row 3, E10 gate

In relation to the benzene plume position relative to the monitoring network, an adjustment of 33% was added to all the mass flux values and an additional 60% of the initial mass flux value was added for the days 113, 175, and 397 for all the BTX-TMB components. The adjusted mass flux of BTX-TMB (Table 5.3.3.5 to Table 5.3.3.8) is only about 30-40% of the predicted mass flux.

Table 5.3.3.5 The mass flux values of benzene before and after adjustments at row 3, E10 gate.

Date	Days	Benzene unadjusted	Benzene adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
03-Feb-05	113	0.19	0.30
05-Apr-05	175	0.41	0.66
06-Jun-05	236	0.39	0.52
16-Aug-05	306	0.25	0.33
17-Nov-05	397	0.11	0.17

Table 5.3.3.6 The mass flux values of toluene before and after adjustments at row 3, E10 gate.

Date	Days	Toluene unadjusted	Toluene adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
03-Feb-05	113	0.29	0.46
05-Apr-05	175	0.85	1.40
06-Jun-05	236	1.10	1.50
16-Aug-05	306	1.40	1.80
17-Nov-05	397	0.68	1.10

Table 5.3.3.7 The mass flux values of o-Xylene before and after adjustments at row 3, E10 gate.

Date	Days	o-Xylene unadjusted	o-Xylene adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
03-Feb-05	113	0.02	0.03
05-Apr-05	175	0.09	0.14
06-Jun-05	236	0.15	0.20
16-Aug-05	306	0.24	0.32
17-Nov-05	397	0.14	0.22

Table 5.3.3.8 The mass flux values of 1,2,3 tri-methyl benzene before and after adjustments at row 3, E10 gate.

Date	Days	TMB unadjusted	TMB adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
03-Feb-05	113	0.000	0.000
05-Apr-05	175	0.002	0.003
06-Jun-05	236	0.010	0.013
16-Aug-05	306	0.016	0.021
17-Nov-05	397	0.012	0.020

The BTX-TMB, E10 gate, Row 4

Increases of 60% were applied to the BTX-TMB compounds (Table 5.3.3.9 to Table 5.3.3.12) at days 183, 232, and 306 and only the adjustment of 33% was applied for day 408. The mass flux for all the analyzed components remains over-predicted by about 70% for benzene and by about 50% for the others.

Table 5.3.3.9 The mass flux values of benzene before and after adjustments at row 4, E10 gate.

Date	Days	Benzene unadjusted	Benzene adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
22-Jan-05	102		
08-Apr-05	178		
13-Apr-05	183	0.33	0.53
02-Jun-05	232	0.54	0.86
16-Aug-05	306	0.38	0.60
28-Nov-05	408	0.19	0.25

Table 5.3.3.10 The mass flux values of toluene before and after adjustments at row 4, E10 gate.

Date	Days	Toluene unadjusted	Toluene adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
22-Jan-05	102		
08-Apr-05	178		
13-Apr-05	183	0.53	0.85
02-Jun-05	232	1.10	1.80
16-Aug-05	306	1.20	1.90
28-Nov-05	408	0.95	1.30

Table 5.3.3.11 The mass flux values of o-Xylene before and after adjustments at row 4, E10 gate.

Date	Days	o-Xylene unadjusted	o-Xylene adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
22-Jan-05	102		
08-Apr-05	178		
13-Apr-05	183	0.04	0.06
02-Jun-05	232	0.10	0.16
16-Aug-05	306	0.16	0.26
28-Nov-05	408	0.19	0.25

Table 5.3.3.12 The mass flux values of 1,2,3 tri-methyl benzene before and after adjustments at row 4, E10 gate.

Date	Days	TMB unadjusted	TMB adjusted
		Mass Flux (g/day)	
10-Oct-04	0		
17-Nov-04	37		
22-Jan-05	102		
08-Apr-05	178		
13-Apr-05	183	0.000	0.000
02-Jun-05	232	0.002	0.003
16-Aug-05	306	0.008	0.013
28-Nov-05	408	0.013	0.017

Chapter 6

DISSOLUTION OF OXYGENATES AND BTX-TMB

6.1 The Oxygenates

Dissolution of NAPLs and oxygenated gasolines is typically represented as an equilibrium process by using Raoult's Law to represent mass transfer from the NAPL to the aqueous phase (Frind et al., 1999; Rivett & Feenstra, 2005; Priddle & MacQuarrie, 1994; Molson et al., 2002). Rixey and Joshi (2000), however, provide laboratory evidence that dissolution of MTBE from gasoline residuals was not always well represented in this way and that kinetic aspects may be significant. Another complexity in NAPL source zones was recognized by Russold et al. (2006). This involves repartitioning of dissolved chemicals from upgradient of the NAPL residuals back into the NAPL as advection carries them through the NAPL source zone. In our experiment during injection the oxygenates were likely displaced outward in a radial fashion by the injected water. After the injection stopped and the groundwater gradient reestablished, the upgradient oxygenates could have partitioned back into the gasoline residuals, in a process similar to that simulated by Russold. et al., (2006). This would produce an apparent delay in plume arrival at the fence and a longer than expected duration of the slug. However, given the high solubility of MTBE and of TBA (see Chapter 4), repartitioning of the oxygenates to the NAPL phase would not likely cause a major delay or significant broadening of the dissolved slug.

Evidence for equilibrium dissolution of oxygenates and aromatic hydrocarbons from the GMT and E10 sources were sought in the field aqueous concentration data. With a uniform source, there would be a short-duration “slug” of oxygenated groundwater transported downgradient. If the gasoline residuals had retained significant oxygenate and had formed pools of gasoline of significant thickness, then diffusion through this NAPL could contribute to a kinetic control of oxygenate transfer to pore water and the downgradient slug would show tailing. Also, significant deviations from predictions of downgradient concentration and mass flux distribution derived from the BIONAPL model were sought which could also reflect non-equilibrium NAPL dissolution. However, the low frequency of the cross section sampling events and the limited breakthrough curve monitoring points may not allow a clear conclusion.

The BIONAPL model was run by assuming equilibrium dissolution, essentially following Raoult’s law, for all the NAPL components with downgradient advection and dispersion parameters typical of the Borden aquifer. No retardation or biodegradation of oxygenates or aromatics was considered. As a result, the mass of oxygenates moves downgradient as a somewhat symmetrical “slug” with some longitudinal broadening of the slug and reduction of maximum mass flux due to longitudinal dispersion. Ideally, similar shaped breakthrough curves (concentration vs. time) for ethanol and MTBE/TBA in the GMT and E10 gates would be found. Aquifer heterogeneities are expected to cause more mass and higher concentrations to pass through certain stream tubes and also to cause the slug of oxygenates to advect faster or slower, depending on the average groundwater velocity in each stream tube. This behaviour should be captured in the BIONAPL modeling.

However, a significant tailing of the breakthrough curves or mass flux curves could point to a non-equilibrium dissolution where mass transfer limitations are significant.

The BIONAPL model assumed similar source dimensions for oxygenates and for aromatic hydrocarbons. This was not the case in the field. Due to their high solubilities, mostly all of the oxygenates partitioned mainly in the first injected water and were pushed in a radial fashion from each injection point. Therefore, the oxygenates source would occupy the volume of the injected water but with a very complex spatial distribution. The aromatics, due to their lower solubility remained mainly into the NAPL phase closer to the injection screen creating a smaller NAPL source. Table 6.1 shows the aqueous concentrations that would result if all the oxygenates had been dissolved uniformly in the injected water. Such a uniform dissolved concentration is unlikely as the initial water contacting the gasoline should extract the greatest proportion of each oxygenate and so smaller volumes may have reached much higher concentrations, even under equilibrium partitioning. So the injection of water along with gasoline by using 45 injection points in each source likely created a complex and non homogeneous initial distribution of the water-soluble oxygenates. This complexity was not captured by the BIONAPL model. Therefore, the downgradient data was really examined for non-ideal dissolution, where non-idealities include non-equilibrium dissolution and non-uniform initial NAPL and groundwater concentrations.

Table 6.1 The estimated source concentrations of the oxygenates (mg/L) in the groundwater after the free phase was removed from the source.

Source	TBA	MTBE	Ethanol
GMT	33	2100	NA
E10	NA	NA	1800

In any event, the near-source groundwater samples (row M and row 2) were examined for evidence of non-ideal dissolution; specifically, tailing of the breakthrough curves and mass flux versus time curves. Equilibrium dissolution could be assessed from comparison of the simulated concentrations generated by BIONAPL with the observed concentrations detected at row 2. As long as the diffusion/dispersion processes are accurately incorporated in the model and biodegradation is not significant, the field concentrations would be similar to concentrations suggested by the model.

The monitoring points closest to the injected source are in Row M, 1.75 m downgradient of the source injection wells. However, the M sampling points were installed only to the depth of the top of the target injection zone (2.1 m b.g.s) to check if free phase was moving upward toward the watertable after injection. Nevertheless, these sampling points which are close to the source may provide useful information about dissolution of contaminants before the confounding effect of transport in the heterogeneous media becomes evident. Data from monitoring points in Row 2 (3.5 m downgradient of the sources) of GMT and E10 were also examined for evidence of non-equilibrium oxygenate dissolution.

6.1.1 Dissolution of MTBE and TBA

The apparent symmetry and short duration of the MTBE and TBA breakthrough curves (M2-6) (Figure 6.1.1.1) is consistent with equilibrium dissolution. However, the monitoring was not frequent and so the "symmetry" may be only apparent.

The breakthrough curves in row 2 show a fair agreement between the BIONAPL-predicted and the field breakthrough curves with respect to the length of the oxygenate slugs (Figure 6.1.1.2 and Figure 6.1.1.3) and are probably consistent with an equilibrium dissolution of the oxygenates. The position of the oxygenate slugs in time seems to be delayed compared to the prediction (Figure 6.1.1.2, Figure 6.1.1.3). The fact that the MTBE and TBA maximum concentration in the simulated breakthrough curve is lower than predicted, could reflect that the sampling points are not within the "core" of the plume.

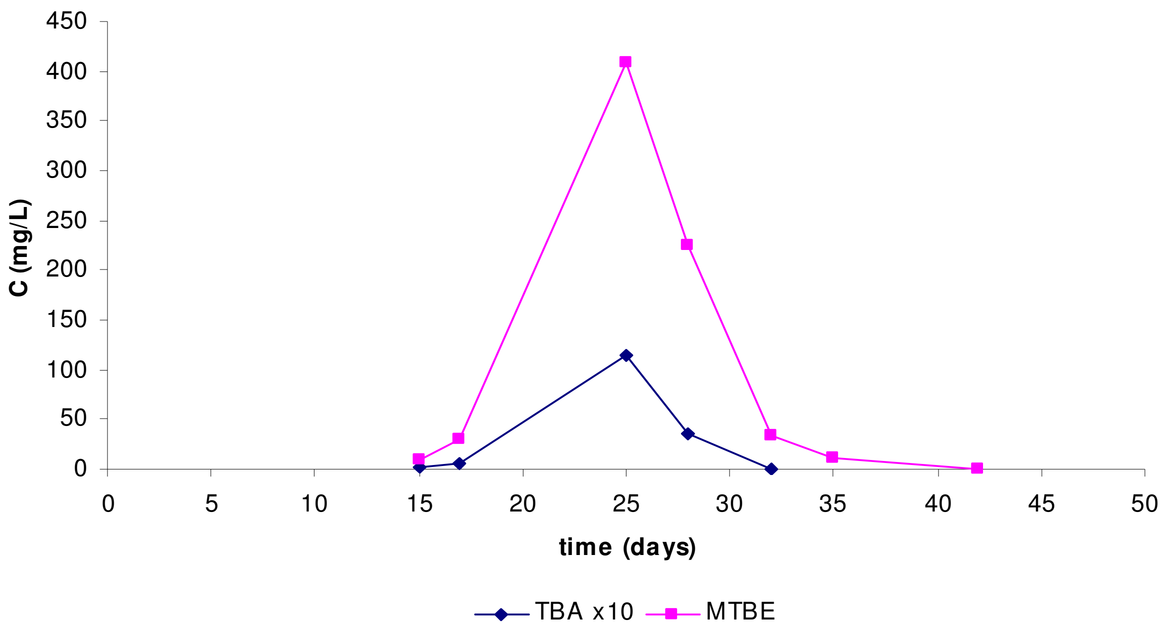

Figure 6.1.1.1 The observed MTBE (red) and TBA (blue) breakthrough curves (M2-6 from GMT gate).

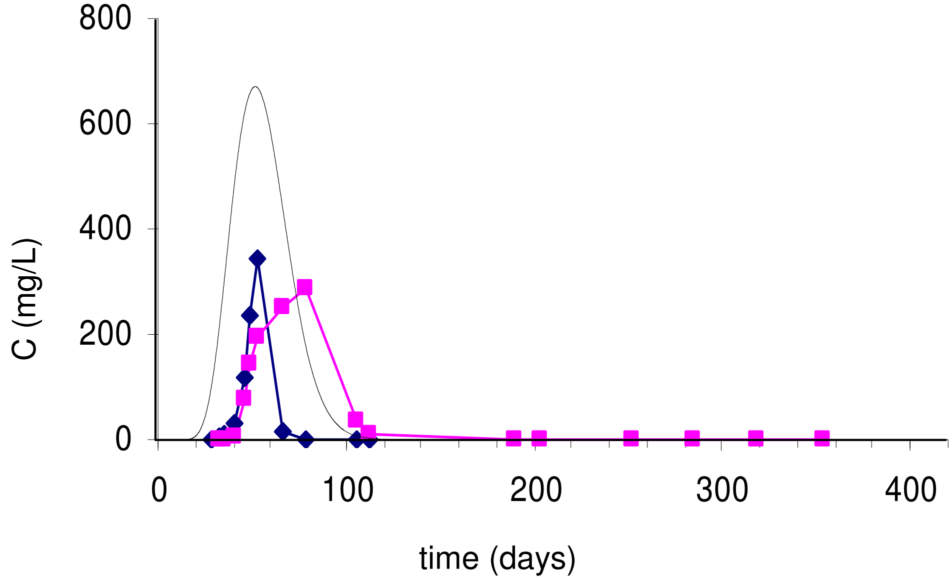

Figure 6.1.1.2 MTBE concentration prediction from BIONAPL (solid continuous black line), and 2 field breakthrough curves at row 2 (R2-3-6 in blue, R2-4-11 in red).

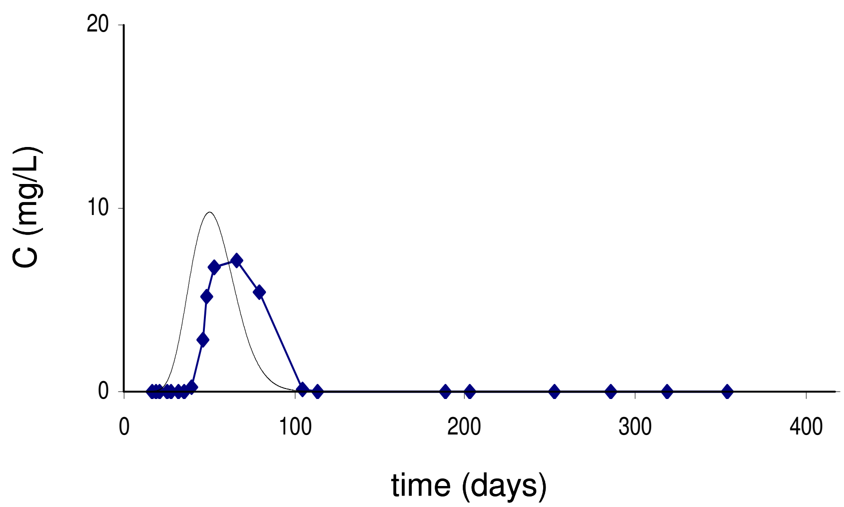

Figure 6.1.1.3 TBA concentrations prediction from BIONAPL (solid continuous black line), and 2 field breakthrough curves at row 2 (R2-4-11).

At row 2, during the flux estimation sampling events, the concentrations (the black squares) of MTBE (Figure 6.1.1.4) and TBA (Figure 6.1.1.5) show a large variability and maximum concentrations three times higher than the concentrations predicted by the model (the continuous black line). Both the variability and high concentrations are of interest.

This variability suggests that the initial source concentration was not uniform. The fact that the TBA/MTBE ratio in samples from row 2 is generally close to 0.03 rather than the ratio of 0.01 present in the emplaced gasoline mixture before emplacement may be further evidence for an initial irregular distribution of oxygenates in the source.

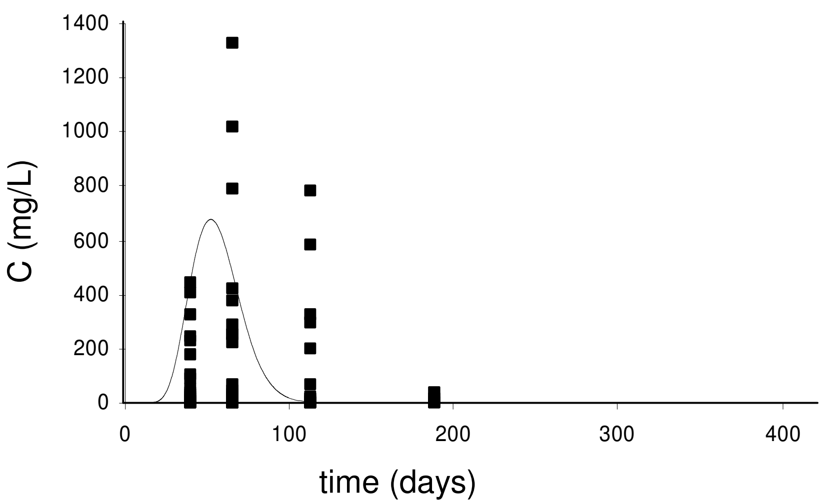

Figure 6.1.1.4 Field and model-predicted concentrations of MTBE detected in cross section sampling events at row 2.

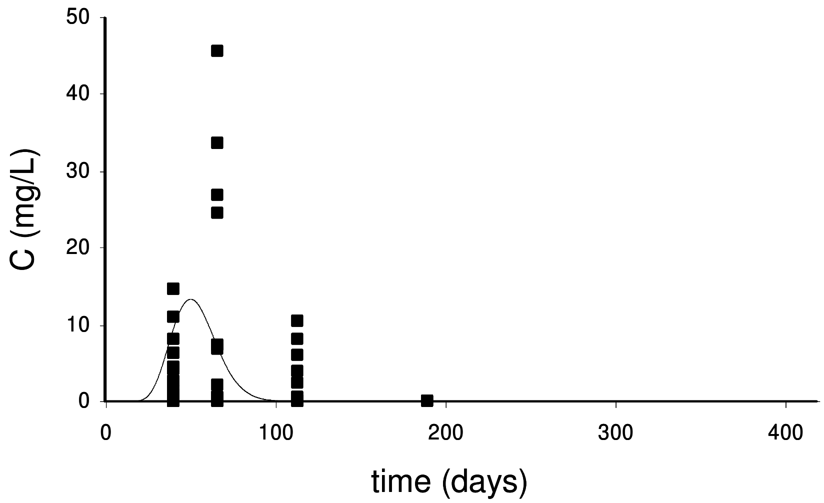

Figure 5.1.1.5 Field and model-predicted concentrations of TBA detected in cross sampling events at row 2.

The higher than modeled concentrations seen in Figures 6.1.1.4 and 6.1.1.5 are also consistent with a non-uniform distribution of oxygenates in the initially injected water of the source. However, the concentrations for MTBE and TBA anticipated assuming uniform dissolution into the injected water (Table 6.1) were not reached in any of the sampling points. In a non-uniform source, it was expected that at least some sampling points would exceed the uniform concentration expectation. None did. This "low" field concentration condition suggests that not all the MTBE and TBA were dissolved in the injected water and that some remained in the residual gasoline. In that case, significant tailing in the mass flux passing row 2, at least relative to the BIONAPL prediction, should be evident in Figures 5.1.1.6 and 5.1.1.7. Finding of significant mass flux after day 100 may support this non-ideal dissolution behaviour.

An alternate explanation for the “low” MTBE and TBA concentrations is that essentially complete and ideal dissolution occurred, but that a significant loss of mass occurred before row 2. While the mass fluxes of MTBE and TBA encountered at row 2 could be reasonably fit to a somewhat delayed BIONAPL curve (Figure 6.1.1.6 and Figure 6.1.1.7), it is also possible that significant oxygenate mass was lost by row 2. The sparse data at row 2 and the potential uncertainties in mass flux estimates prompted examination of row 3 and row 4 data to see if these alternate hypotheses could be resolved. As will be discussed in the next chapter, the missing mass of MTBE and TBA did not appear.

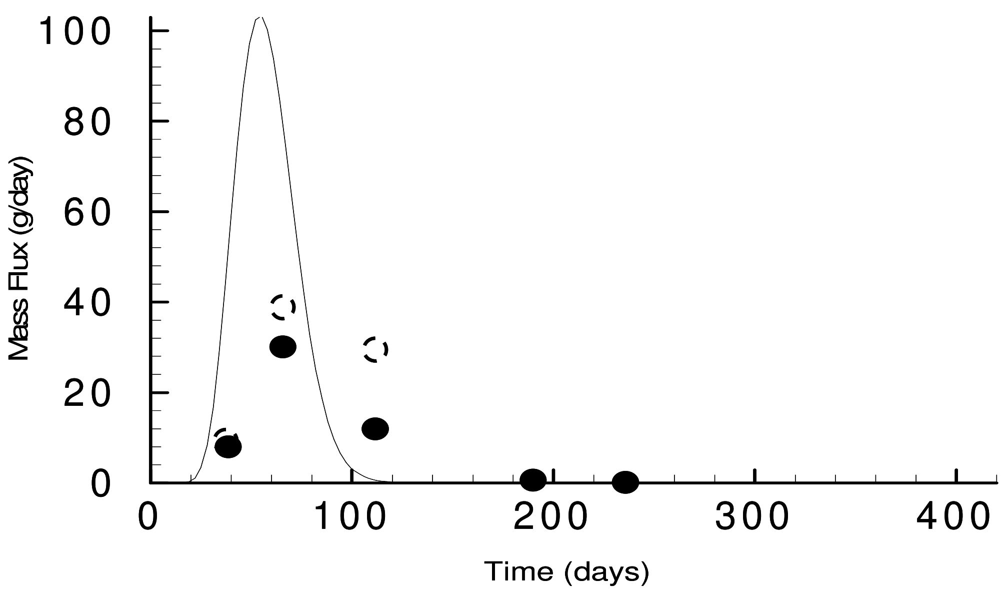

Figure 6.1.1.6 Prediction and field data for MTBE mass flux at row 2.

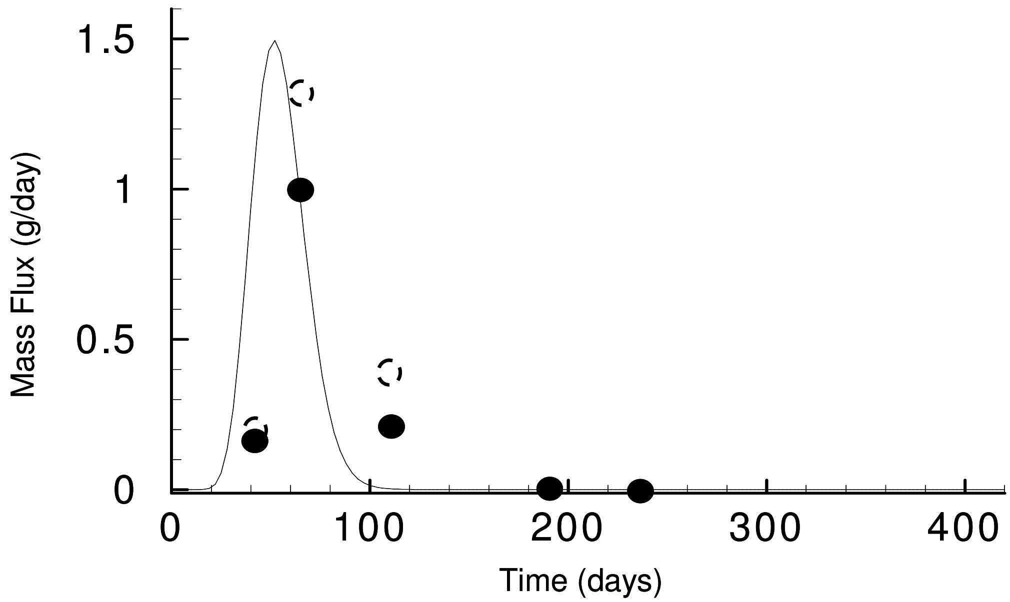

Figure 6.1.1.7 Prediction and field data for TBA mass flux at row 2.

6.1.2 Dissolution of ethanol from the E10 source

The ethanol breakthrough at selected points in row 2 falls within the envelope predicted by the BIONAPL model (Figure 6.1.2.1). However, each point shows a shorter than predicted slug, which is consistent with an initially non-uniform source distribution for ethanol. The higher than expected concentrations of ethanol in the flux monitoring events (Figure 6.1.2.2) are consistent with this view of the ethanol in the E10 source. Many of these ethanol concentrations exceed the 1800 mg/L concentrations (Table 6.1) expected if ethanol was initially dissolved uniformly in the injected water. These findings suggest that the ethanol was quickly dissolved in initial fractions of the injected water and distributed irregularly in the source.

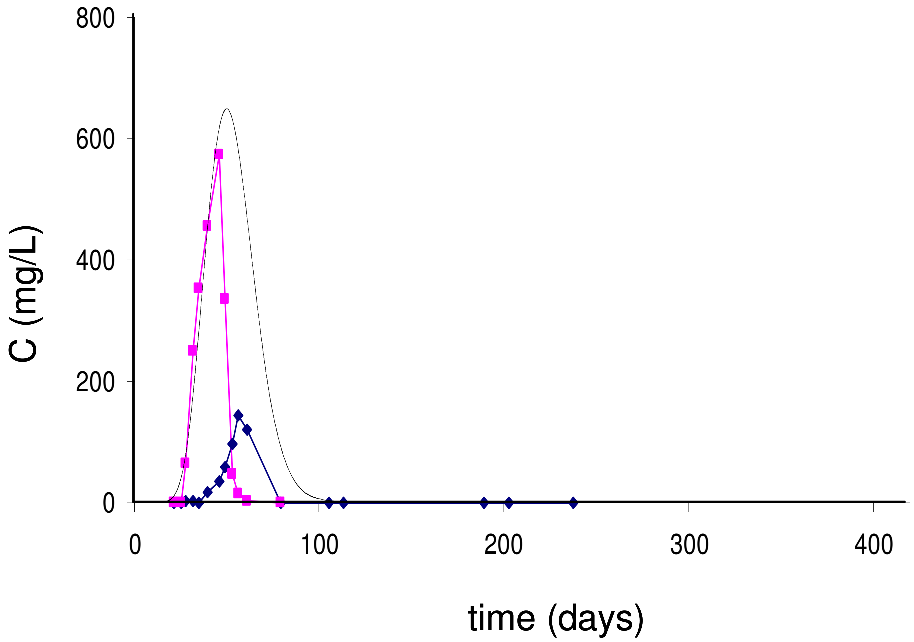

Figure 6.1.2.1 Ethanol concentrations predicted from BIONAPL (solid black line) and field breakthrough curves (R2-4-11 in red, R2-2-10 in blue) at row 2.

The good match of the limited field mass flux estimates and the predicted values of the mass flux (Figure 6.1.2.3) are consistent with an equilibrium-based prediction. No mass loss of Ethanol at row 2 is evident in Figure 6.1.2.3, although data is sparse. Overall, ethanol dissolution and transport to row 2 was perhaps better fit by the BIONAPL model with its equilibrium dissolution approach than were MTBE and TBA.

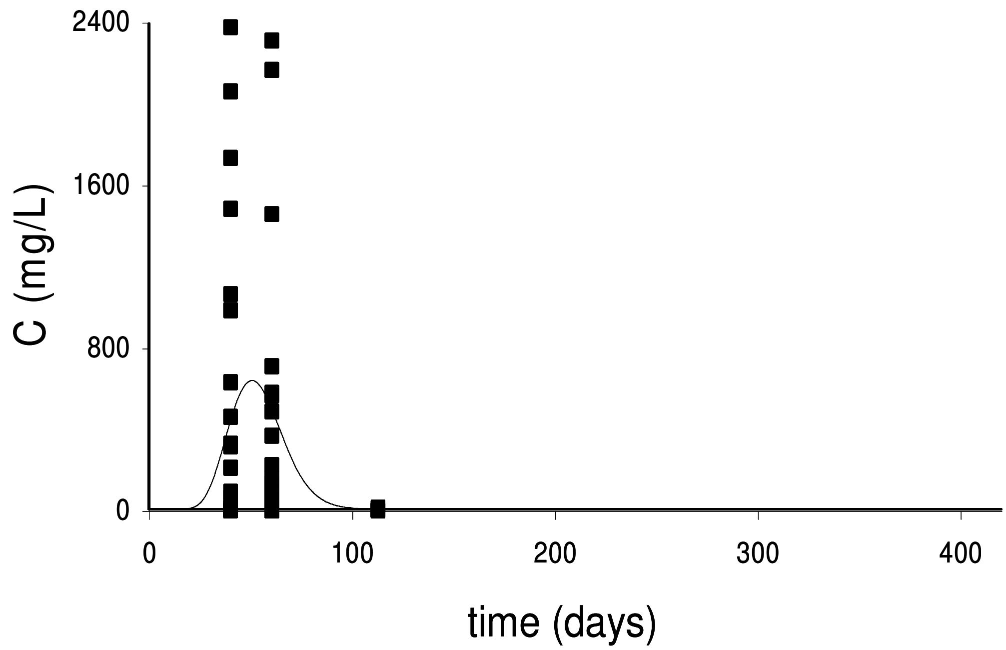

Figure 6.1.2.2 Field and model-predicted concentrations of ethanol detected in cross section sampling events at row 2.

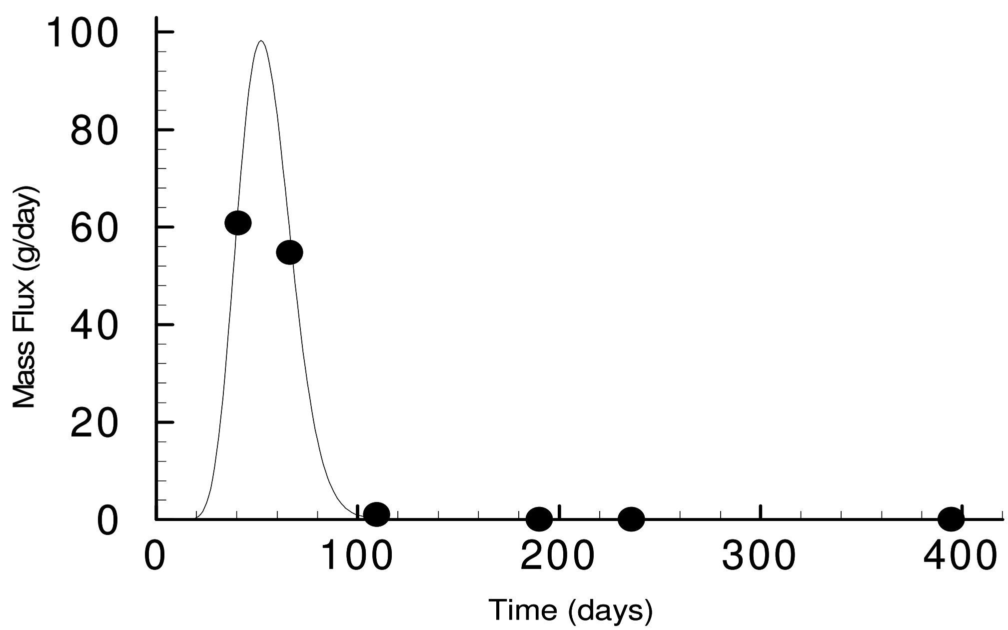

Figure 6.1.2.3 Prediction and field data for ethanol mass flux at row 2.

6.2 The Aromatic Hydrocarbons

Similarly, the equilibrium dissolution of aromatics (benzene, toluene, o-xylene, and 1,2,3 tri-methyl benzene, as a group: BTX-TMB) from the GMT and E10 sources was assessed by comparing the field data and BIONAPL-derived predictions. As the aromatics are less water soluble, the residual gasoline phase likely retained a more significant portion of the mass during water injection than was the case for the water soluble oxygenates. As in the case of oxygenates, the predicted concentration versus time curve is derived from the BIONAPL model assuming a uniform NAPL source dissolving at equilibrium with no biodegradation. Due to their high solubilities, mostly all of the oxygenates partitioned mainly in the first injected water and were pushed in a radial fashion from each injection point. Therefore, the oxygenates source would occupy the volume of the injected water but with a very complex spatial distribution. The aromatics, due to their lower solubility remained mainly into the NAPL phase closer to the injection screen creating a smaller NAPL source. This complexity and difference between oxygenates and aromatics source dimensions were not represented by the BIONAPL model. In order to minimize the effect of any BTX-TMB degradation in the field, and to minimize the degree of dilution through dispersion, the comparison was made close to the source at row 2, only about 40 days travel time from the source.

Given the similar initial BTX-TMB composition of the GMT and E10 sources, it was expected that the concentration and mass flux profiles would be similar for each chemical in the two gates. The initial assumed equilibrium concentrations in the source are given in Table 6.2.1. They are calculated based on the component mole fraction and its pure phase solubility with respect to the water (Raoult's Law). However, the aromatics are readily biodegraded aerobically and oxygen is available in the Borden groundwater (Chapter 7). The aromatics may behave differently in the GMT and E10 gates, with more mass loss anticipated in the GMT gate because rapid degradation of ethanol in the E10 plume may have preferentially consumed the available oxygen which would be expected to inhibit the BTX-TMB degradation in that gate. Thus, higher concentrations and higher mass fluxes of BTX-TMB are possible in the E10 plume compared to the GMT plume. On the other hand, the ethanol leaves the gasoline residuals source quickly and travels at the groundwater velocity at the front of the BTX-TMB plume. The removal of oxygen would thus occur at the leading edge of the BTX-TMB plume, leaving only the gasoline residual source exposed to background groundwater containing the background oxygen. Therefore, at row 2 the persistence of the BTX-TMB plume should be less affected by ethanol degradation.

At many field sampling event times, the observed concentrations were below the corresponding predicted value. The lower observed concentrations could be related to the position of the sampling points relative to the core of the plume. It can also be attributed to biodegradation, not considered in the modeling, or non-ideal source characteristics causing 1) dilution by clean water flowing around residual zones, 2) NAPL droplets being trapped in dead-end pores with little contact with the flowing water, and 3) some residual phase being in low permeability zones. The source zone was not characterized and so none of these effects are taken into consideration by the model. Comparisons were made between the predicted peak breakthrough curve and the best breakthrough curve that was available.

Tailing of breakthrough curves at later times often suggests a non-equilibrium dissolution process (Powers, 1992). In our case there is not sufficient data for all the BTX-

TMB compounds to assess the late-time dissolution rates. However, benzene should have essentially completely passed through at row 2 by day 390 and so tailing can be assessed for benzene at least.

The features of the aromatic data are well illustrated by benzene and o-xylene, discussed below. Therefore, the other aromatics are not discussed. Figures for the other aromatics are included in Appendix 5.

Table 6.2.1 The calculated aqueous concentrations of the BTX-TMB (ug/L) equilibrated with the NAPL source after the free phase was removed from the source.

	Benzene	Toluene	O-xylene	1,2,3-TMB
GMT	41700	28400	2960	247
E10	41000	24800	2740	236

6.2.1 Dissolution of Aromatic Plumes from the GMT Source

The Benzene Plume

The field breakthrough curves for benzene show far lower concentrations compared to the prediction (Figure 6.2.1.1). This is probably because, in part, the sampling points used for breakthrough curve development were not in the highest concentration zone of the plume. It also likely reflects the considerable benzene mass loss apparent in the mass flux field data (6.2.1.2). As in the case of the oxygenates, the existence of heterogeneities (low and high permeability zones) would not produce high concentration but could generate low concentrations (Figure 6.2.1.1). The higher-than-simulated concentrations after 350 days suggest some tailing, consistent with dissolution of benzene being slightly slower than anticipated by the model. The mass flux field data suggest that much of the benzene mass was undetected.

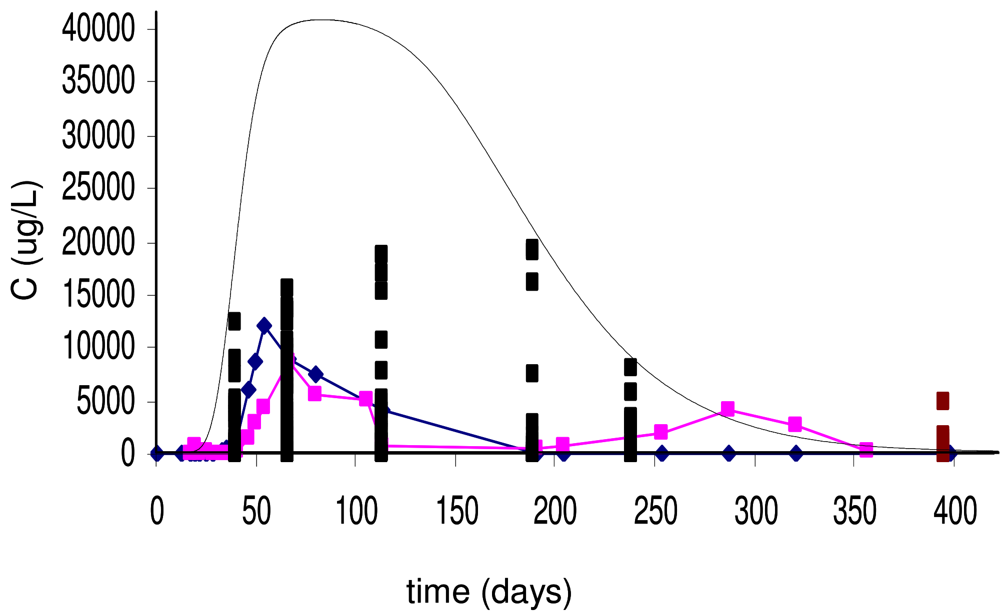

Figure 6.2.1.1 Benzene concentrations at row 2, GMT gate: field and predicted breakthrough curves (R2-3-6 in blue, R2-4-11 in red), together with the concentrations detected in the fence sampling events (black dots).

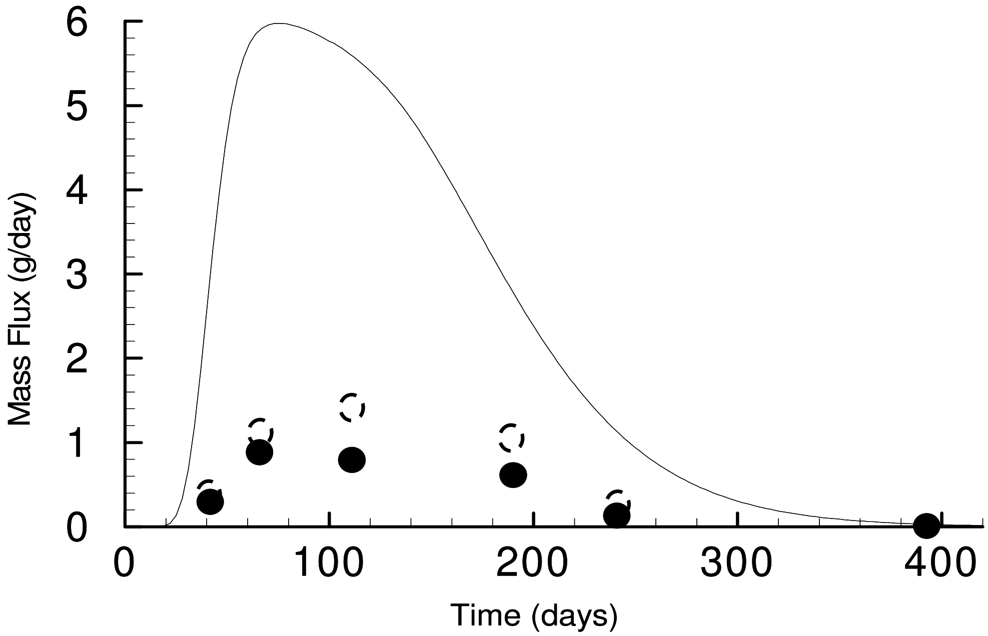

Figure 6.2.1.2 Benzene mass flux at row 2, GMT gate: Prediction versus adjusted field data.

The Ortho-Xylene Plume

The non-biodegradation, equilibrium dissolution model predicts concentration and mass flux curves for o- Xylene that maintain concentration and flux plateaus after the initial breakthrough (Figure 6.2.1.3). The field concentration data and interpreted field mass flux trend (Figure 6.2.1.4) show the predicted plateau shape, but reflect significant variability in concentrations and mass flux. Higher-than-predicted concentrations and mass flux after 120 days are consistent with a slower than predicted dissolution of o-Xylene. The presence of high concentrations between day 180 and 240 are reflected in higher than predicted mass fluxes at least if the “corrected” mass flux values are considered.

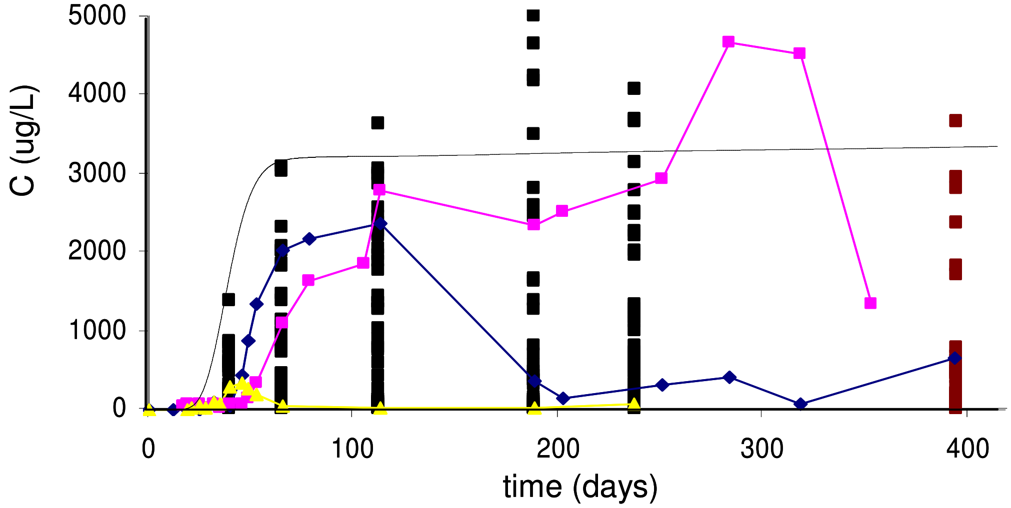

Figure 6.2.1.3 Ortho-xylene concentrations at row 2, GMT gate: field and predicted breakthrough curves (R2-3-6 in blue, R2-4-11 in red) together with the concentrations detected in the fence sampling events (black dots).

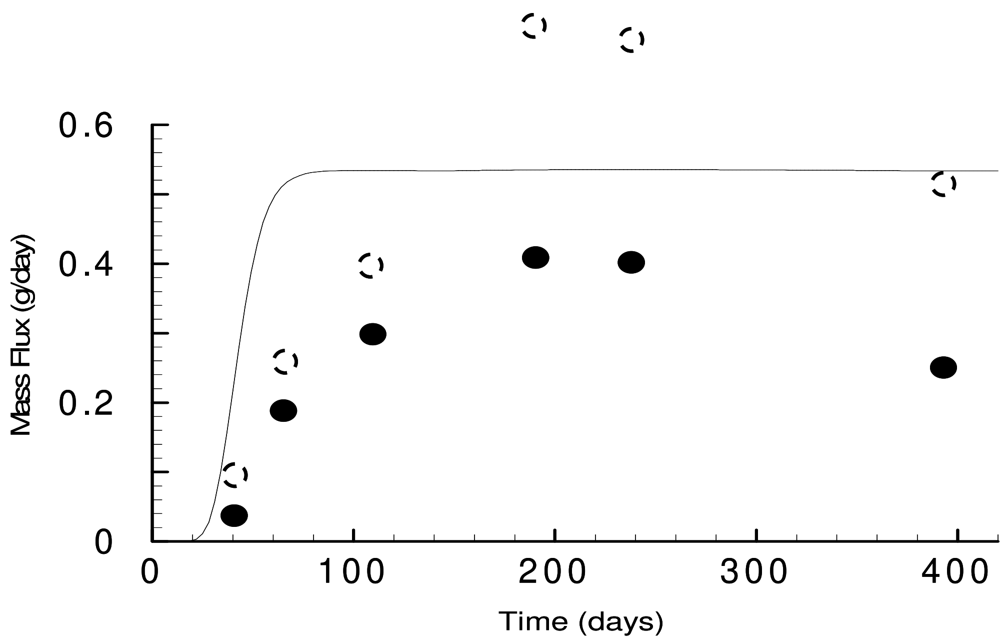

Figure 6.2.1.4 Ortho-xylene mass flux at row 2, GMT gate: prediction versus adjusted field data.

6.2.2 Dissolution of Aromatic Plumes from the E10 Source

The Benzene Plume

The field breakthrough curves (not shown) show much lower concentration profiles compared to those predicted likely due to the positioning of the sampling points relative to the high concentration zones and to the apparent considerably benzene mass loss (Figure 6.2.2.2). Concentrations detected in the first three fence sampling events (Figure 6.2.2.1) were lower than those predicted in Table 6.2.1.and lower than expected based on the BIONAPL model. The concentrations during fence sampling on days 189, 236 and 384 are higher than expected from the BIONAPL modeling and are consistent with tailing expected with non-equilibrium dissolution. The complex distribution of the source concentrations likely accounts for much of the benzene concentration variability at row 2.

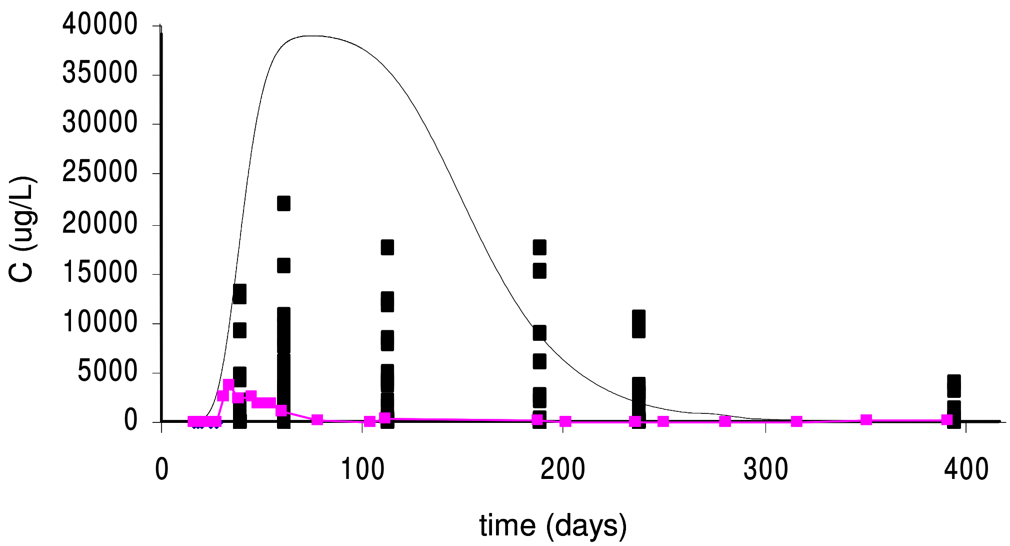

Figure 6.2.2.1 Benzene concentrations at row 2, E10 gate: field and predicted breakthrough curves (R2-4-11 in red) together with the concentrations detected in the fence sampling events (black dots).

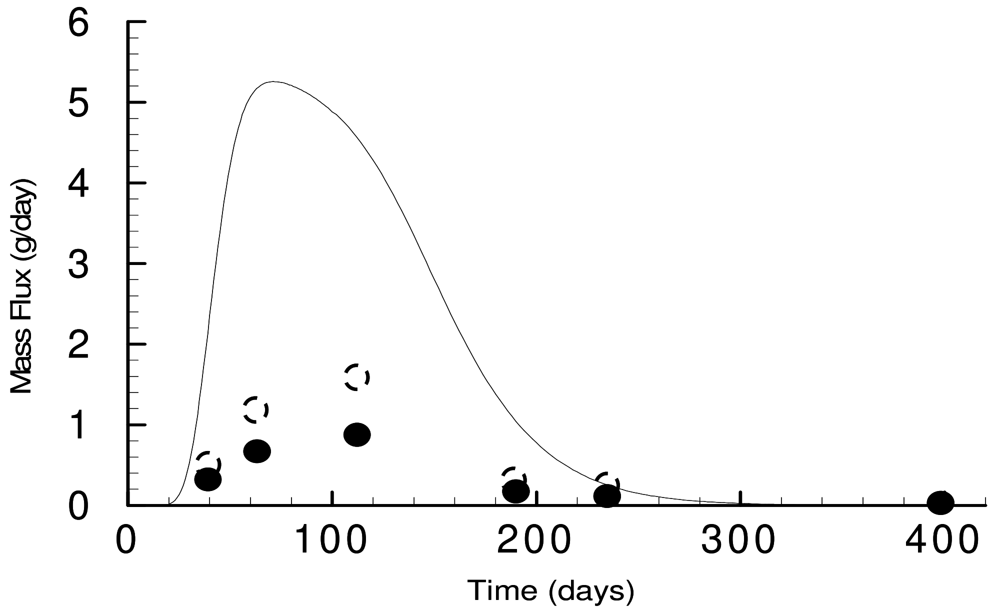

Figure 6.2.2.2 Benzene mass flux at row 2, E10 gate: Prediction versus adjusted field data.

The Ortho-Xylene Plume

The non-biodegradation, equilibrium dissolution model predicts concentration and mass flux curves for o-Xylene that maintain a plateau of concentration and flux after the initial breakthrough (Figure 6.2.2.4) until about day 150. The predicted concentrations then indicate a slow increase, probably related to the earlier dissolution of the most soluble compounds and consequently an increase in mole fraction of the less soluble compounds such as o-xylene. The field concentrations also show an increase after day 180. The higher than predicted concentrations after 180 days are also consistent with a slower-than-predicted dissolution. The field data and predicted mass flux (Figure 6.2.2.4) show the predicted plateau shape, but also reflect significant apparent mass loss.

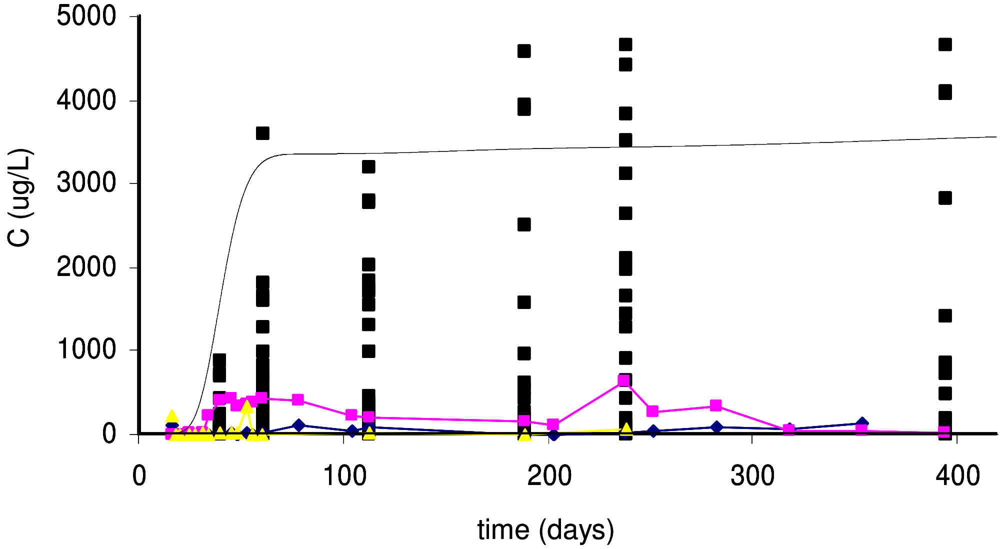

Figure 6.2.2.3 Ortho-xylene concentrations at row 2, E10 gate: field and predicted breakthrough curves together with the concentrations detected in the fence sampling events.

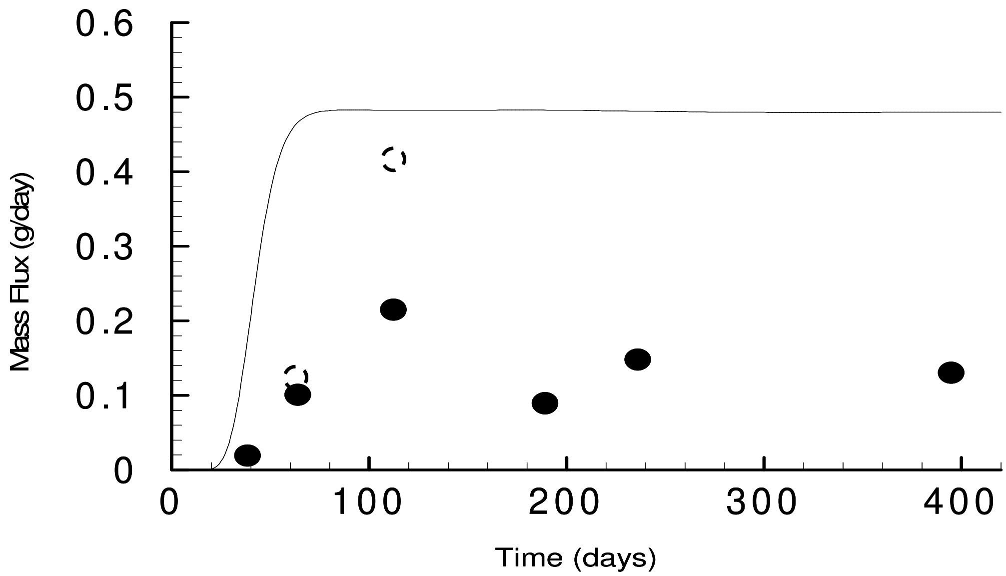

Figure 6.2.2.4 Ortho-xylene mass flux at row 2, E10 gate: prediction versus adjusted field data.

Summary

Even though the MTBE and TBA breakthrough curves are generally consistent with equilibrium dissolution, the mass flux values suggest non ideal dissolution. The concentration breakthrough curves and the mass flux of ethanol are consistent with equilibrium dissolution. The BTX-TMB dissolution is similar and suggests non equilibrium in both GMT and E10 gates. The high uncertainties related to the monitoring network, between -143% to -40% (Chapter 7) make an acceptable assessment of the mass loss difficult to achieve and adds uncertainty to mass flux interpretation. The complexity of the contaminant distribution in the source, the different aromatics and oxygenates source geometries, and the aquifer heterogeneities were not captured by the BIONAPL model. This adds uncountable uncertainty to the prediction and consequently to final analysis.

Chapter 7

THE ATTENUATION OF OXYGENATES AND AROMATICS DURING TRANSPORT

7.1 Migration and Attenuation of Oxygenates during Transport

It is recognized that the breakthrough curves are of limited use in assessing mass loss as the oxygenates migrate and disperse downgradient. Since relatively few points were sampled to develop the breakthrough curves, it is likely that at least some of the flow lines with higher concentration and higher flux were not detected**.** For MTBE and TBA, the concentrations in the breakthrough curves were much lower than the estimated source zone concentrations. This could reflect mass loss due to biodegradation during transport. To estimate the mass loss during transport, the mass flux close to the source at row 2 will be compared with the mass flux at row 3 and at row 4 situated at 9.5 m and 15.5m, respectively, downgradient from the source. Recalling the uncertainties in the estimates of mass flux derived from monitoring data, this analysis is considered qualitative.

The adjusted mass of all the chemicals in the GMT gate (Table 7.1.1) and in the E10 gate (Table 7.1.2) decreases from row 2 to row 3 and 4. The mass that is missing when compared to the BIONAPL predicted mass (assuming no mass loss due to biodegradation) that should have passed each row is summarized for the GMT gate in Table 7.1.3 and for the E10 gate in Table 7.1.4.

Table 7.1. 1 GMT Gate: The total initial mass emplaced, the mass predicted to have passed the row using BIONAPL, and the calculated values of the total mass flux that passed the fences before and after the mass flux adjustments. Note: The "bulk" organics are not included here.

Plume Component	Initial Mass (g)	Predicted Mass (g)			Calculated Total Mass Before Adjustments (g)			Calculated Total Mass After Adjustments (g)		
		Row 2	Row 3	Row 4	Row 2	Row 3	Row 4	Row 2	Row 3	Row 4
MTBE	3700	3800	3800	3800	2100	210	210	3400	400	210
TBA	60	50	50	50	50	5	3	80	8	4
B	880	890	890	870	160	20	50	290	40	90
T	2400	1600	1400	1100	690	120	170	1300	190	320
X	870	190	160	120	130	40	50	250	50	90
TMB	190	20	10	10	10	4	3	30	5	6

Table 7.1. 2 E10 Gate: The total initial mass emplaced, the mass predicted to have passed the row using BIONAPL, and the calculated values of the total mass flux that passed the fences before and after the mass flux adjustments. Note: The "bulk" organics are not included here.

Plume Component	Initial Mass(g)	Predicted Mass (g)			Calculated Total Mass Before Adjustments (g)			Calculated Total Mass After Adjustments (g)		
		Row 2	Row 3	Row 4	Row 2	Row 3	Row 4	Row 2	Row 3	Row 4
Ethanol	3200	3200	3200	3200	2800	1400	670	2800	2400	980
B	600	600	600	600	120	80	100	210	140	170
T	1600	1400	1200	960	390	300	290	600	490	500
X	600	200	100	110	60	50	40	90	80	70
TMB	100	20	10	10	3	3	2	5	5	3

Table 7.1.3 GMT gate. The total mass missing calculated relative to the prediction based on the adjusted data.

Chemical Component	Mass Missing (g)			Mass Missing (%)		
	Row 2	Row 3	Row 4	Row 2	Row 3	Row 4
MTBE	419	3400	3600	10%	90%	90%
TBA	-26	41	45	-50%	80%	90%
B	600	850	780	70%	100%	890%
T	330	1200	750	20%	90%	70%
X	-60	100	34	-30%	70%	30%
TMB	-10	9	5	-60%	70%	40%

Table 7.1.4 E10 gate. The total mass missing calculated relative to prediction calculated by using the adjusted data.

Chemical Component	Mass Missing (g)			Mass Missing (%)		
	Row 2	Row 3	Row 4	Row 2	Row 3	Row 4
Ethanol	380	820	2200	10%	30%	70%
B	400	470	430	70%	80%	70%
T	740	690	460	60%	60%	50%
X	83	64	42	50%	50%	40%
TMB	9	7	6	70%	60%	60%

At row 2, the missing mass of the MTBE plume (10%) is similar to that of the ethanol plume (10%) (Table 7.1.3 and Table 7.1.4). At row 3 and 4, the missing mass of MTBE increased to 90% in both cases. The ethanol missing mass increased more gradually from 10% to about 30% at row 3 and to about 70% at row 4, which is consistent with a greater persistence as compared to MTBE. In terms of mass, the MTBE missing mass increased from 420 g at row 2 to 3400 g at row 3 and 3600 g at row 4 (Table 7.1.3). The missing ethanol mass was 380 g at row 2 as compared to 820 g at row 3 and 2200 g at row 4 (Table 7.1.3). The ethanol appears more persistent than MTBE.

In many field experiments, the apparent mass loss often increases with distance of the monitoring fences from the source. The unusual situations where the mass loss is higher closer to the source (e.g. at row 2 compared to row 3 and 4) or where the apparent mass increases (negative mass loss) reflect the uncertainties related to the fence monitoring and to the total mass flux calculation. The negative values of missing mass and the higher percentage of the mass that is missing at row 2 compared to row 3 and 4 (Table 7.2.3) also suggests an over-adjustment of the total field mass flux. For example, the mass loss of the TBA plume appears consistent with respect to the mass loss at row 3 (80%) and at row 4 (90%) but at row 2 the apparent increase, not decrease, by 50% is most likely due to an unrealistic adjustment of the raw mass flux data, rather than to a true increase as MTBE is biotransformed to TBA.

The missing mass at a fence is calculated as the difference between the prediction and the adjusted field values. A negative difference could have been generated due to an over adjustment of the field mass flux or due to too low a prediction. The prediction considers all the NAPL components conservative. During MTBE biodegradation, the by-product TBA is produced and therefore, a higher TBA mass flux than actually predicted could be possible. Comparing the values of the mass flux along the gates, it is clear that there is a strong decrease in flux for MTBE, TBA, and ethanol as the distance from the source increases (Appendix 4, Figure 4.1.1 to Figure 4.1.9). The decrease in mass flux along the plume path could indicate degradation of the oxygenates. Paradoxically, the decrease in mass flux seems to be stronger for MTBE compared to ethanol. This is not consistent with the generally recognized MTBE recalcitrance to biodegradation and to previous Borden observations (Hubbard et al., 1992) that show no distinguishable mass loss of MTBE over 476 days. These observations might suggest that the apparent MTBE mass loss was more likely due to uncertain monitoring data than to biodegradation.

In the case of ethanol there was not much evidence of ethanol mass loss in the E10 plume by row 2 that is within in the first 100 days. This is similar to Hubbard et al.'s, (1992) observations regarding methanol. Both the current and Hubbard et al.'s, (1992) field experiment find significant subsequent mass loss of alcohol.

7.1.1 Discussion of the MTBE and TBA Loss of Mass

The values of the total mass flux of both MTBE and TBA passing rows 3 and 4 are much lower than predicted based on their transport as non-reactive solutes (Table 7.1.1). The total mass that is missing increases from row 2 to row 3 and 4.

Could this mass loss be due to mass removal during sampling? The total water volume extracted in one sampling event from the wells found to contain MTBE was about 11 L. Assuming an average MTBE concentration for each sample, the total mass of MTBE removed in one sampling event would be 24 g. This represents about 0.5% of the initial mass and does not explain the major loss of mass observed.

Could MTBE and TBA have undergone almost complete biotransformation over the 180 days of transport from row 2 to row 4? Previous research at the Borden site found that MTBE was only slowly degraded (Schirmer et al., 1999). On the other hand, TBA was shown to biodegrade at a higher rate compared to MTBE (Schirmer et al., 2003). Three lines of evidence were considered in order to verify the possibility of MTBE biotransformation:

1. TBA is a biodegradation product of MTBE (Hunkeler et al., 2001). If the MTBE is degraded, it should be reflected in a decreased MTBE concentration and an increase of the TBA concentrations. This would lead to an increase of the TBA/MTBE ratio.

2. During MTBE biodegradation, the heavier isotope of ^{13}C will accumulate in the remaining MTBE such that the $^{13}C/^{12}C$ ratio will increase after MTBE biotransformation

3. MTBE biodegradation is expected to consume electron acceptors and there should therefore be evidence of electron acceptor (EA) mass loss sufficient to support the apparent MTBE mass loss.

1. The TBA/MTBE ratio

Production of TBA by MTBE biotransformation should be seen by increasing TBA concentrations or increasing TBA/MTBE ratios. However, this pattern was not seen in the breakthrough curves (Figure 7.1.1.1), but there was some slight increase in the TBA/MTBE ratio in some downgradient sampling points (Table 7.1.1.1). This could be related to the mixing and redistribution of oxygenates during injection below the watertable. However, this is not a compelling argument against MTBE and TBA biotrasformation, as previous research with Borden material suggests TBA generated from MTBE could be biotransformed more rapidly than it would accumulate (Schirmer et al., 2003).

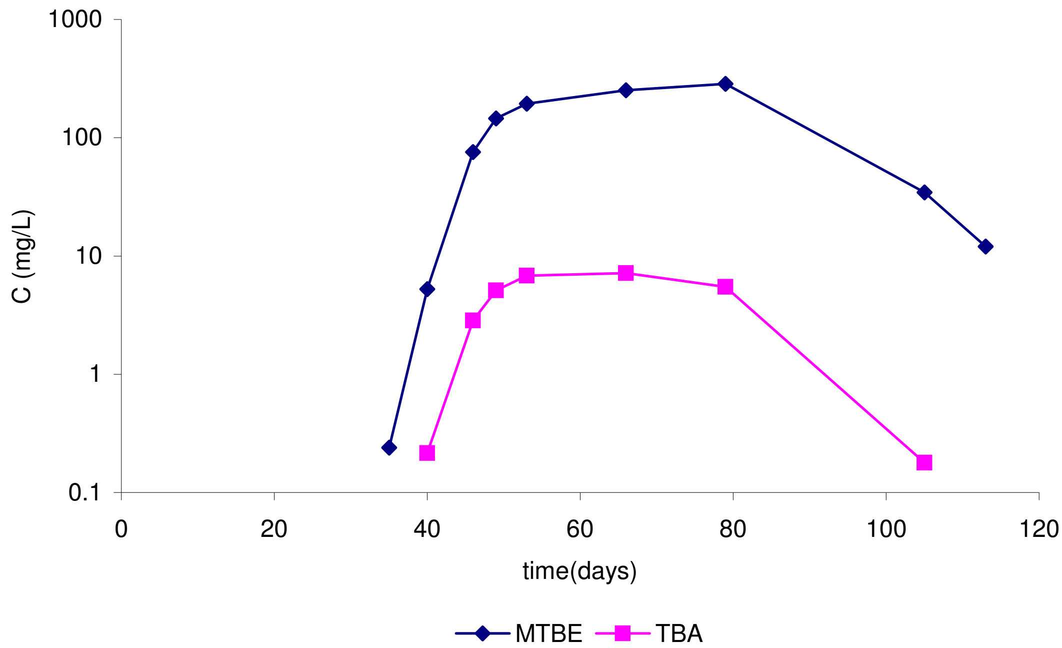

Figure 7.1.1.1 MTBE and TBA breakthrough curves in R2-4-11 from the GMT gate (concentration on log scale)

Table 7.1.1.1 TBA and MTBE concentrations and TBA/MTBE ratios at selected sampling points.

Sampling Point	TBA mg/L	MTBE mg/L	TBA/MTBE
Initial Values	0.075	3.46	0.02
M2-6	11.4	408.5	0.03
R2-4-11	0.22	5.25	0.04
R2-3-13	24.43	375.10	0.07
R3-2-15	0.14	5.66	0.02
R3-3-14	0.44	9.15	0.05
R3-4-12	3.10	55.31	0.06
R4-3-4	0.38	8.10	0.05
R4-3-6	0.44	6.18	0.07
R4-4-4	0.27	5.31	0.05

2. The $\delta^{13}C$ ratios

Another way to verify the possible biodegradation of MTBE is to look at its isotopic signature. If MTBE biodegradation had occurred it is expected that the carbon isotope ratio ^{13}C / ^{12}C expressed in the $\delta^{13}C$ notation would increase to less negative values (Hunkeler et al., 2001). Samples collected after 250 days from row 4, 15 m downgradient from the source, indicate a significant change in MTBE isotopic signature (Table 7.1.1.2) and therefore possible MTBE biodegradation. Although sought, the TBA isotopic signature could not be determined due to the presence of high concentrations of aromatics.

The simplified form of the Rayleigh equation, which has been previously used to describe carbon isotopic fractionation in field (Kolhatkar et al., 2002), can be written as:

$$\delta^{13}C = \delta^{13}C_0 + \varepsilon * \ln\left(\frac{[MTBE]}{[MTBE]_0}\right)$$

where:

$\delta^{13}C$ and $\delta^{13}C_o$ represent the isotopic composition of MTBE at time t and at time t = 0, respectively, [MTBE] and $[MTBE]_o$ represent the MTBE concentrations time t and at time t = 0, respectively, and ε represents the enrichment factor. The enrichment factor is related to the isotopic fractionation factor, α, by:

$$\varepsilon = (\alpha - 1) x 1000.$$

For aerobic MTBE biotransformation, Hunkeler et al. (2001) report ε ranges from -1.52 to -1.97.

Ideally, from the source concentration and isotopic signature, we should see a decrease in MTBE concentrations associated with a correspondent increase in $\delta^{13}C$ values. This relationship could not be seen (Table 7.1.1.2) for all the samples. Moreover, the increase in $\delta^{13}C$ is not proportional to the concentration decrease. The theoretical source concentration (2100 mg/L) has almost the same isotopic signature as the sample collected from R4-4-3 that has a concentration of only 8.7 mg/L.

The fact that the source MTBE concentrations cannot be estimated in our case due to factors such as the non uniform concentration in the source eliminates the possibility to estimate the degree of MTBE conversion to TBA by application of the Rayleigh equation. However, the significant shift in the MTBE isotopic signature suggests the presence of biodegradation.

Table 7.1.1.2 Carbon isotope ratios of MTBE ($^{13}C/^{12}C$ are reported in $\delta^{13}C$ notation[1] and have an uncertainty of ± 0.3 $^{0}/_{00}$).

Sample	$\delta\ ^{13}C$	MTBE Concentrations (mg/L)	TBA Concentrations (mg/L)
Initial values	-31.5	2100 (assumed)	33 (assumed)
R4-4-3	-31.4	9	0.3
R4-3-1	-30.2	32	0.8
R4-4-6	-29.4	2	ND
R4-3-14	-29.0	0.7	0.4

[1] The $\delta^{13}C$ is defined as $\delta^{13}C = (R_s/R_r - 1) \times 1000$, where Rs and Rr are the $^{13}C/^{12}C$ ratios of the sample and the international Vienna Peedee Belemnite standard (VPDB), respectively.

3. The electron acceptor availability

Degradation of MTBE is a redox reaction which consumes electron acceptors (EAs). To evaluate the presence of biodegradation of the GMT plume, the significant EAs (dissolved oxygen and sulfate) and the indicators of Fe^{3+} utilization (increasing bivalent iron) and CO_2 utilization (increasing methane) were measured at row 1, upgradient from the source, as well as at rows 2, 3, and 4 (Table 7.1.1.3). The measurements at row 1, upgradient of the source, were considered to represent background values for groundwater within and entering each gate.

Table 7.1.1.3 The mass flux of dissolved oxygen, sulfate, iron, and methane in GMT gate and the day of collection.

	Row 1	Row 2	Row 3	Row 4
DO (g/day)	3.3	3.0 (7 days) 2.9 (24 days) 1.8 (201 days)	0.91 (201 days)	0.54 (201 days)
SO4 (g/day)	9.3	9.9 (24 days) 11 (180 days)	10 (197 days)	9.18 (197 days)
Fe II (g/day)	0.02	0.01 (24 days) 0.03 (180 days)	0.04 (197 days)	0.13 (197 days)
CH4 (g/day)	0	22 (30 days) 0.45 (198 days)	1.9 (198 days)	0.011 (198 days)

Sulfate showed no significant changes along the plume pathway suggesting that this it is not a significant electron acceptor responsible for decreases in the oxygenate and BTX-TMB concentrations. Furthermore, the ferrous iron and the methane production do not indicate a significant utilization of Fe^{3+} or CO_2. However, significant dissolved oxygen was present at row 1 and oxygen shows significant depletion and can therefore be seen as the major electron acceptor utilized. Measurements made at row 1, 2, 3, and 4, 240 days after source emplacement show significant oxygen consumption (Figure 7.1.1.2). The almost constant mass flux of sulfate and iron as well as the insignificant presence of methane at a mass flux value two orders of magnitude lower than that of oxygen points to oxygen utilization (aerobic biotransformation) as the dominant terminal electron acceptor process.

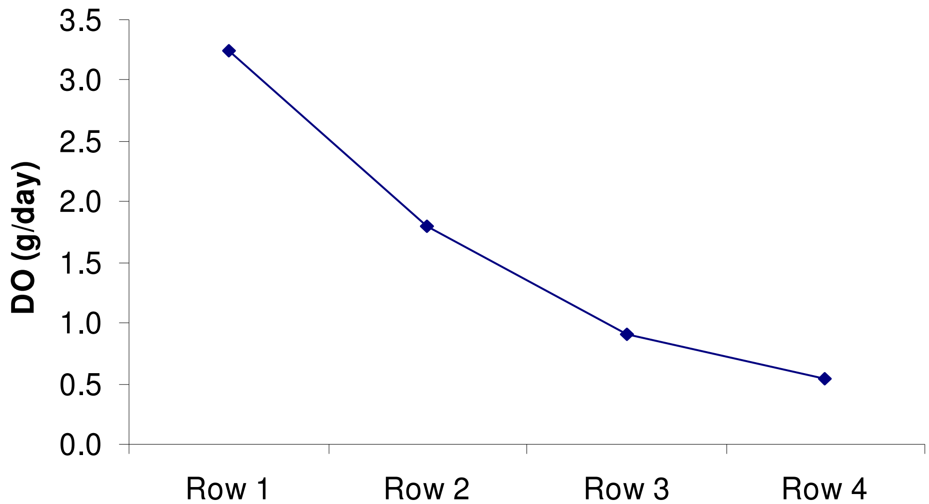

Figure 6.1.1.2 The oxygen mass flux along the GMT gate after 240 days from the start of the experiment.

According to the stoichiometric reaction equations (Equation 1 to Equation 6 below), a specific number of moles of oxygen are required to completely mineralize each mole of compound (Table 7.1.1.4). The mass flux of oxygen entering the gate was calculated at row 1, for a cross section 7m wide (distance between the sheet piling sides) and 3.5 m deep (starting from 1.41m b.g.s to 4.94 m b.g.s). The available oxygen between the source and row 2, row 2 and row 3, and row 3 and row 4 was calculated taking into account a groundwater velocity of 9 cm/day over a

40 day period for row 2, a 106 day period for row 3, and a 172 day period for row 4. The average mass flux of oxygen entering the GMT gate was about 3.3 g/day. Therefore, the available oxygen for complete mineralization of MTBE was too low to explain the missing mass (Table 7.2.1.4).

MTBE	$C_5H_{12}O + 7.5\ O_2 \rightarrow 5CO_2 + 6H_2O$	(Equation 1)
TBA	$C_4H_{10}O + 7\ O_2 \rightarrow 5CO_2 + 5H_2O$	(Equation 2)
Benzene	$C_6H_6 + 7.5\ O_2 \Rightarrow 6CO_2 + 3H_2O$	(Equation 3)
Toluene	$C_7H_8 + 9\ O_2 \Rightarrow 7CO_2 + 4H_2O$	(Equation 4)
o-Xylene	$C_8H_{12} + 11O_2 \Rightarrow 8CO_2 + 6H_2O$	(Equation 5)
1,2,3, tri-methyl benzene	$C_9H_{12} + 12O_2 \Rightarrow 9CO_2 + 6H_2O$	(Equation 6)
Ethanol	$C_2H_6O + 3O_2 \Rightarrow 2CO_2 + 3H_2O$	(Equation 7)

Table 7.1.1.4 The missing mass of MTBE, the oxygen demand required for complete mineralization and the oxygen available in the GMT gate (moles).

Plume Component	Mass Missing (moles)			Oxygen Required (moles)		
	Row 2	Row 3	Row 4	Row 2	Row 3	Row 4
MTBE	3.9	38	40	30	280	300
Oxygen Available				8	21	35

To summarize, the small changes in TBA/MTBE ratio associated with significant changes in MTBE isotopic signature suggest that some biodegradation of MTBE could have occurred. On the other hand, the EA's availability and utilization does not support significant MTBE mineralization but does not exclude some MTBE biotransformation. The low organic carbon content (maximum detected 0.035%) eliminates the possibility that significant mass was sorbed to the matrix. The small Henry's Law constant for MTBE and the initial emplacement below the watertable eliminates volatilization as a possible way of mass loss mechanism. The mass removed due to the sampling collection was also insignificant. A major uncertainty regarding the loss of mass remains the monitoring network and the frequency of monitoring. The $^{+}/_{-}$ 50% uncertainty due to the sampling point density and the -90% bias if the plume plunged below the most detailed monitoring network, creates an uncertainty interval in the MTBE mass passing each row ranging up to -143% to -40%. However, even though the adjustments done for the mass flux values were generous, the difference between the prediction and the field mass flux remains considerable. This uncertainty makes difficult a clear interpretation of the missing mass. Biodegradation of both MTBE and TBA is possible. However, the mechanism of the loss of mass is not totally clear but is certainly related to the monitoring network and mass flux interpretation.

7.1.2 Discussion of the Ethanol Loss of Mass

The issue of electron acceptor availability also applies to the ethanol containing plume. The values of oxygen mass flux along the plume after 240 days from the start of the experiment show a decreasing oxygen flux from row 2 to row 3 and 4. The iron and methane variations are insignificant indicating little utilization of Fe^{3+} and CO_2. The main electron acceptor utilized is again the oxygen. According to the stoichiometric equation (Equation 7), each mole of ethanol requires 3 moles of oxygen for complete mineralization. For complete mineralization of the ethanol that is missing at row 2 and row 3 of the E10 gate, about two times more oxygen than was available would be required. The ethanol missing from row 4 would require 5 times more oxygen than was apparently consumed. As in the case of MTBE, the available oxygen cannot account for the ethanol missing mass.

As in the case of MTBE, the apparent loss of ethanol in the E10 gate is not supported by the equivalent loss of EAs. Unlike MTBE, ethanol can be fermented, a microbial reaction which does not require EAs. However, the common fermentation product, methane, was not found in sufficient abundance to account for the missing ethanol via fermentation to methane and CO_2. Schink et al. (1987) and Kim et al. (1994) note that fermentation of ethanol can also lead to acetate, butyrate and propionate, none of which were sought in the field experiment. Therefore, the apparent ethanol mass loss is likely due to a combination of fermentation and EA-utilizing biotransformation. The ethanol plume seemed to remain more in the center of the monitoring network as compared to the MTBE plume and so the field data is less likely biased by mass moving through unmonitored aquifer as was the MTBE plume.

Table 7.1.2.1 The mass flux of dissolved oxygen, sulfate, iron, and methane in the E10 gate and the day of collection.
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	Row 1	Row 2	Row 3	Row 4
DO (g/day)	3.5	2.5 (7 days) 2.4 (22 days) 3.3 (201 days)	1.3 (201 days)	1.9 (201 days)
SO4 (g/day)	10.2	9.1 (24 days) 11 (180 days)	11 (200 days)	11 (201 days)
Fe II (g/day)	0.03	0.003 (24 days) 0.03 (180 days)	0.01 (200 days)	0.02 (199 days)
CH4 (g/day)	0	19 (24 days) 0.4 (201 days)	0.01 (200 days)	0.01 (199 days)

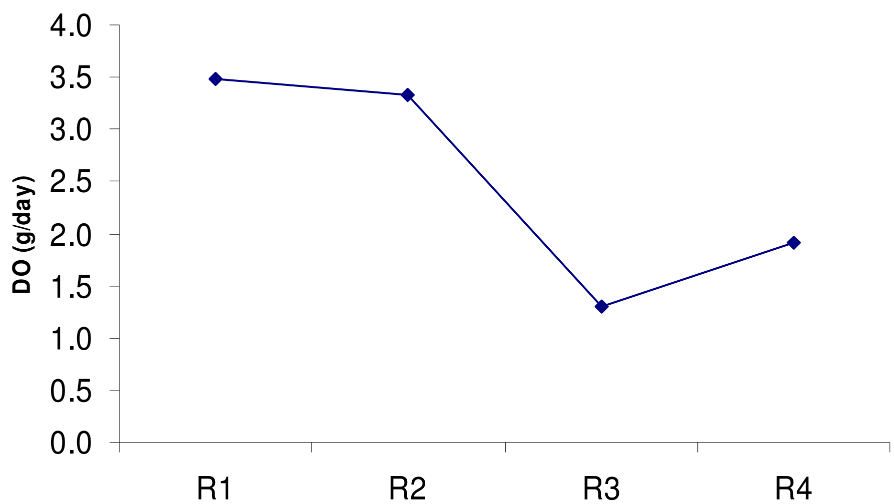

Figure 7.1.2.1 The oxygen mass flux along the E10 gate on day 240 days from the start of the experiment.

Table 7.1.2. 2 The missing mass of ethanol, the oxygen demand to complete mineralization, and the available oxygen in E10 gate (moles).

Plume Component	Mass Missing (moles)			Oxygen Required (moles)		
	Row 2	Row 3	Row 4	Row 2	Row 3	Row 4
Ethanol (E10)	7	16	47	21	49	140
Oxygen Available				9	23	38

7.2 Migration and Attenuation of Aromatics in the GMT and E10 gates

Even though similar masses of aromatics were injected, the recovered free phase was different in each gate. This created sources of slightly different composition. Therefore, a more useful comparison of the missing mass between the two plumes would use the percentage of the missing mass rather than the missing mass itself. However, tracking the missing mass remains essential in the evaluation potential mass loss due to biodegradation.

The benzene mass missing at row 2 (Table 7.1.3 and Table 7.1.4) is similar in the two gates (about 70% in both). More benzene mass is missing in the GMT gate by row 3 and 4 than in the E10 gate. This suggests somewhat greater benzene persistence in the E10 gate.

The percent toluene mass missing is about 2 times higher in the E10 plume as compared to the GMT plume at row 2. The missing mass of toluene in the GMT gate increases to about 90% at row 3 and to about 70% at row 4 while remaining essentially unchanged downgradient in the E10 gate. This suggests toluene was initially more easily degraded near the source in the E10 gate, but that toluene then became more biodegraded downgradient in the GMT gate so that by row 4, similar mass losses were found.

The percentages of o-xylene and TMB mass loss in the GMT gate are not reliable due to the negative missing mass values in row 2. By row 4, more o-xylene and TMB persists in the presence of ethanol.

For all the BTX-TMB components, the mass flux values strongly decrease from row 2 to row 3 and row 4 in the GMT gate. In the E10 gate, the mass flux values of BTX-TMB decrease less from row 2 to row 3 and 4 indicating a possible inhibition of aromatic degradation due to the onset of significant ethanol biodegradation after row 2. The available oxygen could have been readily consumed by the ethanol creating a deficit of electron acceptors. This created a slower degradation of BTX-TMB and consequently a greater persistence.

Previous laboratory studies (Hunt et al., 1997; Corseuil et al., 1998; Da Silva and Alvarez, 2002) show that the biodegradation rates of BTEX decrease in the presence of ethanol. In a Borden field experiment, Hubbard et al., (1994) found that the apparent persistence of benzene, ethylbenzenes, and p-Xylene was enhanced when the plume contained 85% methanol as compared to a gasoline plume containing 10% MTBE. In the same experiment, the BTEX persistence was found to be similar in the MTBE containing plume and in the unleaded oxygenate-free gasoline (PS-6) plume. In our experiment, the BTX and TMB plumes also appear to be more persistent in the presence of ethanol.

Table 7.2.1 The missing mass BTX-TMB, the oxygen demand for complete mineralization and the oxygen available in GMT gate (moles).

Plume Component	Mass Missing (moles)			Oxygen Required (moles)		
	Row 2	Row 3	Row 4	Row 2	Row 3	Row 4
Benzene	7.6	11	10	57	81	76
Toluene	13	24	23	110	220	210
o-Xylene	5.8	7.7	7.4	64	84	81
1,2,3-TMB	1.4	1.6	1.6	17	19	19
Oxygen Available (moles)				8	21	35

Table 7.2. 2 The missing mass BTX-TMB, the oxygen demand to complete mineralization, and the available oxygen in the E10 gate (moles).

Plume Component	Mass Missing (moles)			Oxygen Required (moles)		
	Row 2	Row 3	Row 4	Row 2	Row 3	Row 4
Benzene	5	6	5	37	43	41
Toluene	11	12	12	98	110	110
o-Xylene	5	5	5	51	52	53
1,2,3-TMB	1	1	1	12	12	12
Oxygen Available (moles)				9	23	38

Summary

The mass of all the considered chemicals decreased from row 2 to row 4. The loss of mass of MTBE, TBA, and ethanol is most likely only apparent and related to the uncertainties in data monitoring. The small change in MTBE isotopic signature indicates that a fractionation process is present but not significant. The oxygen content does not support the loss of mass of MTBE or ethanol. The ethanol loss of mass is likely due to a combination of fermentation and EA-utilizing biotransformation. All aromatics lost considerable mass by row 4 and they show a somewhat higher persistence in the presence of ethanol. There is not enough electron acceptor available within the gates to support the complete mineralization of the oxygenates and aromatics observed.

Chapter 8

ESTIMATION OF THE INITIAL NAPL MASS USING DOWNGRADIENT CONCENTRATIONS: THE RME APPROACH

8.1 Estimation of the initial NAPL mass using the BIONAPL model and plume information

The estimation of the initial mass in a NAPL source is of great importance in designing a remediation strategy. At many contaminated sites, the source mass (and often its location) is unknown but the concentrations of contaminants downgradient of the source are known. The RME method attempts to estimate the initial NAPL mass using the downgradient concentration ratios of NAPL chemical (Devlin and Barbaro, 2001; Broholm et al., 2005).

The field experiment with the supporting modeling provides two tests of the RME approach. The first used the model to verify the RME approach is valid for non-biodegrading chemicals. The second test used actual downgradient field data to assess the method for chemicals undergoing significant mass loss due to biodegradation.

With equation 4.7.1.b,(Chapter 4, section 4.7.1) downgradient concentrations can be used to estimate the initial NAPL mass. BIONAPL was used to define the lateral plume dimensions at row 2 using the source dimensions defined in the model calibration (Chapter

4, section 4.6.4) and this defined the plume area required in the RME method. The flow rate through the area was consistent with the groundwater velocity of 9 cm/day. The predicted breakthrough curves for the plume core (Figure 8.1.1) of BTX and TMB at row 2 were used in order to calculate the natural logarithm of the ratio of the NAPL components (Figure 8.1.2). The slope of the line is calculated from the "linear" portion of the natural logarithm ratio graph which increases constantly; in our case, after 200 days (Figure 8.1.3). The slope of each line is calculated and can be seen in Figure 8.1.3.

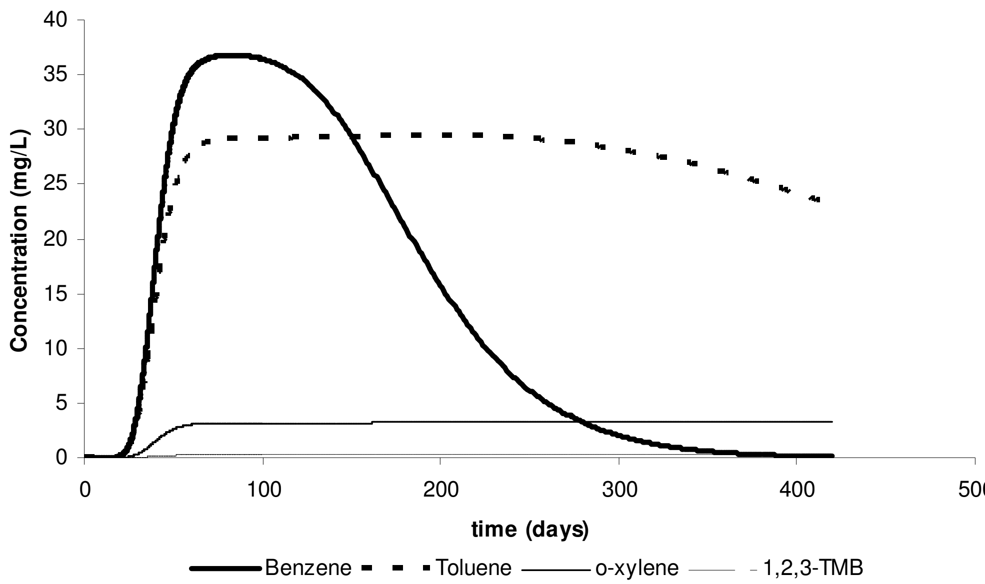

Figure 8.1.1 The concentration breakthrough curves at row 2 for BTX and TMB from the GMT plume generated by the BIONAPL model.

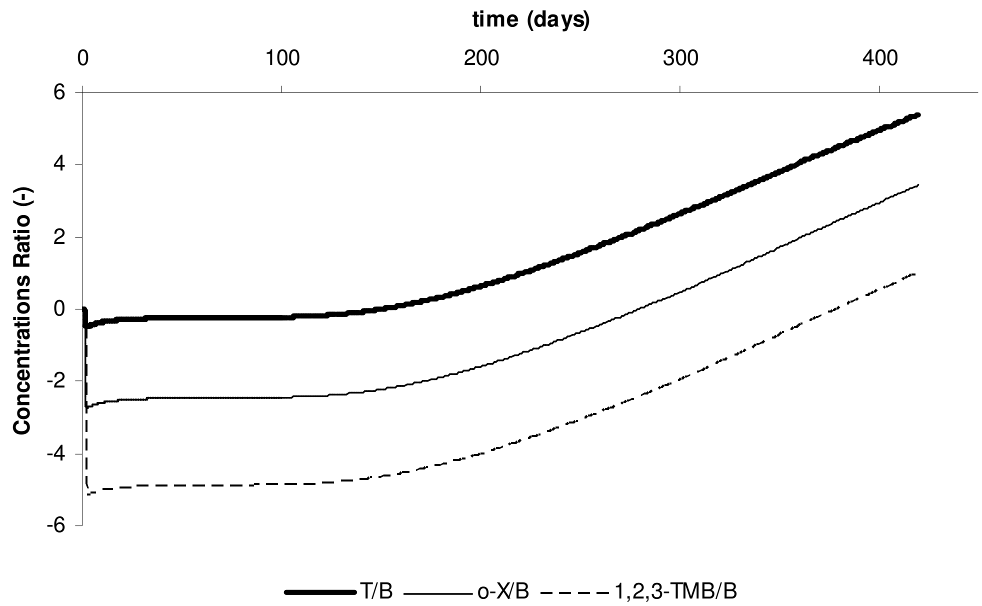

Figure 8.1.2 Natural logarithm of the ratio of the considered NAPL components. Vertical axis is on ln scale.

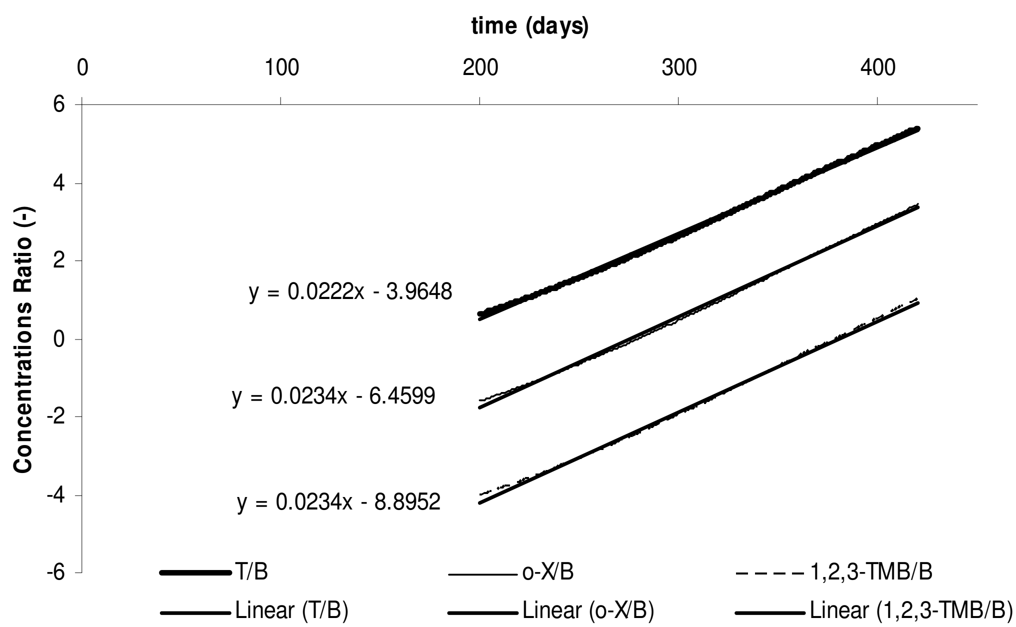

Figure 8.1.3 The natural logarithm of the concentration ratios for the retained portion of the breakthrough curves and the best fit lines together with the calculated slope of each line. Vertical axis is on ln scale.

The cross-sectional area covered by the plume (A), the flow rate through this area (Q), and the value of the B term can be found in the bionapl.lst file generated by BIONAPL. For this particular case these values together with the estimated initial mass of NAPL are summarized in Table 8.1.1. Even though changes in flow rate and in cross-sectional area of the plume could have occurred due to depletion of the source, they were considered constant over time. The actual initial mass of NAPL into the GMT source was about 46000 grams (Chapter 4). The estimated NAPL mass at row 2 is better matched by the benzene/TMB ratio and represents about 95% of the source.

Table 8.1.1 Summary of the BIONAPL model based parameters used for the initial NAPL mass estimation from the peak concentration breakthrough curves in the GMT gate.

Parameter	Row 2		
	Toluene /Benzene	o-Xylene /Benzene	1,2,3-TMB /Benzene
Flow rate (L/day)	510	510	510
B (moles/L)	0.0171	0.0211	0.0222
Slope (1/day)	0.0222	0.0234	0.0234
Estimated NAPL Mass (g)	35300	41400	43400
Estimated NAPL Mass (% of the Initial Mass)	77%	90%	95%

In the second case with actual field data it is expected that the concentration ratios would change due to biodegradation and source depletion. All the parameters used in the first case with the exception of the slope of the line were used in this calculation. The breakthrough curves of Toluene, o-Xylene, 1,2,3-TMB and Benzene at row 2 (Figure 8.1.4) and at row 4 (Figure 8.1.5) were used to estimate the initial NAPL mass. The natural logarithms of the component ratio at row 2 are plotted versus time (Figure 8.1.6). The curve profiles are significantly different than the predicted curves (Figure 8.1.2). Due to the different shape of each curve, a specific interval was selected for calculating the best fit line. An example can be seen in Figure 8.1.7. The field parameters used in the initial mass estimation at row 2 and at row 4 are summarized in Table 8.1.2.

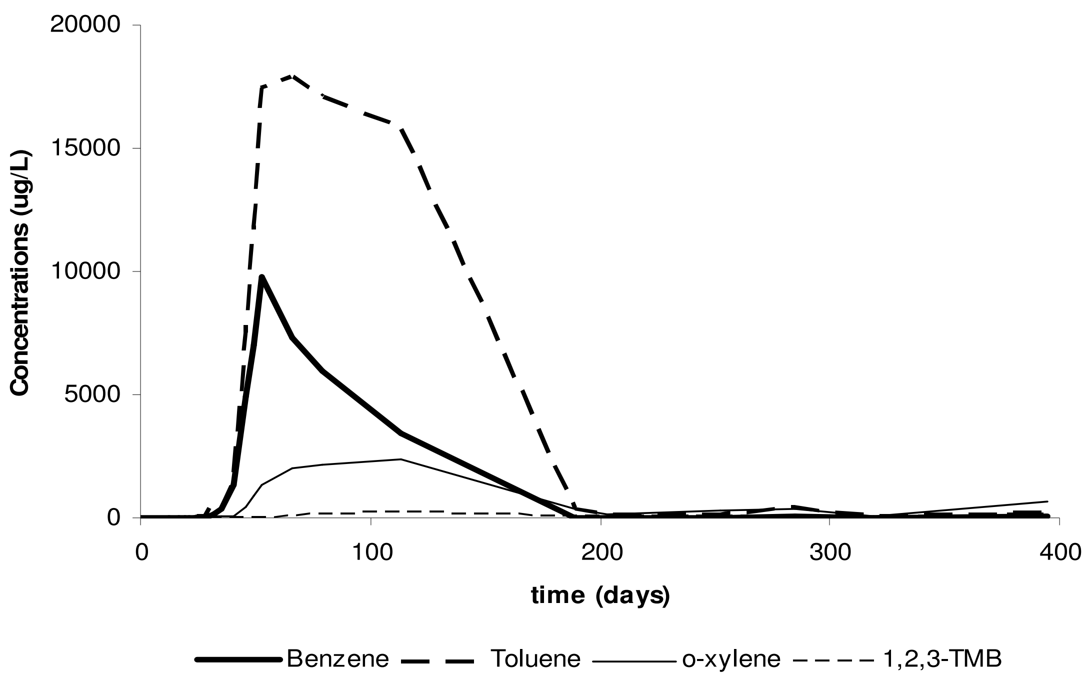

Figure 8.1.4 Observed breakthrough curves of BTX and TMB (sampling point R2-3-6) in the GMT gate used for estimation of the initial NAPL mass in the source from data collected at row 2.

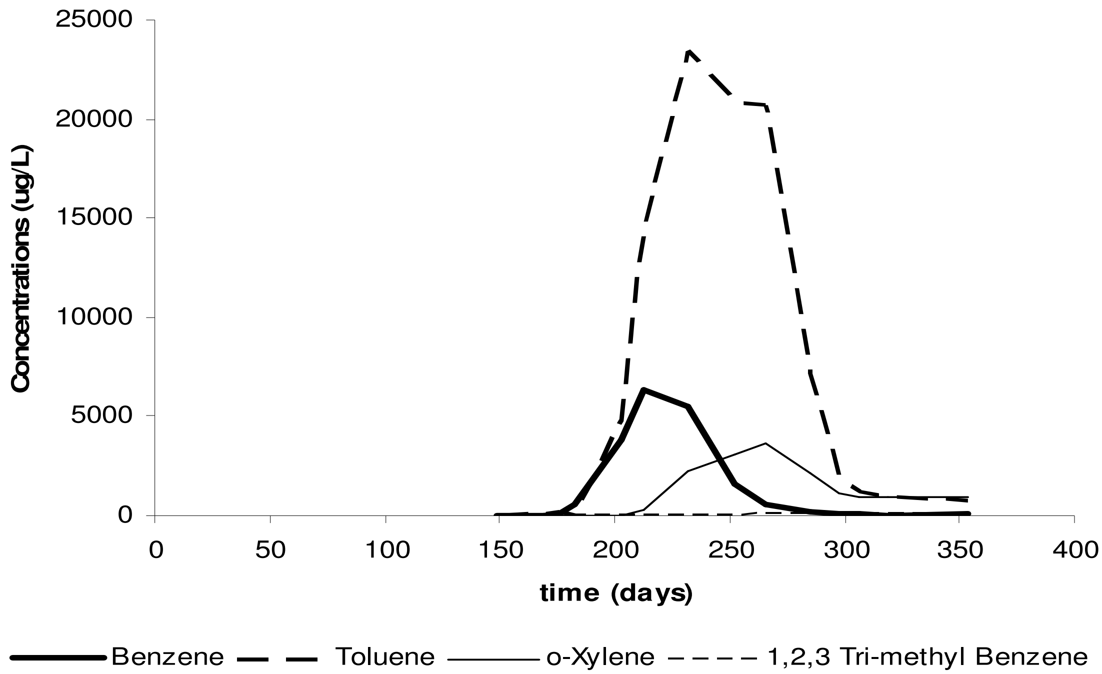

Figure 8.1.5 Observed breakthrough curves of BTX and TMB (sampling point R4-3-12) in the GMT gate used for estimation of the initial NAPL mass in the source from data collected at row 4. Vertical axis is on ln scale.

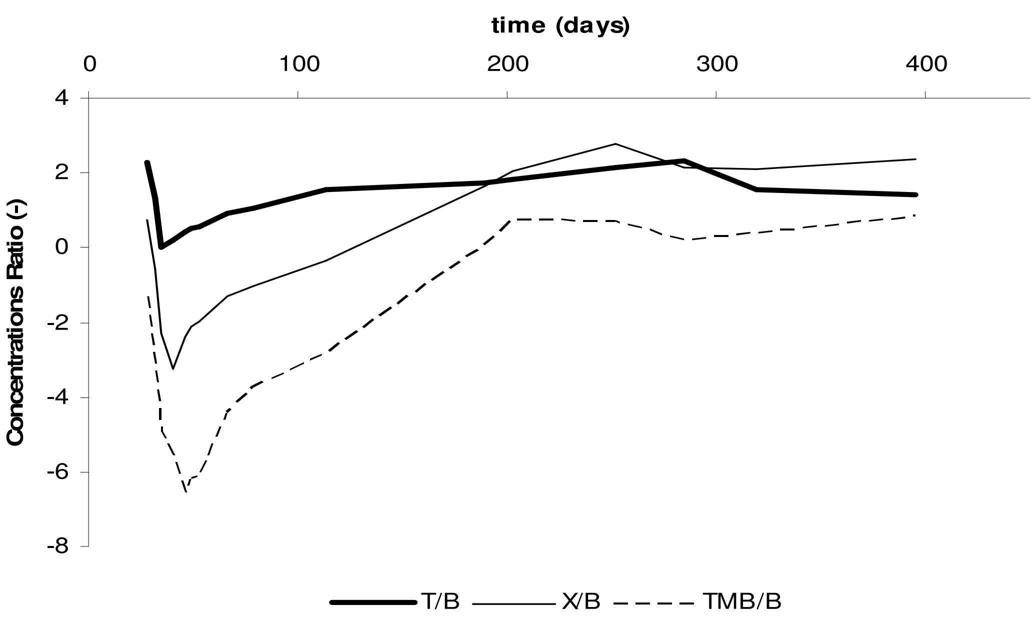

Figure 8.1.6 Natural logarithm of the observed ratios of the NAPL components. Concentrations are collected from row 2, sampling point R2-3-6. Vertical axis is on ln scale.

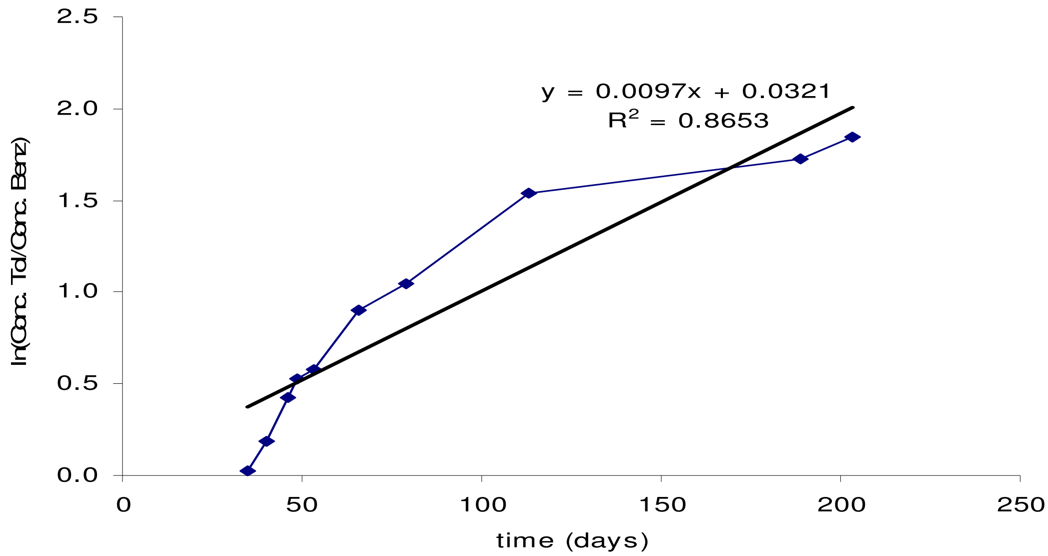

Figure 8.1.7 Logarithmic transformation of the observed toluene and benzene ratio plotted against time. The ratio is calculated from field measured concentrations at row 2.

Table 8.1.2 Summary of field based parameters used for the initial NAPL mass estimation from concentrations in the GMT gate.

Parameter	Row 2			Row 4		
	Toluene /Benzene	o-Xylene /Benzene	1,2,3-TMB /Benzene	Toluene /Benzene	o-Xylene /Benzene	1,2,3-TMB /Benzene
Flowing rate (L/day)	510	510	510	510	510	510
B (moles/L)	0.0171	0.0211	0.0222	0.0171	0.0211	0.0222
Slope (1/day)	0.0097	0.0249	0.0366	0.0456	0.0505	0.0907
Estimated NAPL Mass from Concentrations (g)	80700	38900	27800	17200	19200	11200
Estimated NAPL Mass (% of the Initial Mass)	180%	85%	6%	38%	42%	24%

The value closest to the initial NAPL mass of 42500 g is given by the o-xylene/benzene ratio at row 2 (Table 8.1.2). The other pairs, o-Xylene/benzene and 1,2,3-TMB/benzene produced the same order of magnitude estimate of the initial NAPL mass. Clearly the estimated values using row 4 data are all much lower than those estimated using row 2 data. Note that the only factor that is changed at row 4 compared to row 2 is the value of the slope. The change in the slope indicates a change in the ratio between the concentrations of each pair of components. Dispersion due to physical factors would decrease all concentrations by the same factor and therefore would not change the ratio of any two NAPL components. Retardation would have an impact on data early in the breakthrough of aromatics, but is not likely significant within the core of the aromatic plume. The only remaining process which could be responsible for changes in the ratio is biodegradation. Moreover, if biodegradation is mainly responsible for the change in concentration ratios and so is also responsible for the underestimation of the initial NAPL mass using row 4 data, then the reliability of this method is compromised at greater distance from the source because the cumulative effect of the differential loss of mass due to biodegradation likely increases with distance from the source.

Summary

The RME method produces better results when synthetic data is used. The cumulative effect of the different degradation rates is more pronounced further from the source. As anticipated, a better estimate of the NAPL mass was obtained when using field data collected closer to the source.

Chapter 9

SUMMARY

Three API gasolines containing oxygenates were emplaced below the watertable in the Borden aquifer: the first (the GMT source) containing 9.8% MTBE and 0.2% TBA, the second (E10) containing 10% ethanol, and the third (E95) containing 95% ethanol. These sources were each emplaced with about 2200Lof groundwater to counter buoyant rise of gasoline. The present study covers a comparison of the plume containing 9.8% MTBE with the plume containing 10% ethanol. The oxygenates MTBE, TBA and ethanol as well as the aromatic hydrocarbons: BTX and TMB were followed and some measurement of dissolved oxygen, sulfate, Fe and methane were made to assess electron acceptor utilization.

The dissolution of the oxygenated gasoline and the migration and fate of oxygenate and aromatic hydrocarbons in groundwater were evaluated by estimating the mass discharge of chemicals through three rows of downgradient multilevel monitoring wells. Each row contained six, 15-point multilevel sampling points. The mass discharge was estimated from 4 to 6 times at each row over the 395 day monitoring period reported here.

The precision or uncertainty in the multilevel mass discharge estimate is related to the uncertainties in the Darcy flux, concentration, and area associated with each sampling point. These uncertainties are first due to physical measurements of the input parameters and second, due to underlying assumptions and procedures (e.g. interpolation between sampling point data).

The relative uncertainty in the analytical measurement was typically less than to 5% for all organics. Previous studies in the Borden aquifer made under similar conditions (Beland-Pelletier, 2001) show that the uncertainties due to the variations in hydraulic conductivity, groundwater gradient, and area associated to each sampling point add up to about 7%. The uncertainty due to the density of the sampling points per square meter was about 50% (Fraser, in progress). The total relative uncertainty in mass discharge was estimated using the equation (adapted from Bevington and Robinson, 1992):

$$E = \sqrt{\sum_{i=1}^{n} E_i^2}$$

where E_i is the individual relative uncertainty. From the above equation, the total estimated uncertainty in mass flux discharge was about 50%.

The position of a plume in a poorly monitored segment of a monitoring row could have resulted in underestimating the mass discharge in some cases by 90 %. A correction to the mass discharge was attempted but this also increased the uncertainty. Thus the high uncertainty in mass flux discharge made the mass flux results difficult to interpret.

The concentrations of MTBE and TBA at row 2 are consistent with expectations based on the BIONAPL model with ideal source dissolution but no biodegradation. On the other hand, a broader than expected distribution of the mass flux over time and higher observed concentrations relative to those simulated at some points at later times, could suggest a slower than predicted dissolution rate.

Overall, the MTBE and TBA mass fluxes further downgradient were less than expected suggesting considerable mass was missing, even after a generous adjustment of the field mass flux values to account for possible monitoring deficiencies. Factors favouring MTBE recalcitrance include: previous field experience at Borden, lack of increased TBA concentrations, lack of electron acceptors. Factors suggesting at least some MTBE biotransformation include: slight increase in TBA/MTBE ratio and shift in isotopic signature $\delta^{13}C$ of MTBE. The high uncertainties related to the monitoring network make an acceptable assessment of the mass loss difficult. Therefore, the mechanism of the MTBE and TBA loss of mass is not totally clear.

The groundwater ethanol concentrations and mass flux changes over time from the E10 source generally fit the predicted values based on the equilibrium dissolution model. Often, higher than predicted concentrations are found at later time, suggesting some higher than expected persistence of ethanol in the source. It appears that about 70 % of the injected ethanol was lost by row 4. Insufficient electron acceptors were available to support the apparent ethanol mass loss. However, fermentation to organic acids, which were not monitored in the field experiment, may account for much of the ethanol biotransformation.

Significant BTX-TMB mass was lost in the two gates and the electron acceptor availability was similar in the two gates. In the E10 gate, the mass fluxes of BTX-TMB leaving the gate are somewhat higher than those leaving the GMT gate, suggesting a possible inhibition of aromatic degradation in the presence of ethanol. Perhaps the available oxygen was consumed by the ethanol creating a deficit of electron acceptors, thus creating a slower degradation of BTX-TMB and consequently a greater persistence of aromatics in the E10 gate.

The field experiment suffered some monitoring deficiencies but much of the complexity and uncertainty with the field data likely reflects the sources that were created. Specifically, the inclusion of miscible ethanol and highly soluble MTBE and TBA, as well as the initial injection of water used in the current experiment to spread the gasoline mixture, may have produced an initially non-homogeneous and poorly defined source. Most of the oxygenates likely were transferred to the aqueous phase, while most of the aromatics likely remained in the residual gasoline phase. Therefore the "source" for oxygenates may not have corresponded with the volume and shape of the residual hydrocarbon source. This non-uniform distribution of contaminants in the source associated with two effective source zones (one of oxygenates and one of hydrocarbons) of different volumes and unknown shape would have introduced considerable complexity in the dissolution process and in the downgradient distribution of dissolved chemicals. These source complexities were certainly not monitored nor captured in the modelling process.

Previous studies (Rivett and Feenstra, 2005) show that even for an initially homogeneous contaminant distribution in the source, the dissolution process could produce a non-uniformly distributed residual phase and heterogeneous downgradient concentration distributions. This would add to the complexity of the field data, for example the wide range of concentrations found at row 2 just 3.5 m downgradient of the source.

Additional research into the fate of MTBE at this field site is warranted. The reason for its apparent mass loss should be better established. Also, the residual gasoline source in the E10 and the GMT gates should be sampled to assess the above hypothesis that the residuals will be irregularly distributed but in a zone very close to the injection wells.

Further field research in this field site should consider increasing the density of sampling points in the monitoring rows. Plumes should be better situated in the middle of these rows. While long duration plumes such as BTEX in the current experiment were well captured by the fences or rows of sampling points, short duration plumes like ethanol or MTBE were not. This should be considered in the design of future experiments.

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Appendix A

Lab experiment to test spreading of gasoline under the water gradient

Conducted at the University of Waterloo on July 30, 2004

The purpose of experiment

The purpose of the experiment was to check if ethanol-gasoline mixture can be controlled and spread out when injected under the water table using water injected above and below the gasoline.

The system envisaged injecting the gasoline-ethanol mixture at the bottom of a well screen and water at the upper half of the screen. The water gradient is expected to create a radial driving force from the upper section of the well screen to push the gasoline mixture laterally away from the screen instead of allowing the gasoline to immediately flow upward due to the buoyancy effect.

To accomplish this task, a packer system was designed that allowed the simultaneous injection of water and gasoline-ethanol under the water table at the same time. The packer system was made from a piece of 10 cm long, 3" sch.40 flush joint PVC screen. This screen was divided into two equal intervals of 5 cm long by an inflexible hard plastic packer that was glued to the screen. Hard plastic caps were fitted to both ends of the screen.

This packer system was placed vertically at the bottom of a plastic bucket filled with Borden sand. To allow the water to flow out freely from the bucket a number of 10mm diameter holes were made on the sides of the bucket. To prevent the Borden sand from flowing out t through the holes, a 200x200/in mesh was placed against the interior wall of the bucket.

To simulate the field conditions where the medium is not limited to the bucket dimensions, the bucket was placed into a bigger box and the water table inside the box was raised to 8cm above the upper end of the injection screen. In this way, the water could flow out freely from the bucket under the induced gradient simulating the real field conditions where the flow boundaries are well removed. The flowing rate of the injected water for which a constant water level was maintained in the bucket was 1.5 L/min. For this injection rate the water level inside the bucket was constant and did not produced fluidization of sand at the surface of the bucket (20 cm from the injection screen). The ethanol was died yellow (Fluorescein) and the gasoline was died red (Sudan 4).

The experiment started with injecting water into the upper half of the screen at a rate 1.5L/min under a pressure of 1psi for 3 hours. While water continued to be injected at the same rate, 100mL of gasoline and ethanol mixture (50% v/v) was injected 30 cm under the water table through the lower half of the screen at a rate of 0.85 mL/min under a pressure of 5psi. After all the gasoline was injected, the injection of water was continued for 10 minutes and then stopped.

Results

Through visual observations gasoline (red dye) and ethanol (yellow dye) [you didn't say you added these dyes] as residual phase extended 15-18 cm from the injection screen. However the radial distribution of gasoline and ethanol around the well screen was non uniform (Figure 1, 2, and 3). No free phase above the water injection zone or at the water table was found.

1. A fraction of the injected gasoline was found very close to the injection screen (Figure 1). The gasoline residuals were found about 10 cm above the gasoline injection screen

Much of the ethanol was washed out from the bucket during water injection (visual observation). Yet, ethanol was still found in the sand surrounding the gasoline residuals, and even close to the well screen, coexisting or even behind the residual gasoline (Fig. 3). The gasoline had spread more than 10 cm from the injection screen (Fig.3).

The observations illustrate the potential of the injected water to control the buoyant rise of the gasoline mixtures. Gasoline spread laterally rather than vertically under the gradient produced by the water injection. Most of the ethanol partitioned into the injected water but some remained with the gasoline residuals.

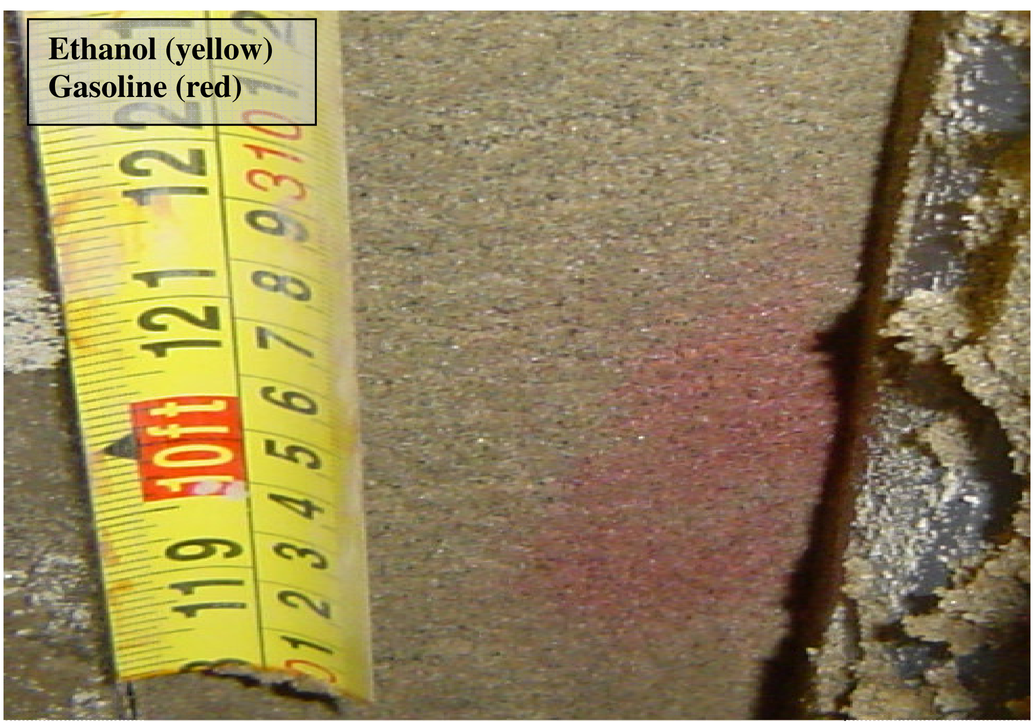

Fig.1 Cross section through the bucket sand showing the gasoline residuals relative to the injection screen.

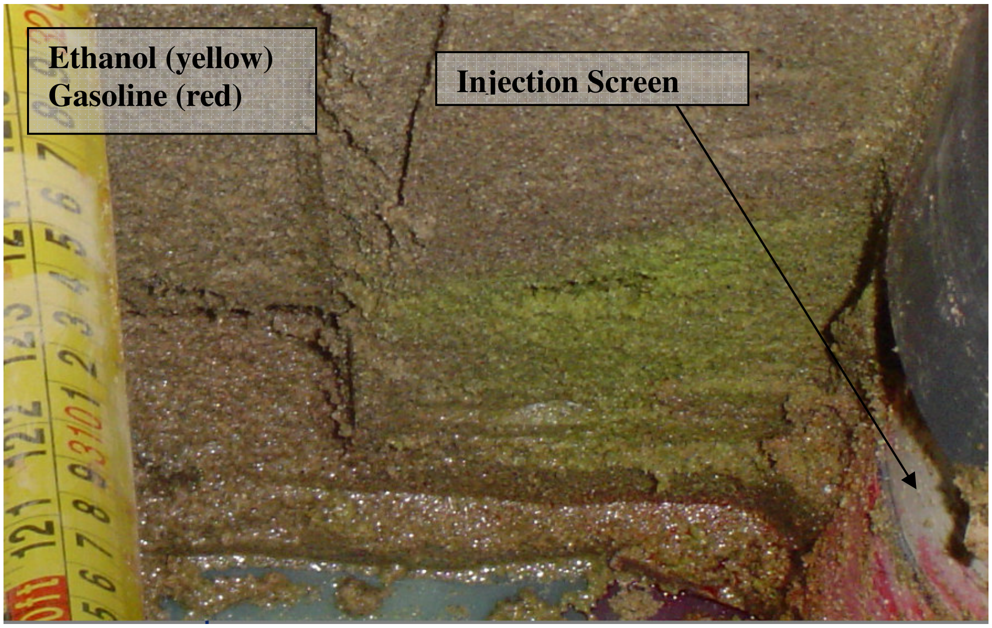
Ethanol (yellow)
Gasoline (red)
Injection Screen

Fig. 2.

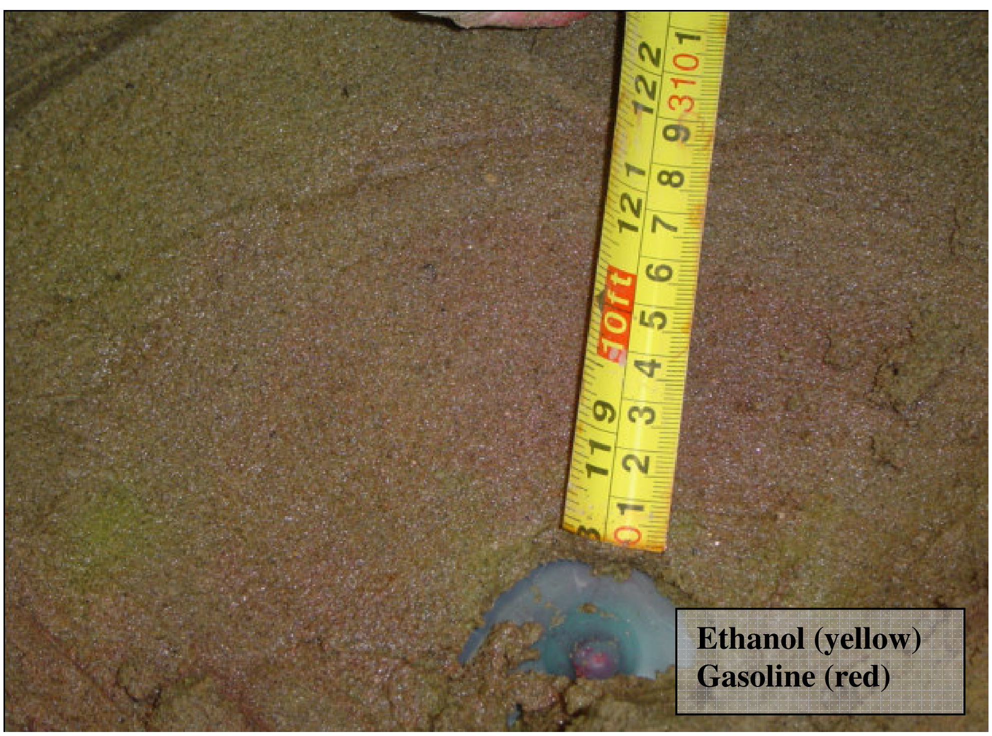
Ethanol (yellow)
Gasoline (red)

Fig. 3.

Appendix B

Calculation of the mass flux of contaminant in areas with not known concentration

When using the block method, each sampling point is associated with an area that extends laterally and vertically half of the distance to the adjacent sampling points.

The question arises: what is the mass of contaminant that is possibly not accounted for due to a missing sampling points where the groundwater could not be sampled or a concentration was not measured?

There are cases when the concentration is missing in some sampling points. For example, if there is a missing datum between two sampling points it is common to assign a value to the missing point equal to the arithmetic mean of the two points above and below. Alternately, the areas assigned to the adjacent points could simply be extended to their mid point which is at the elevation of the missing point. Also, the vertical distance between points 14 and 15 is much bigger (1m) than the usually distance (18 cm) between the other sampling points in the same piezometer. The area assigned to each point is up to the mid distance between the two adjacent multilevel sampling wells and between two consecutive sampling points displaced on the same piezometer. What is the best way of interpolating the concentrations for points which were not sampled and what would be the best way to interpolated between the lowest two points which were 100 cm apart.

In the present work two approaches to the mass flux calculation where there is a missing point were tested: the first one (Fig. 1) no additional point was added and in the second an additional sampling point was added (Fig. 2) between the points A and B whose concentrations were known. To address the problem from a general point of view, the extra sampling point was considered to have an arbitrary position between A and B.

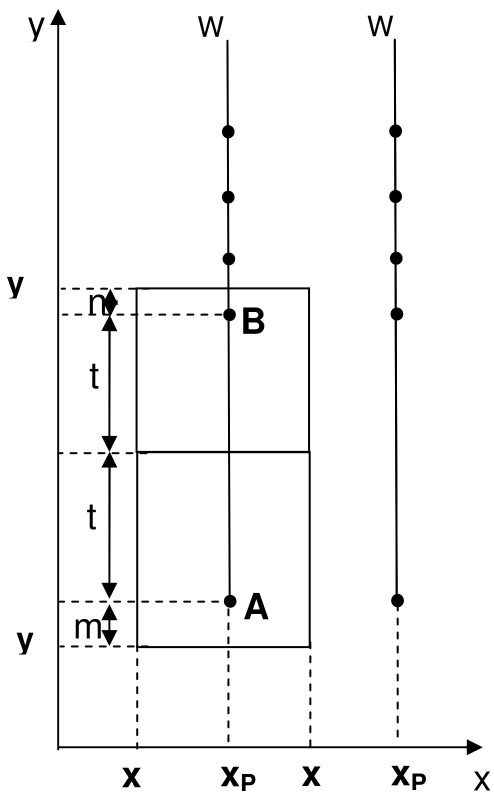

Fig. 1 No additional sampling point is added between sampling point A and sampling point B

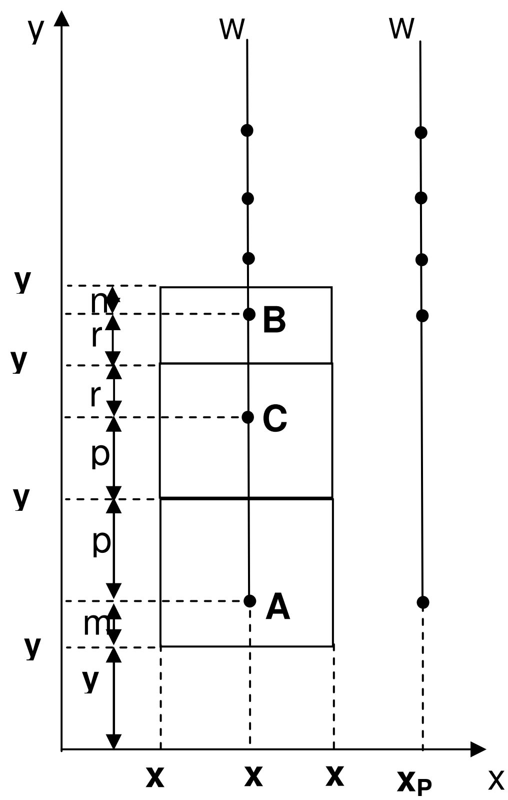

Fig. 2 Arbitrary additional sampling point is added between sampling point A

The Mass Flux Calculation with NO Additional Points

No additional "artificial" sampling points are added in this case when calculating the mass flux (See Figure 1). The mass flux through the two considered points is:

$$MF = MF_A + MF_B \qquad [M/T] \qquad (1)$$

Where

$$MF_A = q_A \text{ x } A_A \text{ x } C_A \text{ and} \qquad [M/T] \qquad (2)$$

$$MF_B = q_B \text{ x } A_B \text{ x } C_B \qquad [M/T] \qquad (3)$$

with

q_A, q_B [L/T] = Darcy flux associated to sampling point A and sampling point B, respectively

A_A, A_B [L^2] = area associated with a sampling point A and sampling point B, respectively

C_A, C_B [M/L^3] = effective concentration associated to sampling point A and sampling point B, respectively

To simplify the algebra assume that:

$$q_A = q_B = q = 1 \qquad [L/T]$$

Therefore,

$$MF_A = A_A \text{ x } C_A \qquad [M/T] \qquad (4)$$

and

$$MF_B = A_B \text{ x } C_B \qquad [M/T] \qquad (5)$$

In order to calculate the mass flux, an area (A) is assigned to each sampling point. The assigned area is equal to the semi distance between the two sampling wells multiplied by the semi distance between the two consecutive sampling points from the same multilevel sampling well. Because there is no way to determine the extent of the contaminant plume below sampling point A (Fig. 2), an arbitrary distance (y_1) is considered from the bottom sampling point to the edge of the domain.

Therefore,

$$A_A = (x_2 - x_1) \times (y_2 - y_1) \qquad [L^2] \qquad (6)$$

and

$$A_B = (x_2 - x_1) \times (y_3 - y_2) \qquad [L^2] \qquad (7)$$

To simplify the calculation let's consider $(x_2-x_1) = 1$ unit.

The areas are expressed now as:

$$A_A = (y_2 - y_1) \qquad [L^2] \qquad (8)$$

and

$$A_B = (y_3 - y_2) \qquad [L^2] \qquad (9)$$

By substitution equation (4) and (5) become:

$$MF_A = (y_2 - y_1) \times C_A \qquad [LM] \qquad (10)$$

and

$$MF_B = (y_3 - y_2) \times C_B \qquad [LM] \qquad (11)$$

and finally

$$MF = (y_2 - y_1) \times C_A + (y_3 - y_2) \times C_B \qquad [LM] \qquad (12)$$

From Figure 1:

$$(y_2 - y_1) = (t + m) \qquad [L] \qquad (13)$$

$$(y_3 - y_2) = (t + n) \qquad [L] \qquad (14)$$

By replacing $(y_2 - y_1)$ from (13) and $(y_3 - y_2)$ from (14) the mass flux becomes:

$$MF = (t + m) \times C_A + (t + n) \times C_B \qquad [LM] \qquad (15)$$

Because it was assumed that q=1 [L/T] and $(x_2 - x_1) = 1$ [L] (12) the total mass flux can be written as:

$$MF = q(x_2 - x_1)\,[(t + m) \times C_A + (t + n) \times C_B] \qquad [M/T] \qquad (16)$$

The Mass Flux Calculation with Additional Points

In order to facilitate calculation of the mass flux, an additional "artificial" sampling point C is added between point A and B (Fig. 2). The same initial assumption about the units of the Darcy flux and about $(x_2 - x_1)$ value was maintained. Both, the concentration and area at point C will have different expressions depending upon the position of point C relative to point A and point B.

Concentration Calculation

The concentration in point C is estimated or assumed to be a function of its relative position to the sampling point A and B (Fig 3). If C is at the middle of distance between A and B, then its concentration is considered to be:

$$C_C = \frac{C_A + C_B}{2} \qquad [M/L^3] \qquad (17)$$

But this case is a particular case of the general case where point C could have any position between A and B. Therefore, to generalize the approach and to eliminate any reservations about the possible implications of the position of point C toward the mass flux calculation in this demonstration it was used the general case (Fig. 2 and Fig 3) rather than the particular one.

In Figure 3, because in both ABB' and ACC' triangles exist:

- a right angle (BB'A = CC'A=90^0)
- a common angle (CAC' = BAB')
- because the sum of the angles in a triangle is 180^0 follows that the third angle in each given triangles are equal

therefore the triangle ABB' and ACC' are similar.

Because the above triangles are similar the corresponding sides are related as:

$$\frac{C_B - C_A}{C_C - C_A} = \frac{y_A - y_B}{y_A - y_C} \qquad (18)$$

From here follows that concentration at point C is given by:

$$C_C = C_A + \frac{(C_B - C_A)(y_A - y_C)}{(y_A - y_B)} \qquad (19)$$

From (19) it can be seen on Figure 3 than as y_c approaches y_A, C_C approaches C_A value, and as y_c approaches y_B, C_C approaches C_B value.

To check the validity of equation (19) we simply consider the particular case when point C is situated at half of the distance between A and B.

In mathematical terms:

$$y_A - y_C = y_C - y_B \qquad (20)$$

or

$$y_C = \frac{y_A + y_B}{2} \qquad (21)$$

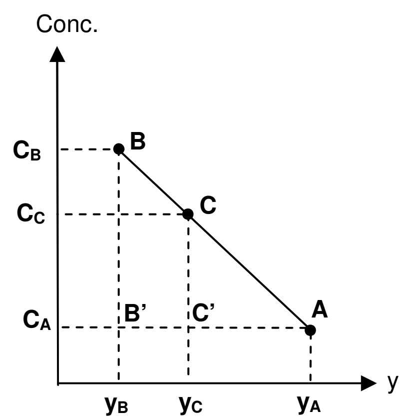

Fig. 3 Additional sampling point C added at a random position between points A and B.

By replacing y_C from equation (21) in equation (19) we have:

$$C_C = C_A + \frac{(C_B - C_A)(y_A - \frac{y_A + y_B}{2})}{(y_A - y_B)} \qquad (22)$$

$$C_C = C_A + \frac{(C_B - C_A)(\frac{2y_A}{2} - \frac{y_A}{2} - \frac{y_B}{2})}{(y_A - y_B)} \qquad (23)$$

$$C_C = C_A + \frac{(C_B - C_A)(\frac{y_A}{2} - \frac{y_B}{2})}{(y_A - y_B)} \qquad (24)$$

$$C_C = C_A + \frac{(C_B - C_A)(\frac{y_A - y_B}{2})}{(y_A - y_B)} \tag{25}$$

$$C_C = C_A + \frac{C_B - C_A}{2} \tag{26}$$

$$C_C = \frac{C_A + C_B}{2} \tag{27}$$

Because the particular case formula (eq. 17) was obtained from the general case formula (Equation 19) it can be inferred that the general formula is correct.

Area Calculation

By keeping the same assumptions $x_2 - x_1 = 1$ [L], area that corresponds to A, B, and C is calculated as (Fig. 2):

$$\left.\begin{aligned} A_A &= y_2 - y_1 = p + m \\ Ac &= y_3 - y_2 = r + p \\ A_B &= y_4 - y_3 = n + r \end{aligned}\right\} \ [L^2] \tag{28}$$

The total mass flux through A,B, and C will be:

$$MF = MF_A + MF_B + MF_C \qquad [M/L] \tag{29}$$

where:

$$\left.\begin{aligned} MF_A &= A_A C_A \\ MF_B &= A_B C_B \\ MF_C &= A_C C_C \end{aligned}\right\} \quad [M/L] \tag{30}$$

that is equivalent to:

$$\left.\begin{aligned} MF_A &= (p + m)C_A \\ MF_B &= (n + r)C_B \\ MF_c &= (r + p)C_C \end{aligned}\right\} \quad [M/L] \tag{31}$$

where $$C_C = C_A + \frac{(C_B - C_A)(y_A - y_C)}{(y_A - y_B)} \quad [M/L^3] \tag{32}$$

$$\left.\begin{aligned} y_A &= m + y_0 \\ y_B &= 2r + 2p + m + y \\ y_C &= 2p + m + y_0 \end{aligned}\right\} \quad [L] \tag{33}$$

By replacing (33) in (y_A- y_c) and (y_A – y_B) we have:

$$\left.\begin{aligned} (y_A - y_C) &= (m + y_0) - (2p + m + y_0) = -2p \\ (y_A - y_B) &= (m + y_0) - (2r + 2p + m + y_0) = -2(r + p) \end{aligned}\right\} [L] \tag{34}$$

The substitution of (34) in (32) yields:

$$C_C = \frac{-2(r+p)C_A - 2p(C_B - C_A)}{-2(r+p)}$$

$$= \frac{rC_A + pC_B}{(r+p)} \qquad [M/L^3] \qquad (35)$$

Replacing (35) in (31):

$$MF_C = (r+p)\frac{rC_A + pC_B}{(r+p)} = rC_A + pC_B \qquad [M/L^2] \qquad (36)$$

The system from (31) becomes:

$$\left.\begin{aligned} MF_A &= (p+m)C_A \\ MF_B &= (n+r)C_B \\ MF_C &= rC_A + pC_B \end{aligned}\right\} \qquad [M/L^2] \qquad (37)$$

from where:

$$MF = (p+m)C_A + (n+r)C_B + rC_A + pC_B$$

$$= (p+m+r)C_A + (n+r+p)C_B \qquad [M/L^2] \qquad (38)$$

or in terms of q and $(x_2 - x_1)$

$$MF = q(x_2 - x_1)[\,(p+m+r)C_A + (n+r+p)C_B] \qquad [M/T] \quad (39)$$

Equation (16) is equal to equation (39) if :

$$(t+m) = (p+m+r)$$

and

$$(t + n) = (n + r + p)$$

This implies:

$$t = p + r$$

But “t” is half of the distance between A and B, so “r + p” should be half of the distance between A and B. This implies that C has to be situated at half of the distance between A and B.

In other words, if C is situated at the half distance between A and B then the mass flux calculated with or without the additional “artificial” sampling point would be the same.

Conclusion

Equation 19 allows division of an interval between two sampling points of known concentrations in as many intervals as needed. When using linear interpolation, the mass flux through a domain does not change if an additional “artificial” sampling point is added at the middle distance between the real sampling points as long as this point has a concentration inferred by linear interpolation between the adjacent two points. Therefore, when this method is used for mass flux calculation it is enough to extent the associated area for each sampling point to the middle of the distance between the point and its neighbors whatever the distance between the points may be.

Appendix C

OXYGENATE ANALYSIS METHOD PROVIDED BY THE LAB (updated December 20, 2004)

PARAMETERS: Ethanol(EtOH), Methyltertiarybutylether(MTBE), Tertiarybutylalcohol(TBA), (Methanol, Acetone, Propanol, Butanol etc)

SAMPLE PREPARATION:

Samples are collected in glass containers fitted with Teflon-lined septa (and no headspace), preserved with sodium azide and stored at 4 degrees C for up to two weeks. A 2ml aliquot of the aqueous solution is transferred to an autosampler vial and placed on a 7673A HP Autosampler for chromatographic analysis.

Calibration standards are prepared by adding (2-50uL) neat compound to 100mL volumetric flasks filled with organic-free water. For lower concentrations (<15mg/L) dilutions of the higher standards is required.

GAS CHROMATOGRAPHIC (GC) ANALYSIS:

The aqueous samples are analyzed on a Hewlett Packard 5890 gas chromatograph equipped with a flame ionization detector and a packed column. Peaks are measured with a HP 3395 integrator. The method is calibrated using an external calibration mode.

GC CONDITIONS:

Column: 10 ft. length by 0.125 in. inner diameter, packed with 3% SPI500 on Carbopack B (80/100 mesh)
Carrier: Helium at 20ml/min
Oven: Isothermal at 115^{o} C for Ethanol
Isothermal at 145^{o} C for MTBE/TBA
Injector: 115 ^{o}C
Detector: 230 ^{o}C

QUALITY ASSURANCE DATA:

COMPOUND	METHOD DETECTION LIMIT (mg/L)
EtOH	0.050
MTBE	0.069
TBA	0.028

REFERENCES: Modification of EPA Method 8015B.

Appendix 1

A. Oxygenates (mg/L)

1. GMT gate

a. Row 2

20 Nov. 04

Point_Name	TBA	MTBE
R2-1-15	0	0
R2-2-15	1.2	37.49
R2-2-3	0	0
R2-2-4	0	0
R2-2-5	0	0
R2-2-6	0	0
R2-2-7	0	0.134
R2-2-8	0	0
R2-2-9	0	0
R2-2-10	0.087	4.68
R2-2-11	0	0
R2-2-12	0	1.665
R2-2-13	0	0.3
R2-2-1	0	0
R2-2-2	0	0
R2-3-10	4.44	176.3
R2-3-4	0	1.78
R2-3-5	0	14.03
R2-3-1	0	0
R2-3-7	0.705	50.42
R2-3-8	4.221	231.9
R2-3-9	6.34	408.4
R2-3-15	0.84	25.54
R2-3-14	0	0
R2-3-13	0	0.38
R2-3-12	0	1.45
R2-3-11	0.05	3.07
R2-3-2	0	1.53
R2-3-6	0	29.5
R2-3-3	0.225	2.05
R2-4-12	10.98	324.2
R2-4-1	0	0.806
R2-4-2	0	11.03
R2-4-3	0	0.627
R2-4-4	0	17.63
R2-4-5	0	89.27
R2-4-6	2.67	105.32
R2-4-8	0	0.906
R2-4-9	7.99	244.8
R2-4-11	0.215	5.245
R2-4-13	0	0.988
R2-4-3	0	0.63
R2-4-15	0.036	1.83
R2-4-14	0	0.145
R2-4-10	14.71	438.5
R2-5-15	0	0
R2-5-1	0	0
R2-5-3	0	0
R2-5-5	0	0
R2-5-6	0	0
R2-5-14	0	0
R2-5-12	0	0
R2-5-11	0	0
R2-5-10	0	0
R2-5-9	0.474	0
R2-5-8	0	0
R2-5-7	0.421	0
R2-5-13	0	0
R2-6-9	0	0
R2-6-15	0	0
R2-6-14	0	0
R2-6-12	0	0
R2-6-10	0	0
R2-6-8	0	0
R2-6-7	0	0
R2-6-6	0	0
R2-6-11	0	0

16 Dec. 04

Point_Name	TBA	MTBE
R2-1-9	0	0
R2-1-1	0	0
R2-1-2	0	0
R2-1-3	0	0
R2-1-4	0	0
R2-1-5	0	0
R2-1-6	0	0
R2-1-8	0	0
R2-1-10	0	0

R2-1-11	0	0
R2-1-13	0	0
R2-1-14	0	0
R2-1-15	0	0
R2-1-12	0	0
R2-1-7	0	0
R2-2-13	24.43	375.1
R2-2-3	0	0
R2-2-4	0	0
R2-2-6	0	0
R2-2-8	0	0
R2-2-9	0	0
R2-2-10	0	0.883
R2-2-15	0	1.208
R2-2-14	1.967	47.28
R2-2-12	0.245	8.801
R2-2-11	0.061	7.389
R2-2-2	0	0
R2-2-5	0	0
R2-2-1	0	0
R2-2-7	0	0
R2-2-10	0	0.883
R2-3-7	0	16.87
R2-3-6	0	15.69
R2-3-15	0	0.427
R2-3-14	0.245	15.67
R2-3-13	7.31	419.6
R2-3-11	6.89	221.5
R2-3-8	0.123	289.5
R2-3-12	45.7	**1328**
R2-3-6	0	15.69
R2-3-5	0	0
R2-3-4	0	0
R2-3-3	0	1.392
R2-3-2	0	0.697
R2-3-1	0	0
R2-3-9	0	24.29
R2-3-10	0.535	62.87
R2-4-6	0	0.636
R2-4-15	0	0.333
R2-4-14	0.616	31.64
R2-4-13	26.95	790.6
R2-4-12	0.25	15.74
R2-4-11	7.173	251.7
R2-4-10	0.633	31.09
R2-4-9	0	9.63
R2-4-7	0	1.311
R2-4-1	0	0
R2-4-5	0	1.158
R2-4-4	0	0
R2-4-3	0	0
R2-4-2	0	0.73
R2-4-11	7.173	251.7
R2-4-3	0	0
R2-4-8	33.52	1016.5
R2-5-5	0	0.194
R2-5-11	0	0.163
R2-5-10	0	0.084
R2-5-14	0	0.104
R2-5-13	0	0.208
R2-5-8	0	0.176
R2-5-7	0	0.176
R2-5-12	0	0
R2-5-8	0	0.168
R2-5-10	0	0.084
R2-5-9	0	0
R2-5-1	0	0.401
R2-5-3	0	0.537
R2-5-15	0	0
R2-5-6	0	0.259
R2-6-4	0	0
R2-6-1	0	0
R2-6-3	0	0
R2-6-8	0.273	0
R2-6-5	0	0
R2-6-6	0	0
R2-6-7	0	0
R2-6-9	0	0
R2-6-10	0	0
R2-6-11	0	0
R2-6-12	0	0
R2-6-13	0	0
R2-6-14	0	0
R2-6-15	0	0
R2-6-2	0	0

3 Feb. 05

Point_Name	TBA	MTBE
R2-2-4	0	0
R2-2-14	6.006	201.6
R2-2-15	0	0
R2-2-13	0.469	13.08
R2-2-12	0	0

R2-2-11	0	0
R2-2-10	0	0
R2-2-9	0	0
R2-2-7	0	0
R2-2-6	0	0
R2-2-5	0	0
R2-2-1	0	0
R2-3-15	0	0
R2-3-2	0	0.43
R2-3-3	0	0
R2-3-4	0	0
R2-3-5	0	0
R2-3-6	0	0
R2-3-7	0	0
R2-3-8	0	0.636
R2-3-9	0	0.505
R2-3-10	0	0.843
R2-3-11	0.127	18.93
R2-3-12	0	7.472
R2-3-13	2.426	292.31
R2-3-14	8.052	583.87
R2-3-1	0	0
R2-4-4	0	0.146
R2-4-1	0	0.214
R2-4-5	0	0.239
R2-4-15	0	0.136
R2-4-14	10.35	784.7
R2-4-13	4	321.2
R2-4-12	0	0.663
R2-4-11	0	12.05
R2-4-10	0	0.344
R2-4-9	0	0.432
R2-4-8	0.413	64.82
R2-4-7	0	0.136
R2-4-6	0	0.164
R2-4-2	0	0.37
R2-4-3	0	0.177
R2-5-3	0	0.135
R2-5-5	0	0
R2-5-6	0	0
R2-5-7	0	0
R2-5-8	0	0
R2-5-9	0	0
R2-5-10	0	0
R2-5-11	0	0
R2-5-12	0	0
R2-5-13	0	0
R2-5-14	0	0
R2-5-15	0	0
R2-5-1	0	0.161

19 Apr. 05

Point_Name	TBA	MTBE
R2-2-10	0	0
R2-2-1	0	0
R2-2-14	0	0
R2-2-13	0	0
R2-2-11	0	0
R2-2-9	0	0
R2-2-8	0	0
R2-2-7	0	0
R2-2-6	0	0
R2-2-5	0	0
R2-2-4	0	0
R2-2-3	0	0
R2-2-2	0	0
R2-2-12	0	0
R2-3-2	0	0
R2-3-7	0	0
R2-3-1	0	0
R2-3-3	0	0
R2-3-4	0	0
R2-3-5	0	0
R2-3-6	0	0
R2-3-9	0	0
R2-3-10	0	0
R2-3-11	0	0
R2-3-12	0	0
R2-3-13	0	0.105
R2-3-14	0	0.113
R2-3-8	0	0
R2-4-11	0	0
R2-4-2	0	0
R2-4-1	0	0
R2-4-4	0	0
R2-4-5	0	0
R2-4-6	0	0
R2-4-7	0	0
R2-4-8	0	0
R2-4-3	0	0
R2-4-10	0	0

R2-4-12	0	0
R2-4-13	0	13.49
R2-4-14	0	33.38
R2-4-9	0	0
R2-5-6	0	0
R2-5-1	0	0
R2-5-14	0	0
R2-5-5	0	0
R2-5-7	0	0
R2-5-8	0	0
R2-5-9	0	0
R2-5-10	0	0
R2-5-11	0	0
R2-5-12	0	0
R2-5-13	0	0
R2-5-2	0	0

8 June 05

Point_Name	TBA	MTBE
R2-2-1	0	0
R2-2-2	0	0
R2-2-3	0	0
R2-2-4	0	0
R2-2-5	0	0
R2-2-6	0	0
R2-2-7	0	0
R2-2-8	0	0
R2-2-9	0	0
R2-2-10	0	0
R2-2-11	0	0
R2-2-12	0	0
R2-2-13	0	0
R2-2-14	0	0
R2-2-15	0	0
R2-5-1	0	0
R2-5-2	0	0
R2-5-5	0	0
R2-5-6	0	0
R2-5-7	0	0
R2-5-8	0	0
R2-5-9	0	0
R2-5-10	0	0
R2-5-11	0	0
R2-5-12	0	0
R2-5-13	0	0
R2-5-14	0	0
R2-5-14	0	0
R2-3-1	0	0
R2-3-2	0	0
R2-3-3	0	0
R2-3-4	0	0
R2-3-5	0	0
R2-3-6	0	0
R2-3-7	0	0
R2-3-8	0	0
R2-3-9	0	0
R2-3-10	0	0
R2-3-11	0	0
R2-3-12	0	0
R2-3-13	0	0
R2-3-14	0	0
R2-3-15	0	0
R2-4-1	0	0
R2-4-2	0	0
R2-4-3	0	0
R2-4-4	0	0
R2-4-5	0	0
R2-4-6	0	0
R2-4-7	0	0
R2-4-8	0	0
R2-4-9	0	0
R2-4-10	0	0
R2-4-11	0	0
R2-4-12	0	0
R2-4-13	0	0.87
R2-4-14	0	0.42
R2-4-15	0	0

B.

1. GMT gate

b. Row 3

3 Feb. 05

Point_Name	TBA	MTBE
R3-2-5	0	0
R3-2-2	0	0

R3-2-1	0	0.21
R3-2-4	0	0
R3-2-6	0	0
R3-2-7	0	0
R3-2-8	0	0
R3-2-11	0.187	11.67
R3-2-12	0	0
R3-2-13	0	0
R3-2-14	0	0
R3-2-15	0.139	5.66
R3-2-3	0	0
R3-3-9	0	7.88
R3-3-2	0	0.073
R3-3-3	0	1.047
R3-3-4	0	5.261
R3-3-5	0	8.314
R3-3-6	0	19.6
R3-3-8	0	37.56
R3-3-11	0.278	18.22
R3-3-12	3.04	82.16
R3-3-13	2.015	58.07
R3-3-15	0.211	7.606
R3-3-10	0.559	27.23
R3-3-7	0	14.58
R3-4-4	0	2.317
R3-4-15	0	0.52
R3-4-14	0.401	15.26
R3-4-13	0.42	11.463
R3-4-12	3.096	55.31
R3-4-10	1.942	50.58
R3-4-9	0	3.559
R3-4-8	0	14.47
R3-4-7	0	8.068
R3-4-5	0	1.028
R3-4-3	0	11.55
R3-4-2	0	1.414
R3-4-11	2.735	48.79
R3-4-1	0	1.817
R3-4-6	0	11.61
R3-5-1	0	0.201
R3-5-2	0	0.15
R3-5-3	0	0.101
R3-5-4	0	0
R3-5-5	0	0
R3-5-6	0	0
R3-5-7	0	0
R3-5-8	0	0
R3-5-9	0	0
R3-5-10	0	0.112
R3-5-11	0	0
R3-5-12	0	0
R3-5-13	0	0
R3-5-15	0	0
R3-5-14	0	0

5 Apr. 05

Point_Name	TBA	MTBE
R3-2-10	0	0.134
R3-2-1	0	1.53
R3-2-13	0.382	25.79
R3-2-11	0	1.923
R3-2-9	0	0
R3-2-8	0	0
R3-2-7	0	0
R3-2-6	0	0
R3-2-5	0	0
R3-2-4	0	0
R3-2-3	0	0
R3-2-2	0	0.889
R3-2-12	0.934	23.38
R3-3-2	0	2.91
R3-3-7	0	11.36
R3-3-1	0	0.146
R3-3-3	0	0.947
R3-3-4	0	0
R3-3-5	0	0.897
R3-3-6	0	4.777
R3-3-9	0	0
R3-3-10	0	0
R3-3-11	0	0.069
R3-3-12	0	2.289
R3-3-13	0	4.335
R3-3-14	0.438	9.15
R3-3-8	0	1.297
R3-4-12	0	0
R3-4-3	0	3.439
R3-4-4	0	0.428
R3-4-5	0	2.609
R3-4-6	0	0
R3-4-7	0	0.06
R3-4-8	0	0

R3-4-9	0	0.103
R3-4-2	0.113	9.913
R3-4-11	0	0.109
R3-4-13	0	1.481
R3-4-1	0	2.066
R3-4-14	0	1.918
R3-4-10	0	2.106
R3-5-6	0	0
R3-5-1	0	0
R3-5-2	0	0
R3-5-14	0	0
R3-5-4	0	0
R3-5-7	0	0
R3-5-8	0	0
R3-5-9	0	0
R3-5-10	0	0
R3-5-11	0	0
R3-5-12	0	0
R3-5-13	0	0
R3-5-3	0	0

6 June 05

Point_Name	TBA	MTBE
R3-2-1	0	0.082
R3-2-2	0	0.133
R3-2-3	0	0.189
R3-2-4	0	0
R3-2-5	0	0
R3-2-6	0	0
R3-2-7	0	0
R3-2-8	0	0
R3-2-9	0	0
R3-2-10	0	0.132
R3-2-11	0	1.104
R3-2-12	0	1.379
R3-2-13	0	2.133
R3-2-14	0	1.715
R3-2-15	0	0
R3-5-1	0	0
R3-5-2	0	0
R3-5-3	0	0
R3-5-4	0	0
R3-5-6	0	0
R3-5-7	0	0
R3-5-8	0	0
R3-5-9	0	0
R3-5-10	0	0
R3-5-11	0	0
R3-5-12	0	0
R3-5-13	0	0
R3-5-14	0	0
R3-5-14	0	0
R3-3-1	0	0
R3-3-2	0	0.098
R3-3-3	0	0.519
R3-3-4	0	0.87
R3-3-5	0	0.122
R3-3-6	0	0
R3-3-7	0	0.037
R3-3-8	0	0.196
R3-3-9	0	0
R3-3-10	0	0
R3-3-11	0	0
R3-3-12	0	0
R3-3-13	0	0
R3-3-15	0	0.083
R3-4-1	0	0.447
R3-4-2	0	1.967
R3-4-3	0	4.256
R3-4-5	0	0.71
R3-4-6	0	0.24
R3-4-7	0	0
R3-4-8	0	0.191
R3-4-9	0	0
R3-4-10	0	0
R3-4-11	0	0
R3-4-12	0	0
R3-4-13	0	0
R3-4-14	0	0
R3-4-15	0	0

16 Aug. 05

Point_Name	TBA	MTBE
R3-1-1	0	0
R3-1-2	0	0
R3-1-3	0	0

R3-1-4	0	0
R3-1-5	0	0
R3-1-6	0	0
R3-1-7	0	0
R3-1-8	0	0
R3-1-9	0	0
R3-1-10	0	0
R3-1-11	0	0
R3-1-12	0	0
R3-1-13	0	0
R3-1-14	0	0
R3-1-15	0	0
R3-2-1	0	0
R3-2-2	0	0
R3-2-3	0	0
R3-2-4	0	0
R3-2-5	0	0
R3-2-6	0	0
R3-2-7	0	0
R3-2-8	0	0
R3-2-9	0	0
R3-2-10	0	0
R3-2-11	0	0
R3-2-12	0	0
R3-2-13	0	0
R3-2-14	0	0
R3-2-15	0	0
R3-5-1	0	0
R3-5-2	0	0
R3-5-3	0	0
R3-5-4	0	0
R3-5-5	0	0
R3-5-6	0	0
R3-5-7	0	0
R3-5-8	0	0
R3-5-9	0	0
R3-5-10	0	0
R3-5-11	0	0
R3-5-12	0	0
R3-5-13	0	0
R3-5-14	0	0
R3-5-14	0	0
R3-3-1	0	0
R3-3-2	0	0
R3-3-3	0	0.14
R3-3-4	0	0
R3-3-5	0	0
R3-3-6	0	0
R3-3-7	0	0
R3-3-8	0	0
R3-3-9	0	0
R3-3-10	0	0
R3-3-11	0	0
R3-3-12	0	0
R3-3-13	0	0
R3-3-15	0	0
R3-4-1	0	0
R3-4-2	0	0
R3-4-3	0	0.485
R3-4-4	0	0
R3-4-5	0	0
R3-4-6	0	0
R3-4-7	0	0
R3-4-8	0	0
R3-4-9	0	0
R3-4-10	0	0
R3-4-11	0	0
R3-4-12	0	0
R3-4-13	0	0
R3-4-14	0	0
R3-4-15	0	0

C.

1. GMT gate

c. Row 4

13 Apr. 05

Point_Name	TBA	MTBE
R4-2-5	0	0
R4-2-14	0	3.497
R4-2-2	0	1.24
R4-2-1	0	0.71
R4-2-4	0	0
R4-2-6	0	0
R4-2-7	0	0
R4-2-8	0	0
R4-2-9	0	0
R4-2-10	0	0
R4-2-11	0	0
R4-2-12	0	0.895
R4-2-13	0	0.629

R4-2-3	0	0
R4-3-8	0	3.673
R4-3-7	0	3.878
R4-3-1	0.369	3.3
R4-3-2	0	0.125
R4-3-4	0	1.28
R4-3-5	0	0.92
R4-3-9	0	3.422
R4-3-10	0	**84.76**
R4-3-11	0	78.52
R4-3-12	0	38.8
R4-3-13	0	6.5
R4-3-14	0	13.52
R4-3-6	0	1.791
R4-4-2	0	1.325
R4-4-13	0	0.513
R4-4-12	0	0.252
R4-4-11	0	0.73
R4-4-10	0	4.17
R4-4-9	0	11.07
R4-4-8	0	0.33
R4-4-7	0	0.097
R4-4-6	0	14.31
R4-4-3	0	6.855
R4-4-1	1.14	31.68
R4-4-14	0	1.06
R4-4-5	0	15
R4-5-14	0	0
R4-5-1	0	0
R4-5-2	0	0
R4-5-3	0	0
R4-5-4	0	0
R4-5-5	0	0
R4-5-6	0	0
R4-5-7	0	0
R4-5-8	0	0
R4-5-9	0	0
R4-5-10	0	0
R4-5-11	0	0
R4-5-13	0	0
R4-5-12	0	0

01 June 05

Point_Name	TBA	MTBE
R4-2-1	0	0.092
R4-2-2	0	1.143
R4-2-3	0.32	19.32
R4-2-4	0	1.783
R4-2-5	0	1.366
R4-2-6	0.224	14.3
R4-2-7	0.087	5.322
R4-2-8	0.129	9.274
R4-2-9	0.195	10.68
R4-2-10	0	1.75
R4-2-12	0	2.86
R4-2-13	0	2.5
R4-2-14	0	2.42
R4-2-15	0	18.87
R4-5-1	0	0
R4-5-2	0	0
R4-5-3	0	0
R4-5-4	0	0
R4-5-5	0	0
R4-5-6	0	0
R4-5-7	0	0
R4-5-8	0	0
R4-5-9	0	0
R4-5-10	0	0
R4-5-11	0	0
R4-5-12	0	0
R4-5-13	0	0
R4-5-14	0	0
R4-5-15	0	0
R4-3-1	0.843	31.59
R4-3-2	1.076	37.07
R4-3-4	0.383	8.102
R4-3-5	0.295	16.193
R4-3-6	0	1.523
R4-3-7	0	3.56
R4-3-8	0	12.73
R4-3-9	0	3.446
R4-3-10	0	1.395
R4-3-11	0	1.652
R4-3-12	0	1.192
R4-3-13	0	1.767
R4-3-14	0.44	11.5
R4-3-15	0	3.083
R4-4-1	0	0.893
R4-4-2	0	0.696
R4-4-3	0.26	8.704
R4-4-4	0.27	5.31
R4-4-5	0	4
R4-4-6	0	2.17

R4-4-7	0	0.821
R4-4-8	0	0.364
R4-4-9	0	0.248
R4-4-10	0	0
R4-4-11	0	0
R4-4-12	0	0
R4-4-13	0	0.088
R4-4-14	0	0.244
R4-4-15	0	0

16 Aug. 05

Point_Name	TBA	MTBE
R4-1-1	0	0
R4-1-2	0	0
R4-1-3	0	0
R4-1-4	0	0
R4-1-5	0	0
R4-1-6	0	0.175
R4-1-7	0	0.106
R4-1-8	0	0
R4-1-9	0	0
R4-1-10	0	0
R4-1-12	0	0
R4-1-13	0	0
R4-1-14	0	0
R4-1-15	0	0
R4-2-1	0	0
R4-2-2	0	0
R4-2-3	0	0
R4-2-4	0	0
R4-2-5	0	0.081
R4-2-6	0	0.237
R4-2-7	0	0.161
R4-2-8	0	0.123
R4-2-9	0	0.069
R4-2-10	0	0.063
R4-2-12	0	0.065
R4-2-13	0	0.072
R4-2-14	0	0.049
R4-2-15	0	8.296
R4-5-1	0	0
R4-5-2	0	0
R4-5-3	0	0
R4-5-4	0	0
R4-5-5	0	0.405
R4-5-6	0	2.786
R4-5-7	0	1.341
R4-5-8	0	1.658
R4-5-10	0	0.914
R4-5-11	0	0.379
R4-5-12	0	5.931
R4-5-13	0	4.572
R4-5-14	0	4.47
R4-5-15	0	0
R4-3-1	0	0
R4-3-2	0	0.282
R4-3-4	0	0.195
R4-3-5	0.112	2.527
R4-3-6	0.438	6.177
R4-3-7	0	1.605
R4-3-8	0	0.4
R4-3-9	0	0.273
R4-3-10	0	0
R4-3-11	0	0.273
R4-3-12	0	0.217
R4-3-13	0	0.314
R4-3-14	0	0.66
R4-3-15	0	0.105
R4-4-1	0	0
R4-4-2	0	0.334
R4-4-3	0	0.067
R4-4-4	0	0
R4-4-5	0	0
R4-4-6	0.087	2.101
R4-4-7	0.069	2.12
R4-4-8	0.045	1.059
R4-4-9	0	0.216
R4-4-10	0	0
R4-4-11	0	0
R4-4-12	0	0
R4-4-13	0	0
R4-4-14	0	0
R4-4-15	0	0

28 Nov. 05

Point_Name	TBA	MTBE
R4-1-1	0	0
R4-1-2	0	0
R4-1-3	0	0
R4-1-4	0	0

R4-1-5	0	0
R4-1-6	0	0
R4-1-7	0	0
R4-1-8	0	0
R4-1-9	0	0
R4-1-10	0	0
R4-1-12	0	0
R4-1-13	0	0
R4-1-14	0	0
R4-1-15	0	0
R4-2-1	0	0
R4-2-2	0	0
R4-2-3	0	0
R4-2-4	0	0
R4-2-5	0	0
R4-2-6	0	0
R4-2-7	0	0
R4-2-8	0	0
R4-2-9	0	0
R4-2-10	0	0
R4-2-12	0	0
R4-2-13	0	0
R4-2-14	0	0
R4-2-15	0	0
R4-5-1	0	0
R4-5-2	0	0
R4-5-3	0	0
R4-5-4	0	0
R4-5-5	0	0
R4-5-6	0	0
R4-5-7	0	0
R4-5-8	0	0
R4-5-10	0	0
R4-5-11	0	0
R4-5-12	0	0
R4-5-13	0	0
R4-5-14	0	0
R4-5-15	0	0
R4-3-1	0	0
R4-3-2	0	0
R4-3-4	0	0
R4-3-5	0	0
R4-3-6	0	0
R4-3-7	0	0
R4-3-8	0	0
R4-3-9	0	0
R4-3-10	0	0
R4-3-11	0	0
R4-3-12	0	0
R4-3-13	0	0
R4-3-14	0	0
R4-3-15	0	0
R4-4-1	0	0
R4-4-2	0	0
R4-4-3	0	0
R4-4-4	0	0
R4-4-5	0	0
R4-4-6	0	0
R4-4-7	0	0
R4-4-8	0	0
R4-4-9	0	0
R4-4-10	0	0
R4-4-11	0	0
R4-4-12	0	0
R4-4-13	0	0
R4-4-14	0	0
R4-4-15	0	0

D.

2. E10 gate

a. Row 2

20 Nov. 04

Point_Name	Ethanol
R2-1-1	0
R2-1-2	0
R2-1-3	0
R2-1-4	0
R2-1-5	0
R2-1-6	0
R2-1-7	0
R2-1-8	0
R2-1-9	0
R2-1-10	0
R2-1-11	0
R2-1-12	0
R2-1-13	0
R2-1-14	0
R2-1-15	0
R2-2-1	0
R2-2-10	17.3
R2-2-11	0.725

R2-2-12	8.65
R2-2-13	332.9
R2-2-14	977.6
R2-2-15	0
R2-2-2	0
R2-2-3	0
R2-2-4	0.116
R2-2-5	3.207
R2-2-6	0
R2-2-7	0
R2-2-8	0.163
R2-2-9	65.17
R2-3-1	0
R2-3-10	213.3
R2-3-11	1.211
R2-3-12	1063.5
R2-3-13	1737.7
R2-3-14	635.2
R2-3-15	0
R2-3-2	0
R2-3-3	0
R2-3-4	0
R2-3-5	1.76
R2-3-6	0
R2-3-7	311.8
R2-3-8	1484.5
R2-3-9	2374.4
R2-4-1	0
R2-4-10	89.99
R2-4-11	456.2
R2-4-12	23.43
R2-4-13	209.6
R2-4-14	2055.5
R2-4-15	0
R2-4-2	0
R2-4-3	0
R2-4-4	0
R2-4-5	0
R2-4-6	0.075
R2-4-7	0.292
R2-4-8	1.837
R2-4-9	6.05
R2-5-1	0
R2-5-10	0
R2-5-11	0
R2-5-12	0
R2-5-13	0
R2-5-14	0
R2-5-15	0
R2-5-2	0
R2-5-3	0
R2-5-4	0
R2-5-5	0
R2-5-6	0
R2-5-7	0
R2-5-8	0
R2-5-9	0
R2-6-15	0
R2-6-8	0
R2-6-1	0
R2-6-2	0
R2-6-3	0
R2-6-4	0
R2-6-5	0
R2-6-6	0
R2-6-7	0
R2-6-9	0
R2-6-10	0
R2-6-11	0
R2-6-12	0
R2-6-13	0
R2-6-14	0

11 Dec. 04

Point_ID	Ethanol
R2-1-1	0
R2-1-10	0
R2-1-11	0
R2-1-12	0
R2-1-13	0
R2-1-14	0
R2-1-15	0
R2-1-2	0
R2-1-3	0
R2-1-4	0
R2-1-5	0
R2-1-6	0
R2-1-7	0
R2-1-8	0
R2-1-9	0
R2-2-1	0

R2-2-10	121.65
R2-2-11	225.8
R2-2-12	81.13
R2-2-13	19.56
R2-2-14	0
R2-2-15	0
R2-2-2	0
R2-2-3	0
R2-2-4	0
R2-2-5	0.156
R2-2-6	17.52
R2-2-7	1.895
R2-2-8	1.65
R2-2-9	0
R2-3-1	0
R2-3-10	2167.9
R2-3-11	566.1
R2-3-12	2304.6
R2-3-13	362.3
R2-3-14	73.74
R2-3-15	0.444
R2-3-2	0
R2-3-3	0
R2-3-4	0
R2-3-5	0
R2-3-6	27.48
R2-3-7	31.27
R2-3-8	130.25
R2-3-9	579.53
R2-4-1	0
R2-4-10	15.85
R2-4-11	2.03
R2-4-12	490.5
R2-4-13	1450
R2-4-14	711
R2-4-15	0
R2-4-2	0
R2-4-3	0
R2-4-4	0
R2-4-5	0
R2-4-6	0
R2-4-7	0
R2-4-8	14.1
R2-4-9	154.13
R2-5-1	0
R2-5-10	0
R2-5-11	0
R2-5-12	0
R2-5-13	0
R2-5-14	0
R2-5-15	0
R2-5-2	0
R2-5-3	0
R2-5-4	0
R2-5-5	0
R2-5-6	0
R2-5-7	0
R2-5-8	0
R2-5-9	0
R2-6-1	0
R2-6-10	0
R2-6-11	0
R2-6-12	0
R2-6-13	0
R2-6-14	0
R2-6-15	0
R2-6-3	0
R2-6-4	0
R2-6-5	0
R2-6-6	0
R2-6-7	0
R2-6-8	0
R2-6-9	0
R2-6-2	0

3 Feb. 05

Point_ID	Ethanol
R2-1-1	0
R2-1-2	0
R2-1-3	0
R2-1-4	0
R2-1-5	0
R2-1-6	0
R2-1-7	0
R2-1-8	0
R2-1-9	0
R2-1-10	0
R2-1-11	0
R2-1-12	0
R2-1-13	0
R2-1-14	0
R2-1-15	0
R2-2-10	0.159

R2-2-11	0
R2-2-12	0
R2-2-13	0
R2-2-14	0
R2-2-15	0.117
R2-2-5	0
R2-2-6	0
R2-2-7	0
R2-2-8	0
R2-3-10	16.89
R2-3-11	19.12
R2-3-12	0
R2-3-13	0
R2-3-14	0
R2-3-15	0.318
R2-3-5	0
R2-3-6	0.34
R2-3-7	0
R2-3-8	0
R2-3-9	0
R2-4-10	0
R2-4-11	0
R2-4-12	0.602
R2-4-13	0.14
R2-4-14	0
R2-4-15	0.239
R2-4-5	0
R2-4-6	0
R2-4-7	0
R2-4-8	0
R2-4-9	0
R2-2-1	0
R2-2-2	0
R2-2-3	0
R2-2-4	0
R2-2-9	0
R2-3-1	0
R2-3-2	0
R2-3-3	0
R2-3-4	0
R2-4-1	0
R2-4-2	0
R2-4-3	0
R2-4-4	0
R2-5-1	0
R2-5-10	0
R2-5-11	0
R2-5-12	0
R2-5-13	0
R2-5-14	0
R2-5-15	0
R2-5-2	0
R2-5-3	0
R2-5-4	0
R2-5-5	0
R2-5-6	0
R2-5-7	0
R2-5-8	0
R2-5-9	0
R2-6-15	0
R2-6-8	0
R2-6-1	0
R2-6-2	0
R2-6-3	0
R2-6-4	0
R2-6-5	0
R2-6-6	0
R2-6-7	0
R2-6-9	0
R2-6-10	0
R2-6-11	0
R2-6-12	0
R2-6-13	0
R2-6-14	0

19 Apr. 05

Point_Name	Ethanol
R2-2-1	0
R2-2-10	0
R2-2-11	0
R2-2-12	0
R2-2-13	0
R2-2-14	0
R2-2-2	0
R2-2-3	0
R2-2-4	0
R2-2-5	0
R2-2-6	0
R2-2-7	0
R2-2-8	0
R2-3-1	0
R2-3-10	0
R2-3-11	0

R2-3-12	0
R2-3-13	0
R2-3-14	0
R2-3-2	0
R2-3-3	0
R2-3-4	0
R2-3-5	0
R2-3-6	0
R2-3-7	0
R2-3-8	0
R2-3-9	0
R2-4-1	0
R2-4-10	0
R2-4-11	0
R2-4-12	0
R2-4-13	0
R2-4-14	0
R2-4-2	0
R2-4-3	0
R2-4-4	0
R2-4-5	0
R2-4-6	0
R2-4-7	0
R2-4-8	0
R2-4-9	0
R2-5-1	0
R2-5-10	0
R2-5-11	0
R2-5-12	0
R2-5-13	0
R2-5-14	0
R2-5-2	0
R2-5-3	0
R2-5-4	0
R2-5-5	0
R2-5-6	0
R2-5-7	0
R2-5-8	0
R2-5-9	0

9 June 05

Point_ID	Ethanol
R2-2-1	0
R2-2-10	0
R2-2-11	0
R2-2-12	0
R2-2-13	0
R2-2-14	0
R2-2-15	0
R2-2-2	0
R2-2-3	0
R2-2-4	0
R2-2-5	0
R2-2-6	0
R2-2-7	0
R2-2-8	0
R2-3-1	0
R2-3-10	0
R2-3-11	0
R2-3-12	0
R2-3-13	0
R2-3-14	0
R2-3-15	0
R2-3-2	0
R2-3-3	0
R2-3-4	0
R2-3-5	0
R2-3-6	0
R2-3-7	0
R2-3-8	0
R2-3-9	0
R2-4-1	0
R2-4-10	0
R2-4-11	0
R2-4-12	0
R2-4-13	0
R2-4-14	0
R2-4-15	0
R2-4-2	0
R2-4-3	0
R2-4-4	0
R2-4-5	0
R2-4-6	0
R2-4-7	0
R2-4-8	0
R2-4-9	0
R2-5-1	0
R2-5-10	0
R2-5-11	0
R2-5-12	0
R2-5-13	0

R2-5-14	0
R2-5-15	0
R2-5-2	0
R2-5-3	0
R2-5-4	0
R2-5-5	0
R2-5-6	0
R2-5-7	0
R2-5-8	0
R2-5-9	0

E.

3. E10 gate

b. Row 3

3 Feb. 05

Point_Name	Ethanol
R2-1-1	0
R2-1-2	0
R2-1-3	0
R2-1-4	0
R2-1-5	0
R2-1-6	0
R2-1-7	0
R2-1-8	0
R2-1-9	0
R2-1-10	0
R2-1-11	0
R2-1-12	0
R2-1-13	0
R2-1-14	0
R2-1-15	0
R3-2-10	50.98
R3-2-11	4.2
R3-2-12	19.25
R3-2-13	202.72
R3-2-14	34.05
R3-2-15	0.122
R3-2-5	0
R3-2-6	0.196
R3-2-7	0.15
R3-2-8	0.2
R3-2-9	13.061
R3-3-10	308.1
R3-3-11	23.1
R3-3-12	118.68
R3-3-13	641.4
R3-3-14	477.8
R3-3-15	0.112
R3-3-5	0
R3-3-6	0
R3-3-7	3.84
R3-3-8	236.4
R3-3-9	743.1
R3-4-10	23.01
R3-4-11	26.41
R3-4-12	7.04
R3-4-13	1471.9
R3-4-14	35.53
R3-4-5	0
R3-4-6	0
R3-4-7	0
R3-4-8	0
R3-4-9	1.89
R2-2-1	0
R2-2-2	0
R2-2-3	0
R2-2-4	0
R2-3-1	0
R2-3-2	0
R2-3-3	0
R2-3-4	0
R2-4-1	0
R2-4-15	0
R2-4-2	0
R2-4-3	0
R2-4-4	0
R2-5-1	0
R2-5-10	0
R2-5-11	0
R2-5-12	0
R2-5-13	0
R2-5-14	0
R2-5-15	0
R2-5-2	0
R2-5-3	0
R2-5-4	0
R2-5-5	0
R2-5-6	0

R2-5-7	0
R2-5-8	0
R2-5-9	0
R2-6-15	0
R2-6-8	0
R2-6-1	0
R2-6-2	0
R2-6-3	0
R2-6-4	0
R2-6-5	0
R2-6-6	0
R2-6-7	0
R2-6-9	0
R2-6-10	0
R2-6-11	0
R2-6-12	0
R2-6-13	0
R2-6-14	0

5 Apr. 05

Point_Name	Ethanol
R2-1-1	0
R2-1-2	0
R2-1-3	0
R2-1-4	0
R2-1-5	0
R2-1-6	0
R2-1-7	0
R2-1-8	0
R2-1-9	0
R2-1-10	0
R2-1-11	0
R2-1-12	0
R2-1-13	0
R2-1-14	0
R2-1-15	0
R3-2-1	0
R3-2-10	0
R3-2-11	0
R3-2-12	5.315
R3-2-13	0
R3-2-14	0
R3-2-2	0
R3-2-4	0
R3-2-5	0.057
R3-2-6	0
R3-2-7	0
R3-2-8	0
R3-2-9	0
R3-3-1	0
R3-3-10	0
R3-3-11	3.62
R3-3-12	399.6
R3-3-13	515.7
R3-3-14	15.3
R3-3-2	0
R3-3-4	0
R3-3-5	0
R3-3-6	0
R3-3-7	0
R3-3-8	0
R3-3-9	0
R3-4-1	0
R3-4-10	0
R3-4-11	0
R3-4-12	0
R3-4-13	0
R3-4-14	0
R3-4-2	0
R3-4-3	0
R3-4-4	0
R3-4-5	0
R3-4-6	0
R3-4-7	0
R3-4-8	0
R3-4-9	0
R3-5-1	0
R3-5-10	0
R3-5-11	0
R3-5-12	0
R3-5-13	0
R3-5-14	0
R3-5-2	0
R3-5-3	0
R3-5-4	0
R3-5-5	0
R3-5-6	0
R3-5-7	0
R3-5-8	0
R3-5-9	0
R2-2-15	0
R2-2-3	0
R2-3-15	0

R2-3-3	0
R2-4-15	0
R2-5-15	0
R2-6-15	0
R2-6-8	0
R2-6-1	0
R2-6-2	0
R2-6-3	0
R2-6-4	0
R2-6-5	0
R2-6-6	0
R2-6-7	0
R2-6-9	0
R2-6-10	0
R2-6-11	0
R2-6-12	0
R2-6-13	0
R2-6-14	0

7 June 05

Point_Name	Ethanol
R3-2-1	0
R3-2-10	0
R3-2-11	0
R3-2-12	0
R3-2-13	0
R3-2-14	0
R3-2-15	0
R3-2-2	0
R3-2-4	0
R3-2-5	0
R3-2-6	0
R3-2-7	0
R3-2-8	0
R3-2-9	0
R3-2-9	0
R3-3-1	0
R3-3-10	0
R3-3-11	0
R3-3-12	0
R3-3-13	0
R3-3-14	0
R3-3-2	0
R3-3-3	0
R3-3-4	0
R3-3-5	0
R3-3-6	0
R3-3-7	0
R3-3-8	0
R3-3-9	0
R3-4-1	0
R3-4-10	0
R3-4-11	0
R3-4-12	0
R3-4-13	0
R3-4-14	0
R3-4-2	0
R3-4-3	0
R3-4-4	0
R3-4-5	0
R3-4-6	0
R3-4-7	0
R3-4-8	0
R3-4-9	0
R3-5-1	0
R3-5-10	0
R3-5-11	0
R3-5-12	0
R3-5-13	0
R3-5-14	0
R3-5-15	0
R3-5-2	0
R3-5-3	0
R3-5-4	0
R3-5-5	0
R3-5-6	0
R3-5-7	0
R3-5-8	0
R3-5-9	0

16 Aug. 05

Point_Name	Ethanol
R3-2-1	0
R3-2-10	0
R3-2-11	0
R3-2-12	0
R3-2-13	0
R3-2-14	0

R3-2-15	0
R3-2-2	0
R3-2-4	0
R3-2-5	0
R3-2-6	0
R3-2-7	0
R3-2-8	0
R3-2-9	0
R3-2-9	0
R3-3-1	0
R3-3-10	0
R3-3-11	0
R3-3-12	0
R3-3-13	0
R3-3-14	0
R3-3-2	0
R3-3-3	0
R3-3-4	0
R3-3-5	0
R3-3-6	0
R3-3-7	0
R3-3-8	0
R3-3-9	0
R3-4-1	0
R3-4-10	0
R3-4-11	0
R3-4-12	0
R3-4-13	0
R3-4-14	0
R3-4-2	0
R3-4-3	0
R3-4-4	0
R3-4-5	0
R3-4-6	0
R3-4-7	0
R3-4-8	0
R3-4-9	0
R3-5-1	0
R3-5-10	0
R3-5-11	0
R3-5-12	0
R3-5-13	0
R3-5-14	0
R3-5-15	0
R3-5-2	0
R3-5-3	0
R3-5-4	0
R3-5-5	0
R3-5-6	0
R3-5-7	0
R3-5-8	0
R3-5-9	0

F.

4. E10 gate

c. Row 4

13 Apr. 05

Point_Name	Ethanol
R4-1-1	0
R4-1-2	0
R4-1-3	0
R4-1-4	0
R4-1-5	0
R4-1-6	0
R4-1-7	0
R4-1-8	0
R4-1-9	0
R4-1-10	0
R4-1-11	0
R4-1-12	0
R4-1-13	0
R4-1-14	0
R4-1-15	0
R4-2-1	0
R4-2-10	9.38
R4-2-11	0
R4-2-12	0
R4-2-13	0
R4-2-14	0
R4-2-2	0
R4-2-3	0
R4-2-4	0
R4-2-5	0
R4-2-6	0
R4-2-7	0
R4-2-8	0.17
R4-2-9	4.47
R4-3-1	0

R4-3-10	9.61
R4-3-11	494.5
R4-3-12	453.3
R4-3-13	19.19
R4-3-14	0.106
R4-3-2	0
R4-3-3	0
R4-3-4	0
R4-3-5	0
R4-3-6	1.078
R4-3-7	32.37
R4-3-8	248.4
R4-3-9	344.7
R4-4-1	0
R4-4-10	1.15
R4-4-11	0
R4-4-12	0.076
R4-4-13	198.6
R4-4-14	404.2
R4-4-2	0
R4-4-3	0
R4-4-4	0
R4-4-5	0
R4-4-6	0
R4-4-7	0
R4-4-8	1.11
R4-4-9	0
R4-5-1	0.084
R4-5-10	0
R4-5-11	0
R4-5-12	0
R4-5-13	0
R4-5-3	0
R4-5-4	0
R4-5-5	0
R4-5-6	0
R4-5-7	0
R4-5-8	0
R4-5-9	0
R4-6-1	0
R4-6-2	0
R4-6-3	0
R4-6-4	0
R4-6-5	0
R4-6-6	0
R4-6-7	0
R4-6-8	0
R4-6-9	0
R4-6-10	0
R4-6-11	0
R4-6-12	0
R4-6-13	0
R4-6-14	0
R4-6-15	0
R4-2-15	0
R4-5-14	0
R4-5-15	0
R4-4-15	0
R4-3-15	0
R4-5-2	0

2 June 05

Point_Name	Ethanol
R4-1-1	0
R4-1-2	0
R4-1-3	0
R4-1-4	0
R4-1-5	0
R4-1-6	0
R4-1-7	0
R4-1-8	0
R4-1-9	0
R4-1-10	0
R4-1-11	0
R4-1-12	0
R4-1-13	0
R4-1-14	0
R4-1-15	0
R4-2-1	0
R4-2-10	0
R4-2-11	0
R4-2-12	13.65
R4-2-13	0
R4-2-14	0
R4-2-2	0
R4-2-3	0
R4-2-4	0
R4-2-5	0
R4-2-6	0
R4-2-7	0
R4-2-8	0

R4-2-9	0
R4-3-1	0
R4-3-10	**560.16**
R4-3-11	236.3
R4-3-12	0.507
R4-3-13	0.067
R4-3-14	0
R4-3-15	0
R4-3-2	0
R4-3-3	0
R4-3-4	0
R4-3-5	0
R4-3-6	0
R4-3-7	0
R4-3-8	0.055
R4-3-9	9.75
R4-4-1	0
R4-4-10	0
R4-4-11	0
R4-4-12	0
R4-4-13	0
R4-4-14	0
R4-4-15	0
R4-4-2	0
R4-4-3	0
R4-4-4	0
R4-4-5	0
R4-4-6	0
R4-4-7	0
R4-4-8	0
R4-4-9	0
R4-5-1	0
R4-5-10	0
R4-5-11	0
R4-5-12	0
R4-5-13	0
R4-5-14	0
R4-5-15	0
R4-5-3	0
R4-5-4	0
R4-5-5	0
R4-5-6	0
R4-5-7	0
R4-5-8	0
R4-5-9	0
R4-6-1	0
R4-6-2	0
R4-6-3	0
R4-6-4	0
R4-6-5	0
R4-6-6	0
R4-6-7	0
R4-6-8	0
R4-6-9	0
R4-6-10	0
R4-6-11	0
R4-6-12	0
R4-6-13	0
R4-6-14	0
R4-6-15	0
R4-5-2	0
R4-2-15	0

16 Aug. 05

Point_Name	Ethanol
R4-1-1	0
R4-1-2	0
R4-1-3	0
R4-1-4	0
R4-1-5	0
R4-1-6	0
R4-1-7	0
R4-1-8	0
R4-1-9	0
R4-1-10	0
R4-1-11	0
R4-1-12	0
R4-1-13	0
R4-1-14	0
R4-1-15	0
R4-2-1	0
R4-2-10	0
R4-2-11	0
R4-2-12	0
R4-2-13	0
R4-2-14	0
R4-2-2	0
R4-2-3	0
R4-2-4	0
R4-2-5	0
R4-2-6	0

R4-2-7	0
R4-2-8	0
R4-2-9	0
R4-3-1	0
R4-3-10	0
R4-3-11	0
R4-3-12	0
R4-3-13	0
R4-3-14	0
R4-3-15	0
R4-3-2	0
R4-3-3	0
R4-3-4	0
R4-3-5	0
R4-3-6	0
R4-3-7	0
R4-3-8	0
R4-3-9	0
R4-4-1	0
R4-4-10	0
R4-4-11	0
R4-4-12	0
R4-4-13	0
R4-4-14	0
R4-4-15	0
R4-4-2	0
R4-4-3	0
R4-4-4	0
R4-4-5	0
R4-4-6	0
R4-4-7	0
R4-4-8	0
R4-4-9	0
R4-5-1	0
R4-5-10	0
R4-5-11	0
R4-5-12	0
R4-5-13	0
R4-5-14	0
R4-5-15	0
R4-5-3	0
R4-5-4	0
R4-5-5	0
R4-5-6	0
R4-5-7	0
R4-5-8	0
R4-5-9	0
R4-6-1	0
R4-6-2	0
R4-6-3	0
R4-6-4	0
R4-6-5	0
R4-6-6	0
R4-6-7	0
R4-6-8	0
R4-6-9	0
R4-6-10	0
R4-6-11	0
R4-6-12	0
R4-6-13	0
R4-6-14	0
R4-6-15	0
R4-5-2	0
R4-2-15	0

G.

3. E95 gate

a. Row 2

20 Nov. 04

Point_Name	Ethanol
R2-1-15	0
R2-2-14	0
R2-2-1	0
R2-2-2	0
R2-2-3	0
R2-2-4	0.088
R2-2-5	0
R2-2-6	0
R2-2-7	0
R2-2-8	0
R2-2-9	0
R2-2-10	0
R2-2-11	0
R2-2-13	0
R2-2-13	0
R2-2-10	0
R2-2-15	0
R2-2-12	0.418
R2-3-3	0
R2-3-10	509.9

R2-3-10	497.3
R2-3-6	0.069
R2-3-15	0
R2-3-2	0
R2-3-8	3320
R2-3-4	59.04
R2-3-5	3.36
R2-3-7	143.2
R2-3-11	10110
R2-3-9	1386
R2-3-1	0
R2-3-12	5480.2
R2-3-13	797.9
R2-3-14	113.1
R2-3-11	10118
R2-3-6	0.069
R2-4-13	188.9
R2-4-7	9319
R2-4-8	6829
R2-4-10	691.7
R2-4-11	5256
R2-4-6	4463
R2-4-12	543
R2-4-7	9526
R2-4-14	40.29
R2-4-15	0
R2-4-11	5234
R2-4-3	0.53
R2-4-11	5234
R2-4-5	5.78
R2-4-4	84.65
R2-4-3	0.53
R2-4-1	0
R2-4-6	4207
R2-4-9	380.6
R2-5-15	0
R2-5-14	0
R2-5-13	0
R2-5-1	0
R2-5-10	0
R2-5-14	0
R2-5-12	0
R2-5-11	0
R2-5-10	0
R2-5-2	0
R2-5-3	0
R2-5-4	0
R2-5-5	0.072
R2-5-6	0
R2-5-8	0
R2-5-9	0
R2-6-8	0
R2-6-8	0
R2-6-15	0

11 Dec. 04

Point_Name	Ethanol
R2-1-9	0
R2-1-1	0
R2-1-14	0
R2-1-13	0
R2-1-12	0
R2-1-10	0
R2-1-15	0
R2-1-8	0
R2-1-7	0
R2-1-6	0
R2-1-5	0
R2-1-4	0
R2-1-3	0
R2-1-2	0
R2-1-11	0
R2-2-6	0
R2-2-5	0
R2-2-12	0
R2-2-7	0.065
R2-2-8	0.167
R2-2-9	0
R2-2-10	0
R2-2-11	0
R2-2-13	0
R2-2-14	0
R2-2-4	0
R2-2-3	0
R2-2-1	0
R2-2-10	0
R2-2-15	0

R2-2-2	0
R2-3-2	3.029
R2-3-13	164.9
R2-3-1	0.574
R2-3-3	0.117
R2-3-4	151.7
R2-3-5	5.5
R2-3-6	88.41
R2-3-7	7260.5
R2-3-8	7753
R2-3-9	8799
R2-3-10	4641
R2-3-12	75.15
R2-3-14	448
R2-3-15	0
R2-3-6	88.41
R2-3-11	3769.2
R2-4-5	171.8
R2-4-1	0
R2-4-13	21.02
R2-4-3	55.92
R2-4-3	55.92
R2-4-11	1819
R2-4-2	0
R2-4-14	0.095
R2-4-12	0.585
R2-4-11	1819
R2-4-10	1367
R2-4-9	33.7
R2-4-8	105.7
R2-4-7	12531.8
R2-4-6	12761.5
R2-4-4	3245.5
R2-4-15	0.109
R2-5-10	0.092
R2-5-10	0.092
R2-5-1	0.119
R2-5-2	0.16
R2-5-3	1.117
R2-5-4	1.531
R2-5-5	38.72
R2-5-6	121.33
R2-5-11	0
R2-5-12	0.15
R2-5-13	0.34
R2-5-14	0
R2-5-15	0
R2-5-14	0
R2-5-9	0.264
R2-5-8	0.115
R2-6-7	0
R2-6-1	0
R2-6-8	0
R2-6-2	0
R2-6-14	0
R2-6-13	0
R2-6-12	0
R2-6-11	0
R2-6-10	0
R2-6-8	0
R2-6-6	0
R2-6-5	0
R2-6-3	0
R2-6-4	0
R2-6-9	0.337

3 Feb. 04

Point_Name	Ethanol
R2-2-12	0
R2-2-1	0
R2-2-6	127.95
R2-2-15	0.446
R2-2-13	0
R2-2-11	0
R2-2-10	0.345
R2-2-3	0
R2-2-8	0
R2-2-7	0.068
R2-2-2	0
R2-2-5	0
R2-2-4	0
R2-2-9	0
R2-2-14	0.31
R2-3-8	2034.6
R2-3-9	249.4
R2-3-9	252.2
R2-3-10	4919.5
R2-3-10	2618
R2-3-7	2004.9
R2-3-1	0
R2-3-10	5281.4
R2-3-6	8228.1
R2-3-6	8253

R2-3-5	713.1
R2-3-5	716.8
R2-3-4	1.23
R2-3-10	2564
R2-3-2	0.105
R2-3-8	2028
R2-3-3	0.378
R2-3-13	0.148
R2-3-14	0.317
R2-3-14	0.229
R2-3-15	0.457
R2-3-12	1.832
R2-3-7	2014.7
R2-4-10	585.8
R2-4-14	0.281
R2-4-13	0.21
R2-4-12	0.223
R2-4-12	0.196
R2-4-11	55.54
R2-4-14	0.207
R2-4-10	570.3
R2-4-6	11222
R2-4-9	0.295
R2-4-9	0.34
R2-4-8	0.782
R2-4-11	49.12
R2-4-4	2614.7
R2-4-1	0.622
R2-4-1	0.643
R2-4-15	0.437
R2-4-2	6079.7
R2-4-2	6242.5
R2-4-7	290.4
R2-4-3	9685
R2-4-15	0.499
R2-4-5	7984.2
R2-4-5	7719
R2-4-6	11737
R2-4-7	270.8
R2-4-8	0.743
R2-4-3	9536.7
R2-5-11	0.075
R2-5-1	0
R2-5-2	0
R2-5-3	0
R2-5-4	0
R2-5-5	0.19
R2-5-6	0.156
R2-5-8	0.166
R2-5-10	0.207
R2-5-12	0.165
R2-5-13	0
R2-5-14	0
R2-5-15	0.332
R2-5-9	0.085

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Point_Name	Ethanol
R2-2-2	0
R2-2-14	0
R2-2-13	0
R2-2-12	0
R2-2-11	0
R2-2-10	0
R2-2-9	0
R2-2-8	0
R2-2-7	0
R2-2-6	0
R2-2-5	0
R2-2-4	0
R2-2-1	0
R2-2-3	0
R2-3-2	0
R2-3-3	0
R2-3-4	0
R2-3-5	0
R2-3-6	1.26
R2-3-7	0.59
R2-3-8	0.201
R2-3-9	0
R2-3-10	0.172
R2-3-11	57.23
R2-3-12	72.29
R2-3-14	0
R2-3-13	0.05
R2-3-1	0
R2-4-2	0.519

R2-4-1	0
R2-4-14	0
R2-4-13	0
R2-4-12	0
R2-4-11	0
R2-4-10	0.151
R2-4-9	0.182
R2-4-8	1.025
R2-4-7	1129.1
R2-4-6	617.1
R2-4-5	1513.2
R2-4-3	1.34
R2-4-4	0.356
R2-5-13	0
R2-5-1	0
R2-5-14	0
R2-5-2	0
R2-5-3	0
R2-5-4	0
R2-5-5	0
R2-5-6	0
R2-5-8	0
R2-5-9	0
R2-5-10	0
R2-5-11	0
R2-5-12	0

9 June 05

Point_Name	Ethanol
R2-1-1	0
R2-1-10	0
R2-1-11	0
R2-1-12	0
R2-1-13	0
R2-1-14	0
R2-1-15	0
R2-1-2	0
R2-1-3	0
R2-1-4	0
R2-1-5	0
R2-1-6	0
R2-1-7	0
R2-1-8	0
R2-1-9	0
R2-2-1	0
R2-2-10	0
R2-2-11	0
R2-2-12	0
R2-2-13	0
R2-2-14	0
R2-2-15	0
R2-2-2	0
R2-2-3	0
R2-2-4	0
R2-2-5	0
R2-2-6	0
R2-2-7	0
R2-2-8	0
R2-2-9	0
R2-3-1	0
R2-3-10	0
R2-3-11	0
R2-3-12	0
R2-3-13	0
R2-3-14	0
R2-3-15	0
R2-3-2	0
R2-3-3	0
R2-3-4	0
R2-3-5	0
R2-3-6	0
R2-3-7	0
R2-3-8	0
R2-3-9	0
R2-4-1	0
R2-4-10	0
R2-4-11	0
R2-4-12	0
R2-4-13	0
R2-4-14	0
R2-4-15	0
R2-4-2	0
R2-4-3	0
R2-4-4	0
R2-4-5	0
R2-4-6	0.047
R2-4-7	0
R2-4-8	0
R2-4-9	0
R2-5-1	0
R2-5-10	0
R2-5-11	0
R2-5-12	0

R2-5-13	0
R2-5-14	0
R2-5-15	0
R2-5-2	0
R2-5-3	0
R2-5-4	0
R2-5-5	0
R2-5-6	0
R2-5-8	0
R2-5-9	0
R2-6-1	0
R2-6-10	0
R2-6-11	0
R2-6-12	0
R2-6-13	0
R2-6-14	0
R2-6-15	0
R2-6-2	0
R2-6-3	0
R2-6-4	0
R2-6-5	0
R2-6-6	0
R2-6-7	0
R2-6-8	0
R2-6-9	0
R2-5-7	0

H.

4. E95 gate

i. Row 3

3 Feb. 05

POINT_Name	Ethanol
R3-1-1	0
R3-1-10	0
R3-1-11	0
R3-1-12	0
R3-1-13	0
R3-1-14	0
R3-1-15	0
R3-1-2	0
R3-1-3	0
R3-1-4	0
R3-1-5	0
R3-1-6	0
R3-1-7	0
R3-1-8	0
R3-1-9	0
R3-2-1	0
R3-2-10	0.353
R3-2-11	50.93
R3-2-12	169.11
R3-2-13	30.872
R3-2-14	1.861
R3-2-15	0.235
R3-2-2	0
R3-2-3	0
R3-2-4	0
R3-2-5	0.137
R3-2-6	2.5
R3-2-7	25.011
R3-2-8	1.39
R3-2-9	0.118
R3-3-1	0
R3-3-10	1098.3
R3-3-11	1596.1
R3-3-13	917.4
R3-3-14	12.08
R3-3-15	0.189
R3-3-2	0
R3-3-3	0.122
R3-3-4	62.73
R3-3-5	225.7
R3-3-7	410.7
R3-3-9	3391.8
R3-4-1	0
R3-4-10	49.97
R3-4-11	660.8
R3-4-13	0.146
R3-4-15	0.181
R3-4-2	0
R3-4-3	0.892
R3-4-4	126.98
R3-4-5	1645.4
R3-4-6	736.6
R3-4-7	8.15
R3-4-9	58.8

R3-5-1	0.168
R3-5-10	0
R3-5-11	0
R3-5-12	0
R3-5-13	0
R3-5-14	0
R3-5-2	0.132
R3-5-3	0.091
R3-5-4	0.082
R3-5-5	0.083
R3-5-7	0
R3-5-8	0
R3-6-1	0
R3-6-10	0
R3-6-11	0
R3-6-12	0
R3-6-13	0
R3-6-14	0
R3-6-15	0
R3-6-2	0
R3-6-3	0
R3-6-4	0
R3-6-5	0
R3-6-6	0
R3-6-7	0
R3-6-8	0
R3-6-9	0
R3-3-12	0
R3-3-6	0
R3-3-8	0
R3-4-14	0
R3-4-8	0
R3-5-15	0
R3-5-6	0
R3-5-9	0

5 Apr. 05

POINT_Name	Ethanol
R3-1-1	0
R3-1-10	0
R3-1-11	0
R3-1-12	0
R3-1-13	0
R3-1-14	0
R3-1-15	0
R3-1-2	0
R3-1-3	0
R3-1-4	0
R3-1-5	0
R3-1-6	0
R3-1-7	0
R3-1-8	0
R3-1-9	0
R3-2-1	0
R3-2-10	152.1
R3-2-11	0
R3-2-12	0
R3-2-13	0
R3-2-14	0
R3-2-2	0
R3-2-3	0
R3-2-4	0
R3-2-5	0
R3-2-6	0
R3-2-7	0
R3-2-8	0
R3-2-9	7.06
R3-3-1	0
R3-3-10	1256
R3-3-11	55.1
R3-3-12	1304.6
R3-3-13	323.5
R3-3-14	1.583
R3-3-2	0
R3-3-3	0
R3-3-4	0
R3-3-5	1215.8
R3-3-6	3464.4
R3-3-7	4516.2
R3-3-9	2806.4
R3-4-1	0
R3-4-10	800.4
R3-4-11	0
R3-4-12	0
R3-4-13	29.92
R3-4-2	0
R3-4-3	0
R3-4-4	0
R3-4-5	40.72
R3-4-6	290.2
R3-4-7	860.4

R3-4-8	5117
R3-4-9	4064
R3-5-1	0
R3-5-11	0
R3-5-12	0
R3-5-13	0
R3-5-14	0
R3-5-2	0
R3-5-3	0
R3-5-4	0
R3-5-5	0
R3-5-6	0
R3-5-7	0.176
R3-5-8	0.065
R3-5-9	0
R3-2-15	0
R3-3-15	0
R3-4-14	0
R3-4-15	0
R3-5-10	0
R3-5-15	0
R3-6-1	0
R3-6-10	0
R3-6-11	0
R3-6-12	0
R3-6-13	0
R3-6-14	0
R3-6-15	0
R3-6-2	0
R3-6-3	0
R3-6-4	0
R3-6-5	0
R3-6-6	0
R3-6-7	0
R3-6-8	0
R3-6-9	0

7 June 05

Point_Name	Ethanol
R3-1-1	0
R3-1-10	0
R3-1-11	0
R3-1-12	0
R3-1-13	0
R3-1-14	0
R3-1-15	0
R3-1-2	0
R3-1-3	0
R3-1-4	0
R3-1-5	0
R3-1-6	0
R3-1-7	0
R3-1-8	0
R3-1-9	0
R3-2-1	0
R3-2-10	93.31
R3-2-11	13.29
R3-2-12	0
R3-2-14	0.11
R3-2-15	0
R3-2-2	0
R3-2-3	0
R3-2-4	0
R3-2-5	0
R3-2-6	0
R3-2-7	0
R3-2-8	22.62
R3-2-9	1.003
R3-3-1	0
R3-3-10	0.56
R3-3-11	0
R3-3-12	0.09
R3-3-13	0
R3-3-14	0
R3-3-15	0
R3-3-2	0
R3-3-3	0
R3-3-4	175.99
R3-3-5	996.61
R3-3-6	134.66
R3-3-7	1354.8
R3-3-8	11.51
R3-3-9	0.17
R3-4-1	0
R3-4-10	0.15
R3-4-11	0
R3-4-12	0
R3-4-13	0
R3-4-15	0
R3-4-2	0
R3-4-3	0

R3-4-4	0
R3-4-5	0
R3-4-6	0.032
R3-4-7	0.118
R3-4-8	16.08
R3-4-9	4.06
R3-5-1	0
R3-5-11	0
R3-5-12	0
R3-5-13	0
R3-5-14	0
R3-5-15	0
R3-5-2	0
R3-5-3	0
R3-5-4	0
R3-5-5	0
R3-5-7	0
R3-5-8	0
R3-2-13	0
R3-4-14	0
R3-5-10	0
R3-5-6	0
R3-5-9	0
R3-6-1	0
R3-6-10	0
R3-6-11	0
R3-6-12	0
R3-6-13	0
R3-6-14	0
R3-6-15	0
R3-6-2	0
R3-6-3	0
R3-6-4	0
R3-6-5	0
R3-6-6	0
R3-6-7	0
R3-6-8	0
R3-6-9	0

16 Aug. 05

Point_Name	Ethanol
R3-2-1	0.000
R3-2-2	0.000
R3-2-3	0.000
R3-2-4	0.000
R3-2-5	0.000
R3-2-6	0.000
R3-2-7	0.000
R3-2-8	0.000
R3-2-9	0.000
R3-2-10	0.000
R3-2-11	0.000
R3-2-12	0.000
R3-2-14	0.000
R3-2-15	0.000
R3-5-1	0.000
R3-5-2	0.000
R3-5-3	0.000
R3-5-4	0.000
R3-5-5	0.000
R3-5-7	0.000
R3-5-8	0.000
R3-5-11	0.000
R3-5-12	0.000
R3-5-13	0.000
R3-5-15	0.000
R3-3-1	0.000
R3-3-2	0.000
R3-3-3	0.000
R3-3-4	0.000
R3-3-5	0.000
R3-3-6	0.000
R3-3-7	5.990
R3-3-8	0.000
R3-3-9	0.000
R3-3-10	0.000
R3-3-11	0.000
R3-3-12	0.000
R3-3-13	0.000
R3-3-14	0.000
R3-3-15	0.000
R3-4-1	0.000
R3-4-2	0.000
R3-4-3	0.000
R3-4-4	0.000
R3-4-5	0.000
R3-4-6	0.000
R3-4-7	0.000
R3-4-8	0.000

R3-4-9	0.000
R3-4-10	0.000
R3-4-11	0.000
R3-4-12	0.000
R3-4-13	0.000
R3-4-15	0.000
R3-1-9	0.000
R3-1-10	0.000
R3-1-11	0.000
R3-1-12	0.000
R3-1-13	0.000
R3-1-14	0.000

I.

5. E95 gate

c. Row 4

13 Apr. 05

Point_Name	Ethanol
R4-1-1	0
R4-1-10	0
R4-1-11	0
R4-1-12	0
R4-1-13	0
R4-1-14	0
R4-1-15	0
R4-1-2	0
R4-1-3	0
R4-1-4	0
R4-1-5	0
R4-1-6	0
R4-1-7	0
R4-1-8	0
R4-1-9	0
R4-2-1	0
R4-2-10	363.5
R4-2-11	0.111
R4-2-12	0
R4-2-13	0
R4-2-14	0
R4-2-2	0
R4-2-3	0
R4-2-4	0
R4-2-5	0
R4-2-6	117.4
R4-2-7	594.9
R4-2-8	83.41
R4-2-9	67.05
R4-3-1	18.18
R4-3-10	272.2
R4-3-11	277.7
R4-3-12	139.73
R4-3-13	34.07
R4-3-14	0
R4-3-2	214.2
R4-3-3	26.32
R4-3-4	5.62
R4-3-5	34.661
R4-3-6	750
R4-3-7	2456
R4-3-8	1130.4
R4-3-9	921.3
R4-4-1	0
R4-4-10	0.35
R4-4-11	8.13
R4-4-12	0
R4-4-13	0
R4-4-14	0
R4-4-2	0.077
R4-4-3	12.11
R4-4-4	51.65
R4-4-5	0.061
R4-4-6	0.088
R4-4-7	0
R4-4-8	0
R4-4-9	5.67
R4-5-1	0
R4-5-10	0
R4-5-11	0
R4-5-12	0
R4-5-13	0
R4-5-14	0
R4-5-2	0
R4-5-3	0
R4-5-4	0
R4-5-5	0
R4-5-6	0

R4-5-7	0
R4-5-8	0
R4-5-9	0
R4-2-15	0
R4-6-1	0
R4-6-10	0
R4-6-11	0
R4-6-12	0
R4-6-13	0
R4-6-14	0
R4-6-15	0
R4-6-2	0
R4-6-3	0
R4-6-4	0
R4-6-5	0
R4-6-6	0
R4-6-7	0
R4-6-8	0
R4-6-9	0
R4-3-15	0
R4-4-15	0
R4-5-15	0

3 June 05

Point_Name	Ethanol
R4-1-1	0
R4-1-10	0
R4-1-11	0
R4-1-12	0
R4-1-13	0
R4-1-14	0
R4-1-15	0
R4-1-2	0
R4-1-3	0
R4-1-4	0
R4-1-5	0
R4-1-6	0
R4-1-7	0
R4-1-8	0
R4-1-9	0
R4-2-1	0
R4-2-10	888.28
R4-2-11	1166.7
R4-2-12	1098.4
R4-2-13	889.66
R4-2-14	612.98
R4-2-15	0.47
R4-2-2	0
R4-2-3	0
R4-2-4	0
R4-2-5	0
R4-2-6	0
R4-2-7	0
R4-2-8	0
R4-2-9	69.8
R4-3-1	36.07
R4-3-10	1.72
R4-3-11	0.22
R4-3-12	0.16
R4-3-13	0.12
R4-3-14	0
R4-3-15	0
R4-3-2	602.51
R4-3-3	5033.96
R4-3-4	1127.2
R4-3-5	4543.8
R4-3-6	3758.6
R4-3-7	3995.2
R4-3-8	1935.16
R4-3-9	66.11
R4-4-1	0
R4-4-10	0.72
R4-4-11	0.37
R4-4-12	0
R4-4-13	0
R4-4-14	0
R4-4-15	0
R4-4-2	0.086
R4-4-3	73.31
R4-4-4	308.69
R4-4-5	793.3
R4-4-6	812.4
R4-4-7	194.1
R4-4-8	895.77
R4-4-9	145.1
R4-5-1	0
R4-5-10	0
R4-5-11	0
R4-5-12	0
R4-5-13	0
R4-5-14	0

R4-5-15	0
R4-5-2	0
R4-5-3	0
R4-5-4	0
R4-5-5	0
R4-5-6	0
R4-5-7	0
R4-5-8	0
R4-5-9	0
R4-6-1	0
R4-6-10	0
R4-6-11	0
R4-6-12	0
R4-6-13	0
R4-6-14	0
R4-6-15	0
R4-6-2	0
R4-6-3	0
R4-6-4	0
R4-6-5	0
R4-6-6	0
R4-6-7	0
R4-6-8	0
R4-6-9	0

16 Aug. 05

Point_Name	Ethanol
R4-2-1	0.000
R4-2-2	0.000
R4-2-3	0.000
R4-2-4	0.000
R4-2-5	0.000
R4-2-6	0.000
R4-2-7	0.000
R4-2-8	0.000
R4-2-9	2.230
R4-2-10	34.950
R4-2-11	2.290
R4-2-12	0.210
R4-2-13	0.200
R4-2-14	0.000
R4-2-15	0.000
R4-5-1	0.000
R4-5-2	0.000
R4-5-3	0.000
R4-5-4	0.000
R4-5-5	0.000
R4-5-6	0.000
R4-5-7	0.000
R4-5-8	0.000
R4-5-9	0.000
R4-5-10	0.000
R4-5-11	0.000
R4-5-12	0.000
R4-5-13	0.000
R4-5-14	0.000
R4-5-15	0.000
R4-4-1	0.000
R4-4-2	0.000
R4-4-3	0.000
R4-4-4	0.000
R4-4-5	0.000
R4-4-6	0.000
R4-4-7	0.000
R4-4-8	0.000
R4-4-9	0.000
R4-4-10	0.000
R4-4-11	0.000
R4-4-12	0.000
R4-4-13	0.000
R4-4-14	0.000
R4-4-15	0.000
R4-3-1	0.000
R4-3-2	0.047
R4-3-3	0.151
R4-3-4	0.049
R4-3-5	0.097
R4-3-6	456.100
R4-3-7	88.400
R4-3-8	74.610
R4-3-9	44.510
R4-3-10	0.000
R4-3-11	0.000
R4-3-12	0.000
R4-3-13	0.000
R4-3-14	0.000
R4-3-15	0.000
R4-1-9	0.000
R4-1-10	0.000
R4-1-11	0.000
R4-1-12	0.000

R4-1-13	0.000
R4-1-14	0.000
R4-1-15	0.000

23 Nov. 05

Point_Name	Ethanol
R4-2-1	0
R4-2-2	0
R4-2-3	0
R4-2-4	0
R4-2-5	0
R4-2-6	0
R4-2-7	0
R4-2-8	0
R4-2-9	0
R4-2-10	0
R4-2-11	0
R4-2-12	0
R4-2-13	0
R4-2-14	0
R4-2-15	0
R4-5-1	0
R4-5-2	0
R4-5-3	0
R4-5-4	0
R4-5-5	0
R4-5-6	0
R4-5-7	0
R4-5-8	0
R4-5-9	0
R4-5-10	0
R4-5-11	0
R4-5-12	0
R4-5-13	0
R4-5-14	0
R4-4-1	0
R4-4-2	0
R4-4-3	0
R4-4-4	0
R4-4-5	0
R4-4-6	0
R4-4-7	0
R4-4-8	0
R4-4-9	0
R4-4-10	0
R4-4-11	0
R4-4-12	0
R4-4-13	0
R4-4-14	0
R4-4-15	0
R4-3-1	0
R4-3-2	0
R4-3-3	0
R4-3-4	0
R4-3-5	0
R4-3-6	0
R4-3-7	0
R4-3-8	0
R4-3-9	0
R4-3-10	0
R4-3-11	0
R4-3-12	0
R4-3-13	0
R4-3-14	0
R4-3-15	0

Appendix 1

B. BTEX (ug/L) 1. GMT a. Row 2

20 Nov. 04

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-1-15	3.38	5.64	1.87	5.00	1.90	0.00	0.00	0.00	2.18
R2-2-1	0.00	6.97	3.01	7.69	3.04	0.00	0.00	0.00	0.00
R2-2-10	13.93	6.69	3.25	8.34	3.81	0.00	1.54	0.00	1.52
R2-2-11	0.00	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-12	8.34	6.27	3.39	8.57	3.71	0.00	0.00	0.00	0.00
R2-2-13	0.00	-0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-15	233.55	6.74	1.09	3.47	1.65	0.00	0.00	0.00	1.27
R2-2-2	0.00	-0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-3	0.00	3.98	2.12	5.69	2.21	0.00	0.00	0.00	0.00
R2-2-4	0.00	-0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-5	0.00	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-6	0.00	5.22	2.92	7.45	3.09	0.00	0.00	0.00	0.00
R2-2-7	0.00	5.08	3.10	8.09	3.77	0.00	0.00	0.00	0.00
R2-2-8	0.00	16.60	7.47	17.29	7.97	0.00	2.66	0.00	0.00
R2-2-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-3-1	543.63	4594.76	926.53	1899.29	811.61	74.88	258.81	68.78	86.83
R2-3-10	2164.64	2284.96	81.44	156.81	86.25	0.00	3.32	1.62	0.00
R2-3-11	67.18	195.19	15.40	33.35	15.76	0.00	0.00	0.00	0.00
R2-3-12	27.53	99.76	10.47	23.90	10.66	0.00	0.00	0.00	0.00
R2-3-13	5.47	23.24	3.32	8.38	3.63	0.00	0.00	0.00	0.00
R2-3-14	3.24	13.38	2.15	5.71	2.53	0.00	0.00	0.00	0.00
R2-3-15	354.39	279.08	2.61	6.00	3.57	0.00	0.00	0.00	0.00

R2-3-2	26.55	108.82	12.80	28.60	12.31	0.00	1.54	0.00	1.55
R2-3-3	679.67	1928.81	281.16	565.57	249.76	18.25	65.57	17.86	21.00
R2-3-4	1294.52	1851.15	137.52	257.71	122.25	2.16	8.71	3.22	1.80
R2-3-5	3695.85	7321.76	668.30	1261.03	614.37	3.95	17.97	9.01	0.00
R2-3-6	1309.18	1577.62	51.88	84.07	50.90	5.99	0.00	0.00	0.00
R2-3-7	333.17	232.43	14.18	28.89	12.95	0.00	0.00	0.00	0.00
R2-3-8	3167.82	4099.49	207.58	411.30	216.67	1.44	5.85	3.11	0.00
R2-3-9	8833.33	12986.26	811.55	1717.23	863.39	5.53	21.76	11.09	2.94
R2-4-1	781.26	3580.13	650.98	1367.29	580.21	58.03	206.12	52.85	81.08
R2-4-10	7581.65	11330.70	649.63	1242.16	670.71	3.03	9.09	6.02	1.78
R2-4-11	191.71	683.66	64.46	130.09	62.11	1.94	1.59	0.00	0.00
R2-4-12	3747.99	6302.66	597.13	1150.50	578.94	4.67	17.85	10.12	1.91
R2-4-13	113.50	96.34	59.41	120.72	54.58	0.00	2.43	0.00	0.00
R2-4-14	156.44	306.89	32.12	64.40	29.07	0.00	3.34	0.00	0.00
R2-4-15	36.31	6.48	1.45	4.14	1.40	0.00	0.00	0.00	0.00
R2-4-2	1159.92	2549.25	271.03	508.96	238.19	8.40	30.31	8.81	8.75
R2-4-3	888.46	3527.69	337.26	612.52	301.25	3.55	14.55	5.17	3.33
R2-4-4	4460.55	8456.79	874.89	1707.89	776.87	19.83	81.36	27.01	13.40
R2-4-5	12431.54	20543.28	1475.64	2684.60	1384.75	7.39	35.44	16.29	0.00
R2-4-6	5152.05	8448.07	470.96	823.24	454.11	3.06	12.67	5.50	3.16
R2-4-8	92.27	512.86	74.60	147.48	63.86	1.33	5.20	1.49	1.84
R2-4-9	4853.34	7344.11	493.46	939.72	534.73	2.55	6.94	4.66	3.05
R2-5-1	1.50	2.33	2.17	5.87	2.78	0.00	0.00	0.00	1.96
R2-5-10	0.00	1.46	1.50	4.36	1.83	0.00	0.00	0.00	0.00
R2-5-11	0.00	1.78	1.96	5.52	2.24	0.00	0.00	0.00	0.00
R2-5-12	0.00	1.26	1.43	4.35	2.33	0.00	0.00	0.00	0.00
R2-5-13	0.00	1.05	1.44	4.30	1.80	0.00	0.00	0.00	0.00
R2-5-14	0.00	1.56	1.68	4.83	2.39	0.00	0.00	0.00	0.00
R2-5-15	50.13	314.26	84.98	178.52	77.87	10.10	33.66	9.69	12.66
R2-5-3	0.00	1.98	1.93	5.45	2.09	0.00	0.00	0.00	0.00
R2-5-5	0.00	1.71	1.63	4.77	1.90	0.00	0.00	0.00	0.00
R2-5-6	0.00	2.13	1.99	5.60	2.72	0.00	0.00	0.00	0.00

R2-5-7	0.00	1.61	1.81	5.13	2.16	0.00	0.00	0.00	0.00
R2-5-8	0.00	1.57	1.93	5.51	2.33	0.00	0.00	0.00	0.00
R2-5-9	0.00	1.29	1.42	4.35	1.72	0.00	0.00	0.00	0.00
R2-6-15	33.98	229.01	76.49	162.02	67.06	11.77	38.79	9.51	11.89
R2-6-8	13.41	67.71	10.13	21.21	9.10	0.00	0.00	0.00	0.00

16 Dec. 04

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-1-1	1.58	7.18	1.57	4.77	1.82	0.00	0.00	0.00	0.00
R2-1-10	0.00	4.49	1.56	4.96	1.66	0.00	1.72	0.00	0.00
R2-1-11	1.54	6.32	2.02	5.84	2.18	0.00	2.47	0.00	0.00
R2-1-12	0.00	5.30	1.69	5.22	1.80	0.00	2.14	0.00	0.00
R2-1-13	0.00	4.57	1.50	4.82	1.64	0.00	2.38	0.00	0.00
R2-1-14	1.49	5.54	1.82	5.59	2.04	0.00	2.52	0.00	0.00
R2-1-15	3.36	9.04	0.00	2.43	0.00	0.00	0.00	0.00	0.00
R2-1-2	2.14	11.94	2.93	8.95	3.42	0.00	3.56	0.00	1.69
R2-1-3	2.23	13.10	3.21	8.41	3.39	0.00	2.58	0.00	1.58
R2-1-4	0.00	8.24	2.43	6.62	2.37	0.00	2.36	0.00	0.00
R2-1-5	0.00	7.85	2.31	6.58	2.27	0.00	2.57	0.00	1.38
R2-1-6	2.00	10.29	2.84	8.03	3.25	0.00	3.76	1.56	1.65
R2-1-7	1.45	6.21	1.79	5.99	2.10	0.00	2.43	0.00	2.06
R2-1-8	0.00	5.22	1.52	5.04	1.85	0.00	1.84	0.00	0.00
R2-1-9	2.93	17.43	4.39	11.27	4.58	1.64	4.83	2.04	2.38
R2-2-1	0.00	2.70	0.00	3.39	0.00	0.00	1.77	0.00	0.00
R2-2-10	35.03	153.15	5.38	11.41	8.52	0.00	1.37	0.00	0.00
R2-2-11	133.79	273.93	1.77	4.75	2.73	0.00	1.52	0.00	0.00
R2-2-12	119.76	190.39	14.24	25.43	13.72	0.00	1.57	0.00	0.00
R2-2-13	2655.12	3142.00	106.73	162.01	104.52	0.00	2.34	0.00	0.00
R2-2-14	262.71	291.18	12.54	21.42	11.39	0.00	4.54	0.00	0.00

R2-2-15	35.74	134.46	1.95	3.55	2.51	0.00	0.00	0.00	0.00
R2-2-2	0.00	1.88	0.00	3.14	0.00	0.00	0.00	0.00	0.00
R2-2-3	0.00	6.55	0.00	3.76	0.00	0.00	0.00	0.00	0.00
R2-2-4	0.00	2.29	0.89	3.32	0.00	0.00	0.00	0.00	0.00
R2-2-5	0.00	2.74	0.00	3.93	0.00	0.00	1.70	0.00	0.00
R2-2-6	0.00	2.75	1.16	3.83	0.00	0.00	1.71	0.00	0.00
R2-2-7	0.00	3.45	1.12	4.01	1.13	0.00	1.62	0.00	0.00
R2-2-8	1.91	9.14	2.50	5.59	2.18	0.00	3.12	1.22	1.61
R2-2-9	0.00	2.54	0.00	3.60	0.00	0.00	1.26	0.00	0.00
R2-3-1	93.55	920.26	228.58	493.14	215.70	24.74	77.13	21.01	24.63
R2-3-10	4327.88	9967.21	756.33	2039.21	968.51	10.77	46.47	18.95	5.42
R2-3-11	2815.72	4053.35	204.30	518.74	259.82	4.88	15.84	6.37	5.04
R2-3-12	15430.68	22636.46	1591.46	2941.49	1469.52	10.17	47.48	21.08	0.00
R2-3-13	7042.99	12043.24	774.70	1416.29	723.30	5.13	18.20	7.80	2.92
R2-3-14	422.54	1151.07	133.30	280.33	121.06	2.75	11.15	3.74	2.43
R2-3-15	74.74	318.24	48.01	96.77	44.80	0.00	1.53	0.00	0.00
R2-3-2	1085.73	3069.45	473.94	959.43	419.97	25.55	92.92	26.34	25.23
R2-3-3	1636.42	3776.27	492.48	990.93	437.11	21.15	80.60	23.13	18.22
R2-3-4	158.51	1371.97	301.69	662.32	289.36	7.82	29.07	10.05	6.39
R2-3-5	303.29	2051.73	504.62	1057.40	435.92	34.82	124.22	35.98	22.90
R2-3-6	7593.96	18259.39	2202.90	4673.59	2056.79	66.37	271.11	88.23	29.42
R2-3-7	6225.03	11780.70	1071.32	2441.19	1122.45	34.81	135.53	44.03	19.47
R2-3-8	13391.88	23945.52	1975.03	4217.21	1999.69	40.81	164.66	55.91	32.36
R2-3-9	9489.73	20844.02	2415.88	5070.45	2314.81	89.68	353.19	108.31	61.28
R2-4-1	50.67	467.36	146.33	316.22	130.10	18.20	59.87	15.35	22.95
R2-4-10	8499.54	18695.73	1832.13	3989.47	1846.08	66.96	258.06	81.31	38.67
R2-4-11	5617.37	9885.51	726.94	1654.14	790.60	16.32	61.73	22.35	11.97
R2-4-12	3944.94	11651.48	1040.13	2965.95	1373.41	47.15	183.49	59.49	37.76
R2-4-13	10725.71	14810.71	811.53	1487.82	765.23	14.61	42.32	14.94	9.58
R2-4-14	799.86	1894.50	196.15	146.90	185.39	8.36	29.86	8.94	6.22
R2-4-15	11.67	122.46	48.94	104.52	42.71	0.00	3.64	2.63	0.00
R2-4-2	286.56	1088.21	355.59	751.17	316.12	20.19	77.32	22.79	17.45

R2-4-3	20.65	119.02	56.35	127.82	48.97	4.74	16.68	5.00	4.61
R2-4-4	2243.34	6825.66	900.04	1840.96	817.37	56.83	209.74	58.30	69.52
R2-4-5	13603.25	29596.50	3352.99	6813.07	3087.24	171.65	649.70	181.76	176.66
R2-4-6	13673.69	29503.47	3263.24	6611.70	3019.87	128.66	510.71	154.10	106.75
R2-4-7	6239.80	17563.79	1909.78	3975.20	1811.92	57.26	221.40	71.91	34.15
R2-4-8	12479.37	16530.69	1096.80	2091.77	1032.61	24.04	77.14	27.75	16.60
R2-4-9	9930.81	22481.24	2092.38	4248.13	2008.94	80.14	298.44	90.65	70.73
R2-5-1	176.16	683.96	100.21	226.56	92.57	5.47	19.89	6.41	4.89
R2-5-10	43.24	229.24	39.99	92.21	37.22	2.88	9.60	3.01	1.83
R2-5-11	67.85	365.98	62.21	142.00	58.38	4.09	14.14	4.32	3.04
R2-5-12	38.22	211.62	38.09	88.32	36.29	2.89	9.38	3.23	2.01
R2-5-13	35.11	215.58	39.37	91.01	37.33	2.56	9.65	2.85	1.66
R2-5-14	45.77	276.58	50.98	116.98	48.86	3.50	12.28	3.43	2.66
R2-5-15	4.10	21.01	4.16	10.20	4.11	0.00	0.00	0.00	0.00
R2-5-3	204.82	934.95	149.35	338.55	140.32	8.51	31.23	9.09	6.56
R2-5-5	89.25	398.74	63.62	145.33	60.09	3.70	13.66	4.12	3.19
R2-5-6	127.38	574.31	88.59	200.69	84.84	4.85	18.63	5.73	4.18
R2-5-7	74.53	356.46	58.51	135.06	55.52	3.73	13.26	4.16	3.34
R2-5-8	77.28	379.29	62.69	143.89	59.71	3.73	14.24	4.53	3.31
R2-5-9	50.70	264.12	45.16	104.28	42.43	3.13	10.93	3.17	2.69
R2-6-1	94.41	444.40	73.26	165.33	67.66	3.49	12.77	3.87	2.34
R2-6-10	38.68	232.95	43.62	100.92	41.60	2.61	9.52	2.97	1.93
R2-6-11	36.53	236.01	47.30	112.08	43.98	3.24	11.02	3.28	2.22
R2-6-12	38.76	254.73	50.75	117.16	47.16	3.76	11.86	3.42	2.34
R2-6-13	36.95	284.77	62.34	144.20	57.44	4.31	14.64	4.50	2.62
R2-6-14	24.05	159.68	31.11	72.03	29.63	2.25	7.63	2.47	1.75
R2-6-15	3.65	17.03	3.31	8.37	4.99	7.37	0.00	0.00	0.00
R2-6-2	79.31	384.84	64.86	147.36	60.38	2.99	11.77	3.65	1.87
R2-6-3	96.87	471.84	79.62	179.86	73.38	3.85	14.71	5.22	2.74
R2-6-4	60.09	302.21	52.41	119.63	48.96	2.83	10.35	3.14	2.12
R2-6-5	67.76	363.19	62.32	140.83	58.53	3.30	11.38	3.77	2.42
R2-6-6	52.12	286.94	51.05	116.74	47.81	3.00	10.23	3.03	2.06

R2-6-7	68.78	392.08	71.47	163.68	65.86	4.42	15.30	4.35	2.57
R2-6-8	32.30	188.95	35.40	82.93	33.49	2.18	7.86	2.37	1.63
R2-6-9	49.16	292.79	54.73	125.48	51.66	2.99	11.78	3.47	2.28

3 Feb. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-2-1	25.76	399.74	125.19	275.45	109.93	13.01	45.63	12.23	11.04
R2-2-10	9.03	156.51	45.15	100.12	44.37	4.34	15.61	5.07	5.42
R2-2-11	9.34	176.97	54.34	119.57	51.16	5.63	19.04	5.59	5.41
R2-2-12	8.49	175.44	58.44	128.35	58.07	5.73	18.39	5.33	6.32
R2-2-13	198.95	538.97	85.68	226.61	112.42	3.96	14.28	5.10	4.80
R2-2-14	2967.62	5468.48	350.64	695.14	404.73	5.47	18.34	6.30	5.71
R2-2-15	3.91	12.10	7.92	18.10	6.55	0.00	0.00	0.00	0.00
R2-2-4	16.08	272.53	82.70	185.47	77.52	9.89	34.52	9.46	10.41
R2-2-5	22.03	371.16	103.59	227.63	96.58	10.70	37.87	10.09	10.40
R2-2-6	15.42	254.31	74.12	163.51	68.92	8.71	27.73	7.92	7.58
R2-2-7	32.64	394.17	86.62	185.04	81.87	9.15	28.30	7.95	7.89
R2-2-9	16.53	203.87	54.05	118.95	51.62	6.43	20.79	6.51	8.37
R2-3-1	163.13	1923.55	891.45	1832.90	776.93	106.40	313.80	85.21	56.10
R2-3-10	1117.14	4040.07	647.60	1301.92	587.58	35.69	129.68	39.53	27.31
R2-3-11	2311.04	6681.32	839.28	1922.83	879.19	32.03	123.88	41.14	23.35
R2-3-12	10758.35	20717.46	2499.11	5267.10	2445.43	161.61	609.07	171.47	181.38
R2-3-13	18705.18	29831.72	3220.83	6523.54	3041.56	137.99	544.11	164.55	134.24
R2-3-14	16868.77	28333.29	2715.78	5311.33	2564.16	26.38	117.65	48.24	25.89
R2-3-15	8.71	17.29	8.18	19.18	6.99	0.00	1.65	0.00	0.00
R2-3-2	2149.89	8928.79	1511.77	3098.35	1359.04	107.33	379.50	103.14	120.91
R2-3-3	3491.22	15129.17	2472.59	5114.26	2192.73	190.55	676.11	176.91	219.10

R2-3-4	174.65	1399.14	253.02	537.59	236.73	20.37	64.27	20.33	17.19
R2-3-5	1069.47	11790.54	2279.64	4640.66	2021.29	187.58	628.36	165.15	143.23
R2-3-6	3397.48	15819.64	2627.55	5461.01	2366.65	216.13	753.60	197.08	229.49
R2-3-7	2105.57	8600.86	1330.12	2732.32	1263.23	94.88	301.02	83.70	60.15
R2-3-8	7872.23	23880.64	3092.45	6241.83	2867.95	208.70	749.22	204.18	225.30
R2-3-9	4034.82	11470.64	1488.10	2890.77	1342.55	106.76	356.94	99.03	1.73
R2-4-1	28.82	155.17	58.72	148.67	65.45	12.70	36.16	10.39	7.55
R2-4-10	1094.36	7825.24	1564.95	3195.30	1424.10	112.06	393.42	109.02	108.37
R2-4-11	4120.22	14073.99	1889.51	4089.71	1863.41	93.00	353.85	107.90	72.82
R2-4-12	836.64	7231.76	1363.27	2817.08	1251.83	121.15	374.49	104.47	75.50
R2-4-13	18572.71	29407.72	2976.73	6382.96	2960.72	125.20	503.68	152.61	103.73
R2-4-14	15386.11	23806.70	2031.80	4010.75	1955.11	32.52	97.71	37.32	21.57
R2-4-15	27.93	51.17	9.61	22.18	8.51	0.00	2.66	0.00	0.00
R2-4-2	41.36	115.11	76.88	186.03	72.58	12.06	41.00	10.87	14.06
R2-4-3	52.81	223.63	37.96	78.49	34.74	3.04	9.42	3.69	3.43
R2-4-4	5044.60	24226.25	3310.12	6735.03	2999.69	238.19	840.34	228.45	285.28
R2-4-5	4984.52	29700.35	3962.91	8078.62	3613.67	282.67	1007.80	274.38	369.55
R2-4-6	1144.19	12777.34	2488.33	5206.98	2242.75	206.38	741.07	195.42	270.41
R2-4-7	397.12	5369.17	1163.51	2333.74	1025.78	89.41	293.94	84.09	90.85
R2-4-8	3244.70	5794.69	605.10	1313.09	754.95	33.19	144.40	55.73	83.53
R2-4-9	2006.34	11166.71	1858.35	3839.11	1744.55	131.35	474.45	134.17	156.36
R2-5-1	2.13	17.74	7.78	18.80	7.57	0.00	3.65	0.00	0.00
R2-5-10	1.34	8.22	3.77	9.85	3.53	0.00	2.16	0.00	0.00
R2-5-11	1.69	11.95	3.98	10.38	4.27	0.00	1.83	0.00	0.00
R2-5-12	2.70	10.69	3.81	9.83	3.96	0.00	1.96	0.00	0.00
R2-5-13	32.11	121.63	15.02	24.11	15.72	2.06	3.30	2.74	3.66
R2-5-14	1.52	14.53	4.19	10.52	4.21	0.00	0.97	0.00	1.39
R2-5-15	3.04	10.40	2.12	5.90	2.26	0.00	0.00	0.00	0.00
R2-5-3	3.21	25.65	7.13	17.52	7.96	0.00	3.38	1.88	1.81
R2-5-5	1.55	9.98	4.41	11.17	4.42	0.00	2.19	0.00	0.00
R2-5-6	1.73	12.75	5.64	13.92	5.41	0.00	2.75	0.00	0.00
R2-5-7	1.39	9.19	4.29	10.96	3.87	0.00	2.34	0.00	0.00

R2-5-8	1.57	11.79	5.08	12.71	5.03	0.00	2.56	0.00	0.00
R2-5-9	0.00	7.26	3.30	8.82	3.21	0.00	1.82	0.00	0.00

19 Apr. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-2-1	0.00	-0.14	0.00	1.52	0.00	0.00	1.20	0.00	0.00
R2-2-10	0.00	0.27	0.00	2.03	0.00	0.00	0.80	0.00	0.00
R2-2-11	0.00	-0.29	0.00	1.49	0.00	0.00	0.00	0.00	0.00
R2-2-12	0.00	-0.10	0.00	1.42	0.00	0.00	0.00	0.00	0.00
R2-2-13	0.00	4.74	12.31	25.97	11.96	1.09	2.40	1.19	0.00
R2-2-14	8.36	52.73	37.03	94.15	45.73	0.00	2.66	1.31	1.40
R2-2-2	0.00	-0.21	0.00	1.40	0.00	0.00	0.00	0.00	0.00
R2-2-3	0.00	-0.36	0.00	1.48	0.00	0.00	1.57	0.00	0.00
R2-2-4	0.00	-0.02	0.00	1.88	0.00	0.00	1.30	0.00	1.01
R2-2-5	0.00	0.44	2.67	6.92	2.33	0.00	2.76	0.00	0.00
R2-2-6	3.97	102.09	120.79	265.24	92.68	17.76	65.99	15.40	12.76
R2-2-7	29.51	458.87	118.78	223.25	100.59	3.83	12.41	4.21	3.50
R2-2-8	2.44	117.24	107.15	230.94	85.43	13.15	46.28	11.92	11.00
R2-2-9	2.04	151.04	65.76	122.77	54.01	3.84	13.64	3.63	4.31
R2-3-1	5.87	9.22	3.82	13.11	5.14	2.29	4.80	2.05	0.00
R2-3-10	1783.49	8414.89	1487.84	2830.38	1261.31	104.46	345.91	92.56	58.40
R2-3-11	333.01	2563.59	828.66	1616.27	677.99	70.88	230.41	62.98	41.86
R2-3-12	1105.11	7499.20	1925.98	3979.15	1640.03	170.71	590.33	151.17	197.76
R2-3-13	16055.76	38425.28	5287.60	10913.41	4638.37	390.34	1400.94	355.69	484.65
R2-3-14	18903.89	41610.03	5733.97	11832.17	5034.01	388.14	1428.46	368.02	408.86
R2-3-2	56.30	663.73	353.45	791.57	315.31	50.92	156.24	41.02	37.51
R2-3-3	60.26	794.01	474.07	1058.13	421.25	64.05	203.31	52.25	50.12

R2-3-4	47.93	2224.25	975.04	1985.68	809.28	82.84	241.39	72.89	42.89
R2-3-5	9.64	85.45	81.52	136.14	64.57	24.07	56.82	16.63	17.92
R2-3-6	7.22	404.26	453.63	937.17	367.72	96.22	290.83	76.82	69.39
R2-3-8	846.02	7384.25	1954.74	3847.42	1633.75	200.76	660.50	167.56	195.94
R2-3-9	7531.23	29377.08	4777.65	9285.99	4174.82	366.70	1265.28	326.77	345.76
R2-4-1	327.95	3148.93	524.18	1218.34	540.48	65.14	172.17	52.56	43.89
R2-4-10	97.35	3332.32	1640.41	3383.23	1366.24	169.75	567.68	144.67	159.99
R2-4-11	806.71	12853.33	3306.29	6738.59	2795.18	309.17	1023.35	259.71	255.70
R2-4-12	35.41	698.02	545.19	916.24	421.99	83.46	167.99	55.86	17.98
R2-4-13	19094.48	43894.69	5704.53	11716.59	5003.00	386.20	1413.10	356.74	472.13
R2-4-14	19243.97	38914.51	4799.48	9789.99	4236.16	279.97	1033.28	272.07	296.19
R2-4-2	18.05	122.50	144.26	332.66	147.49	23.11	66.21	20.15	13.96
R2-4-3	7.63	49.11	21.75	60.20	25.52	3.18	10.55	3.01	3.24
R2-4-4	14.91	168.46	124.63	298.30	108.17	28.97	99.00	22.34	41.51
R2-4-5	38.13	864.52	564.88	1288.10	475.94	83.12	290.78	69.53	111.17
R2-4-6	181.04	8458.68	2894.79	6125.78	2456.65	282.53	985.76	245.85	348.30
R2-4-7	242.69	10602.60	4337.26	8945.08	3489.38	452.42	1500.69	382.51	336.26
R2-4-8	2995.55	14167.04	3001.51	6112.70	2573.06	244.46	852.05	218.68	275.79
R2-4-9	32.18	357.29	455.09	933.99	368.02	76.67	236.31	59.80	68.26
R2-5-1	9.29	34.38	4.98	11.45	4.59	0.00	2.52	0.00	0.92
R2-5-10	1.99	9.76	2.22	5.61	2.37	0.00	2.13	0.00	0.92
R2-5-11	2.64	13.20	2.95	7.19	2.75	0.00	4.35	0.00	1.11
R2-5-12	1.80	9.77	2.33	5.98	2.45	0.00	3.71	0.00	0.00
R2-5-13	1.86	9.38	1.90	5.45	2.06	0.00	2.60	0.00	0.00
R2-5-14	1.81	8.37	2.03	5.31	1.86	0.00	1.35	0.00	0.00
R2-5-3	12.02	50.25	8.71	19.46	8.02	0.00	7.59	0.00	1.67
R2-5-5	3.95	17.48	3.33	8.05	3.10	0.00	5.86	0.00	0.00
R2-5-6	3.71	18.02	3.19	8.38	3.19	0.00	4.17	0.00	0.97
R2-5-7	2.68	13.75	2.80	7.34	2.39	0.00	1.65	0.00	1.24
R2-5-8	3.43	16.89	3.50	8.36	3.24	0.00	2.30	0.00	0.88
R2-5-9	2.01	9.39	1.40	5.29	1.87	0.00	2.29	0.00	0.86

8 June 05

Point_Name	Benzene	Toluene	Ethylbenzene	P,M-xylene	O-xylene	1,3,5-Trimethyl-Benzene	1,2,4-Trimethyl-Benzene	1,2,3-Trimethyl-Benzene	Naphthalene
R2-2-1	0.00	1.57	0.00	2.42	0.00	0.00	0.00	0.00	0.00
R2-2-2	0.00	1.26	0.00	1.91	0.00	0.00	0.00	0.00	0.00
R2-2-3	5.52	374.05	187.49	351.30	157.61	9.06	30.67	9.61	5.91
R2-2-4	56.88	2488.65	1452.39	2968.81	1198.98	149.21	523.19	1310.86	136.50
R2-2-5	148.96	4331.19	1562.54	3126.48	1307.35	156.17	542.03	133.31	163.70
R2-2-6	18.47	115.42	270.72	588.41	196.17	80.53	253.25	58.54	52.87
R2-2-7	15.20	89.28	306.64	657.21	226.49	51.30	165.33	44.19	28.77
R2-2-8	27.42	951.63	782.79	1606.66	613.11	110.22	371.34	90.65	89.67
R2-2-9	15.77	604.72	650.97	1351.46	511.72	52.27	183.81	50.16	45.58
R2-2-10	3.14	241.18	191.36	364.96	153.17	7.87	25.97	8.73	4.34
R2-2-11	0.00	6.25	4.20	7.76	3.43	0.00	0.00	0.00	1.20
R2-2-12	0.00	2.55	1.36	3.92	2.17	0.00	0.00	0.00	1.24
R2-2-13	0.00	2.35	4.12	9.32	4.65	0.00	1.68	1.69	0.00
R2-2-14	3.46	79.72	121.75	240.27	107.34	8.19	26.37	12.73	1.00
R2-2-15	1.70	9.89	2.92	7.65	2.17	0.00	3.30	1.15	0.00
R2-3-1	94.74	793.01	250.24	464.11	188.75	185.74	400.99	86.82	34.13
R2-3-2	116.71	13122.93	2537.36	4837.47	2240.84	214.40	689.08	179.07	198.13
R2-3-3	164.83	19279.72	4233.92	8235.43	3669.87	355.68	1194.06	296.51	348.53
R2-3-4	38.34	430.88	812.77	1601.55	787.87	19.64	311.31	89.25	42.80
R2-3-5	40.74	719.69	919.61	1277.02	710.73	98.47	199.05	60.33	26.40
R2-3-6	20.30	172.53	417.61	690.66	324.79	61.20	134.37	40.14	8.81
R2-3-7	64.92	1046.75	1341.23	2417.51	1089.41	155.19	434.59	117.74	64.30
R2-3-8	94.02	2447.16	1231.67	2206.86	995.09	82.92	363.91	102.64	40.81
R2-3-9	48.40	928.49	743.89	1421.76	644.63	103.20	305.30	79.90	66.81
R2-3-10	834.85	9577.05	2567.15	4735.49	2184.32	194.08	627.04	167.71	127.89
R2-3-11	2780.79	18035.98	2941.48	5301.79	2486.25	184.87	603.03	162.52	106.92
R2-3-12	3492.23	15091.25	2408.34	4479.88	1992.40	258.82	855.40	207.43	262.22
R2-3-13	2171.34	10214.71	2264.50	4575.59	1953.92	234.20	824.06	205.82	302.57

R2-3-14	2568.86	14472.20	3080.02	6219.71	2765.20	264.15	933.33	238.64	353.64
R2-3-15	11.44	78.09	14.06	36.35	21.04	1.66	6.29	2.85	2.05
R2-4-1	65.53	731.35	729.11	1495.45	649.88	156.69	360.07	102.62	60.66
R2-4-2	51.45	791.85	735.09	1288.51	618.19	154.23	320.64	98.62	25.22
R2-4-3	15.65	75.91	83.10	169.13	79.91	37.38	60.78	25.31	5.51
R2-4-4	48.29	315.90	676.55	1379.89	528.60	133.15	382.23	106.63	81.75
R2-4-5	37.63	353.01	482.10	1083.20	461.64	126.47	368.95	97.38	114.12
R2-4-6	37.37	421.30	827.44	1738.07	691.99	134.20	452.72	105.95	139.65
R2-4-7	66.26	2596.69	1528.54	2948.25	1266.32	167.02	529.46	138.28	115.87
R2-4-8	3251.88	21718.07	3650.10	7189.08	3140.71	400.96	1356.50	336.21	418.60
R2-4-9	29.59	219.23	386.79	768.36	312.47	66.36	179.22	48.41	45.80
R2-4-10	63.96	1984.90	1397.05	2799.20	1147.53	165.84	547.31	137.11	151.77
R2-4-11	637.88	9957.83	2980.40	5889.56	2509.30	294.97	989.94	245.94	263.96
R2-4-12	27.05	490.48	595.63	1095.48	478.04	79.90	192.15	59.04	12.54
R2-4-13	5681.24	24342.90	4215.56	8392.48	3645.44	372.78	1303.10	329.69	413.35
R2-4-14	7987.78	28792.35	4576.21	9044.68	4059.96	339.60	1201.99	315.77	399.16
R2-4-15	5.26	32.36	6.74	14.44	6.06	0.94	3.31	1.48	1.50
R2-5-1	0.00	2.14	0.00	2.21	0.00	0.00	0.00	0.00	0.00
R2-5-3	0.00	1.43	0.00	1.66	0.00	0.00	0.00	0.00	0.00
R2-5-5	0.00	1.57	0.00	1.77	0.00	0.00	0.00	0.00	0.00
R2-5-6	0.00	0.91	0.00	1.51	0.00	0.00	0.00	0.00	0.00
R2-5-7	0.00	1.26	0.00	1.75	0.00	0.00	0.00	0.00	0.00
R2-5-8	0.00	0.00	0.00	1.70	0.00	0.00	0.00	0.00	0.00
R2-5-9	0.00	0.00	0.00	1.39	0.00	0.00	0.00	0.00	0.00
R2-5-10	0.00	0.00	0.00	1.42	0.00	0.00	0.00	0.00	0.00
R2-5-11	0.00	0.00	0.00	1.58	0.00	0.00	0.00	0.00	0.00
R2-5-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-13	0.00	0.00	0.00	1.28	0.00	0.00	0.00	0.00	0.00
R2-5-14	0.00	0.00	0.00	1.46	0.00	0.00	0.00	0.00	0.00
R2-5-15	0.00	0.00	0.00	1.52	0.00	0.00	0.00	0.00	0.00

C. 1. GMT gate b. Row 3

3 Feb. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R3-2-1	36.56	220.51	46.61	100.10	45.98	3.47	12.82	4.44	7.91
R3-2-11	18.87	82.34	22.49	50.12	21.20	2.45	7.62	2.69	3.73
R3-2-12	6.56	45.41	12.16	27.84	12.14	0.00	4.44	1.49	2.89
R3-2-13	4.79	31.62	8.36	19.36	8.39	0.00	3.02	0.00	1.81
R3-2-14	7.76	53.41	15.37	34.72	14.36	1.70	5.89	1.82	2.78
R3-2-15	116.63	7.10	1.53	4.53	1.38	0.00	0.00	0.00	0.00
R3-2-2	7.14	51.11	13.13	29.68	12.15	0.00	4.72	1.59	2.60
R3-2-3	5.84	40.35	10.97	24.68	10.19	0.00	3.63	1.49	2.02
R3-2-4	5.61	37.60	10.43	23.81	10.18	0.00	3.10	1.98	2.19
R3-2-5	5.42	37.19	9.51	21.62	9.20	0.00	3.15	0.00	2.69
R3-2-6	5.63	36.47	9.24	21.13	9.21	0.00	3.24	0.00	1.82
R3-2-7	4.86	31.70	8.17	18.74	7.61	0.00	2.94	0.00	1.60
R3-2-8	5.04	31.50	8.36	19.66	8.51	0.00	3.42	2.04	2.71
R3-3-10	261.43	203.50	8.48	18.89	9.46	0.00	3.66	0.00	1.92
R3-3-11	88.59	118.24	7.33	16.91	7.97	0.00	3.45	0.00	1.68
R3-3-12	332.00	311.45	7.10	16.82	7.82	0.00	3.27	0.00	0.00
R3-3-13	1839.33	987.59	73.01	171.48	85.04	0.00	34.83	14.23	19.43
R3-3-15	350.65	49.37	1.45	4.21	0.00	0.00	0.00	0.00	0.00
R3-3-2	23.06	244.98	163.74	349.04	153.60	16.02	50.34	15.71	13.95
R3-3-3	312.45	176.10	113.06	224.89	103.01	2.30	7.57	3.25	2.89
R3-3-4	643.19	409.74	17.52	33.50	17.47	0.00	4.37	1.51	2.15
R3-3-5	912.06	637.42	11.79	23.90	12.33	0.00	3.80	1.65	2.06
R3-3-6	2457.87	1966.63	22.95	34.36	24.16	0.00	3.06	0.00	1.70
R3-3-7	3978.43	5627.08	104.63	133.65	109.12	0.00	3.83	0.00	1.85
R3-3-8	2757.87	2356.06	17.04	26.18	18.94	0.00	3.42	0.00	1.83
R3-3-9	1235.42	1425.80	14.82	25.72	16.74	0.00	4.09	1.45	2.14

R3-4-1	212.61	2423.68	511.12	1163.81	503.03	42.94	153.87	42.26	42.90
R3-4-10	427.31	132.24	10.48	23.04	10.22	0.00	3.27	1.66	1.55
R3-4-11	361.16	211.05	12.39	27.30	11.79	0.00	3.77	1.41	1.83
R3-4-12	299.64	117.25	10.20	23.08	9.59	0.00	3.49	1.23	0.00
R3-4-13	44.75	97.51	11.39	24.78	10.62	0.00	3.88	1.60	1.77
R3-4-14	31.31	70.78	9.10	20.80	8.77	0.00	3.22	0.00	1.72
R3-4-15	35.49	8.74	1.53	4.21	2.08	0.00	0.00	0.00	0.00
R3-4-2	521.53	1970.47	364.24	764.70	343.34	18.13	69.44	21.77	13.21
R3-4-3	2154.68	3853.68	423.84	805.59	381.74	3.77	17.43	7.38	3.01
R3-4-4	255.67	218.20	39.79	78.91	35.16	1.52	4.87	1.83	3.70
R3-4-5	72.28	178.46	40.16	415.49	36.25	2.92	7.10	3.30	4.12
R3-4-6	1058.50	1477.81	68.69	141.35	70.50	4.25	15.97	5.44	9.47
R3-4-7	1205.76	2761.33	39.54	63.26	43.46	1.83	5.82	2.23	2.72
R3-4-8	1458.44	1486.93	16.79	31.70	17.65	0.00	3.74	1.29	1.77
R3-4-9	175.79	173.39	10.93	23.87	10.45	2.82	3.47	1.59	1.53
R3-5-1	18.36	36.61	5.41	13.24	6.04	0.00	3.04	0.00	1.69
R3-5-10	13.73	46.20	6.95	16.82	8.80	0.00	3.88	1.76	2.71
R3-5-11	8.22	28.62	5.17	13.02	6.24	0.00	3.17	1.33	1.70
R3-5-12	6.60	24.62	4.79	12.45	6.01	0.00	3.19	1.29	1.36
R3-5-13	6.51	25.14	4.87	12.47	5.77	0.00	2.91	0.00	1.93
R3-5-14	5.79	23.31	4.63	12.33	5.71	0.00	3.13	0.00	1.97
R3-5-15	2.44	6.55	1.45	4.46	1.86	0.00	0.00	0.00	0.00
R3-5-2	16.92	35.00	4.97	12.53	5.69	0.00	2.61	0.00	1.50
R3-5-3	13.88	30.30	4.49	11.26	4.77	0.00	2.80	0.00	1.40
R3-5-4	11.67	26.96	4.16	10.56	4.37	0.00	2.55	0.00	0.00
R3-5-5	13.00	31.84	4.80	12.03	5.74	0.00	2.48	0.00	1.81
R3-5-6	12.53	31.88	4.95	11.89	5.86	0.00	2.76	0.00	1.75
R3-5-7	9.47	25.04	4.14	10.64	4.68	0.00	2.23	0.00	1.48
R3-5-8	3.80	15.94	3.88	10.28	4.36	0.00	2.41	0.00	1.46
R3-5-9	11.14	32.08	5.23	13.23	6.12	0.00	3.13	1.49	1.83

5 Apr. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R3-2-10	50.62	213.92	27.27	77.39	35.10	0.00	1.96	0.00	0.00
R3-2-11	496.10	1415.14	119.91	383.32	182.37	1.82	7.02	3.50	0.00
R3-2-12	1347.56	3127.27	117.93	380.44	213.08	0.00	2.55	1.59	0.00
R3-2-13	639.85	1071.99	21.62	52.38	25.83	0.00	2.49	1.21	0.00
R3-2-4	8.27	48.59	9.19	23.30	9.45	0.00	0.00	0.00	0.00
R3-2-5	8.58	49.83	9.39	23.85	9.60	0.00	0.00	0.00	0.00
R3-2-6	10.39	59.11	10.79	27.45	11.03	0.00	1.13	0.00	0.00
R3-2-7	11.03	60.82	10.80	27.51	11.10	0.00	0.00	0.00	0.00
R3-2-8	14.11	74.87	12.64	32.22	13.06	0.00	1.35	0.00	0.00
R3-2-9	18.41	97.30	14.77	37.85	16.06	0.00	1.41	0.00	0.00
R3-3-1	27.53	150.68	35.44	83.09	33.08	4.81	11.46	3.20	2.70
R3-3-10	1242.37	7864.47	957.32	2233.76	991.56	13.35	62.67	28.20	1.42
R3-3-11	2391.34	10318.50	1268.70	2525.13	1151.52	9.60	45.79	22.90	1.93
R3-3-12	1059.61	3084.22	237.82	574.03	296.42	0.00	3.50	2.61	2.75
R3-3-13	1025.49	3693.38	317.76	1047.50	495.94	2.03	7.55	6.08	1.20
R3-3-14	1108.68	2752.49	180.84	542.65	301.50	1.94	6.03	2.93	1.49
R3-3-2	29.48	139.94	47.66	111.72	44.44	18.32	43.28	11.95	10.83
R3-3-3	63.93	332.60	317.77	718.84	276.90	72.68	214.47	55.84	32.40
R3-3-4	156.52	883.32	732.47	1327.71	620.20	35.27	115.92	41.49	11.21
R3-3-5	1409.56	2750.03	474.80	844.81	412.38	6.53	24.99	9.51	2.12
R3-3-6	4481.68	8587.33	725.31	1256.10	638.00	2.51	10.11	4.52	0.00
R3-3-7	6303.46	13487.75	1286.10	2513.52	1164.08	14.20	64.19	25.02	3.36
R3-3-8	1471.01	6497.13	958.18	2351.00	1021.03	22.44	97.66	36.75	4.36
R3-3-9	295.08	2831.96	329.95	1178.40	520.12	4.45	18.35	10.43	0.00
R3-4-1	10.77	92.74	53.28	122.97	62.65	15.40	28.85	11.64	6.17
R3-4-10	4390.34	16714.31	2260.97	4525.22	1998.29	20.14	105.60	44.48	0.00

R3-4-11	1519.62	7799.11	1191.23	2317.45	1034.02	9.50	49.55	23.00	1.44
R3-4-12	244.96	2239.84	378.44	790.24	361.96	2.68	14.61	7.01	1.69
R3-4-13	306.37	2354.83	381.13	849.24	410.42	1.14	5.80	3.43	1.50
R3-4-14	577.79	3134.91	448.38	1094.84	522.66	0.00	3.14	1.18	0.00
R3-4-2	46.23	785.31	320.17	736.05	365.37	53.58	139.55	43.99	34.25
R3-4-3	44.79	600.78	303.02	670.97	299.04	33.82	104.32	30.83	24.95
R3-4-4	188.88	519.29	296.00	621.85	267.71	11.57	43.52	14.03	6.55
R3-4-5	812.26	964.96	463.27	891.66	409.73	3.64	13.95	6.85	1.31
R3-4-6	659.50	1008.90	465.07	874.17	411.49	0.00	4.93	3.28	0.00
R3-4-7	224.37	829.47	1976.99	601.82	248.42	0.00	2.51	10.94	0.00
R3-4-8	899.64	3746.33	285.43	938.12	423.59	2.82	13.09	8.03	0.00
R3-4-9	2119.83	7529.77	448.69	1803.82	803.21	12.11	55.57	22.51	0.00
R3-5-1	0.00	-1.06	1.36	1.85	1.23	0.00	2.45	0.00	0.00
R3-5-10	0.00	0.54	0.00	1.75	0.00	0.00	2.98	0.00	0.00
R3-5-11	0.00	0.36	0.00	1.67	0.00	0.00	2.16	0.00	0.00
R3-5-12	0.00	0.11	0.00	1.65	0.00	0.00	1.74	0.00	0.00
R3-5-13	0.00	-0.02	0.00	1.85	0.00	0.00	1.29	0.00	0.00
R3-5-14	0.00	0.41	0.00	1.98	0.00	0.00	1.70	0.00	0.00
R3-5-2	1.51	-1.24	0.97	1.92	1.23	0.00	3.35	1.05	0.00
R3-5-3	0.00	-0.15	3.93	1.56	0.00	0.00	3.74	0.00	0.00
R3-5-4	0.00	-0.25	0.00	1.41	0.00	0.00	0.00	0.00	0.00
R3-5-6	0.00	0.06	0.00	1.53	0.00	0.00	2.96	0.00	0.00
R3-5-7	0.00	-0.14	3.68	1.51	0.00	0.00	2.66	0.00	0.00
R3-5-8	0.00	0.60	0.00	3.00	0.00	0.00	4.82	0.00	0.00
R3-5-9	0.00	0.12	0.00	1.58	0.00	0.00	2.12	0.00	0.00

6 June 05

Point_Name	Benzene	Toluene	Ethylbenzene	P,M-xylene	O-xylene	1,3,5-Trimethyl-Benzene	1,2,4-Trimethyl-Benzene	1,2,3-Trimethyl-Benzene	Naphthalene

R3-2-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-8	17.43	96.77	9.41	15.43	8.43	0.00	0.00	0.00	0.00
R3-2-9	222.92	1835.76	440.59	895.65	398.36	10.46	42.74	15.02	3.79
R3-2-10	774.56	4974.84	1310.69	2768.66	1169.81	89.57	334.52	91.22	57.05
R3-2-11	1077.65	9419.54	1527.01	4062.49	1820.44	108.14	404.16	112.28	67.33
R3-2-12	2693.23	11967.65	1733.01	3600.45	1665.62	50.62	206.47	69.10	16.70
R3-2-13	2115.90	6517.84	781.61	1628.61	785.12	3.07	16.75	11.96	1.31
R3-2-14	148.37	866.09	90.50	313.19	178.31	0.00	0.00	0.00	0.00
R3-2-15	1063.46	1538.35	153.98	279.62	133.86	4.49	16.82	7.48	0.00
R3-3-1	11.32	1631.96	800.22	2141.13	1031.64	101.77	325.73	103.27	59.40
R3-3-2	8.07	214.55	119.89	306.02	142.48	24.98	381.17	17.48	17.18
R3-3-3	6.94	6.56	11.31	10.19	13.26	2.23	4.80	14.08	19.63
R3-3-4	11.09	41.25	86.35	47.22	90.12	9.99	21.01	38.91	36.85
R3-3-5	79.05	1334.21	1386.53	2838.58	1200.23	189.82	612.24	170.26	110.58
R3-3-6	236.13	2385.02	1834.86	3838.49	1562.52	139.06	507.18	139.85	74.93
R3-3-7	1405.76	8029.34	2306.41	4592.23	1975.13	144.08	531.05	142.54	104.53
R3-3-8	2349.69	15800.58	3231.85	6202.47	2765.76	194.59	703.89	185.78	128.91
R3-3-9	2084.57	18213.13	3433.30	6135.50	2849.05	412.63	606.37	164.50	79.95
R3-3-10	483.57	5633.61	1367.11	2052.46	1009.25	75.06	254.75	68.50	45.98
R3-3-11	41.09	1685.38	287.07	1108.51	508.04	41.66	143.07	43.06	20.27
R3-3-12	17.14	681.69	123.25	511.88	262.02	16.17	54.09	18.83	5.05
R3-3-13	26.82	119.27	42.24	180.18	96.92	3.04	12.24	6.20	0.00
R3-3-15	301.47	262.82	145.05	287.97	140.18	2.53	10.64	6.52	0.00
R3-4-1	24.32	816.63	395.17	1242.24	662.14	145.32	318.42	126.88	103.28
R3-4-2	33.61	818.80	504.62	1517.21	815.09	135.48	345.00	119.25	92.51
R3-4-3	72.46	3333.44	1317.97	3139.04	1525.30	155.57	456.42	135.88	132.72

R3-4-5	92.65	3640.65	1161.44	2787.51	1290.63	113.23	366.53	105.19	72.16
R3-4-6	76.89	3615.20	1151.57	2655.36	1196.01	111.24	387.71	112.22	57.57
R3-4-7	45.09	602.59	895.38	1610.44	739.35	84.87	285.90	84.25	42.46
R3-4-8	118.07	1731.72	887.94	1624.20	728.50	91.12	299.60	83.18	40.24
R3-4-9	48.63	946.88	328.90	1007.11	415.83	60.59	195.18	54.08	13.67
R3-4-10	40.62	944.03	302.02	1020.80	417.31	39.34	139.36	41.02	23.97
R3-4-11	5.04	114.64	94.54	205.18	84.55	9.50	29.62	10.31	4.89
R3-4-12	3.33	68.12	71.09	163.86	67.91	3.14	11.69	4.93	0.00
R3-4-13	0.00	9.71	4.43	25.02	14.30	1.34	2.84	2.14	0.00
R3-4-14	0.00	6.52	2.24	11.00	6.72	0.00	0.96	1.25	0.00
R3-4-15	23.11	55.95	9.20	19.43	9.78	0.00	1.01	0.00	0.00
R3-5-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-2	0.00	0.00	0.00	0.00	1.16	0.00	0.00	1.82	0.00
R3-5-3	0.00	2.08	1.31	3.03	1.76	0.00	0.00	0.00	0.00
R3-5-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-10	0.00	6.81	2.48	6.15	2.58	0.00	0.00	0.00	0.00
R3-5-11	0.00	5.75	2.26	5.65	2.09	0.00	0.00	0.00	0.00
R3-5-12	0.00	5.70	2.14	5.56	1.96	0.00	0.00	0.00	0.00
R3-5-13	0.00	5.65	2.17	5.47	2.10	0.00	0.00	0.00	0.00
R3-5-14	0.00	0.60	2.61	6.41	2.46	0.00	0.00	0.00	0.00
R3-5-15	1.88	6.92	1.75	4.16	1.50	0.00	0.00	0.00	0.00

16 Aug. 05

Point_Name	Benzene	Toluene	Ethylbenzene	P,M-xylene	O-xylene	1,3,5-Trimethyl-Benzene	1,2,4-Trimethyl-Benzene	1,2,3-Trimethyl-Benzene	Naphthalene
R3-1-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-1-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-1-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-1-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-1-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-1-8	34.98	1104.12	941.60	1602.52	787.70	60.52	172.95	65.61	40.95
R3-1-9	0.00	1.76	1.95	3.76	0.00	0.00	0.00	0.00	0.00
R3-1-10	0.00	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-1-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-1-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-1-13	0.00	1.69	0.00	2.67	0.00	0.00	1.40	0.00	2.09
R3-1-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-1-15	21.72	88.26	9.52	18.43	9.48	0.00	0.00	0.00	0.00
R3-2-1	0.00	1.34	0.00	5.12	1.75	0.00	0.00	0.00	2.19
R3-2-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-4	68.05	661.08	34.30	34.88	31.11	0.00	0.00	0.00	0.00
R3-2-5	90.68	1076.61	234.30	369.87	207.86	0.00	0.00	0.00	0.00
R3-2-6	153.33	2007.04	190.16	278.41	173.05	0.00	3.39	2.03	0.00
R3-2-7	226.74	5026.67	1329.79	2860.85	1245.22	51.44	174.30	63.90	25.77
R3-2-8	25.60	1046.54	909.91	1531.35	760.50	58.42	166.16	63.24	39.88
R3-2-9	95.67	3013.74	1302.47	2443.67	1094.71	77.93	245.69	76.55	25.52
R3-2-10	719.06	9433.18	1965.78	3885.80	1739.21	127.87	429.62	115.22	82.57
R3-2-11	1329.33	12989.58	2545.32	4893.26	2214.38	155.43	513.58	137.33	121.70
R3-2-12	1533.35	10250.81	1744.74	3301.22	1504.79	110.73	372.86	103.74	70.18
R3-2-13	1098.17	4845.78	841.48	1441.76	716.68	44.55	163.01	50.84	16.84
R3-2-14	276.41	1263.11	255.99	415.77	245.49	2.16	9.18	5.51	0.00
R3-2-15	67.78	107.27	73.53	150.39	60.02	3.86	13.08	3.93	3.13

R3-3-1	16.04	884.37	578.32	1287.20	462.25	288.31	764.64	173.85	145.57
R3-3-2	49.00	3579.54	1608.69	3167.46	1369.86	229.44	696.07	170.77	130.04
R3-3-3	26.55	993.50	819.78	856.58	813.15	74.83	212.25	73.60	57.40
R3-3-4	54.12	4852.57	2872.45	3927.70	2374.66	192.43	625.24	182.69	186.74
R3-3-6	51.70	2190.28	2727.84	5162.75	2228.28	195.69	669.68	177.83	184.77
R3-3-7	51.80	1407.01	2413.74	4978.41	1976.31	305.27	679.50	176.60	173.45
R3-3-8	67.70	3592.51	3824.58	7660.60	3124.41	291.59	984.25	253.82	219.55
R3-3-9	40.28	1406.26	1790.19	3627.09	1448.74	164.86	522.42	136.71	94.36
R3-3-10	32.03	1363.07	1080.50	2073.51	879.02	78.30	244.10	65.46	30.46
R3-3-11	35.00	1334.45	787.62	1211.78	654.84	42.63	123.71	41.89	16.23
R3-3-12	32.19	1969.60	770.32	1179.62	689.52	36.41	92.56	35.82	9.04
R3-3-13	23.68	1090.37	162.04	174.51	208.28	6.09	14.21	11.67	2.00
R3-3-15	21.27	78.47	39.58	75.85	23.46	3.12	9.60	3.56	1.38
R3-4-1	22.15	12.00	172.77	198.66	133.29	77.09	154.25	44.77	26.50
R3-4-2	25.49	28.91	337.25	608.35	380.46	105.95	265.21	78.89	70.27
R3-4-3	49.11	359.76	873.56	2169.38	1199.38	167.50	519.99	144.86	140.94
R3-4-4	21.15	98.20	362.68	700.17	404.87	100.75	321.80	81.22	71.38
R3-4-5	13.59	91.38	333.97	496.82	404.59	70.56	216.91	60.36	43.53
R3-4-6	5.28	26.63	64.93	142.48	78.97	22.12	62.50	17.39	18.74
R3-4-7	7.93	43.61	119.42	148.84	133.70	30.43	81.82	24.52	25.25
R3-4-8	7.88	73.11	114.92	107.69	107.29	22.31	57.24	19.21	18.31
R3-4-9	0.00	3.97	3.38	7.94	3.04	0.00	1.49	0.00	0.00
R3-4-10	1.45	7.37	8.28	28.88	13.43	5.90	10.90	5.20	3.83
R3-4-11	1.49	8.69	8.65	22.74	10.42	2.92	7.04	2.85	3.11
R3-4-12	0.00	7.92	5.15	16.87	6.22	2.60	2.38	1.18	0.00
R3-4-13	0.00	4.49	2.02	6.28	2.02	0.00	0.00	0.00	0.00
R3-4-14	3.13	14.66	5.07	7.65	4.52	0.00	0.00	0.00	0.00
R3-4-15	22.09	72.88	13.02	23.90	11.15	0.00	1.83	2.99	0.00
R3-5-1	0.00	1.33	1.21	3.34	1.04	0.00	0.00	0.00	0.00
R3-5-2	0.00	0.00	1.83	3.15	1.15	0.00	0.00	0.00	0.00
R3-5-3	0.00	0.00	2.15	2.73	0.00	0.00	0.00	1.80	0.00
R3-5-4	0.00	1.16	2.38	3.14	1.89	0.00	0.00	0.00	0.00

R3-5-5	0.00	0.00	0.00	3.33	1.25	0.00	0.00	0.00	0.00
R3-5-6	0.00	1.04	1.61	3.30	1.09	0.00	0.00	0.00	0.00
R3-5-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-10	0.00	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-11	0.00	1.73	4.13	1.76	0.00	0.00	0.00	0.00	0.00
R3-5-12	0.00	1.66	1.53	3.70	1.28	0.00	1.08	0.00	1.90
R3-5-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-15	8.40	50.15	8.64	17.83	8.04	0.00	0.00	0.00	0.00

D. 1. GMT gate c. Row 4

13 Apr. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R4-2-1	0.00	-0.14	0.00	1.49	0.00	0.00	2.51	0.00	0.00
R4-2-10	0.00	-0.22	0.00	1.76	0.00	0.00	4.98	0.00	0.00
R4-2-12	0.00	-0.48	0.00	1.50	0.00	0.00	2.34	0.00	0.00
R4-2-13	0.00	-0.11	0.00	1.56	0.00	0.00	22.06	0.00	0.00
R4-2-14	0.00	-0.36	0.00	1.42	0.00	0.00	2.10	0.00	0.00
R4-2-2	0.00	-0.40	0.00	1.56	0.00	0.00	1.79	0.00	0.00
R4-2-3	0.00	-0.16	0.00	1.41	0.00	0.00	5.23	0.00	0.00
R4-2-4	0.00	-0.17	0.00	1.55	0.00	0.00	3.50	0.00	0.00
R4-2-5	0.00	-0.42	0.00	1.35	0.00	0.00	3.68	0.00	0.00
R4-2-6	0.00	-0.40	0.00	1.29	0.00	0.00	2.02	0.00	0.00
R4-2-7	0.00	-0.47	0.00	1.32	0.00	0.00	2.06	0.00	0.00
R4-2-8	0.00	-0.29	0.00	1.38	0.00	0.00	1.20	0.00	0.00
R4-2-9	0.00	-0.37	0.00	1.31	0.00	0.00	2.04	0.00	0.00

R4-3-1	6.88	38.56	25.20	100.61	40.87	6.07	17.77	5.99	1.69
R4-3-10	3614.04	636.00	1.67	3.03	0.00	0.00	3.24	0.00	0.00
R4-3-11	3866.08	320.40	4.47	5.86	4.06	0.00	1.46	0.00	0.00
R4-3-12	598.83	40.53	6.00	8.23	5.39	0.00	1.86	0.00	0.00
R4-3-13	1.69	-0.16	0.00	1.44	0.00	0.00	1.98	0.00	0.00
R4-3-14	7.75	1.41	0.00	1.78	0.00	0.00	1.46	0.00	0.00
R4-3-2	9.68	0.19	0.00	1.40	0.00	0.00	1.33	0.00	0.00
R4-3-4	678.72	1062.60	184.26	312.41	159.55	0.00	4.15	0.00	0.00
R4-3-5	113.46	30.64	0.00	1.75	0.00	0.00	1.05	0.00	0.00
R4-3-6	146.36	21.11	0.00	1.58	0.00	0.00	1.72	0.00	0.00
R4-3-7	6.80	4.20	0.00	1.95	0.00	0.00	1.85	0.00	1.20
R4-3-8	23.13	11.79	0.00	1.52	0.00	0.00	1.29	0.00	0.00
R4-3-9	53.00	14.88	1.55	2.75	1.45	0.00	2.29	0.00	0.00
R4-4-10	0.00	0.50	0.00	1.56	0.00	0.00	1.28	0.00	0.00
R4-4-11	0.00	0.20	0.00	1.41	0.00	0.00	1.35	0.00	0.00
R4-4-12	0.00	0.42	0.00	1.50	0.00	0.00	1.03	0.00	0.00
R4-4-13	0.00	0.24	0.00	1.44	0.00	0.00	2.74	0.00	0.00
R4-4-14	0.00	1.43	0.00	2.02	0.00	0.00	1.38	0.00	0.00
R4-4-2	97.69	159.98	23.51	50.01	21.71	0.00	3.97	1.17	0.85
R4-4-3	1263.38	3277.47	355.62	650.39	314.37	0.00	4.56	1.76	0.00
R4-4-5	2182.98	3130.91	218.25	363.61	192.03	0.00	2.29	0.00	0.00
R4-4-6	2219.72	3378.94	264.49	453.28	232.34	0.00	3.47	1.07	0.00
R4-4-7	3.42	4.40	0.00	2.40	0.00	0.00	1.29	0.00	0.00
R4-4-8	1.02	0.87	0.00	1.54	0.00	0.00	1.61	0.00	0.00
R4-4-9	26.56	0.74	0.00	1.56	0.00	0.00	2.50	0.00	0.00
R4-5-1	0.00	8.83	0.00	5.29	0.00	0.00	1.55	0.00	0.00
R4-5-10	0.00	-0.14	0.00	1.39	0.00	0.00	2.04	0.00	0.00
R4-5-11	0.00	-0.15	0.00	1.39	0.00	0.00	2.35	0.00	0.00
R4-5-12	0.00	0.08	0.00	1.39	0.00	0.00	1.74	0.00	0.00
R4-5-13	0.00	-0.10	0.00	1.32	0.00	0.00	2.42	0.00	0.00
R4-5-14	0.00	-0.06	0.00	1.33	0.00	0.00	1.90	0.00	0.00
R4-5-2	0.91	1.59	0.00	2.04	0.00	0.00	1.32	0.00	0.00

R4-5-3	0.00	0.14	0.00	1.49	0.00	0.00	1.05	0.00	0.00
R4-5-4	0.00	-0.14	0.00	1.34	0.00	0.00	1.26	0.00	0.00
R4-5-5	0.00	-0.01	0.00	1.36	0.00	0.00	1.51	0.00	0.00
R4-5-6	0.00	0.11	0.00	1.76	0.00	0.00	1.73	0.00	0.00
R4-5-7	0.00	0.02	0.00	1.59	0.00	0.00	0.94	0.00	0.00
R4-5-8	0.00	-0.37	0.00	1.50	0.00	0.00	1.68	0.00	0.00

01 June. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R4-2-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-2	10.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-3	258.72	42.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-4	32.39	25.39	1.36	2.85	1.67	0.00	0.00	0.00	0.00
R4-2-5	44.72	60.01	1.30	3.22	1.80	0.00	0.00	0.00	0.00
R4-2-6	346.15	394.13	2.62	3.47	3.56	0.00	0.00	0.00	0.00
R4-2-7	124.16	125.04	1.10	2.58	1.57	0.00	0.00	0.00	0.00
R4-2-8	279.99	347.76	3.09	4.56	4.17	0.00	0.00	0.00	0.00
R4-2-9	282.31	314.23	1.63	2.95	2.28	0.00	0.00	0.00	0.00
R4-2-10	43.74	80.59	1.44	3.07	1.70	0.00	0.00	0.00	0.00
R4-2-12	48.40	76.55	0.00	1.79	0.00	0.00	0.00	0.00	0.00
R4-2-13	263.66	760.90	2.50	2.89	3.20	0.00	0.00	0.00	0.00
R4-2-14	959.89	3493.92	55.73	69.88	70.73	0.00	0.00	0.00	0.00
R4-2-15	13176.63	26926.26	3285.50	6306.96	2978.37	1.48	29.54	23.17	0.00
R4-3-1	1266.23	2616.56	175.04	330.41	178.30	4.48	14.26	5.96	0.00
R4-3-2	1496.70	4076.64	672.37	1346.79	611.61	15.11	57.56	23.91	2.27
R4-3-4	833.56	4324.97	1077.27	2099.79	965.14	26.74	104.98	36.60	4.70
R4-3-5	2411.99	4280.24	339.50	562.93	324.06	0.00	2.05	1.81	0.00
R4-3-6	1878.25	2258.24	629.52	1065.21	559.97	1.22	5.71	3.89	0.00
R4-3-7	1593.17	3252.73	136.02	146.27	129.49	0.00	0.00	0.00	0.00

R4-3-8	5293.80	10998.37	156.69	155.77	151.37	0.00	0.00	0.00	0.00
R4-3-9	7195.04	23178.79	1631.97	2421.33	1416.20	0.00	0.00	0.00	0.00
R4-3-10	4193.97	26152.08	3583.12	6532.39	3099.58	0.00	4.41	6.22	0.00
R4-3-11	8410.57	31801.98	2694.43	4249.78	2370.13	0.00	0.00	0.00	0.00
R4-3-12	5170.42	22119.89	2108.35	4125.94	2132.55	0.00	0.00	0.00	0.00
R4-3-13	2232.68	12318.04	776.22	1844.16	1112.22	0.00	1.37	0.00	0.00
R4-3-14	1234.38	5557.26	264.27	586.83	396.56	0.00	2.40	1.38	0.00
R4-3-15	13060.99	24290.44	2424.57	4431.42	2151.61	0.00	16.37	18.36	0.00
R4-4-1	104.14	1293.06	344.01	844.32	364.24	28.37	104.99	30.01	15.46
R4-4-2	459.76	6999.97	1737.00	4272.78	1828.05	145.85	564.52	159.33	59.24
R4-4-3	382.40	8875.26	1926.90	5097.09	2224.17	224.40	778.03	191.16	202.57
R4-4-4	342.42	6104.70	1635.88	4144.41	1806.35	148.00	545.17	146.30	86.40
R4-4-5	2197.28	1230.29	225.24	376.05	189.86	1.18	4.51	2.67	0.00
R4-4-6	1708.94	736.69	7.76	10.67	9.23	0.00	0.00	0.00	0.00
R4-4-7	330.10	467.30	3.07	5.60	2.89	0.00	0.00	0.00	0.00
R4-4-8	169.02	1270.89	46.71	40.84	50.64	0.00	0.00	0.00	0.00
R4-4-9	195.92	2180.19	26.74	20.44	31.63	0.00	0.00	0.00	0.00
R4-4-10	33.30	425.27	13.80	42.05	33.61	0.00	0.00	0.00	0.00
R4-4-11	10.56	63.92	0.00	2.81	1.63	0.00	0.00	0.00	0.00
R4-4-12	1.50	8.70	1.25	3.40	1.48	0.00	0.00	0.00	0.00
R4-4-13	1.50	7.04	1.10	3.05	0.00	0.00	0.00	0.00	0.00
R4-4-14	3.68	11.26	1.39	3.72	1.63	0.00	1.12	0.00	0.00
R4-4-15	214.82	85.17	26.40	36.77	25.74	0.00	0.00	0.00	0.00
R4-5-1	3.08	22.19	2.61	5.74	2.40	0.00	0.00	0.00	0.00
R4-5-2	1.99	20.53	2.50	5.84	2.47	0.00	0.00	0.00	0.00
R4-5-3	2.09	16.75	2.08	4.84	2.16	0.00	0.00	0.00	0.00
R4-5-4	1.77	13.42	1.74	4.29	1.86	0.00	0.00	0.00	0.00
R4-5-5	3.51	27.52	2.94	9.65	3.75	0.00	0.00	0.00	0.00
R4-5-6	1.12	9.07	0.00	3.40	1.56	0.00	0.00	0.00	0.00
R4-5-7	1.12	8.84	1.42	3.41	1.14	0.00	0.00	0.00	0.00
R4-5-8	0.90	11.19	1.62	4.03	1.67	0.00	0.00	0.00	0.00
R4-5-11	0.99	7.33	1.06	3.01	1.19	0.00	0.00	0.00	0.00

R4-5-12	2.38	15.96	2.16	5.14	2.16	0.00	0.00	0.00	0.00
R4-5-13	0.00	7.16	1.09	2.97	1.18	0.00	0.00	0.00	0.00
R4-5-14	0.00	6.80	0.91	2.94	1.11	0.00	0.00	0.00	0.00
R4-5-15	1.82	8.46	1.10	3.64	1.01	0.00	0.00	0.00	0.00

16 Aug. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R4-1-1	0.00	50.33	0.00	0.00	0.00	0.00	0.00	4.47	0.00
R4-1-2	0.00	33.70	0.00	0.00	0.00	0.00	0.00	1.18	0.00
R4-1-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-8	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R4-2-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-11	1.38	14.00	0.00	2.45	0.00	0.00	0.00	0.00	0.00
R4-2-13	5.12	25.51	29.24	49.38	26.54	0.00	0.00	0.00	0.00
R4-2-14	26.29	226.88	125.33	216.75	103.57	0.00	3.09	3.00	0.00
R4-2-15	15188.77	34062.94	3901.50	7942.55	3589.51	105.39	460.57	140.66	31.08
R4-3-1	22.92	388.75	1111.68	1078.24	1236.26	91.51	247.17	103.25	86.66
R4-3-2	33.55	107.28	90.25	199.31	451.30	19.12	48.37	39.80	18.19
R4-3-4	95.79	261.16	241.85	290.66	589.19	13.04	32.20	51.67	87.15
R4-3-5	86.83	184.82	157.53	373.52	426.67	16.56	51.50	49.29	36.04
R4-3-6	669.48	1774.01	1498.99	2434.63	1399.01	54.57	194.60	70.58	36.92
R4-3-7	566.07	4472.01	1326.70	2612.03	1200.74	47.74	192.98	59.91	16.26
R4-3-8	249.32	3247.71	1047.93	2186.11	936.49	19.20	88.89	35.94	2.58
R4-3-9	387.06	987.96	858.72	1701.79	755.44	4.23	19.04	11.22	2.31
R4-3-10	333.78	566.75	736.55	1435.94	632.00	4.17	21.55	12.03	0.00
R4-3-11	182.54	675.85	882.70	1868.58	780.36	27.17	124.70	44.45	4.02
R4-3-12	71.31	1197.70	1077.23	2348.80	974.93	51.40	223.21	71.26	8.98
R4-3-13	125.00	4512.10	1938.78	4411.16	1829.32	81.62	358.67	113.37	16.28
R4-3-14	108.05	2480.80	1416.32	2990.22	1411.99	66.55	267.77	88.36	36.96
R4-3-15	4211.59	14931.18	2886.21	6094.45	2648.15	93.08	431.23	140.41	14.02
R4-4-1	4.77	17.84	11.93	41.12	125.86	19.95	42.50	29.46	15.07
R4-4-2	54.67	165.81	359.42	737.75	434.65	63.91	197.24	70.08	48.04
R4-4-3	14.02	35.50	77.16	83.87	185.98	17.57	45.58	41.48	49.68
R4-4-4	7.29	38.35	72.65	26.14	176.31	5.67	12.06	46.01	68.79
R4-4-5	12.56	48.53	403.65	120.70	552.70	26.33	54.39	63.63	87.34
R4-4-6	22.78	20.75	488.53	68.76	517.00	11.57	24.19	51.34	28.67
R4-4-7	31.18	40.69	592.83	205.68	617.11	8.02	22.84	35.59	4.36
R4-4-8	28.66	30.09	287.69	174.34	234.19	0.00	2.12	3.36	0.00
R4-4-9	12.44	12.14	117.62	130.00	92.14	0.00	0.00	0.00	0.00

R4-4-10	5.86	6.00	42.95	9.47	35.84	0.00	0.00	0.00	0.00
R4-4-11	0.94	3.86	7.17	7.25	5.89	0.00	0.00	0.00	0.00
R4-4-12	0.00	5.10	2.18	5.38	2.46	0.00	0.00	0.00	0.00
R4-4-13	0.00	3.00	1.75	3.54	0.00	0.00	0.00	0.00	0.00
R4-4-14	0.00	3.15	1.61	3.98	1.51	0.00	0.00	0.00	0.00
R4-4-15	61.78	239.26	41.39	76.18	38.93	0.00	1.55	0.00	0.00
R4-5-1	0.00	1.12	0.00	2.74	0.00	0.00	0.00	0.00	0.00
R4-5-2	0.00	1.53	1.57	3.09	1.50	0.00	0.00	0.00	0.00
R4-5-3	0.00	0.00	0.98	2.93	1.36	0.00	0.00	0.00	0.00
R4-5-4	0.00	1.28	1.68	3.16	0.00	0.00	0.00	0.00	0.00
R4-5-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-6	0.00	1.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-15	20.17	127.24	16.96	34.04	16.61	0.00	1.50	0.00	0.00

E. BTEX 2. E10 gate a. Row 2

20 Nov. 04

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-1-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-15	25.21	168.24	63.94	136.14	54.29	10.83	34.75	8.99	10.37
R2-2-1	2.11	11.88	3.07	8.06	3.04	0.00	0.00	0.00	0.00
R2-2-10	60.19	171.98	26.11	54.48	21.64	1.94	0.00	0.00	0.00
R2-2-11	74.22	411.58	58.75	116.69	49.48	0.00	2.91	1.31	0.00
R2-2-12	263.95	1146.50	139.13	267.23	120.07	1.15	4.97	2.09	0.00
R2-2-13	4823.35	8852.52	786.69	1479.61	703.82	5.02	25.60	12.73	1.77
R2-2-14	12620.75	17568.42	797.87	1285.16	728.67	2.75	6.68	3.37	0.00
R2-2-15	34.57	216.84	74.67	157.90	64.57	11.85	38.04	10.04	11.26

R2-2-2	2.68	15.28	3.85	9.92	3.15	0.00	0.00	0.00	0.00
R2-2-3	3.42	22.85	2.67	13.53	5.14	0.00	0.00	0.00	0.00
R2-2-4	10.51	39.09	6.64	16.35	6.09	0.00	0.00	0.00	0.00
R2-2-5	23.54	59.01	12.20	28.22	11.54	0.00	1.96	0.00	0.00
R2-2-6	13.89	76.69	13.95	30.45	11.12	0.00	1.33	0.00	0.00
R2-2-7	16.35	86.56	15.19	33.51	12.51	0.00	1.50	0.00	0.00
R2-2-8	30.92	120.74	17.31	36.39	14.62	0.00	1.46	0.00	0.00
R2-2-9	336.07	324.28	20.66	41.16	18.02	0.00	1.80	0.00	0.00
R2-3-1	3.96	15.61	3.67	9.15	3.42	0.00	0.00	0.00	2.91
R2-3-10	1245.63	1079.93	30.79	49.04	27.87	0.00	0.00	0.00	0.00
R2-3-11	418.86	765.90	38.17	64.00	33.89	0.00	0.00	0.00	0.00
R2-3-12	4407.64	6605.62	266.50	417.32	244.32	0.00	2.22	0.00	0.00
R2-3-13	13026.83	20667.46	986.20	1526.32	888.70	0.00	0.00	0.00	0.00
R2-3-14	4283.09	5626.97	123.33	160.95	120.70	0.00	1.57	0.00	0.00
R2-3-15	19.83	116.50	47.75	9.02	39.29	9.51	30.24	7.63	7.88
R2-3-2	3.94	16.40	3.06	7.98	3.21	0.00	0.00	0.00	0.00
R2-3-3	3.97	20.64	3.81	9.53	3.56	0.00	0.00	0.00	0.00
R2-3-4	5.82	32.37	5.32	12.67	4.49	0.00	1.48	0.00	0.00
R2-3-5	31.36	145.74	16.68	35.75	14.81	1.41	4.47	0.00	1.71
R2-3-6	39.52	159.99	13.05	26.00	11.67	0.00	2.89	0.00	0.00
R2-3-7	528.04	799.96	33.96	55.63	32.14	1.23	3.46	1.46	2.77
R2-3-8	4286.92	5387.33	90.50	124.38	97.68	4.07	6.44	2.41	2.64
R2-3-9	9220.26	9080.05	168.62	229.82	168.95	2.72	2.47	3.85	2.55
R2-4-1	3.79	17.28	3.61	8.75	3.38	0.00	0.00	0.00	0.00
R2-4-10	557.91	550.44	33.00	63.56	28.67	0.00	1.87	0.00	0.00
R2-4-11	1965.04	4295.84	454.97	813.37	413.21	0.00	3.40	2.99	0.00
R2-4-12	235.19	345.25	27.07	52.36	22.78	0.00	1.83	0.00	0.00
R2-4-13	688.86	953.06	64.97	119.46	56.92	0.00	2.80	1.32	1.44
R2-4-14	114.03	1508.97	96.09	168.29	0.51	0.00	1.20	0.64	0.31
R2-4-15	2.54	18.30	4.46	11.68	4.36	0.00	1.74	2.65	0.00
R2-4-2	4.83	24.97	5.12	11.84	4.28	0.00	0.00	0.00	0.00
R2-4-3	5.21	27.72	5.68	13.08	4.56	0.00	0.00	0.00	0.00

R2-4-4	5.15	26.19	5.27	12.14	4.25	0.00	0.00	0.00	0.00
R2-4-5	12.05	65.01	11.83	25.70	10.33	0.00	1.31	0.00	0.00
R2-4-6	23.52	108.75	18.69	39.63	15.99	2.20	1.89	0.00	0.00
R2-4-7	15.56	53.50	9.66	21.01	7.73	0.00	0.00	0.00	0.00
R2-4-8	22.36	101.15	17.44	36.45	14.36	0.00	1.95	0.00	2.77
R2-4-9	58.01	148.64	20.43	41.71	17.25	0.00	1.47	0.00	1.47
R2-5-1	1.83	7.36	1.92	5.41	1.57	0.00	0.00	0.00	0.00
R2-5-10	2.98	16.76	3.80	9.55	3.21	0.00	0.00	0.00	0.00
R2-5-11	3.56	20.10	4.59	11.05	3.83	0.00	0.00	0.00	0.00
R2-5-12	4.07	24.58	5.41	12.55	4.38	0.00	0.00	0.00	0.00
R2-5-13	4.15	24.03	5.34	12.65	4.61	0.00	0.00	0.00	0.00
R2-5-14	5.80	32.02	6.08	13.71	5.09	0.00	0.00	0.00	0.00
R2-5-15	2.71	10.99	2.29	6.03	2.54	0.00	0.00	0.00	0.00
R2-5-2	1.87	8.31	2.13	5.88	2.39	0.00	4.38	0.00	0.00
R2-5-3	0.00	8.77	2.25	6.28	1.96	0.00	0.00	0.00	0.00
R2-5-4	3.34	17.27	4.03	10.03	3.39	0.00	0.00	0.00	0.00
R2-5-5	2.64	12.92	3.22	8.39	3.16	0.00	0.00	0.00	0.00
R2-5-6	2.37	12.10	3.02	7.80	2.51	0.00	0.00	0.00	0.00
R2-5-7	4.13	21.55	4.78	11.78	4.39	0.00	0.00	0.00	0.00
R2-5-8	3.38	17.08	4.02	9.85	3.64	0.00	0.00	0.00	0.00
R2-5-9	3.05	15.80	3.67	9.26	3.35	0.00	0.00	0.00	0.00
R2-6-15	0.00	3.29	2.90	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-8	2.22	6.35	1.73	4.88	1.56	0.00	0.00	0.00	0.00
R2-6-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R2-6-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

11 Dec. 04

Point_ID	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-2-1	0.00	0.00	0.00	2.34	0.00	0.00	1.37	0.00	0.00
R2-2-2	0.00	0.00	0.00	2.15	0.00	0.00	0.00	0.00	0.00
R2-2-3	0.00	0.00	0.00	2.43	0.00	0.00	1.76	0.00	0.00
R2-2-4	0.00	0.00	0.00	2.84	0.00	0.00	1.56	0.00	0.00
R2-2-5	13.94	12.39	0.00	2.71	0.00	0.00	1.99	0.00	0.00
R2-2-6	17.18	2.73	0.00	3.35	0.00	0.00	2.96	0.00	1.89
R2-2-7	12.77	5.20	0.00	2.45	0.00	0.00	1.65	0.00	0.00
R2-2-8	29.83	10.06	0.00	2.25	0.00	0.00	1.18	0.00	0.00
R2-2-9	23.04	60.60	3.95	6.93	4.38	0.00	0.00	0.00	0.00
R2-2-10	1210.11	1338.37	17.02	22.56	17.91	0.00	1.54	2.16	0.00
R2-2-11	1965.78	3583.44	106.98	150.63	104.42	9.05	1.59	1.72	3.18
R2-2-12	1750.07	4167.48	384.17	714.33	348.11	6.03	25.45	8.96	5.63
R2-2-13	1707.49	3972.26	507.04	1044.43	450.03	19.68	80.52	25.03	17.26
R2-2-14	3321.15	9451.35	1412.45	2924.83	1274.46	32.68	147.52	53.21	15.69
R2-2-15	72.12	304.99	45.71	95.83	40.34	1.42	5.48	1.95	1.57
R2-4-1	16.41	67.21	3.43	6.70	3.41	0.00	1.17	0.00	0.00
R2-4-2	10.29	43.85	2.41	5.42	2.54	0.00	0.00	0.00	0.00
R2-4-3	7.72	31.17	1.94	4.37	2.00	0.00	0.00	0.00	0.00
R2-4-4	5.55	22.35	1.39	3.94	1.87	0.00	0.00	0.00	0.00
R2-4-5	6.29	26.78	1.84	4.30	1.99	0.00	1.27	0.00	0.00

R2-4-6	4.52	18.12	1.33	3.62	1.53	0.00	0.00	0.00	0.00
R2-4-7	5.41	19.85	1.19	3.24	0.00	0.00	0.00	0.00	0.00
R2-4-8	737.23	1350.02	18.34	21.77	21.84	0.00	1.12	0.00	0.00
R2-4-9	2729.65	3316.12	55.71	72.91	58.12	12.22	1.55	0.00	0.00
R2-4-10	2695.79	4496.76	230.36	399.65	212.88	0.00	5.16	3.19	0.00
R2-4-11	967.49	3427.49	466.98	964.11	440.81	13.91	58.76	22.48	4.88
R2-4-12	2693.38	3963.22	285.24	526.52	266.26	2.92	9.91	5.23	0.00
R2-4-13	6045.71	9291.44	544.40	934.91	498.44	2.76	8.41	5.85	1.63
R2-4-14	9799.22	17237.40	1785.33	3522.22	1594.28	56.12	227.58	70.08	42.56
R2-4-15	75.96	300.19	38.27	78.23	36.33	1.61	5.69	6.42	2.04
R2-5-1	41.98	197.97	29.70	61.87	25.65	0.00	3.67	2.19	0.00
R2-5-2	29.22	134.10	20.23	42.65	17.27	0.00	2.87	0.00	0.00
R2-5-3	30.27	142.06	21.57	45.33	19.04	0.00	3.31	1.77	0.00
R2-5-4	23.21	119.59	18.46	39.04	16.53	0.00	3.03	1.95	0.00
R2-5-5	17.61	83.53	13.02	28.88	11.44	0.00	2.17	0.00	0.00
R2-5-6	13.29	63.46	10.21	22.42	9.00	0.00	2.30	0.00	0.00
R2-5-7	11.60	55.81	8.76	19.32	7.87	0.00	2.15	0.00	0.00
R2-5-8	8.53	42.09	6.81	15.48	5.85	0.00	1.95	0.00	0.00
R2-5-9	7.06	34.78	5.92	13.60	4.98	0.00	2.09	0.00	0.00
R2-5-10	15.22	105.19	26.56	58.68	22.34	1.50	5.29	2.21	1.57
R2-5-11	18.31	116.48	28.90	63.82	24.95	1.71	5.86	2.27	1.18
R2-5-12	53.18	126.20	30.88	67.86	26.60	0.00	6.22	3.36	1.97
R2-5-13	23.69	145.75	33.82	74.79	29.20	1.73	6.56	2.31	1.60
R2-5-14	24.02	152.71	35.79	77.81	30.62	1.74	6.59	2.33	1.55
R2-5-15	6.59	35.16	8.19	18.54	7.44	0.00	2.36	0.00	0.00
R2-3-1	2.76	24.75	9.01	20.72	7.72	0.00	2.87	0.00	1.65
R2-3-2	2.49	21.85	8.09	18.63	6.76	0.00	3.31	0.00	1.32
R2-3-3	2.44	20.72	7.03	17.73	6.51	0.00	2.66	0.00	0.00
R2-3-4	2.78	25.64	9.34	21.47	7.91	0.00	3.09	0.00	1.73
R2-3-5	6.43	52.45	16.34	36.45	13.88	1.40	5.32	2.00	2.50
R2-3-6	84.80	43.13	9.17	20.56	7.17	0.00	2.84	0.00	4.00
R2-3-7	548.53	576.39	72.38	147.77	63.69	1.15	4.56	2.19	1.58

R2-3-8	4638.32	8732.40	770.63	1453.85	703.35	12.96	55.03	21.50	6.22
R2-3-9	3443.07	7592.48	897.00	1737.71	825.08	8.25	35.96	17.20	3.86
R2-3-10	10652.88	14936.15	1042.79	1926.63	975.82	9.11	28.04	16.11	4.07
R2-3-11	7685.39	11559.94	700.57	1235.73	633.91	4.65	18.90	9.45	3.51
R2-3-12	15636.18	23326.92	1798.15	3365.90	1644.57	17.26	77.17	30.93	12.46
R2-3-13	22083.66	37377.79	3898.72	7879.36	3597.73	132.29	556.40	174.51	92.52
R2-3-14	8455.31	16606.02	1989.06	3967.90	1810.35	29.37	134.56	51.93	16.07
R2-3-15	103.66	400.30	56.94	115.27	49.50	1.52	6.15	3.45	1.68
R2-1-1	0.00	2.48	1.75	5.55	1.65	0.00	2.44	0.00	0.00
R2-1-2	0.00	1.09	1.38	4.61	1.37	0.00	3.56	1.65	1.36
R2-1-3	0.00	0.06	0.00	3.20	0.00	0.00	2.35	0.00	0.00
R2-1-4	0.00	0.00	0.00	2.78	0.00	0.00	1.49	0.00	0.00
R2-1-5	0.00	0.00	0.00	3.10	0.00	0.00	2.01	0.00	0.00
R2-1-6	0.00	0.00	0.00	2.67	0.00	0.00	1.66	0.00	0.00
R2-1-7	0.00	0.02	0.00	3.20	0.00	0.00	1.99	0.00	0.00
R2-1-8	0.00	0.11	0.00	3.19	0.00	0.00	2.37	0.00	0.00
R2-1-9	0.00	0.00	0.00	2.98	0.00	0.00	1.91	0.00	0.00
R2-1-10	0.00	0.00	0.00	2.57	0.00	0.00	1.35	0.00	0.00
R2-1-11	0.00	0.00	0.00	2.66	0.00	0.00	1.76	0.00	0.00
R2-1-12	0.00	0.00	0.00	2.83	0.00	0.00	1.89	0.00	0.00
R2-1-13	0.00	0.00	0.00	2.53	0.00	0.00	1.45	0.00	0.00
R2-1-15	0.00	0.00	0.00	3.02	0.00	0.00	1.85	0.00	0.00
R2-6-1	88.25	476.57	88.93	186.97	75.84	3.13	12.60	4.44	2.63
R2-6-2	61.51	365.68	73.15	155.58	61.83	2.97	11.48	3.68	2.70
R2-6-4	58.16	350.28	71.20	152.85	61.09	2.94	11.59	3.63	3.06
R2-6-5	44.53	268.74	56.20	120.09	47.14	2.39	9.10	3.11	2.29
R2-6-6	41.70	256.78	55.17	118.26	46.32	2.68	9.34	3.11	2.16
R2-6-7	39.99	243.08	51.82	111.05	43.22	2.21	8.47	3.39	2.39
R2-6-8	23.75	139.97	30.31	65.84	26.02	7.03	5.18	2.39	0.00
R2-6-9	40.20	234.11	51.99	104.52	41.68	2.24	7.64	2.73	1.96
R2-6-10	30.14	179.56	39.96	85.62	34.00	2.11	6.71	2.33	1.82
R2-6-11	23.84	145.22	33.61	73.15	28.62	1.80	6.38	2.45	2.35

R2-6-12	27.56	168.63	37.84	82.67	32.84	1.94	7.21	2.25	2.03
R2-6-13	22.83	497.06	34.14	74.48	29.38	1.90	6.54	2.43	1.59
R2-6-14	19.84	127.53	30.35	66.36	25.60	1.41	5.86	1.82	1.65
R2-6-15	4.74	26.74	6.61	15.30	6.16	0.00	1.76	0.00	0.00
R2-1-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3 Feb. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-1-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-5	343.24	1866.00	334.98	723.80	303.92	21.47	77.60	21.71	23.87
R2-2-6	123.11	628.36	134.01	297.66	119.38	10.62	37.13	9.75	11.70
R2-2-7	184.52	740.80	134.61	288.53	121.72	8.95	33.57	9.45	10.02
R2-2-8	136.37	535.99	94.79	203.16	85.41	6.17	22.28	6.25	6.86

R2-2-10	119.39	510.97	93.94	202.33	89.37	6.19	24.01	7.07	9.55
R2-2-11	102.61	419.03	77.07	166.06	71.96	5.11	18.76	6.35	6.65
R2-2-12	95.10	392.16	72.65	154.68	68.30	4.59	17.16	5.31	6.03
R2-2-13	2049.36	9512.46	1335.13	2834.41	1291.55	99.20	339.21	96.42	103.67
R2-2-14	3614.52	11605.89	1532.07	3448.98	1540.59	121.69	431.48	115.79	137.11
R2-2-15	3.23	10.65	2.11	5.65	2.06	0.00	0.00	0.00	0.00
R2-3-5	4.00	25.21	8.89	20.56	8.70	1.90	3.68	2.14	4.22
R2-3-6	5.70	37.45	21.24	41.36	20.21	0.00	2.16	0.00	1.44
R2-3-7	365.45	1588.50	356.79	685.80	344.78	4.85	20.05	11.35	2.55
R2-3-8	181.00	1471.00	366.66	755.69	363.81	20.44	76.66	26.04	14.15
R2-3-9	1660.84	3670.73	496.01	943.47	456.98	24.36	95.67	30.41	18.56
R2-3-10	7962.26	15134.39	1839.88	3724.05	1698.79	79.37	317.17	100.48	66.79
R2-3-11	17474.51	27402.00	2976.05	6039.60	2801.35	145.83	560.74	171.09	165.36
R2-3-12	11652.80	23875.07	2971.21	6126.67	2770.80	188.21	700.01	195.60	215.27
R2-3-13	12291.14	27975.62	3383.81	7054.53	3203.17	223.89	819.63	225.82	323.23
R2-3-14	4920.56	13311.60	1984.03	4136.71	1823.53	123.15	457.13	128.46	148.79
R2-3-15	4.83	15.47	2.90	7.39	2.91	0.00	0.00	0.00	0.00
R2-4-5	473.35	1408.63	243.10	533.98	223.33	18.37	68.07	17.97	19.76
R2-4-6	297.57	948.78	166.74	370.70	154.60	13.84	51.81	13.37	15.06
R2-4-7	228.11	736.29	129.22	287.38	119.52	11.30	40.50	10.75	11.43
R2-4-8	254.83	837.18	444.54	324.56	139.35	9.97	37.79	11.29	11.15
R2-4-9	380.00	1445.79	209.14	544.54	262.26	20.70	74.09	23.35	13.59
R2-4-10	263.39	1161.20	199.41	554.43	260.78	16.26	57.12	19.61	12.51
R2-4-11	326.80	1189.88	220.99	482.97	211.70	16.10	54.05	16.32	14.44
R2-4-12	3900.90	7959.94	1067.41	2184.16	980.28	41.32	162.72	52.56	37.17
R2-4-13	8371.66	17543.99	2165.52	4423.94	2009.28	126.83	480.53	136.99	130.58
R2-4-14	4126.98	12285.56	1871.19	3823.77	1717.28	130.11	463.16	128.16	148.17
R2-4-15	5.20	17.64	3.40	8.27	2.98	0.00	1.12	0.00	0.00
R2-6-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R2-6-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-4-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-4-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-4-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-4-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-3-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-3-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R2-3-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-3-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

19 Apr. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-1-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-1	0.00	2.38	0.00	2.75	0.00	0.00	1.73	0.00	0.00
R2-2-2	0.00	1.87	0.00	2.39	0.00	0.00	1.51	0.00	0.00

R2-2-3	0.00	1.62	0.00	2.28	0.00	0.00	2.92	0.00	0.00
R2-2-4	0.00	1.28	0.00	2.19	0.00	0.00	3.00	0.00	0.00
R2-2-5	0.00	2.04	0.00	2.62	0.00	0.00	2.96	0.00	0.00
R2-2-6	0.00	1.38	0.00	2.11	0.00	0.00	1.79	0.00	0.00
R2-2-7	0.00	1.07	0.00	2.20	0.00	0.00	2.83	0.00	0.00
R2-2-8	0.00	1.21	0.00	2.27	0.00	0.00	3.00	0.00	0.00
R2-2-10	1.23	2.24	0.00	2.50	0.00	0.00	1.94	0.00	0.00
R2-2-11	1.02	2.32	0.00	2.58	0.00	0.00	3.18	0.00	0.00
R2-2-12	0.90	3.85	1.13	4.06	1.31	0.00	4.29	0.00	0.00
R2-2-13	4.76	58.02	58.78	137.06	55.85	13.13	42.07	10.94	14.00
R2-2-14	57.42	1621.02	678.76	1135.80	541.45	69.65	147.10	48.91	29.16
R2-3-1	0.87	2.01	0.81	2.60	0.00	0.00	2.37	0.00	0.00
R2-3-2	0.00	1.34	0.00	2.34	0.00	0.00	3.00	0.00	0.00
R2-3-3	0.00	1.14	0.00	2.00	0.00	0.00	1.89	0.00	0.00
R2-3-4	0.00	1.07	0.00	2.21	0.00	0.00	4.95	0.00	0.00
R2-3-5	0.00	1.78	0.00	2.51	0.00	0.00	3.14	0.00	0.00
R2-3-6	0.00	1.51	1.27	4.65	1.05	1.21	8.97	0.00	1.27
R2-3-7	4.01	16.47	28.57	51.11	25.49	8.54	15.39	6.75	2.82
R2-3-8	111.13	482.93	219.31	391.29	190.25	37.87	94.43	26.73	16.70
R2-3-9	184.71	1349.95	499.15	961.97	436.36	69.39	186.12	50.21	34.56
R2-3-10	211.39	2127.35	715.91	1457.48	604.26	83.42	285.52	70.64	101.15
R2-3-11	1996.80	8181.77	1814.45	3826.36	1572.52	171.04	600.18	152.58	211.20
R2-3-12	17637.56	38837.19	5217.36	10697.09	4580.08	389.15	1376.92	348.09	475.67
R2-3-13	5922.03	15425.93	2894.37	5954.13	2487.88	272.33	945.48	240.58	322.02
R2-3-14	8879.88	29377.32	4221.55	8703.95	3893.99	301.75	1092.04	285.52	389.76
R2-4-1	8.19	36.00	5.28	12.69	4.64	0.00	3.52	0.00	0.00
R2-4-2	4.88	23.85	3.69	9.10	3.48	0.00	5.26	0.00	0.00
R2-4-3	3.33	15.18	2.34	6.58	2.48	0.00	3.31	0.00	0.00
R2-4-4	2.33	11.39	1.86	5.36	1.90	0.00	2.47	0.00	0.00
R2-4-5	2.74	12.20	2.32	5.83	2.15	0.00	5.31	0.00	0.00
R2-4-6	2.52	12.07	2.21	5.63	2.27	0.00	2.89	0.00	0.00
R2-4-7	2.19	10.22	2.11	5.50	1.99	0.00	3.99	0.00	0.00

R2-4-8	2.26	13.13	8.04	15.93	7.11	1.04	3.86	0.00	1.05
R2-4-9	12.94	126.13	64.12	87.83	60.79	6.78	12.72	4.28	3.35
R2-4-10	44.02	216.51	28.00	30.13	27.30	2.08	5.33	1.45	0.00
R2-4-11	104.60	706.43	217.14	239.98	160.36	19.74	40.96	11.38	2.69
R2-4-12	205.69	1588.48	333.03	635.46	275.50	31.35	104.75	13.87	27.14
R2-4-13	2499.55	6154.45	1120.31	2353.59	970.31	103.95	359.35	91.53	115.58
R2-4-14	15241.19	33268.66	4495.43	9066.36	3934.85	344.28	1204.63	308.32	376.28
R2-5-1	8.65	31.61	4.80	10.97	4.18	0.00	3.02	0.00	1.06
R2-5-2	4.67	19.93	3.20	7.66	2.88	0.00	2.82	0.00	0.00
R2-5-3	3.10	13.87	2.47	6.19	2.29	0.00	4.07	0.00	0.00
R2-5-4	2.76	11.95	2.13	5.71	2.21	0.00	2.54	0.00	0.00
R2-5-5	2.38	10.73	2.16	5.40	1.42	0.00	1.88	0.00	0.00
R2-5-6	2.17	9.51	1.93	5.03	1.59	0.00	1.46	0.00	0.00
R2-5-7	2.23	9.21	1.68	5.27	1.86	0.00	1.88	0.00	0.00
R2-5-8	1.65	7.73	1.72	4.48	1.44	0.00	5.04	0.00	0.00
R2-5-9	2.19	10.14	2.19	5.62	2.24	0.00	2.00	0.00	0.00
R2-5-10	1.49	6.89	1.82	4.92	1.89	0.00	2.43	0.00	1.24
R2-5-11	1.33	5.77	1.34	4.07	1.76	0.00	2.17	0.00	0.00
R2-5-12	1.42	6.35	1.54	4.30	0.75	0.00	3.14	0.00	0.00
R2-5-13	1.32	5.42	1.35	4.08	1.55	0.00	1.16	0.00	0.00
R2-5-14	1.22	5.24	1.34	3.89	1.51	0.00	2.25	0.00	0.00
R2-6-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R2-6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-4-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-3-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

8 June 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-1-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R2-2-1	1.57	15.14	3.56	8.10	3.00	0.00	0.00	0.00	0.00
R2-2-2	2.98	23.45	4.86	10.58	4.07	0.00	1.28	0.00	0.00
R2-2-3	1.44	14.93	3.67	8.35	3.20	0.00	1.02	0.00	0.00
R2-2-4	1.31	12.42	3.12	7.30	2.80	0.00	0.00	0.00	0.00
R2-2-5	1.12	11.72	3.17	7.28	2.71	0.00	0.00	0.00	0.00
R2-2-6	0.00	10.88	3.07	7.02	2.54	0.00	0.00	0.00	0.00
R2-2-7	0.00	9.83	2.62	6.67	2.28	0.00	0.00	0.00	0.00
R2-2-8	13.75	120.54	54.24	99.46	45.11	3.58	10.90	3.86	1.93
R2-2-10	51.82	300.52	30.22	43.62	25.35	0.00	1.78	0.00	0.00
R2-2-11	329.31	1885.46	224.66	376.97	196.70	7.46	22.91	8.15	3.70
R2-2-12	2013.12	15053.05	2431.40	4588.80	2107.96	127.78	418.55	112.99	65.79
R2-2-13	2872.65	23287.80	4534.12	8580.49	3831.25	344.44	1069.97	288.35	176.12
R2-2-14	363.30	6552.03	1986.66	3692.00	1651.78	124.91	344.27	103.84	51.61
R2-2-15	1.45	20.03	4.89	10.50	4.23	0.00	1.11	0.00	0.00
R2-3-1	0.00	10.37	2.89	6.44	2.35	0.00	0.00	0.00	0.00
R2-3-2	0.00	10.25	2.95	6.66	2.48	0.00	0.00	0.00	0.00
R2-3-3	0.00	8.82	2.50	6.10	2.19	0.00	0.00	0.00	0.00
R2-3-4	1.78	8.15	2.39	5.95	2.38	0.00	0.00	0.00	0.00
R2-3-5	3.81	30.21	10.51	18.78	9.76	3.09	4.60	3.50	1.42
R2-3-6	22.99	159.61	68.71	158.51	72.84	30.30	61.50	19.58	9.55
R2-3-7	22.02	231.00	118.75	235.93	100.87	20.87	55.17	16.14	9.31
R2-3-8	2901.42	12563.86	2277.36	4354.44	1960.96	157.91	552.59	143.33	147.06
R2-3-9	10517.68	35643.68	4979.72	9721.78	4408.76	346.86	1236.10	329.07	381.93
R2-3-10	9227.59	33075.75	5316.76	10395.79	4660.07	403.96	1406.05	356.87	461.75
R2-3-11	3773.17	20402.40	4004.89	7960.44	3520.58	349.73	1184.68	300.28	337.38
R2-3-12	299.78	2874.38	1488.62	3047.51	1284.75	178.31	602.09	148.74	209.46
R2-3-13	2684.96	18302.40	3497.23	7041.63	3122.79	323.27	1090.03	273.00	307.95
R2-3-14	3431.05	16161.04	3016.44	5883.28	2633.47	273.96	923.86	241.53	285.88
R2-3-15	9.38	58.12	10.89	22.80	10.19	1.01	3.33	2.41	1.40
R2-4-1	0.00	4.33	1.05	3.23	1.24	0.00	0.00	0.00	0.00
R2-4-2	0.00	2.84	0.00	2.61	0.00	0.00	0.00	0.00	0.00
R2-4-3	0.00	3.86	0.00	3.20	1.02	0.00	0.00	0.00	0.00

R2-4-4	0.00	2.77	0.00	2.73	0.00	0.00	0.00	0.00	0.00
R2-4-5	0.00	2.24	0.00	2.41	0.00	0.00	0.00	0.00	0.00
R2-4-6	0.00	11.93	2.59	3.98	2.49	0.00	0.00	0.00	0.00
R2-4-7	3.49	80.40	48.10	52.37	41.20	2.37	3.59	2.38	0.00
R2-4-8	1.81	23.59	30.07	33.66	26.95	3.31	4.06	2.68	0.00
R2-4-9	1.73	50.68	29.71	30.70	32.91	2.41	2.49	2.75	0.00
R2-4-10	26.37	691.79	224.75	245.48	197.96	7.73	7.85	7.79	0.00
R2-4-11	75.14	3351.18	736.01	1006.94	635.65	35.44	83.28	28.89	14.76
R2-4-12	1152.60	6931.10	1709.40	3190.56	1441.76	139.81	452.18	119.64	120.04
R2-4-13	154.09	2705.38	1105.73	2018.18	895.25	126.33	399.72	101.62	89.52
R2-4-14	32.05	936.68	534.30	1025.88	435.64	85.61	280.60	69.68	83.89
R2-4-15	1.46	19.45	7.04	14.43	6.48	0.00	2.89	0.00	1.21
R2-5-1	0.00	4.16	1.41	3.96	1.09	0.00	0.00	0.00	0.00
R2-5-2	0.00	3.30	0.00	3.46	1.25	0.00	0.00	0.00	0.00
R2-5-3	0.00	2.99	1.14	3.28	0.00	0.00	0.00	0.00	0.00
R2-5-4	0.00	2.31	0.00	2.83	0.00	0.00	0.00	0.00	0.00
R2-5-5	0.00	2.52	1.02	3.15	1.10	0.00	0.00	0.00	0.00
R2-5-6	0.00	1.47	0.00	2.38	0.00	0.00	0.00	0.00	0.00
R2-5-7	0.00	2.37	0.00	2.96	1.66	0.00	0.00	0.00	0.00
R2-5-8	0.00	2.23	0.93	2.96	0.00	0.00	0.00	0.00	0.00
R2-5-9	0.00	1.79	0.00	2.59	0.00	0.00	0.00	0.00	0.00
R2-5-10	0.00	1.47	0.00	2.43	0.00	0.00	0.00	0.00	0.00
R2-5-11	0.00	2.52	1.03	3.14	0.87	0.00	0.00	0.00	0.00
R2-5-12	0.00	1.85	0.00	2.66	0.00	0.00	0.00	0.00	0.00
R2-5-13	0.00	1.49	0.82	2.64	0.00	0.00	0.00	0.00	0.00
R2-5-14	0.00	1.51	0.00	2.27	0.00	0.00	0.00	0.00	0.00
R2-5-15	0.00	1.27	0.00	2.13	0.00	0.00	0.00	0.00	0.00
R2-6-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R2-6-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

F. 2. E10 gate b. Row 3

3 Feb. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R3-2-10	109.14	30.82	3.47	9.21	3.75	0.00	2.09	0.00	1.52
R3-2-11	9.73	13.44	3.48	9.09	3.80	0.00	1.87	0.00	1.62
R3-2-12	61.53	14.24	2.84	7.81	3.16	0.00	1.96	0.00	0.00
R3-2-13	102.80	224.09	3.50	9.34	4.32	1.60	2.41	0.00	1.49
R3-2-14	1683.11	3542.69	228.89	358.97	223.19	2.29	2.35	2.41	1.46
R3-2-15	2.58	5.01	1.18	3.59	1.08	0.00	0.00	0.00	0.00
R3-2-5	12.00	20.16	3.09	8.50	3.49	0.00	1.81	0.00	1.39
R3-2-6	69.36	71.77	5.14	13.36	5.72	2.73	2.99	0.00	1.90
R3-2-7	14.98	22.67	4.93	12.91	5.56	2.38	3.17	0.00	2.51
R3-2-8	4.05	13.05	3.44	9.20	4.22	0.00	2.38	0.00	1.45
R3-2-9	10.34	9.88	2.32	6.96	2.53	0.00	1.51	0.00	0.00

R3-3-10	531.00	136.85	4.63	10.75	4.94	1.90	1.99	0.00	1.40
R3-3-11	67.89	64.99	4.37	10.07	4.93	0.00	1.81	0.00	0.00
R3-3-12	281.60	82.27	4.09	9.71	5.32	0.00	1.67	0.00	0.00
R3-3-13	5038.15	5577.43	293.47	510.26	290.30	31.30	3.02	2.05	2.24
R3-3-14	12667.08	18202.42	970.12	1594.07	954.78	42.19	4.44	3.18	3.21
R3-3-15	4.32	8.56	1.41	4.05	1.40	0.00	0.00	0.00	0.00
R3-3-5	48.39	98.69	10.85	22.62	11.16	0.00	2.76	0.00	2.07
R3-3-6	30.82	67.73	7.77	16.63	8.16	0.00	2.43	0.00	1.50
R3-3-7	34.29	75.51	8.16	18.25	9.43	0.00	2.80	0.00	2.14
R3-3-8	80.14	49.44	5.98	12.86	6.21	0.00	2.31	0.00	1.68
R3-3-9	1434.21	876.37	6.32	13.70	7.79	31.43	3.39	2.39	2.04
R3-4-10	59.88	28.15	6.56	17.29	6.54	0.00	3.24	0.00	1.47
R3-4-11	77.63	20.37	5.19	12.58	5.17	0.00	2.36	0.00	1.50
R3-4-12	566.20	678.94	46.85	84.46	47.50	0.00	1.42	0.00	1.41
R3-4-13	1367.76	2503.16	175.66	307.14	175.86	6.18	0.00	3.28	1.28
R3-4-14	5885.06	11274.80	868.07	1444.26	869.63	0.00	2.32	1.57	1.78
R3-4-5	4.59	21.49	5.73	13.73	5.53	0.00	2.42	0.00	1.80
R3-4-6	6.45	35.87	10.20	23.62	8.48	0.00	4.57	1.43	2.03
R3-4-7	4.54	25.16	7.11	16.92	6.93	0.00	3.02	0.00	1.46
R3-4-8	3.45	15.64	3.92	9.96	3.84	0.00	1.57	0.00	0.00
R3-4-9	7.70	19.92	4.91	11.76	4.49	0.00	2.01	0.00	1.39

5 Apr. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R3-2-1	0.00	9.31	4.02	10.62	4.93	0.00	2.72	2.00	3.26
R3-2-10	0.00	5.17	2.03	5.99	2.49	0.00	1.68	0.00	0.00
R3-2-11	193.26	346.74	12.32	19.93	12.92	0.00	2.05	0.00	1.62

R3-2-12	1213.79	1808.08	48.00	67.64	46.29	0.00	1.48	0.00	1.15
R3-2-13	623.16	1450.64	123.52	204.20	114.78	0.00	1.59	0.00	1.45
R3-2-14	439.85	1972.32	271.38	533.74	273.33	6.27	23.85	10.68	2.38
R3-2-2	0.00	5.50	2.71	7.58	3.77	0.00	2.22	0.00	1.96
R3-2-4	0.00	7.20	3.65	9.77	4.57	0.00	2.47	1.27	1.99
R3-2-5	0.00	4.09	2.06	6.18	2.64	0.00	1.70	0.00	1.38
R3-2-6	0.00	6.80	3.24	8.93	4.21	0.00	2.47	0.00	1.76
R3-2-7	4.65	33.75	5.05	12.89	6.25	0.00	3.70	1.31	2.31
R3-2-8	6.85	57.68	2.50	6.89	3.14	0.00	1.86	0.00	1.39
R3-2-9	0.00	4.53	1.64	5.03	1.97	0.00	1.41	0.00	0.00
R3-3-1	16.29	67.59	9.79	20.21	9.65	0.00	1.62	0.00	0.00
R3-3-10	588.45	2701.83	491.64	941.31	443.96	3.28	16.50	8.14	1.43
R3-3-11	1053.50	3566.85	547.95	1046.01	491.47	1.02	5.24	4.10	1.60
R3-3-12	5203.97	9114.29	723.03	1254.97	644.16	1.60	4.90	3.03	1.52
R3-3-13	15830.10	26627.14	2574.25	5008.67	2310.79	13.30	61.31	30.81	17.99
R3-3-14	13269.38	27652.76	3378.77	6853.21	3058.99	102.80	410.53	126.38	82.74
R3-3-2	11.71	40.66	6.21	13.52	6.53	0.00	1.52	0.00	0.00
R3-3-4	7.43	32.97	5.46	12.57	6.04	0.00	1.71	0.00	0.00
R3-3-5	7.94	31.78	5.51	12.60	5.60	0.00	2.25	0.00	2.29
R3-3-6	6.25	25.33	4.32	10.27	4.51	0.00	1.87	0.00	1.52
R3-3-7	4.01	26.64	7.94	19.16	9.17	1.51	4.78	1.70	2.84
R3-3-8	3.29	18.23	5.71	13.98	6.58	0.00	3.63	1.28	2.04
R3-3-9	31.43	307.61	31.56	54.14	30.97	0.00	3.34	1.22	2.00
R3-4-1	133.66	450.88	63.94	131.32	59.26	1.35	5.34	2.02	1.84
R3-4-10	82.87	317.50	46.22	93.81	46.36	0.00	3.58	1.34	1.54
R3-4-11	182.15	813.93	91.20	163.32	63.92	0.00	2.80	1.32	1.27
R3-4-12	521.01	1299.03	144.44	259.53	135.91	0.00	2.85	1.28	1.29
R3-4-13	2118.32	4182.19	412.84	771.09	373.14	0.00	4.92	3.12	1.37
R3-4-14	10155.54	20653.88	2443.34	4895.33	2200.39	43.74	174.93	57.58	34.45
R3-4-2	94.49	330.92	50.49	105.31	46.65	1.29	4.90	1.72	1.79
R3-4-3	89.47	312.71	47.56	99.26	43.97	0.00	4.56	1.64	1.77
R3-4-4	60.26	221.53	35.10	73.96	32.72	0.00	3.70	1.35	1.57

R3-4-5	57.83	212.00	33.59	71.07	30.49	0.00	3.78	1.25	1.58
R3-4-6	73.13	302.15	53.05	111.93	48.41	1.91	6.48	2.19	2.44
R3-4-7	53.33	212.41	33.97	71.96	31.51	0.00	3.99	1.44	1.65
R3-4-8	32.56	136.61	21.59	46.17	20.01	0.00	2.83	1.34	0.00
R3-4-9	43.64	182.67	26.71	55.41	26.56	0.00	3.07	1.22	1.02
R3-5-1	109.83	390.39	57.99	118.25	52.33	0.00	4.08	1.69	1.56
R3-5-10	45.85	234.03	49.19	105.93	44.62	2.02	6.90	2.43	2.52
R3-5-11	26.37	116.15	20.68	44.35	19.11	0.00	2.64	1.25	0.00
R3-5-12	19.30	90.96	16.60	35.71	15.60	0.00	2.19	0.00	0.00
R3-5-13	14.60	70.67	13.56	29.76	12.45	0.00	1.77	0.00	0.00
R3-5-14	12.72	73.68	17.13	37.96	15.21	0.00	2.82	0.00	0.00
R3-5-2	86.59	312.26	48.68	100.66	43.58	0.00	3.89	1.38	1.50
R3-5-3	79.35	294.40	47.28	98.24	42.95	1.58	4.43	1.80	2.47
R3-5-4	48.49	188.59	31.64	66.61	28.47	0.00	2.93	1.22	1.70
R3-5-5	54.32	270.78	55.97	118.97	49.18	2.06	6.60	2.08	2.37
R3-5-6	35.22	169.61	35.58	76.50	31.07	1.42	4.40	1.59	1.94
R3-5-7	50.54	223.91	43.24	92.04	38.69	1.75	5.38	1.77	1.94
R3-5-8	26.01	127.69	27.32	58.95	24.32	0.00	3.76	1.29	1.70
R3-5-9	24.95	124.69	26.67	57.71	23.71	0.00	3.71	1.31	1.44

6 June 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R3-2-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-4	0.00	1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-6	0.00	2.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R3-2-7	0.00	2.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-10	12.93	46.20	14.59	30.53	14.66	0.00	0.00	0.00	0.00
R3-2-11	365.26	909.93	143.36	272.04	131.76	0.00	1.17	1.43	0.00
R3-2-12	545.29	1837.21	273.41	575.26	266.70	3.01	13.43	7.69	0.00
R3-2-13	55.93	387.78	144.47	355.55	159.36	2.54	10.02	6.15	0.00
R3-2-14	616.21	4483.00	788.60	1790.81	859.65	76.43	252.51	72.66	54.21
R3-2-15	0.93	7.00	1.54	4.46	1.80	0.00	0.00	0.00	0.00
R3-3-1	0.00	1.89	0.85	2.75	0.90	0.00	0.00	0.00	0.00
R3-3-2	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-3-4	0.00	1.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-3-5	0.00	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-3-6	0.00	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-3-7	0.00	1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-3-8	151.09	1046.30	335.63	635.16	310.90	8.79	33.70	16.63	1.64
R3-3-9	1503.40	3627.90	705.11	1290.89	619.20	33.30	130.83	44.70	10.12
R3-3-10	11776.10	24664.30	3103.40	5867.58	2718.36	77.72	340.00	114.81	15.33
R3-3-11	12991.93	30254.18	3931.01	7444.50	3472.61	79.07	372.48	137.16	12.53
R3-3-12	11618.32	29667.14	4457.63	8662.80	3944.12	193.85	775.13	229.51	89.38
R3-3-13	9192.72	31448.54	4955.09	9875.27	4419.52	326.40	1224.69	320.93	266.52
R3-3-14	6427.77	23757.95	3967.60	7991.59	3529.15	323.43	1157.55	296.00	363.52
R3-3-15	1.84	5.59	3.03	8.60	3.68	0.00	0.00	0.00	0.00
R3-4-1	2.25	16.14	3.01	7.05	2.83	0.00	0.00	0.00	0.00
R3-4-2	1.91	14.43	2.89	6.82	2.35	0.00	0.00	0.00	0.00
R3-4-4	0.00	5.51	1.14	3.36	0.89	0.00	0.00	0.00	0.00
R3-4-5	0.00	3.00	0.61	2.28	0.00	0.00	0.00	0.00	0.00
R3-4-6	4.52	15.39	3.13	7.11	3.44	0.00	0.00	0.00	0.00
R3-4-7	23.81	116.17	28.79	63.20	38.76	0.00	1.89	2.18	0.00
R3-4-8	6.60	34.71	11.78	49.97	23.53	0.00	1.79	1.83	0.00
R3-4-9	75.89	134.30	11.16	32.81	17.63	0.00	0.90	1.09	0.00
R3-4-10	3072.95	8133.99	869.86	1491.83	753.03	9.49	42.53	20.33	0.00

R3-4-11	2867.93	6827.56	771.71	1377.48	682.86	3.35	18.70	13.64	0.00
R3-4-12	4050.68	11593.52	1637.96	3024.24	1425.16	35.67	150.63	54.98	10.21
R3-4-13	3594.48	12640.66	2218.74	4293.23	1926.50	158.73	551.38	147.96	120.50
R3-4-14	1831.81	6390.80	1162.92	2320.93	1036.40	93.82	331.32	86.89	92.50
R3-4-15	1.36	8.17	1.66	4.30	1.51	0.00	0.00	0.00	0.00
R3-5-1	1.15	8.09	1.71	4.68	1.57	0.00	0.00	0.00	0.00
R3-5-2	1.11	8.05	1.79	4.61	1.43	0.00	0.00	0.00	0.00
R3-5-3	0.90	8.25	1.95	5.03	1.82	0.00	0.00	0.00	0.00
R3-5-4	0.00	5.76	1.45	3.75	1.11	0.00	0.00	0.00	0.00
R3-5-5	1.05	9.35	1.82	5.12	1.66	0.00	0.00	0.00	0.00
R3-5-6	0.00	4.85	1.22	3.46	1.17	0.00	0.00	0.00	0.00
R3-5-7	0.00	6.40	1.60	4.23	1.54	0.00	0.00	0.00	0.00
R3-5-8	0.00	4.54	1.22	3.30	1.03	0.00	0.00	0.00	0.00
R3-5-9	0.00	3.82	1.02	3.09	0.00	0.00	0.00	0.00	0.00
R3-5-10	0.00	6.91	1.62	4.25	1.66	0.00	0.00	0.00	0.00
R3-5-11	0.00	3.95	1.24	3.47	1.30	0.00	0.00	0.00	0.00
R3-5-12	0.00	3.05	0.00	2.51	0.00	0.00	0.00	0.00	0.00
R3-5-13	0.00	1.84	0.00	2.60	0.00	0.00	0.00	0.00	0.00
R3-5-14	0.00	2.88	0.00	2.53	0.00	0.00	0.00	0.00	0.00
R3-5-15	0.00	1.28	0.00	1.84	0.00	0.00	0.00	2.20	0.00

16 Aug. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R3-2-1	0.00	4.56	3.07	3.11	0.00	0.00	0.00	0.00	0.00
R3-2-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R3-2-6	0.00	0.00	0.00	1.73	0.00	0.00	0.00	1.95	0.00
R3-2-7	0.00	10.00	0.00	8.21	4.29	0.00	0.00	0.00	0.00
R3-2-8	12.24	228.16	19.71	336.53	174.21	0.00	0.00	0.00	0.00
R3-2-9	934.42	7453.51	1507.39	3140.03	1389.17	31.44	108.00	44.64	4.15
R3-2-10	2097.92	12308.11	1497.07	2763.29	1326.18	28.75	96.34	35.74	9.10
R3-2-11	1949.33	10544.10	1438.65	2814.88	1269.82	61.00	212.11	63.46	42.45
R3-2-12	3102.39	24762.10	4151.55	8445.19	3664.40	195.60	645.93	181.78	135.31
R3-2-13	2277.35	21181.16	4229.98	8601.30	3683.83	176.23	602.46	181.83	89.06
R3-2-14	1278.55	16091.27	3658.97	7330.26	3128.27	207.92	605.94	181.61	128.32
R3-2-15	14.79	100.92	17.00	34.49	15.40	0.00	1.99	6.36	0.00
R3-3-1	3.47	26.76	6.36	13.47	4.96	0.00	0.00	0.00	0.00
R3-3-2	3.24	22.80	5.46	12.42	4.67	0.00	0.00	0.00	0.00
R3-3-4	0.00	10.40	3.09	6.13	1.91	0.00	0.00	0.00	0.00
R3-3-5	1.65	9.72	3.10	5.99	2.03	0.00	0.00	0.00	0.00
R3-3-6	2.57	9.37	1.47	5.16	2.33	0.00	0.00	0.00	0.00
R3-3-7	40.32	316.86	3.52	100.75	122.98	1.47	2.63	4.06	0.00
R3-3-8	340.55	2552.40	1008.58	1927.26	863.97	21.90	56.39	22.02	5.02
R3-3-9	2852.45	12101.11	2721.01	5477.65	2364.53	155.19	549.62	155.24	95.74
R3-3-10	7998.27	27381.39	4403.75	8977.29	3866.93	284.28	1020.60	264.41	279.26
R3-3-11	6973.64	25711.63	4643.50	9610.09	4087.54	363.84	1269.10	322.57	408.47
R3-3-12	3713.17	17829.06	4201.29	8824.92	3664.36	343.17	1173.24	297.98	377.11
R3-3-13	1373.02	10702.21	3824.60	8032.29	3345.89	285.81	983.65	254.38	326.84
R3-3-14	3056.12	24497.95	4292.45	8995.79	3837.86	372.94	1254.70	316.71	374.94
R3-3-15	21.01	130.54	23.78	49.36	22.55	1.32	4.67	2.37	1.99
R3-4-1	3.07	36.81	8.40	18.30	7.24	0.00	1.94	0.00	0.00
R3-4-3	2.36	25.21	6.21	13.52	5.24	0.00	0.00	0.00	0.00
R3-4-4	1.74	20.60	5.80	11.60	3.89	0.00	0.00	0.00	0.00
R3-4-5	1.76	19.50	5.29	11.61	4.30	0.00	0.00	0.00	0.00
R3-4-6	2.39	32.43	8.88	15.63	8.17	0.00	0.00	0.00	0.00
R3-4-7	1.18	15.82	4.44	9.54	3.51	0.00	0.00	0.00	0.00
R3-4-8	1.04	12.60	4.20	8.35	2.99	0.00	0.00	0.00	0.00
R3-4-9	1.75	20.48	4.95	11.84	4.67	0.00	0.00	0.00	0.00

R3-4-10	215.66	1797.35	338.90	772.72	362.17	16.92	56.72	19.63	7.44
R3-4-11	100.36	889.66	353.75	707.94	301.57	17.52	59.45	19.68	7.57
R3-4-12	16.46	294.21	287.53	589.86	240.37	18.55	61.10	18.40	9.31
R3-4-13	16.67	241.99	358.40	776.67	306.21	44.89	145.31	39.52	32.36
R3-4-14	128.16	1207.34	486.21	988.23	437.56	44.54	146.02	39.28	43.47
R3-4-15	13.41	71.65	12.28	25.62	12.03	0.00	1.60	2.22	0.00
R3-5-1	0.00	7.32	2.98	6.61	2.24	0.00	0.00	0.00	0.00
R3-5-2	0.00	7.46	2.94	6.29	1.96	0.00	0.00	0.00	0.00
R3-5-3	0.00	7.02	2.96	6.05	2.18	0.00	0.00	3.17	0.00
R3-5-4	0.00	5.71	2.81	5.74	1.59	0.00	0.00	0.00	0.00
R3-5-5	0.00	7.30	3.14	6.17	2.04	0.00	0.00	0.00	0.00
R3-5-6	0.00	5.23	2.52	5.26	1.31	0.00	0.00	0.00	0.00
R3-5-7	0.00	6.42	2.24	5.93	1.74	0.00	0.00	0.00	0.00
R3-5-8	0.00	6.20	2.64	5.36	1.84	0.00	0.00	0.00	0.00
R3-5-9	0.00	6.30	2.33	5.36	1.71	0.00	0.00	0.00	0.00
R3-5-10	0.00	6.91	2.68	6.15	2.06	0.00	0.00	0.00	0.00
R3-5-11	0.00	4.93	2.27	5.46	1.49	0.00	0.00	0.00	0.00
R3-5-12	0.00	3.84	1.93	4.76	1.46	0.00	0.00	0.00	0.00
R3-5-13	0.00	4.04	2.01	4.26	1.35	0.00	0.00	0.00	0.00
R3-5-14	0.00	4.71	1.78	4.95	1.62	0.00	0.00	0.00	0.00
R3-5-15	9.54	54.09	7.92	17.62	8.09	0.00	0.00	2.56	0.00

G. 2. E10 gate c. Row 4

13 Apr. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R4-2-1	0.00	-0.15	0.00	1.36	0.00	0.00	1.32	0.00	0.00
R4-2-10	3.46	0.06	0.00	1.41	0.00	0.00	1.09	0.00	0.00
R4-2-11	1.96	0.10	0.00	1.30	0.00	0.00	0.00	0.00	0.00

R4-2-12	150.97	71.94	1.33	2.09	1.52	0.00	2.02	0.00	0.00
R4-2-13	501.90	1317.47	158.45	246.93	146.16	0.00	1.39	0.00	0.00
R4-2-14	717.56	2393.74	128.24	193.89	121.51	0.00	1.09	0.00	1.14
R4-2-2	0.00	0.34	0.00	1.38	0.00	0.00	1.30	0.00	0.00
R4-2-3	0.00	0.23	0.00	1.34	0.00	0.00	0.99	0.00	0.00
R4-2-4	0.00	0.38	0.00	1.35	0.00	0.00	2.91	0.00	0.00
R4-2-5	0.00	0.23	0.00	1.40	0.00	0.00	1.47	0.00	0.00
R4-2-6	0.85	1.01	0.00	0.00	1.71	0.00	1.39	0.00	0.00
R4-2-7	0.00	0.14	0.00	1.28	0.00	0.00	0.74	0.00	0.00
R4-2-8	0.00	0.00	0.00	1.31	0.00	0.00	3.95	0.00	0.00
R4-2-9	0.99	-0.13	0.00	1.34	0.00	0.00	1.41	0.00	0.00
R4-3-1	0.00	1.55	0.00	1.53	0.00	0.00	1.67	0.00	0.00
R4-3-10	104.51	15.12	0.00	1.77	0.00	0.00	2.57	0.00	0.00
R4-3-11	4315.21	4195.39	271.41	504.29	225.80	0.00	2.28	0.00	0.00
R4-3-12	10371.03	18174.91	1671.59	3173.47	1460.03	0.00	0.00	7.51	0.00
R4-3-13	18340.75	35471.83	3083.85	5467.35	2671.27	0.00	11.50	7.10	0.00
R4-3-14	1706.22	468.06	3.45	7.34	2.81	0.00	1.73	0.00	0.00
R4-3-2	0.00	0.91	0.00	1.56	0.00	0.00	2.28	0.00	0.00
R4-3-3	0.00	0.57	0.00	1.49	0.00	0.00	0.96	0.00	0.00
R4-3-4	0.00	0.91	0.00	1.40	0.00	0.00	0.68	0.00	0.00
R4-3-5	0.00	0.57	0.00	1.48	0.00	0.00	1.13	0.00	0.00
R4-3-6	12.20	0.06	0.00	1.41	0.00	0.00	0.82	0.00	0.00
R4-3-7	58.17	7.95	0.00	1.37	0.00	0.00	1.81	0.00	0.00
R4-3-8	1430.82	439.60	0.00	1.48	0.00	0.00	0.99	0.00	0.00
R4-3-9	1508.45	15.49	0.00	0.00	0.00	0.00	0.00	0.00	1.10
R4-4-1	2.27	5.86	0.65	2.46	0.00	0.00	0.00	0.00	0.00
R4-4-10	2.20	3.59	0.48	2.24	0.00	0.00	1.48	0.00	0.67
R4-4-11	46.72	6.31	0.00	1.90	0.00	0.00	1.79	0.00	0.00
R4-4-12	683.46	278.65	2.25	3.74	2.45	0.00	1.79	0.00	0.76
R4-4-13	3528.06	2900.90	150.33	263.20	124.72	0.00	1.18	0.00	0.00
R4-4-14	9690.15	15941.03	1335.32	2581.08	1161.78	0.00	36.38	15.43	0.00
R4-4-2	2.22	5.88	0.73	2.41	0.00	0.00	1.38	0.00	0.00

R4-4-3	1.84	4.59	0.00	2.46	0.00	0.00	1.57	0.00	0.00
R4-4-4	1.47	4.07	0.00	2.28	0.00	0.00	2.30	0.00	0.00
R4-4-5	1.37	3.29	0.00	2.17	0.00	0.00	1.95	0.00	0.00
R4-4-6	1.85	4.01	0.53	2.40	0.00	0.00	0.59	0.00	0.57
R4-4-7	1.35	3.34	0.00	2.16	0.00	0.00	1.55	0.00	0.00
R4-4-8	4.53	2.72	0.00	1.92	0.00	0.00	1.28	0.00	0.00
R4-4-9	54.72	4.82	0.00	2.06	0.00	0.00	2.30	0.00	0.00
R4-5-1	4.19	9.65	1.02	3.24	1.00	0.00	1.10	0.00	1.03
R4-5-10	1.22	3.01	0.00	2.09	0.00	0.00	1.45	0.00	0.00
R4-5-11	1.28	2.71	0.00	2.06	0.00	0.00	0.00	0.00	1.08
R4-5-12	1.11	2.35	0.00	2.08	0.00	0.00	4.04	0.00	0.00
R4-5-13	0.96	2.01	0.00	1.79	0.00	0.00	2.97	0.00	0.00
R4-5-14	0.99	2.25	0.00	1.95	0.00	0.00	0.81	0.00	0.00
R4-5-3	2.52	6.36	0.67	2.50	0.00	0.00	0.99	0.00	0.00
R4-5-4	2.13	4.97	0.00	2.27	0.00	0.00	1.57	0.00	0.00
R4-5-5	1.62	4.32	0.00	2.18	0.00	0.00	1.70	0.00	0.00
R4-5-6	1.49	4.04	0.00	2.09	0.00	0.00	0.92	0.00	0.00
R4-5-7	1.42	3.67	0.00	2.04	0.00	0.00	4.00	0.00	0.00
R4-5-8	1.16	3.06	0.00	1.92	0.00	0.00	1.96	0.00	0.00
R4-5-9	1.31	3.23	0.00	1.88	0.00	0.00	1.83	0.00	0.00

2 June 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R4-2-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R4-2-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-8	1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-10	18.79	29.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-11	632.29	688.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-12	2684.65	2393.13	13.09	13.12	13.47	0.00	0.00	0.00	0.00
R4-2-13	2721.81	4620.07	222.65	307.29	210.36	14.37	0.00	0.00	0.00
R4-2-14	1786.59	6662.54	786.88	1680.16	842.97	1.12	8.14	9.44	0.00
R4-2-15	1.94	8.05	1.02	3.37	0.90	0.00	0.00	0.00	0.00
R4-3-1	0.00	4.36	0.00	2.18	0.00	0.00	0.00	0.00	0.00
R4-3-2	0.00	2.57	0.00	1.81	0.00	0.00	0.00	0.00	0.00
R4-3-3	0.00	2.20	0.00	1.68	0.00	0.00	0.00	0.00	0.00
R4-3-4	0.00	2.12	0.00	1.71	0.00	0.00	0.00	0.00	0.00
R4-3-5	0.00	1.91	0.00	1.95	0.00	0.00	0.00	0.00	0.00
R4-3-6	0.00	2.08	0.00	2.05	0.00	0.00	0.00	0.00	0.00
R4-3-7	473.77	577.60	11.05	13.50	10.63	0.00	0.00	0.00	0.00
R4-3-8	771.36	2213.26	131.41	195.04	118.37	0.00	0.00	0.00	0.00
R4-3-9	2104.25	5946.40	396.30	577.19	356.30	0.00	0.00	0.00	0.00
R4-3-10	9798.21	14674.84	477.34	663.91	413.11	0.00	0.00	0.00	0.00
R4-3-11	16712.12	30017.16	2527.40	4242.22	2161.99	1.69	11.54	7.15	1.31
R4-3-12	15068.36	34026.17	4584.42	8863.24	4055.63	80.26	356.52	114.42	18.66
R4-3-13	10687.56	25782.63	3068.70	5953.20	2732.22	56.89	283.32	103.34	5.68
R4-3-14	13853.13	24532.20	2219.01	3820.76	1920.73	0.00	2.39	3.21	0.00
R4-3-15	8.61	26.50	2.92	6.47	2.63	0.00	0.00	1.19	0.00
R4-4-1	19.43	45.19	3.17	7.43	8.16	0.00	0.00	0.00	0.00
R4-4-2	8.28	21.10	2.53	5.75	18.35	0.00	0.00	0.00	0.00
R4-4-3	10.66	20.20	1.63	4.18	35.55	0.00	0.00	0.00	0.00
R4-4-4	4.76	15.99	1.76	4.74	7.67	0.00	0.00	0.00	0.00
R4-4-5	1.15	7.66	1.45	3.67	13.59	0.00	0.00	0.00	0.00
R4-4-6	2.09	8.86	1.43	3.91	1.25	0.00	0.00	0.00	0.00

R4-4-7	3.30	6.43	0.99	2.96	23.31	0.00	0.00	0.00	0.00
R4-4-8	5.10	8.69	0.97	3.12	0.00	0.00	0.00	0.00	0.00
R4-4-9	456.93	449.53	2.76	4.81	3.66	0.00	0.00	0.00	0.00
R4-4-10	134.75	166.46	0.00	2.47	0.00	0.00	0.00	0.00	0.00
R4-4-11	522.05	518.17	2.18	4.82	2.39	0.00	0.00	0.00	0.00
R4-4-12	1891.53	3959.73	191.50	264.24	192.00	0.00	0.00	0.00	0.00
R4-4-13	3555.34	11265.27	1637.90	3048.48	1439.95	6.06	29.83	14.06	0.00
R4-4-14	4023.36	14131.71	2085.36	3902.05	1819.25	15.53	80.71	34.41	0.00
R4-4-15	5.27	15.71	1.89	5.13	1.73	0.00	0.00	0.00	0.00
R4-5-1	2.39	13.22	1.98	4.68	2.14	0.00	0.00	0.00	0.00
R4-5-3	1.21	6.92	1.19	3.34	1.13	0.00	0.00	0.00	0.00
R4-5-4	0.00	6.33	1.03	3.22	1.50	0.00	0.00	0.00	0.00
R4-5-5	1.20	7.51	1.37	3.50	1.58	0.00	0.00	0.00	0.00
R4-5-6	1.06	6.11	1.03	3.02	1.00	0.00	0.00	0.00	0.00
R4-5-7	0.00	5.29	0.00	2.90	0.00	0.00	0.00	0.00	0.00
R4-5-8	0.00	4.63	0.00	2.65	0.00	0.00	0.00	0.00	0.00
R4-5-9	0.00	5.21	0.92	2.85	0.00	0.00	0.00	0.00	0.00
R4-5-10	0.00	4.18	0.00	2.55	0.00	0.00	0.00	0.00	0.00
R4-5-11	0.00	4.76	0.95	3.05	0.00	0.00	0.00	0.00	0.00
R4-5-12	0.00	4.28	0.00	2.61	0.00	0.00	0.00	0.00	0.00
R4-5-13	0.00	4.53	0.00	2.88	0.00	0.00	0.00	0.00	0.00
R4-5-14	1.20	7.77	1.50	4.02	1.62	0.00	0.00	0.00	0.00
R4-5-15	0.00	2.05	0.00	2.03	0.00	0.00	0.00	0.00	0.00

16 Aug. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R4-2-1	0.00	0.00	1.40	3.96	1.09	0.00	0.00	0.00	0.00
R4-2-2	0.00	0.90	1.83	5.15	1.61	0.00	0.00	0.00	0.00
R4-2-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R4-2-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-10	35.69	16.73	8.20	19.63	11.24	0.00	0.00	0.00	0.00
R4-2-11	654.92	2087.37	245.16	474.66	223.69	0.00	1.26	1.66	0.00
R4-2-12	3072.93	10134.77	1270.68	2533.50	1157.32	2.62	14.65	10.80	0.00
R4-2-13	1705.85	10305.73	1593.51	3174.25	1408.95	55.03	214.29	68.15	22.24
R4-2-14	1695.84	9990.49	1898.75	3667.43	1657.99	112.77	416.37	114.48	60.03
R4-2-15	13.19	82.37	13.18	26.68	12.28	0.00	1.93	0.00	0.00
R4-3-1	1.88	12.93	3.46	7.52	2.66	0.00	0.00	0.00	0.00
R4-3-2	1.07	6.33	1.88	4.25	1.37	0.00	0.00	0.00	0.00
R4-3-3	0.00	5.35	0.00	4.13	1.39	0.00	0.00	0.00	0.00
R4-3-4	0.00	4.03	0.00	3.11	0.00	0.00	0.00	0.00	0.00
R4-3-5	0.00	2.92	0.00	2.89	0.00	0.00	0.00	0.00	0.00
R4-3-6	15.70	10.10	0.00	8.58	8.28	0.00	0.00	0.00	0.00
R4-3-7	122.26	314.74	178.81	387.60	264.53	1.27	5.22	4.49	0.00
R4-3-8	685.38	1714.95	527.86	1017.34	463.79	4.69	25.36	15.12	0.00
R4-3-9	6298.93	13198.52	1461.43	2735.75	1267.60	17.29	69.02	36.09	5.82
R4-3-10	8489.16	20218.58	2396.43	4672.42	2087.50	14.33	69.67	33.68	3.92
R4-3-11	8535.08	20492.66	2460.17	4798.32	2146.34	15.04	75.55	35.50	4.10
R4-3-12	7512.00	24078.89	3774.26	7798.46	3366.67	132.11	562.43	171.44	57.04
R4-3-13	6542.69	26573.30	4392.57	9304.36	3932.65	319.38	1160.56	298.76	316.28
R4-3-14	5417.09	21268.78	3541.36	7406.44	3148.13	246.98	924.74	245.56	199.77
R4-3-15	32.71	131.18	20.84	44.01	18.85	1.04	3.70	2.47	1.14
R4-4-1	531.96	3219.58	669.75	1351.57	591.95	43.37	157.93	45.20	22.61
R4-4-2	11.27	50.67	8.48	18.73	9.90	0.00	1.60	0.00	0.00
R4-4-3	8.46	38.50	7.18	14.81	11.36	0.00	0.00	0.00	0.00
R4-4-4	10.14	41.72	8.17	17.63	10.94	0.00	1.31	0.00	0.00
R4-4-5	4.16	26.78	5.55	12.20	5.17	0.00	0.00	0.00	0.00

R4-4-6	26.33	38.36	3.92	15.44	25.16	1.87	0.00	1.33	0.00
R4-4-7	159.77	240.68	2.96	48.18	135.35	2.18	5.79	6.20	0.00
R4-4-8	137.89	94.23	3.82	69.97	123.98	3.00	9.16	6.66	3.08
R4-4-9	121.84	28.97	113.89	94.95	119.30	5.87	21.82	7.08	2.92
R4-4-10	213.72	84.16	32.18	59.82	62.26	0.00	4.38	1.53	0.00
R4-4-11	524.91	1105.74	136.83	323.78	170.04	1.57	7.90	3.77	0.00
R4-4-12	1040.02	4051.35	763.90	1506.72	670.42	25.07	99.52	35.54	5.67
R4-4-13	762.19	4492.92	1037.13	2038.61	879.48	69.38	224.99	63.80	32.71
R4-4-14	5771.37	17107.82	2714.59	5645.63	2431.38	37.79	195.96	81.60	4.18
R4-4-15	14.00	59.44	10.10	20.96	9.40	0.00	0.00	0.00	0.00
R4-5-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-15	4.73	32.12	5.63	10.77	4.61	0.00	0.00	2.03	0.00

H. 3. E95 gate a. Row 2

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Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-1-15	29.11	192.05	74.18	158.07	62.21	12.74	40.96	9.33	11.51
R2-2-1	0.00	2.36	0.00	3.16	0.00	0.00	0.00	0.00	0.00
R2-2-10	0.00	3.23	1.28	4.45	1.73	0.00	0.00	0.00	0.00
R2-2-11	0.00	3.79	1.15	4.24	12.46	0.00	0.00	0.00	0.00
R2-2-12	1.46	3.65	1.06	4.13	1.22	0.00	0.00	0.00	0.00
R2-2-13	0.00	3.35	1.14	3.97	1.20	0.00	0.00	0.00	0.00
R2-2-14	0.00	3.49	1.05	3.90	1.18	0.00	0.00	0.00	0.00
R2-2-15	20.82	132.58	26.04	118.52	45.23	10.34	33.36	8.32	8.98
R2-2-2	0.00	2.08	0.00	3.25	0.00	0.00	0.00	0.00	0.00
R2-2-3	0.00	2.34	0.00	3.32	0.00	0.00	0.00	0.00	0.00
R2-2-4	1.80	3.19	1.00	3.82	1.17	0.00	0.00	0.00	0.00
R2-2-5	0.00	3.12	0.99	3.68	1.17	0.00	0.00	0.00	0.00
R2-2-6	1.59	7.70	2.19	6.83	2.69	0.00	0.00	0.00	0.00
R2-2-7	0.00	2.47	1.04	3.86	1.28	0.00	0.00	0.00	0.00
R2-2-8	0.00	5.33	1.61	5.59	1.47	0.00	0.00	0.00	0.00
R2-2-9	0.00	4.12	1.29	4.46	1.37	0.00	0.00	0.00	0.00
R2-3-1	4.95	52.73	18.27	40.42	14.23	0.00	1.41	0.00	0.00
R2-3-10	208.80	1127.89	236.08	461.71	191.48	1.33	7.15	3.31	0.00
R2-3-11	4819.86	20327.42	3216.85	6137.69	2792.55	19.73	103.32	48.71	5.49
R2-3-12	3022.32	10870.11	1290.26	2341.53	1129.52	8.32	40.48	19.41	4.08
R2-3-13	490.56	1482.52	113.49	191.00	104.62	0.00	1.91	0.00	0.00
R2-3-14	57.56	96.87	2.47	5.49	2.86	0.00	0.00	0.00	0.00
R2-3-15	19.64	120.88	49.38	106.98	40.83	9.52	30.47	6.67	7.87
R2-3-2	6.03	67.22	22.96	50.48	18.11	0.00	1.55	0.00	0.00
R2-3-3	6.72	74.16	25.21	54.82	20.13	0.00	1.56	0.00	0.00
R2-3-4	33.14	236.60	66.02	138.00	53.67	0.00	3.81	1.74	0.00
R2-3-5	20.63	218.01	63.72	134.19	50.94	0.00	3.54	1.68	0.00
R2-3-6	52.00	161.86	43.97	92.43	35.19	0.00	2.24	1.72	0.00
R2-3-7	58.85	436.22	87.68	175.46	73.14	0.00	3.94	2.03	0.00
R2-3-8	1031.94	3110.92	363.77	688.86	325.53	4.19	18.16	7.77	0.00
R2-3-9	389.56	827.11	163.60	334.15	130.72	1.43	6.55	2.98	0.00

R2-4-1	2.08	20.28	4.87	11.93	4.50	0.00	2.01	0.00	0.00
R2-4-10	446.66	2204.38	256.83	475.00	220.55	1.69	8.56	4.25	1.28
R2-4-11	3905.07	10362.97	986.79	1706.88	856.22	1.95	11.00	6.68	0.00
R2-4-12	2321.62	10353.86	1989.47	3770.53	1683.86	13.20	66.68	35.06	4.67
R2-4-13	635.77	1925.60	217.15	388.67	190.42	6.57	4.64	3.45	0.00
R2-4-15	0.00	1.52	0.00	2.35	0.00	0.00	0.00	0.00	0.00
R2-4-3	2.26	11.71	2.57	6.87	2.30	0.00	1.26	0.00	0.00
R2-4-4	15.16	115.01	31.93	65.93	27.24	0.00	2.20	1.85	0.00
R2-4-5	18.16	168.23	44.32	90.72	36.98	0.00	2.69	1.35	0.00
R2-4-6	1773.68	3606.21	107.55	141.90	98.57	0.00	0.00	0.00	0.00
R2-4-7	4136.64	11081.46	1340.20	2460.93	1158.51	2.81	15.73	10.71	0.00
R2-4-8	5969.35	22788.00	3873.73	7814.48	3361.69	90.90	42.94	151.02	54.01
R2-4-9	934.83	12506.84	2817.64	5695.70	2487.97	48.16	237.25	93.91	20.37
R2-5-1	3.59	29.74	7.65	17.05	6.49	0.00	0.00	0.00	0.00
R2-5-10	2.59	19.64	6.22	43.99	5.26	0.00	0.00	2.57	0.00
R2-5-11	2.73	25.15	8.47	20.42	7.43	0.00	0.00	0.00	0.00
R2-5-12	3.38	34.29	11.11	26.21	10.14	0.00	1.32	0.00	0.00
R2-5-13	2.97	29.81	9.87	23.24	8.93	0.00	1.17	0.00	0.00
R2-5-14	8.22	88.31	23.35	50.86	20.56	0.00	2.00	0.00	0.00
R2-5-15	21.63	150.92	56.29	120.71	48.49	9.66	31.38	8.81	8.74
R2-5-2	5.05	42.19	10.63	23.10	8.96	0.00	0.00	0.00	0.00
R2-5-3	6.43	57.37	12.94	26.92	6.49	0.00	0.00	0.00	0.00
R2-5-4	17.32	146.03	28.77	57.50	24.23	0.00	1.43	0.00	0.00
R2-5-5	82.58	534.94	71.52	130.22	62.43	0.00	1.98	0.00	0.00
R2-5-6	2.22	22.57	7.93	19.02	6.88	0.00	0.00	0.00	0.00
R2-5-8	2.37	22.34	7.89	19.05	6.34	0.00	0.00	0.00	0.00
R2-5-9	4.23	44.62	13.93	32.38	12.74	0.00	1.87	0.00	1.65
R2-6-15	16.29	109.45	46.53	101.50	38.56	9.16	29.48	6.96	7.43
R2-6-8	0.00	2.22	1.78	5.11	2.05	0.00	0.00	0.00	0.00

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Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-3-13	838.11	5028.20	1577.13	3326.79	1332.64	64.69	288.20	94.35	58.02
R2-3-9	3611.15	9556.29	793.83	1388.53	717.68	3.27	15.83	8.07	2.91
R2-2-5	2.14	9.65	2.71	7.20	2.53	0.00	0.00	0.00	0.00
R2-2-6	3.18	18.57	4.79	11.71	4.32	0.00	1.40	0.00	0.00
R2-2-7	2.07	8.97	2.44	6.62	2.26	0.00	0.00	0.00	0.00
R2-2-8	2.56	13.38	3.49	8.94	3.23	0.00	0.00	0.00	0.00
R2-2-9	2.36	11.72	3.29	8.69	3.05	0.00	0.00	0.00	0.00
R2-3-1	1.97	6.90	2.30	6.28	2.24	0.00	0.00	0.00	1.70
R2-3-10	1685.12	4778.78	412.42	71.77	367.44	1.57	8.14	4.05	1.72
R2-2-3	2.38	11.13	2.92	7.81	1.98	0.00	0.00	0.00	0.00
R2-3-12	968.65	6315.26	1834.43	3929.00	1547.50	143.56	580.66	169.91	179.95
R2-2-2	2.12	8.59	2.47	6.68	2.11	0.00	0.00	0.00	0.00
R2-3-14	970.17	4194.55	725.63	1430.30	626.29	19.45	83.33	30.29	20.89
R2-3-15	9.67	87.41	22.84	49.86	20.27	1.33	5.84	2.09	2.39
R2-3-2	2.12	8.34	2.41	6.79	2.67	0.00	0.00	0.00	0.00
R2-3-3	2.62	13.89	3.25	8.94	3.73	0.00	0.00	0.00	0.00
R2-3-4	88.46	459.83	110.51	221.99	95.04	4.00	14.89	5.18	0.00
R2-3-5	22.30	96.48	20.55	42.09	17.93	0.00	2.68	0.00	0.00
R2-3-6	8.23	24.47	7.27	16.55	6.73	0.00	1.44	0.00	0.00
R2-3-7	2173.63	5230.33	435.46	786.34	392.13	4.99	21.51	7.97	3.89
R2-1-1	4.36	22.56	4.71	11.33	4.44	0.00	1.34	0.00	0.00
R2-3-11	4771.56	17648.18	2835.51	5782.14	2473.27	141.15	586.57	175.50	163.08
R2-1-6	2.90	15.15	3.80	9.38	3.48	0.00	1.43	0.00	0.00
R2-1-10	2.44	10.51	2.48	6.65	2.40	0.00	0.00	0.00	0.00
R2-1-11	3.68	22.51	5.47	13.32	5.27	0.00	1.57	0.00	0.00
R2-1-12	2.41	12.16	3.26	8.28	2.75	0.00	0.00	0.00	0.00

R2-1-13	2.56	10.62	2.66	7.10	2.49	0.00	0.00	0.00	0.00
R2-1-14	2.42	14.05	3.77	9.35	3.36	0.00	0.00	0.00	0.00
R2-1-15	1.90	9.46	4.37	11.97	4.72	1.41	4.02	1.42	1.76
R2-1-2	3.56	17.53	3.99	9.93	3.68	0.00	0.00	0.00	0.00
R2-1-3	4.05	24.60	5.46	13.05	3.33	0.00	1.66	0.00	0.00
R2-2-4	2.16	9.58	2.52	6.93	2.35	0.00	0.00	0.00	0.00
R2-1-5	3.19	17.70	4.38	10.97	4.28	0.00	1.40	0.00	0.00
R2-4-1	101.13	835.52	181.74	381.95	151.93	8.06	32.86	9.75	7.74
R2-1-8	2.76	15.02	3.60	9.31	4.13	0.00	1.39	0.00	0.00
R2-1-9	2.82	15.45	3.73	9.26	3.20	0.00	0.00	0.00	0.00
R2-2-1	1.95	8.58	2.50	6.67	2.45	0.00	0.00	0.00	0.00
R2-2-10	1.82	7.62	2.30	6.28	2.02	0.00	0.00	0.00	0.00
R2-2-11	2.04	8.65	2.50	6.79	2.17	0.00	0.00	0.00	0.00
R2-2-12	0.93	8.68	2.51	6.81	2.44	0.00	0.00	0.00	0.00
R2-2-13	1.93	7.58	2.24	6.13	2.25	0.00	0.00	0.00	0.00
R2-2-14	0.00	9.62	2.86	7.47	2.53	0.00	0.00	0.00	0.00
R2-2-15	0.00	2.64	1.94	6.74	2.78	0.00	1.84	0.00	0.00
R2-1-4	3.40	18.02	4.16	10.26	3.76	0.00	1.27	0.00	0.00
R2-6-13	5.30	58.87	23.04	52.01	18.68	2.43	8.06	2.76	2.44
R2-3-8	2833.85	7530.29	750.58	1374.30	678.53	10.80	45.35	16.18	8.23
R2-5-4	27.90	351.61	119.77	261.77	97.05	9.44	36.64	10.25	10.03
R2-5-5	25.92	349.72	123.27	271.41	100.63	10.10	39.00	10.30	10.06
R2-5-6	24.21	236.50	84.82	186.46	68.27	6.78	26.61	7.12	6.70
R2-5-8	21.78	297.74	103.03	225.10	84.23	8.07	31.13	8.41	8.47
R2-5-9	24.46	329.38	115.60	252.57	94.59	9.13	35.42	9.62	8.82
R2-6-1	5.98	78.30	29.54	66.25	24.12	2.71	10.17	2.83	2.71
R2-6-10	5.31	57.00	20.92	46.85	17.25	2.23	6.95	2.03	0.00
R2-5-2	26.07	364.67	127.49	277.12	102.43	9.79	38.16	10.19	9.52
R2-6-12	5.48	68.10	27.30	61.73	22.49	3.05	9.83	2.79	2.38
R2-5-15	3.02	29.97	12.46	28.73	10.56	4.85	5.11	1.69	1.60
R2-6-14	4.39	50.52	20.36	46.02	16.40	2.37	7.27	2.07	1.99
R2-6-15	1.93	33.45	14.61	34.30	12.80	2.25	7.10	7.38	2.33

R2-6-2	6.73	86.97	34.96	78.66	28.55	3.50	12.81	3.50	3.17
R2-6-3	6.20	82.08	32.47	73.11	26.71	3.28	11.56	3.07	3.36
R2-6-4	8.00	96.57	35.59	79.37	28.98	3.60	12.59	3.30	2.89
R2-6-5	6.24	76.67	30.40	68.18	24.48	2.75	10.27	2.91	2.81
R2-6-6	6.47	80.07	31.12	70.01	25.78	2.92	11.10	3.04	2.78
R2-6-7	8.80	103.77	38.61	85.91	31.75	3.47	13.02	3.55	3.45
R2-6-8	5.59	71.70	28.46	63.92	23.03	2.49	9.76	2.91	2.48
R2-6-11	5.34	68.52	28.03	62.88	22.23	2.90	9.60	2.66	2.59
R2-4-6	4061.42	9967.78	817.53	1407.99	732.31	3.34	14.22	6.44	3.85
R2-4-10	2886.58	14780.15	2427.88	4914.67	2100.11	105.97	428.09	126.58	84.98
R2-4-11	5025.68	18476.10	2671.70	5393.85	2354.07	119.57	478.11	141.18	100.61
R2-4-12	407.86	4201.04	1063.09	2188.29	914.19	89.45	339.97	95.31	99.25
R2-4-13	1236.87	8231.82	1948.28	4042.34	1645.61	135.95	530.57	147.58	126.83
R2-4-14	350.04	2281.92	555.71	1123.76	458.71	26.34	103.08	31.51	25.05
R2-4-15	14.75	168.30	49.94	108.16	42.78	3.49	13.44	4.28	4.17
R2-4-2	31.47	337.77	81.71	177.75	71.38	4.66	18.02	5.34	5.72
R2-4-3	27.56	219.69	55.25	121.24	47.04	3.08	12.92	3.80	3.72
R2-5-3	21.12	301.28	108.72	238.28	87.41	8.76	33.52	9.16	8.75
R2-4-5	70.99	374.11	64.98	138.61	55.98	3.47	14.24	4.39	4.14
R2-6-9	5.24	64.31	25.22	57.10	20.69	2.71	9.12	2.67	2.43
R2-4-7	5733.46	16539.61	1917.07	3662.32	1691.98	30.08	137.14	48.81	25.28
R2-4-8	781.47	16692.71	4080.17	8372.99	3550.63	287.24	1036.09	274.23	318.07
R2-4-9	1089.81	9466.28	2338.17	4764.74	2036.08	646.64	636.78	176.40	183.83
R2-5-1	29.98	380.88	127.48	276.60	102.24	9.73	36.99	10.16	9.72
R2-5-10	10.87	182.54	48.44	108.34	39.01	4.32	16.32	5.00	4.19
R2-5-11	10.45	128.00	48.06	106.74	38.58	4.63	16.34	4.61	4.89
R2-5-12	10.54	137.03	52.46	116.82	41.85	4.92	17.94	4.76	4.76
R2-5-13	8.49	104.62	38.87	86.68	31.39	3.49	13.41	3.45	3.51
R2-5-14	8.65	109.63	41.61	93.41	34.09	3.61	14.11	3.73	3.77
R2-4-4	747.33	1523.64	114.58	214.41	107.42	3.12	12.32	4.01	3.69

3 Feb. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-2-8	1.21	5.83	12.94	31.28	14.14	0.00	2.70	0.00	0.00
R2-3-7	665.89	2900.80	772.04	1603.11	678.94	143.60	133.84	43.24	22.15
R2-3-6	2306.17	6405.62	729.61	1376.70	666.47	5.56	25.61	11.74	3.50
R2-3-5	355.17	757.18	63.27	111.97	60.18	0.00	3.68	1.72	0.00
R2-3-4	14.53	75.81	33.65	74.95	28.09	3.86	12.88	3.91	3.34
R2-3-3	2.10	11.81	2.90	7.61	2.62	0.00	1.38	0.00	0.00
R2-3-2	2.17	12.34	3.05	7.71	3.00	0.00	1.68	0.00	0.00
R2-3-15	3.52	11.19	2.06	5.43	1.93	0.00	0.00	0.00	0.00
R2-3-14	383.92	7708.33	2165.35	4649.71	1859.22	240.15	867.67	226.58	235.55
R2-3-13	336.50	3595.67	1249.51	2648.75	1049.55	154.94	523.89	137.95	131.70
R2-3-12	130.30	3980.50	1504.04	3200.04	1371.15	220.97	656.18	167.36	148.86
R2-3-11	1606.86	12414.64	3119.06	6466.41	2739.50	259.69	925.49	240.88	292.01
R2-3-10	2291.69	14368.95	2923.68	5999.49	2585.10	161.50	628.11	178.76	157.15
R2-2-1	0.00	9.36	26.57	64.13	29.77	4.21	6.08	0.00	0.00
R2-2-9	0.00	3.55	8.85	22.35	9.83	0.00	1.88	0.00	0.00
R2-4-1	12.14	89.76	42.15	94.86	38.35	0.00	3.20	1.68	0.00
R2-2-7	5.47	14.24	7.65	19.17	8.73	0.00	1.67	0.00	0.00
R2-2-6	25.00	25.76	30.00	71.75	33.81	3.92	6.28	0.00	0.00
R2-2-5	1.78	3.62	8.15	19.88	9.17	0.00	1.51	0.00	0.00
R2-2-4	0.00	4.18	12.38	31.44	15.38	2.41	3.18	0.00	0.00
R2-2-3	0.00	4.55	13.98	35.05	16.81	2.66	3.67	0.00	0.00
R2-2-2	0.00	10.24	32.98	79.17	36.08	4.34	6.99	0.00	0.00
R2-2-15	3.15	8.95	1.73	4.65	1.71	0.00	0.00	0.00	0.00
R2-2-14	0.00	1.47	5.18	13.46	6.09	0.00	0.00	0.00	0.00

R2-2-13	0.00	1.47	4.79	12.23	5.52	0.00	0.00	0.00	0.00
R2-2-12	0.00	2.04	6.24	15.79	7.33	0.00	1.70	0.00	0.00
R2-2-11	0.00	1.85	5.97	15.47	6.51	0.00	0.00	0.00	0.00
R2-2-10	0.00	2.76	10.01	24.08	10.52	0.00	1.60	0.00	0.00
R2-3-1	1.99	11.80	2.81	7.52	2.84	0.00	0.00	0.00	0.00
R2-4-8	140.77	577.88	1560.32	3395.80	1208.83	229.67	731.84	191.25	176.57
R2-5-8	15.34	234.30	83.04	183.15	74.14	8.11	29.30	7.80	9.92
R2-5-6	16.33	219.37	78.23	171.57	68.69	8.43	27.35	8.08	10.61
R2-5-5	17.14	263.38	102.56	225.69	86.72	10.48	37.84	9.92	10.75
R2-5-4	23.62	353.39	122.08	268.05	106.40	11.37	41.50	11.45	12.54
R2-5-3	14.84	211.81	70.19	151.80	62.66	6.24	23.21	6.83	7.47
R2-5-2	19.93	296.34	93.03	201.87	83.05	8.20	29.35	8.27	10.03
R2-5-15	2.65	7.59	1.43	4.29	1.65	0.00	0.00	0.00	0.00
R2-5-14	7.28	109.17	38.58	85.53	34.36	3.98	14.13	4.29	4.41
R2-5-13	7.75	111.63	40.05	89.37	35.70	4.18	14.77	4.63	4.98
R2-5-12	8.54	128.17	49.81	111.31	42.87	5.30	19.26	5.24	6.13
R2-5-11	8.89	135.97	48.39	107.61	43.68	5.40	17.89	5.05	5.26
R2-5-10	9.76	145.29	51.69	114.81	46.27	5.60	18.49	5.42	5.71
R2-3-8	1616.43	7306.85	1518.10	3198.35	1370.02	105.43	403.27	117.45	98.14
R2-4-9	121.64	4108.06	1587.42	3258.66	1407.30	193.93	562.15	151.86	107.71
R2-3-9	640.18	9180.19	2341.96	4943.97	2119.02	217.03	785.23	205.92	249.31
R2-4-7	371.69	1669.94	648.93	1422.84	590.55	53.13	204.21	58.39	62.71
R2-4-6	4281.38	13446.96	2198.89	4510.37	2012.30	46.24	223.29	83.74	21.44
R2-4-5	2365.83	4759.52	389.84	713.30	363.85	2.71	11.12	5.00	0.00
R2-4-4	1005.84	2614.23	392.58	812.23	362.74	7.49	34.43	13.27	3.36
R2-4-3	3212.58	8860.56	1289.03	2608.34	1175.94	14.14	71.64	31.62	4.05
R2-4-2	1867.92	5133.52	724.97	1464.71	681.72	6.74	32.09	14.75	1.59
R2-4-15	2.97	10.51	1.91	5.28	1.79	0.00	0.00	0.00	0.00
R2-4-14	292.58	7060.54	1585.40	3337.76	1429.48	110.66	417.44	118.53	104.73
R2-4-13	889.25	14301.83	2861.52	5908.32	2509.93	248.58	877.92	234.73	226.91
R2-4-12	92.36	1461.62	489.07	990.16	438.86	58.82	187.34	49.98	59.54
R2-4-11	270.78	12023.10	3186.06	6433.16	2811.29	251.21	861.39	3.93	236.44

R2-4-10	1245.50	10422.29	2015.41	4108.50	1743.90	154.89	546.19	147.65	132.00
R2-5-9	14.03	215.45	85.00	188.79	72.83	8.73	31.89	8.76	9.64
R2-5-1	30.10	414.23	123.70	263.94	107.66	9.51	34.94	9.93	11.06

19 Apr. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-2-8	0.00	-1.15	0.00	1.50	0.00	0.00	0.00	0.00	0.00
R2-3-7	49.09	382.33	304.32	665.72	246.85	22.08	82.61	22.88	16.64
R2-3-6	11.65	137.42	143.70	313.42	114.70	2.54	12.87	5.75	1.09
R2-3-5	5.06	30.87	29.08	67.80	21.95	3.00	11.26	3.56	1.36
R2-3-4	0.00	2.52	2.48	7.04	2.28	1.12	0.00	0.00	1.01
R2-3-3	0.00	0.34	0.00	1.87	0.00	0.00	1.89	0.00	0.00
R2-3-2	0.00	-0.37	0.00	1.33	0.00	0.00	0.62	0.00	0.00
R2-3-14	42.46	559.19	1239.56	2554.88	1000.87	212.63	664.75	160.71	158.26
R2-3-13	72.70	503.97	1613.17	3147.56	1181.59	252.53	652.89	188.40	82.82
R2-3-12	246.33	3316.53	3475.09	7256.26	2666.80	477.39	1541.52	403.50	315.36
R2-3-11	159.42	2645.01	3392.39	7075.24	2657.17	434.02	1377.95	353.53	294.81
R2-3-10	59.46	1573.82	1821.29	3813.64	1446.24	286.73	923.20	234.25	236.38
R2-2-1	0.00	-1.19	0.00	1.25	0.00	0.00	0.00	0.00	0.00
R2-2-9	0.00	-1.17	0.00	1.01	0.00	0.00	7.13	0.00	0.00
R2-4-1	0.00	1.78	2.45	6.49	2.09	0.00	1.53	0.00	0.00
R2-2-7	1.50	13.98	0.80	2.16	1.04	0.00	0.00	0.00	0.00
R2-2-6	4.06	28.84	1.67	3.27	1.93	0.00	0.79	0.00	0.00
R2-2-5	0.00	-1.16	0.00	1.30	0.00	0.00	1.17	0.00	0.00
R2-2-4	0.00	-0.28	0.00	1.26	0.00	0.00	0.00	0.00	0.00
R2-2-3	0.00	-0.32	0.00	1.37	0.00	0.00	0.00	0.00	0.00
R2-2-2	0.00	-1.16	0.00	1.29	0.00	0.00	0.00	0.00	0.00

R2-2-14	0.00	-0.24	0.00	1.13	0.00	0.00	1.25	0.00	0.00
R2-2-13	0.00	-0.17	0.00	1.27	0.00	0.00	0.00	0.00	0.00
R2-2-12	0.00	-1.17	0.00	1.34	0.00	0.00	1.90	0.00	0.00
R2-2-11	0.00	-0.35	0.00	1.37	0.00	0.00	1.70	0.00	0.00
R2-2-10	0.00	-0.19	0.00	1.36	0.00	0.00	3.23	0.00	0.00
R2-3-1	0.00	-0.19	0.00	1.36	0.00	0.00	0.00	0.00	0.00
R2-4-8	17.69	37.17	109.57	277.55	87.61	56.88	177.59	40.88	38.81
R2-5-8	0.00	1.72	2.27	5.97	2.05	0.00	3.21	0.00	1.10
R2-5-6	0.00	13.52	2.72	6.70	1.75	0.00	1.75	0.00	0.00
R2-5-5	0.00	3.18	3.44	8.28	2.97	0.00	1.79	0.00	0.00
R2-5-4	0.00	5.92	5.95	13.76	5.07	0.00	3.02	0.00	1.14
R2-5-3	0.00	4.51	4.33	10.22	3.56	1.52	2.15	0.00	0.00
R2-5-2	0.00	8.12	6.76	15.88	5.60	0.00	3.12	0.00	1.05
R2-5-14	0.00	0.63	1.29	4.07	1.43	0.00	1.39	0.00	0.00
R2-5-13	0.00	0.68	1.21	3.73	1.24	0.00	4.64	0.00	0.00
R2-5-12	0.00	0.79	1.34	4.21	1.28	0.00	0.00	0.00	0.00
R2-5-11	0.00	0.90	1.33	4.30	0.27	0.00	1.56	0.00	0.00
R2-5-10	0.00	0.92	1.60	4.58	1.43	0.00	1.98	0.00	0.00
R2-3-8	16.76	77.17	112.58	276.00	86.60	46.09	143.05	35.01	33.32
R2-4-9	54.80	56.75	277.94	657.54	183.90	204.30	507.42	124.51	48.88
R2-3-9	27.28	216.14	335.79	764.13	251.97	150.45	486.80	115.26	134.47
R2-4-7	813.01	3031.98	718.08	1538.95	648.94	75.98	284.65	71.38	91.80
R2-4-6	614.36	2686.03	658.04	1414.41	585.29	31.56	129.47	37.21	32.76
R2-4-5	721.87	2545.61	500.93	1033.98	445.16	11.27	54.03	19.56	4.61
R2-4-4	11.45	48.07	21.93	52.18	18.40	1.75	9.91	2.21	2.14
R2-4-3	2.65	15.51	9.93	27.66	8.32	1.08	6.95	1.52	0.00
R2-4-2	1.53	7.52	3.80	9.74	2.79	0.00	3.20	0.00	0.00
R2-4-14	61.19	4777.07	3282.26	6824.63	2811.52	328.28	1136.43	284.69	336.81
R2-4-13	108.51	651.73	2112.44	4103.53	1515.32	312.08	942.67	236.20	193.69
R2-4-12	69.58	1077.16	2628.63	4967.73	1983.70	296.06	843.96	241.67	121.44
R2-4-11	290.64	4135.21	4714.08	9432.20	3878.88	471.30	1545.04	396.61	340.57
R2-4-10	80.05	718.96	1409.57	3021.45	1084.25	288.00	787.78	208.67	106.18

R2-5-9	0.00	1.13	1.98	5.33	1.29	0.00	1.53	0.00	0.00
R2-5-1	0.00	8.47	7.07	17.00	6.40	1.02	3.85	0.00	1.06

8 June 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R2-1-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-1-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-2-1	0.00	1.87	0.00	2.22	0.00	0.00	0.00	0.00	0.00
R2-2-10	0.00	0.00	0.00	1.28	0.00	0.00	0.00	0.00	0.00
R2-2-11	0.00	0.00	0.00	1.31	0.00	0.00	0.00	0.00	0.00
R2-2-12	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.00	0.00
R2-2-13	0.00	0.00	0.00	1.42	0.00	0.00	0.00	0.00	0.00
R2-2-14	0.00	0.00	0.00	1.24	0.00	0.00	0.00	0.00	0.00
R2-2-15	0.00	2.76	1.22	3.78	1.17	0.00	0.00	0.00	0.00

R2-2-2	0.00	0.00	0.00	1.69	0.00	0.00	0.00	0.00	0.00
R2-2-3	0.00	0.00	0.00	1.60	0.00	0.00	0.00	0.00	0.00
R2-2-4	0.00	5.41	0.00	1.84	0.00	0.00	0.00	0.00	0.00
R2-2-5	0.00	27.37	4.81	8.58	4.53	0.00	0.00	0.00	0.00
R2-2-6	0.00	2.20	1.73	4.13	1.31	0.00	0.00	0.00	0.00
R2-2-7	0.00	0.00	0.00	1.34	0.00	0.00	0.00	0.00	0.00
R2-2-8	0.00	1.03	0.00	1.59	0.00	0.00	0.00	0.00	0.00
R2-2-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-3-1	0.00	2.80	3.12	7.42	2.81	1.02	2.01	1.09	1.30
R2-3-10	86.25	1346.41	2208.40	4311.79	1767.17	322.50	977.13	235.01	204.12
R2-3-11	90.62	491.29	2030.74	3997.27	1553.27	401.45	1121.88	273.19	183.31
R2-3-12	98.01	26.08	960.20	1925.63	682.80	262.75	629.14	159.23	90.35
R2-3-13	148.26	89.89	2711.39	5460.57	1965.81	521.85	1564.11	384.66	256.48
R2-3-14	40.33	32.03	559.42	1174.25	415.63	150.09	465.56	112.64	119.79
R2-3-15	0.00	4.56	13.55	28.98	10.22	2.70	7.39	2.31	1.72
R2-3-2	0.00	1.93	2.09	5.36	1.65	0.00	1.18	0.00	0.00
R2-3-3	0.00	2.02	2.59	6.38	2.24	0.00	1.32	0.00	0.00
R2-3-4	2.79	16.22	27.69	62.22	22.59	5.76	17.63	5.23	2.74
R2-3-5	7.00	63.07	124.17	281.89	98.46	9.05	31.60	12.45	2.15
R2-3-6	6.76	22.42	93.47	239.93	73.55	25.45	87.92	25.31	8.88
R2-3-7	2.51	6.58	14.81	38.29	12.26	20.23	58.43	13.27	14.27
R2-3-8	22.86	174.53	1065.74	1785.16	788.32	144.16	463.21	110.03	120.71
R2-3-9	101.84	246.40	4250.55	8354.19	3234.70	473.40	1541.32	385.22	352.62
R2-4-1	0.00	2.27	1.10	3.30	1.13	0.00	0.64	0.00	0.00
R2-4-10	108.74	140.94	922.21	1958.60	630.40	441.98	1183.33	282.85	186.45
R2-4-11	101.32	21.82	286.85	728.13	154.92	523.65	1381.56	337.20	165.22
R2-4-12	67.38	187.85	377.33	757.90	266.13	189.71	495.27	108.23	69.69
R2-4-13	119.74	2119.58	3409.45	6982.14	2682.33	484.79	1595.12	382.25	399.72
R2-4-14	86.97	716.83	1485.24	3183.87	1092.04	328.86	1101.40	261.10	260.15
R2-4-15	0.00	0.00	0.00	2.65	0.00	0.00	0.00	0.00	0.00
R2-4-2	1.38	9.10	2.73	7.22	1.91	0.00	1.16	0.00	0.00
R2-4-3	1.68	13.04	6.96	18.01	6.00	0.00	3.69	1.90	0.00

R2-4-4	6.37	63.54	38.41	82.77	34.44	2.11	8.73	3.33	2.01
R2-4-5	52.15	554.86	284.48	600.48	256.85	14.38	62.55	20.10	10.31
R2-4-6	8.76	107.15	214.19	486.07	190.43	23.33	90.62	25.01	28.35
R2-4-7	42.58	13.57	55.03	153.85	46.02	183.52	433.39	84.55	90.73
R2-4-8	123.61	5.48	10.02	27.31	5.23	522.10	1009.07	167.59	49.59
R2-4-9	57.13	12.65	108.12	244.53	70.03	158.68	359.08	76.12	49.85
R2-5-1	0.00	1.20	0.00	2.77	0.00	0.00	0.00	0.00	0.00
R2-5-10	0.00	0.00	0.00	1.76	0.00	0.00	0.00	0.00	0.00
R2-5-11	0.00	0.88	0.00	1.85	0.00	0.00	0.00	0.00	0.00
R2-5-12	0.00	0.00	0.00	1.58	0.00	0.00	0.00	0.00	0.00
R2-5-13	0.00	0.00	0.00	1.96	0.00	0.00	0.00	0.00	0.00
R2-5-14	0.00	1.31	0.00	2.33	0.00	0.00	0.00	0.00	0.00
R2-5-15	0.00	0.00	0.00	2.23	0.00	0.00	0.00	0.00	0.00
R2-5-2	0.00	1.83	0.00	3.04	0.00	0.00	0.00	0.00	0.00
R2-5-3	0.00	1.42	0.00	2.44	0.00	0.00	0.00	0.00	0.00
R2-5-4	0.00	1.75	0.00	2.84	0.00	0.00	0.00	0.00	0.00
R2-5-5	0.00	1.38	0.00	2.36	0.00	0.00	0.00	0.00	0.00
R2-5-6	0.00	1.54	0.00	2.46	0.00	0.00	0.00	0.00	0.00
R2-5-8	0.00	0.98	0.00	2.12	0.00	0.00	0.00	0.00	0.00
R2-5-9	0.00	1.13	0.00	2.15	0.00	0.00	0.00	0.00	0.00
R2-6-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R2-6-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-6-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R2-5-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

I. 3. E95 gate b. Row 3

3 Feb. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R3-2-1	72.46	377.90	79.33	172.81	73.69	6.11	20.83	6.37	7.60
R3-2-10	34.64	206.93	51.14	113.39	46.78	5.85	16.52	9.00	5.16
R3-2-11	50.51	263.96	46.86	102.17	45.04	3.92	13.60	3.95	4.69
R3-2-12	119.64	540.29	54.66	110.66	53.17	4.17	14.25	4.03	4.40
R3-2-13	57.91	186.50	39.81	87.91	37.58	4.22	12.56	5.25	4.47
R3-2-14	23.12	148.83	35.82	78.97	34.22	2.99	11.56	3.32	4.12
R3-2-15	2.08	5.47	1.45	4.19	0.00	0.00	0.00	0.00	0.00
R3-2-2	85.48	443.83	93.35	203.57	87.33	7.02	24.94	7.93	8.06
R3-2-3	49.31	270.20	59.67	130.95	55.46	4.59	16.77	5.15	5.57
R3-2-4	45.49	252.28	56.62	124.58	53.03	4.86	16.24	4.86	5.17
R3-2-5	46.61	261.33	59.71	131.23	55.46	4.73	17.35	5.00	5.36
R3-2-6	43.33	234.97	53.88	118.41	50.02	4.55	15.49	4.75	5.06
R3-2-7	36.41	205.31	48.61	107.44	46.03	4.18	14.25	4.60	4.86
R3-2-8	45.76	260.81	59.25	130.37	56.34	4.77	17.32	5.20	5.48
R3-2-9	43.50	258.28	63.20	140.52	58.41	5.80	20.08	5.75	6.01
R3-3-1	64.38	270.56	55.71	125.05	52.73	5.13	18.63	5.70	5.18
R3-3-10	321.88	991.29	96.80	182.55	89.91	3.99	13.79	4.47	4.93
R3-3-11	2864.83	13236.69	1335.25	2480.97	1207.79	4.80	20.18	10.36	5.99

R3-3-13	2814.07	12189.60	967.18	1674.27	868.98	4.79	20.72	9.10	5.63
R3-3-14	913.78	3167.18	129.93	203.07	123.82	2.88	9.78	4.60	4.14
R3-3-15	2.28	7.19	0.00	4.24	1.50	0.00	0.00	0.00	1.67
R3-3-2	55.21	262.60	54.44	124.25	53.23	5.54	19.18	6.02	7.32
R3-3-3	45.19	214.94	42.90	97.53	42.22	4.24	15.10	4.57	5.39
R3-3-4	69.33	233.67	45.29	102.02	44.71	4.25	15.15	4.25	5.30
R3-3-5	62.95	302.22	54.38	120.44	54.30	4.55	16.20	4.67	5.51
R3-3-6	37.54	161.24	35.39	80.19	34.04	3.61	11.74	3.67	3.55
R3-3-7	46.93	239.71	46.25	102.71	46.15	4.02	13.55	4.19	5.13
R3-3-9	834.16	1286.78	84.11	162.63	90.70	3.21	11.89	4.03	5.72
R3-4-1	36.83	244.17	43.39	90.06	40.74	2.49	9.85	3.55	3.99
R3-4-10	224.66	8700.62	1692.52	3020.44	1466.79	2.09	8.26	4.02	3.43
R3-4-11	672.84	9342.72	1218.05	2166.02	1056.83	3.01	9.79	4.68	5.14
R3-4-13	116.16	596.84	95.15	178.89	85.73	1.76	6.15	2.19	3.27
R3-4-15	2.41	8.52	1.98	5.61	1.74	0.00	0.00	0.00	0.00
R3-4-2	24.71	176.87	33.41	71.38	31.93	2.39	7.96	2.76	3.78
R3-4-3	25.28	176.96	33.90	72.35	32.41	2.35	8.22	3.77	3.70
R3-4-4	71.22	227.29	29.35	63.13	27.47	2.22	7.40	3.16	3.24
R3-4-5	296.41	190.74	27.72	61.01	28.19	2.37	8.13	3.43	4.27
R3-4-6	29.85	129.96	27.25	59.63	26.73	2.30	7.94	3.17	3.62
R3-4-7	17.85	109.55	22.85	50.00	22.47	2.73	6.43	3.04	3.19
R3-4-9	139.84	2549.71	995.63	1752.68	849.89	4.38	13.37	7.68	4.65
R3-5-1	55.17	207.84	36.37	82.41	36.93	3.45	12.24	3.44	4.18
R3-5-10	10.66	69.58	16.31	38.66	18.30	1.98	6.47	1.95	2.96
R3-5-11	9.04	61.02	15.40	35.90	15.83	1.81	6.21	1.95	2.58
R3-5-12	11.33	76.12	18.79	43.51	20.27	2.28	7.15	1.92	2.75
R3-5-13	9.00	61.49	15.65	36.42	16.35	1.75	6.16	1.84	2.57
R3-5-14	29.99	383.18	80.17	157.17	71.94	2.69	9.04	2.78	3.61
R3-5-2	34.66	144.29	26.86	60.93	27.20	2.98	9.35	2.77	3.48
R3-5-3	19.47	103.95	21.67	50.24	22.47	2.41	8.29	2.49	3.64
R3-5-4	19.06	99.43	20.47	46.77	21.02	2.35	7.50	2.28	2.88
R3-5-5	16.42	93.12	20.78	48.32	22.37	2.38	8.83	2.67	3.07

R3-5-7	14.41	81.57	17.03	39.76	19.20	1.81	6.67	2.57	2.79
R3-5-8	14.20	86.61	19.89	45.52	21.23	2.12	7.53	2.12	2.79

5 Apr. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R3-2-1	2.56	19.33	4.99	12.86	5.38	0.00	5.85	0.00	0.00
R3-2-10	343.75	779.75	22.54	33.99	27.36	0.00	2.31	0.00	0.00
R3-2-11	5.01	27.26	5.51	13.10	5.72	0.00	4.68	0.00	0.00
R3-2-13	2.79	15.42	3.08	8.14	3.22	0.00	2.08	0.00	0.00
R3-2-14	2.36	12.32	2.64	8.02	3.16	0.00	3.65	0.00	0.00
R3-2-2	2.53	18.97	5.07	13.37	5.34	0.00	2.69	0.00	0.00
R3-2-3	1.67	12.25	3.40	9.36	3.61	0.00	2.49	0.00	0.00
R3-2-4	1.63	11.70	3.24	9.05	3.55	0.00	4.01	0.00	0.00
R3-2-5	1.60	11.53	3.11	8.79	3.13	0.00	2.01	0.00	0.00
R3-2-6	1.64	11.64	3.37	9.22	3.62	0.00	1.83	0.00	0.00
R3-2-7	1.52	11.31	3.08	5.89	3.35	0.00	1.50	0.00	0.00
R3-2-8	2.72	20.10	4.24	10.93	4.12	0.00	3.24	0.00	0.00
R3-2-9	58.37	200.72	15.15	28.46	14.63	0.00	2.69	0.00	0.00
R3-3-1	2.09	11.46	3.00	7.93	3.16	0.00	3.83	0.00	0.00
R3-3-10	893.51	4207.57	1283.40	2748.67	1103.17	41.05	197.43	69.12	10.00
R3-3-11	539.79	4583.56	1357.27	2818.80	1177.26	23.63	116.44	46.17	4.99
R3-3-12	1707.33	9792.29	1867.68	3721.10	1609.24	127.39	458.94	118.52	134.40
R3-3-13	285.42	7622.13	3033.28	6051.30	2592.37	122.95	529.61	169.23	40.36
R3-3-14	865.90	10179.97	2252.10	4423.86	1885.86	41.23	177.47	64.05	14.49
R3-3-2	1.54	9.93	2.51	7.04	2.73	0.00	1.97	0.00	0.00
R3-3-3	1.65	10.60	2.79	7.66	2.71	0.00	8.17	0.00	0.00
R3-3-4	8.07	57.42	17.99	37.63	15.17	0.00	1.96	0.00	0.00
R3-3-5	498.04	1769.01	214.45	388.49	191.42	0.00	3.74	0.82	0.00
R3-3-6	1273.60	3624.59	385.72	668.74	341.42	0.00	2.78	0.85	0.00

R3-3-7	1456.31	3922.39	330.50	536.60	297.43	0.00	3.57	0.90	0.00
R3-3-9	1381.36	4036.09	559.88	1126.29	484.06	15.05	69.41	23.72	5.73
R3-4-1	10.99	141.87	48.62	102.46	40.63	1.58	7.95	2.06	1.35
R3-4-10	557.51	2663.30	1238.95	2591.52	966.45	156.87	604.21	161.76	78.79
R3-4-11	76.38	357.22	1779.92	3742.36	1345.59	203.73	772.81	212.11	108.51
R3-4-12	95.64	1213.19	1474.08	3000.89	1179.05	115.01	447.21	135.25	59.45
R3-4-13	466.60	4615.38	1740.78	3427.68	1408.95	199.85	707.62	173.57	103.62
R3-4-2	7.47	96.39	32.33	69.04	27.26	1.13	5.88	1.51	1.06
R3-4-3	7.51	90.77	28.96	62.14	24.28	1.00	5.90	1.36	1.15
R3-4-4	22.98	148.86	30.57	65.42	25.77	0.99	5.68	1.24	0.98
R3-4-5	3.95	400.70	2.14	51.36	106.01	0.92	6.52	1.21	0.92
R3-4-6	308.69	703.84	106.80	212.00	88.13	1.38	5.72	1.70	1.62
R3-4-7	639.98	2900.74	249.37	388.04	224.90	1.12	5.25	1.32	1.02
R3-4-8	2190.68	4743.37	82.35	122.28	75.52	1.54	7.11	1.50	1.14
R3-4-9	1746.26	4821.90	401.68	773.46	334.75	43.57	171.72	43.69	32.43
R3-5-1	8.94	97.17	57.52	123.76	46.77	5.75	22.95	6.21	3.92
R3-5-11	27.62	321.95	181.99	406.11	157.16	16.51	80.33	19.74	14.19
R3-5-12	3.57	45.21	25.62	56.83	21.71	2.43	11.27	2.45	1.89
R3-5-13	3.00	36.45	20.74	45.91	17.39	1.88	9.77	2.20	1.61
R3-5-14	2.76	9.71	18.80	41.70	16.03	1.68	10.22	1.95	1.51
R3-5-2	6.94	76.52	44.67	96.82	36.24	4.36	18.15	4.62	2.99
R3-5-3	6.59	71.06	41.88	90.95	33.83	4.04	15.16	4.29	2.79
R3-5-4	11.59	132.48	75.40	163.54	61.68	7.14	28.04	7.55	4.38
R3-5-5	5.00	56.33	32.82	72.08	26.83	3.29	13.73	3.24	2.21
R3-5-7	5.89	71.54	41.20	90.39	34.03	3.98	40.51	4.20	2.67
R3-5-8	4.99	57.67	33.28	73.19	27.17	3.27	13.53	3.45	2.24
R3-5-9	4.89	60.87	33.82	74.76	28.60	3.18	14.59	3.75	2.65

6 June 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R3-2-1	0.00	2.92	0.00	2.62	0.00	0.00	0.00	0.00	0.00
R3-2-2	0.00	2.11	0.00	2.31	0.00	0.00	0.00	0.00	0.00
R3-2-3	0.00	2.03	0.00	2.09	0.00	0.00	0.00	0.00	0.00
R3-2-4	0.00	1.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-5	0.00	1.84	0.00	2.20	0.00	0.00	0.00	0.00	0.00
R3-2-6	3.07	6.05	0.00	2.20	0.00	0.00	0.00	0.00	0.00
R3-2-7	15.97	34.05	2.44	4.92	2.59	0.00	0.00	0.00	0.00
R3-2-8	390.80	1556.63	104.52	154.26	99.44	0.00	0.00	0.00	0.00
R3-2-9	291.11	1047.56	51.19	84.50	45.82	0.00	0.00	0.00	0.00
R3-2-10	472.43	982.67	82.64	142.07	68.69	0.00	1.84	1.62	0.00
R3-2-11	163.64	1048.42	129.93	228.75	110.36	1.19	5.40	2.43	0.00
R3-2-12	322.96	3969.59	767.38	1330.26	632.47	7.16	32.28	16.10	1.68
R3-2-14	314.00	3918.34	773.47	857.39	636.65	8.23	36.08	16.90	1.65
R3-2-15	0.00	9.11	4.57	8.30	4.45	0.00	0.00	0.00	0.00
R3-3-1	0.00	0.90	0.00	2.31	0.00	0.00	0.00	0.00	1.23
R3-3-2	0.00	0.00	0.00	1.61	0.00	0.00	0.00	0.00	0.00
R3-3-3	20.63	116.36	22.22	44.73	20.06	0.00	0.00	0.00	0.00
R3-3-4	309.90	1189.69	145.65	286.33	124.26	0.00	2.15	1.75	0.00
R3-3-5	239.13	701.15	225.02	416.45	196.66	0.00	3.20	2.53	0.00
R3-3-6	123.97	841.38	243.79	454.10	216.51	0.00	2.47	2.48	0.00
R3-3-7	820.89	2735.04	611.76	1175.97	533.43	1.87	9.62	6.98	0.00
R3-3-8	65.52	462.21	369.12	801.53	323.54	5.14	23.91	12.10	2.01
R3-3-9	26.36	161.12	738.23	1555.58	571.76	95.97	367.06	102.94	62.36
R3-3-10	74.10	1462.31	1240.43	2483.03	1017.01	123.57	475.10	124.24	85.68

R3-3-11	95.78	1755.32	3713.71	7143.15	2988.91	272.00	982.65	262.16	203.84
R3-3-12	89.40	618.46	2773.22	5468.63	2118.54	393.59	1300.50	330.90	313.26
R3-3-13	78.08	1885.84	2239.04	4635.34	1711.74	312.82	1070.85	277.03	220.56
R3-3-14	310.03	6380.75	2764.73	5417.59	2239.02	135.12	546.83	156.88	36.48
R3-3-15	0.00	4.07	1.27	3.71	1.36	0.00	0.00	0.00	0.00
R3-4-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-4-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-4-3	1.58	1.46	3.66	7.06	2.95	0.00	0.00	0.00	0.00
R3-4-4	2.10	14.23	16.88	32.76	14.78	0.00	0.00	0.00	0.00
R3-4-5	4.93	71.56	31.81	58.44	27.70	0.00	0.00	0.00	0.00
R3-4-6	7.19	212.43	111.15	200.14	98.46	0.00	0.00	0.00	0.00
R3-4-7	92.49	1113.08	256.93	424.99	233.47	0.00	0.00	0.00	0.00
R3-4-8	116.42	731.24	362.66	699.91	324.43	2.50	8.88	4.78	1.52
R3-4-9	28.47	207.84	541.65	1140.02	438.68	78.50	269.24	69.76	56.88
R3-4-10	42.51	342.62	638.38	1295.28	453.90	154.92	503.81	120.87	108.45
R3-4-11	28.01	328.98	1036.72	2033.05	771.61	107.89	357.68	93.27	73.12
R3-4-12	12.64	357.83	408.09	824.35	336.13	41.41	134.95	36.63	23.62
R3-4-13	21.35	77.06	536.35	1175.87	403.66	88.89	294.56	73.47	58.63
R3-4-15	0.00	4.82	1.79	5.69	2.02	0.00	0.00	0.00	0.00
R3-5-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

16 Aug. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R3-2-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-2-5	0.00	0.00	0.00	1.86	0.00	0.00	0.00	0.00	0.00
R3-2-6	23.01	131.20	16.22	22.12	17.28	0.00	0.00	0.00	0.63
R3-2-7	102.73	613.97	53.40	86.95	51.02	0.00	0.00	0.00	0.00
R3-2-8	8.36	198.48	186.44	352.81	143.96	2.91	10.45	4.67	0.00
R3-2-9	16.30	755.46	765.91	1377.36	583.83	10.37	39.87	17.48	3.52
R3-2-10	12.71	820.61	586.88	1037.63	451.87	20.95	79.34	25.87	7.26
R3-2-11	42.50	1106.15	995.14	1982.05	760.59	83.85	275.11	77.26	34.13
R3-2-12	36.16	144.94	816.89	1721.57	569.50	129.61	386.29	104.79	54.65
R3-2-13	2.72	18.37	120.65	205.31	89.47	5.28	18.44	6.21	2.24
R3-2-14	7.23	19.24	365.59	603.92	272.37	2.66	10.29	5.37	0.00
R3-2-15	14.63	62.09	18.02	35.72	13.84	0.00	1.48	0.00	0.00
R3-3-1	0.00	2.28	3.82	7.55	2.70	1.50	1.33	0.00	1.87
R3-3-2	0.00	1.08	2.58	4.86	1.54	0.00	0.00	0.00	0.00
R3-3-3	0.00	1.59	2.42	5.97	0.00	0.00	0.00	0.00	0.00
R3-3-4	1.58	11.96	20.53	51.17	16.85	2.61	2.23	0.00	0.00
R3-3-5	5.51	65.02	65.12	149.35	54.42	0.00	3.60	2.14	0.00
R3-3-6	39.05	427.88	20.40	422.36	178.85	1.34	7.37	4.22	0.00
R3-3-7	289.40	1949.88	563.16	1173.16	508.78	8.08	45.77	21.49	3.08
R3-3-8	51.17	550.38	332.31	770.09	296.06	28.65	104.23	35.76	13.93
R3-3-9	72.78	20.97	291.07	719.20	183.93	347.04	901.17	201.37	127.49

R3-3-10	62.38	176.71	1465.41	3167.11	1082.99	333.10	1000.04	243.92	195.64
R3-3-11	46.59	189.17	1436.86	3133.32	1117.08	234.37	758.74	191.45	160.56
R3-3-12	59.79	73.72	1385.78	3066.66	1052.50	244.81	736.45	177.55	136.43
R3-3-13	59.82	360.69	2296.25	4800.57	1862.57	313.32	999.92	244.26	214.75
R3-3-14	23.10	1195.59	1224.54	2478.65	1035.91	125.56	460.33	118.86	72.56
R3-3-15	4.61	35.04	11.50	23.81	9.97	0.00	2.61	0.00	0.00
R3-4-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-4-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-4-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-4-4	1.07	1.91	4.82	11.43	4.22	0.00	0.00	0.00	0.00
R3-4-5	1.35	4.79	16.63	36.49	13.23	0.00	0.00	0.00	0.00
R3-4-6	1.98	17.48	41.56	93.21	34.15	0.00	0.00	0.00	0.00
R3-4-7	2.15	60.24	86.59	193.27	71.77	0.00	0.00	0.00	0.00
R3-4-8	4.48	59.28	55.88	239.67	247.68	17.81	57.16	15.40	11.45
R3-4-9	18.86	12.39	53.72	148.40	33.52	154.99	420.77	97.97	105.07
R3-4-10	17.12	20.65	127.04	320.60	81.63	112.31	324.90	77.98	76.38
R3-4-11	5.69	14.53	64.58	179.87	44.22	45.19	148.01	38.53	32.08
R3-4-12	1.77	11.02	28.55	74.70	21.47	14.99	44.40	11.29	11.08
R3-4-13	3.93	6.97	49.21	138.47	36.34	39.72	124.96	29.07	25.97
R3-4-15	10.33	48.48	6.56	12.73	5.93	0.00	0.00	0.00	0.00
R3-5-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R3-5-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R3-5-15	8.12	44.11	6.18	12.48	5.81	0.00	0.00	0.00	0.00

J. 3. E95 gate c. Row 4

13 Apr. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R4-1-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-1	0.00	0.00	0.00	1.32	0.00	0.00	1.39	0.00	0.00
R4-2-10	169.01	299.55	0.00	1.38	0.00	0.00	0.00	0.00	0.00
R4-2-11	61.00	305.42	1.80	2.18	2.87	0.00	0.00	0.00	0.00
R4-2-12	63.66	531.80	8.51	5.66	11.89	0.00	0.00	0.00	0.00
R4-2-13	100.05	275.00	0.00	1.22	0.00	0.00	1.06	0.00	0.00
R4-2-14	63.49	6.25	0.00	1.35	0.00	0.00	2.44	0.00	0.00
R4-2-2	0.00	0.00	0.00	1.27	0.00	0.00	1.34	0.00	0.00
R4-2-3	0.00	0.00	0.00	1.31	0.00	0.00	1.45	0.00	0.00

R4-2-4	0.00	0.05	0.00	1.32	0.00	0.00	1.90	0.00	0.00
R4-2-5	0.99	0.08	0.00	1.35	0.00	0.00	0.67	0.00	0.00
R4-2-6	65.72	146.16	2.48	3.49	2.74	0.00	0.94	0.00	0.00
R4-2-7	299.06	678.95	23.07	28.65	22.94	0.00	0.00	0.00	0.00
R4-2-8	103.21	107.13	0.99	2.03	1.31	0.00	0.00	0.00	0.00
R4-2-9	17.18	3.20	0.00	1.31	0.00	0.00	0.00	0.00	0.00
R4-3-1	1.38	0.00	0.00	1.21	0.00	0.00	1.08	0.00	0.00
R4-3-10	1637.38	10290.27	1190.37	1855.24	978.59	0.00	0.00	0.00	0.00
R4-3-11	2537.04	16337.91	2131.97	3651.02	1742.19	0.00	5.44	0.00	0.00
R4-3-12	1796.77	11792.20	1239.05	1936.91	1014.65	0.00	0.00	0.00	0.00
R4-3-13	1768.00	7463.41	415.28	532.85	350.90	0.00	0.99	0.00	0.00
R4-3-14	561.59	775.93	5.74	6.83	5.48	0.00	0.78	0.00	0.00
R4-3-2	25.11	0.00	0.00	1.33	0.00	0.00	1.52	0.00	0.00
R4-3-3	0.00	0.00	0.00	1.30	0.00	0.00	1.91	0.00	0.00
R4-3-4	0.96	0.00	0.00	1.27	0.00	0.00	1.15	0.00	0.00
R4-3-5	48.75	83.15	1.09	2.20	0.98	0.00	1.07	0.00	0.93
R4-3-6	277.43	246.10	2.43	3.05	2.35	0.00	2.27	0.00	0.00
R4-3-7	2975.61	9766.27	473.61	652.10	407.00	0.00	1.13	0.00	0.00
R4-3-8	1455.65	7634.76	351.53	445.52	303.68	0.00	1.12	0.00	0.00
R4-3-9	1237.47	4074.43	98.28	112.16	83.02	0.00	1.74	0.00	0.00
R4-4-1	1.10	5.10	0.77	2.30	0.00	0.00	1.16	0.00	0.00
R4-4-10	270.87	737.43	2.89	3.52	3.29	0.00	2.54	0.00	0.00
R4-4-11	129.87	944.88	16.62	13.39	16.17	0.00	0.93	0.00	0.00
R4-4-12	38.46	46.43	0.00	1.94	0.00	0.00	0.76	0.00	0.00
R4-4-13	14.57	4.15	0.00	2.08	0.00	0.00	1.01	0.00	0.00
R4-4-14	0.00	2.32	0.00	1.80	0.00	0.00	1.63	0.00	0.00
R4-4-2	0.82	3.71	0.80	2.31	0.00	0.00	0.00	0.00	0.00
R4-4-3	0.00	2.10	0.00	1.87	1.01	0.00	1.12	0.00	0.00
R4-4-4	0.83	4.14	0.85	2.38	0.00	0.00	0.72	0.00	0.00
R4-4-5	0.00	2.11	0.00	1.75	0.00	0.00	1.09	0.00	0.00
R4-4-6	0.00	4.93	0.70	2.42	0.00	0.00	0.89	0.00	0.00

R4-4-7	3.62	7.80	0.00	1.77	0.00	0.00	1.27	0.00	0.00
R4-4-8	27.18	156.34	0.00	1.64	0.00	0.00	1.17	0.00	0.00
R4-4-9	292.38	476.80	0.00	1.75	0.00	0.00	0.86	0.00	0.00
R4-5-1	0.90	0.83	1.00	2.81	1.05	0.00	0.00	0.00	1.48
R4-5-10	0.00	0.34	0.00	1.39	0.00	0.00	1.36	0.00	0.00
R4-5-11	0.00	0.58	0.00	1.59	0.00	0.00	1.12	0.00	0.00
R4-5-12	0.00	0.67	0.00	1.56	0.00	0.00	1.14	0.00	0.00
R4-5-13	0.00	0.48	0.00	1.55	0.00	0.00	4.48	0.00	0.00
R4-5-14	0.00	0.57	0.00	1.62	0.00	0.00	2.35	0.00	0.00
R4-5-2	0.00	0.00	0.00	1.57	0.00	0.00	1.21	0.00	0.00
R4-5-3	0.00	0.00	0.00	1.50	0.00	0.00	2.05	0.00	0.00
R4-5-4	0.00	0.00	0.00	1.41	0.00	0.00	3.08	0.00	0.00
R4-5-5	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.00	0.00
R4-5-6	0.00	0.11	0.00	1.84	0.00	0.00	1.74	0.00	0.00
R4-5-7	0.00	0.00	0.00	1.59	0.00	0.00	1.10	0.00	0.00
R4-5-8	0.00	0.00	0.00	1.36	0.00	0.00	3.39	0.00	0.00
R4-5-9	0.00	0.39	0.00	1.46	0.00	0.00	2.58	0.00	0.88
R4-5-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-4-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-3-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R4-6-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2 June 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R4-1-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-1-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-10	986.60	2968.55	182.41	256.85	165.16	0.00	0.00	0.00	0.00
R4-2-11	1021.71	3570.65	304.81	501.09	260.25	0.00	0.00	0.00	0.00
R4-2-12	980.86	3276.36	517.30	1008.58	437.45	2.54	14.81	10.31	0.00

R4-2-13	1017.05	4035.09	503.25	996.85	426.94	7.09	38.51	19.99	0.00
R4-2-14	941.01	4154.24	682.22	1364.52	577.37	5.22	29.41	18.82	0.00
R4-2-15	0.00	6.21	0.00	2.66	0.00	0.00	0.00	0.00	0.00
R4-2-2	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.00	0.00
R4-2-3	0.00	0.00	0.00	1.42	0.00	0.00	0.00	0.00	0.00
R4-2-4	0.00	0.00	0.00	1.46	0.00	0.00	0.00	0.00	0.00
R4-2-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-6	23.04	2.32	0.00	1.88	0.00	0.00	0.00	0.00	0.00
R4-2-7	5.45	191.71	12.88	26.45	10.57	0.00	0.00	0.00	0.00
R4-2-8	11.75	391.91	43.75	89.05	37.11	0.00	0.00	0.00	0.00
R4-2-9	292.67	1329.27	193.98	341.15	166.27	0.00	0.00	0.00	0.00
R4-3-1	15.11	22.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-3-10	108.26	1088.78	2329.91	4879.83	1831.34	43.39	250.44	117.13	0.00
R4-3-11	91.86	2791.81	2698.32	5467.62	2198.85	38.86	217.79	100.21	1.78
R4-3-12	306.21	5426.27	2669.62	5223.94	2213.28	55.37	281.42	106.76	2.06
R4-3-13	411.79	6692.93	2749.27	5260.40	2321.78	33.56	184.07	78.63	0.00
R4-3-14	567.59	9973.60	2636.91	4882.87	2200.21	7.65	51.10	32.72	0.00
R4-3-15	0.00	15.45	5.16	11.23	4.17	0.00	0.00	0.00	0.00
R4-3-2	322.45	546.71	8.27	9.45	8.12	0.00	0.00	0.00	0.00
R4-3-3	1373.87	1376.52	2.42	2.52	3.13	0.00	0.00	0.00	0.00
R4-3-4	555.49	157.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-3-5	2542.22	5736.91	425.67	682.57	361.96	2.76	0.00	0.00	0.00
R4-3-6	2331.27	6729.56	463.47	749.40	393.24	2.35	1.05	1.32	0.00
R4-3-7	2547.27	7286.45	745.65	1318.93	635.38	2.05	10.54	7.09	0.00
R4-3-8	1454.06	4221.43	1410.84	2830.15	1172.47	6.14	38.47	27.11	0.00
R4-3-9	419.17	3616.81	2361.52	4594.60	1902.26	6.94	44.03	29.78	0.00
R4-4-1	0.00	3.81	0.00	2.30	0.00	0.00	0.00	0.00	0.00
R4-4-10	201.16	77.69	1.41	2.68	1.48	0.00	0.00	0.00	0.00
R4-4-11	322.27	75.16	4.49	4.80	4.41	0.00	0.00	0.00	0.00
R4-4-12	7.87	6.82	0.00	2.75	0.00	0.00	0.00	0.00	0.00
R4-4-13	0.00	4.07	0.00	2.22	0.00	0.00	0.00	0.00	0.00

R4-4-14	0.00	2.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-4-15	0.00	1.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-4-2	71.19	189.58	0.00	2.39	0.00	0.00	0.00	0.00	0.00
R4-4-3	245.05	495.35	0.00	2.46	0.00	0.00	0.00	0.00	0.00
R4-4-4	76.78	17.15	0.00	2.28	0.00	0.00	0.00	0.00	0.00
R4-4-5	830.19	1085.76	0.00	2.06	5.70	0.00	0.00	0.00	0.00
R4-4-6	916.11	2315.70	0.00	2.00	7.61	0.00	0.00	0.00	0.00
R4-4-7	596.63	2265.72	2.16	2.33	3.63	0.00	0.00	0.00	0.00
R4-4-8	780.70	585.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-4-9	181.22	135.83	0.00	2.15	0.00	0.00	0.00	0.00	0.00
R4-5-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-11	0.00	4.94	2.04	5.54	1.74	0.00	0.00	0.00	0.00
R4-5-12	0.00	6.85	3.08	7.03	2.61	0.00	0.00	0.00	0.00
R4-5-13	0.00	6.29	2.78	6.71	2.81	0.00	0.00	0.00	0.00
R4-5-14	0.00	9.32	3.85	8.63	3.13	0.00	0.00	0.00	0.00
R4-5-15	0.00	7.50	2.85	6.65	2.55	0.00	0.00	0.00	0.00
R4-5-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-4	0.00	1.96	0.00	2.34	0.00	0.00	0.00	0.00	0.00
R4-5-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-6	0.00	1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R4-6-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-6-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

16 Aug. 05

Point_Name	Benzene	Toluene	Ethylbenzene	PM_xylene	O_xylene	125TBenzene	124TBenzene	123TBenzene	Naphthalene
R4-2-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.29
R4-2-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-2-7	105.86	264.67	87.99	175.89	73.91	0.00	2.11	1.37	0.00
R4-2-8	200.24	844.72	315.39	689.71	261.39	6.27	27.58	13.92	1.28
R4-2-9	242.54	1016.32	427.24	888.51	360.17	5.19	22.77	10.17	0.00
R4-2-10	246.83	1353.56	362.13	684.33	314.89	2.81	12.64	5.91	0.00
R4-2-11	295.69	2221.69	464.13	841.17	405.41	3.14	16.32	8.99	0.00
R4-2-12	127.38	4324.70	2327.23	4780.33	1945.02	110.93	441.06	133.48	57.08
R4-2-13	69.73	2357.78	2589.79	5276.59	2114.81	193.94	700.44	185.88	137.21
R4-2-14	55.07	1529.84	2685.49	5501.10	2188.00	226.12	816.60	218.61	135.07
R4-2-15	0.00	8.02	9.67	20.80	8.28	0.00	2.31	0.00	0.00

R4-3-1	1.19	12.21	13.73	28.48	10.91	0.00	2.90	0.00	0.00
R4-3-2	1.27	10.57	17.62	32.65	14.17	0.00	2.48	0.00	0.00
R4-3-3	23.91	126.17	58.50	107.35	49.10	0.00	1.59	0.00	0.00
R4-3-4	48.51	590.63	149.02	257.07	129.06	0.00	1.61	0.00	0.00
R4-3-5	190.06	1360.99	326.72	593.89	285.58	0.00	1.50	0.00	0.00
R4-3-6	238.63	1169.38	383.70	750.14	333.65	0.00	4.63	2.17	0.00
R4-3-7	186.72	459.94	612.44	1496.49	478.73	35.13	153.32	56.75	6.45
R4-3-8	241.33	737.41	859.35	2035.68	679.16	49.44	203.00	62.42	22.53
R4-3-9	300.30	1680.87	1043.43	2294.30	846.61	120.95	456.34	126.72	34.02
R4-3-10	56.33	437.28	1166.66	2652.10	867.94	236.50	751.57	195.16	113.75
R4-3-11	55.00	310.45	1938.39	4168.95	1447.43	238.75	809.66	217.80	118.17
R4-3-12	55.55	429.99	2612.97	5406.66	1996.26	257.49	911.84	245.20	131.64
R4-3-13	49.45	663.34	2486.56	5203.05	1950.46	196.53	731.87	203.07	85.36
R4-3-14	99.50	3214.73	2370.24	4879.65	1932.14	104.93	438.65	140.25	27.30
R4-3-15	0.00	5.24	5.75	12.56	4.63	0.00	1.46	0.00	0.00
R4-4-1	0.00	5.13	7.29	16.23	5.55	0.00	1.99	0.00	0.00
R4-4-2	9.16	4.42	3.24	7.38	2.69	0.00	0.00	0.00	0.00
R4-4-3	3.67	7.75	12.45	18.84	10.85	0.00	0.00	0.00	0.00
R4-4-4	3.37	52.88	26.86	36.37	25.69	0.00	0.00	0.00	0.00
R4-4-5	3.06	58.92	60.49	97.92	52.58	0.00	0.00	0.00	0.00
R4-4-6	2.25	32.50	51.91	88.63	44.73	0.00	0.00	0.00	0.00
R4-4-7	1.47	46.72	17.80	24.08	17.87	0.00	0.00	0.00	0.00
R4-4-8	2.73	137.50	4.32	6.30	4.22	0.00	0.00	0.00	0.00
R4-4-9	1.82	54.73	4.24	7.35	3.42	0.00	0.00	0.00	0.00
R4-4-10	0.00	4.92	2.03	3.21	1.30	0.00	0.00	0.00	0.00
R4-4-11	0.00	2.84	2.77	6.19	2.91	0.00	0.00	0.00	1.25
R4-4-12	0.00	1.22	2.14	5.18	1.93	0.00	0.00	0.00	0.00
R4-4-13	0.00	1.24	2.01	4.46	1.35	0.00	0.00	0.00	0.00
R4-4-14	0.00	1.92	1.90	4.20	1.41	0.00	0.00	0.00	0.00
R4-4-15	73.85	288.25	30.95	59.08	30.42	0.00	1.81	0.00	0.00
R4-5-1	0.00	1.07	0.00	0.00	0.00	0.00	0.00	0.00	1.47

R4-5-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-6	0.00	0.00	1.65	3.48	0.00	0.00	0.00	0.00	0.00
R4-5-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R4-5-15	16.55	95.95	11.71	23.71	11.78	0.00	0.00	0.00	0.00

Appendix 1

C. Dissolved Oxygen (mg/L)

1. GMT gate

a. Row 1

30 Nov. 04

Point_Name	DOxygen
R2-1-1	3.08
R2-1-2	3.40
R2-1-3	2.90
R2-1-4	4.10
R2-1-5	5.30
R2-1-6	4.30
R2-1-7	3.80
R2-1-8	3.90
R2-1-9	4.10
R2-1-10	4.60
R2-1-11	4.70
R2-1-12	5.30
R2-1-13	4.80
R2-1-14	5.20
R2-1-15	3.08
R2-2-1	5.40
R2-2-2	2.50
R2-2-3	5.50
R2-2-4	5.70
R2-2-5	4.40
R2-2-6	3.70
R2-2-7	3.50
R2-2-8	3.10
R2-2-9	3.70
R2-2-10	3.50
R2-2-11	3.60
R2-2-12	7.50
R2-2-13	4.00
R2-2-14	4.10
R2-2-15	3.08
R2-3-1	3.90
R2-3-2	4.70
R2-3-3	4.40
R2-3-4	6.90
R2-3-5	3.30
R2-3-6	3.20
R2-3-7	3.40
R2-3-8	3.90
R2-3-9	4.00
R2-3-10	4.40
R2-3-11	4.60
R2-3-12	3.40
R2-3-13	3.90
R2-3-14	2.80
R2-3-15	3.08
R2-4-1	4.90
R2-4-2	4.30
R2-4-3	6.10
R2-4-4	6.50
R2-4-5	4.60
R2-4-6	4.20
R2-4-7	3.40
R2-4-8	4.10
R2-4-9	3.70
R2-4-10	4.60
R2-4-11	4.70
R2-4-12	4.80
R2-4-13	3.80
R2-4-14	3.90
R2-4-15	3.08
R2-5-1	4.60
R2-5-2	4.50
R2-5-3	5.80
R2-5-4	4.80
R2-5-5	4.00
R2-5-6	3.70
R2-5-7	4.30
R2-5-8	4.20
R2-5-9	4.30
R2-5-10	4.70
R2-5-11	4.10
R2-5-12	4.40
R2-5-13	3.10
R2-5-14	3.30
R2-5-15	3.08
R2-6-1	6.20
R2-6-2	5.70
R2-6-3	5.40
R2-6-4	4.70
R2-6-5	4.60
R2-6-6	4.80
R2-6-7	4.10
R2-6-8	3.80
R2-6-9	3.80
R2-6-10	3.50
R2-6-11	3.60

R2-6-12	4.20
R2-6-13	3.90
R2-6-14	4.00
R2-6-15	4.20

2. GMT gate

b. Row 2

24 Nov. 04

Point_Name	DO
R2-1-1	3.10
R2-1-4	1.20
R2-1-7	5.10
R2-1-10	5.80
R2-1-13	4.30
R2-2-1	1.30
R2-2-4	1.10
R2-2-7	4.70
R2-2-10	4.40
R2-2-13	4.60
R2-3-1	0.70
R2-3-4	1.60
R2-3-7	1.30
R2-3-10	3.00
R2-3-13	2.40
R2-4-1	0.90
R2-4-4	3.30
R2-4-7	3.90
R2-4-10	2.00
R2-4-13	3.30
R2-5-1	2.80
R2-5-4	5.70
R2-5-7	4.20
R2-5-10	4.90
R2-5-13	3.40
R2-6-1	1.50
R2-6-4	5.40
R2-6-7	6.30
R2-6-10	4.30
R2-6-13	3.33

8 Dec. 04

Point_Name	DO
R2-1-1	1.90
R2-1-4	1.00
R2-1-7	4.30
R2-1-10	3.40
R2-1-13	3.30
R2-2-1	1.00
R2-2-4	0.80
R2-2-7	4.50
R2-2-10	3.40
R2-2-13	1.90
R2-3-1	0.60
R2-3-4	1.30
R2-3-7	0.80
R2-3-10	0.70
R2-3-13	2.00
R2-4-1	0.90
R2-4-4	2.70
R2-4-7	2.70
R2-4-10	0.90
R2-4-13	1.70
R2-5-1	2.40
R2-5-5	5.40
R2-5-7	3.80
R2-5-10	4.10
R2-5-13	2.50
R2-6-1	2.00
R2-6-4	5.10
R2-6-7	5.10
R2-6-10	4.10
R2-6-13	8.40

8 June 05

Point_Name	DO
R2-6-1	6.90
R2-6-4	8.60
R2-6-7	2.30
R2-6-10	8.50
R2-6-13	2.70
R2-5-1	3.50
R2-5-7	3.30
R2-5-10	3.00
R2-5-13	3.50
R2-4-1	0.50
R2-4-4	3.20
R2-4-7	0.80
R2-4-10	0.20
R2-4-13	0.10
R2-3-1	0.20
R2-3-4	0.20
R2-3-7	0.10
R2-3-10	0.10
R2-3-13	0.10
R2-2-1	1.00
R2-2-4	3.80
R2-2-7	3.30
R2-2-10	4.10
R2-2-13	1.50
R2-1-1	3.60
R2-1-4	1.10
R2-1-7	4.10
R2-1-10	4.10
R2-1-13	2.40

3. GMT gate

c. Row 3

6 June 05

Point_ID	DO
R3-6-1	0.30
R3-6-4	0.10
R3-6-7	0.30
R3-6-10	2.90
R3-6-13	2.40
R3-5-1	0.30
R3-5-4	0.20
R3-5-7	0.70
R3-5-10	3.90
R3-5-13	4.20
R3-4-1	0.20
R3-4-4	0.10
R3-4-7	0.20
R3-4-10	2.70
R3-4-13	2.10
R3-3-1	3.50
R3-3-4	0.20
R3-3-7	0.30
R3-3-10	0.10
R3-3-13	1.30
R3-2-1	0.20
R3-2-4	0.10
R3-2-7	0.20
R3-2-10	1.60
R3-2-13	0.10
R3-1-1	0.10
R3-1-4	0.10
R3-1-7	0.20
R3-1-10	2.30
R3-1-13	3.10

4. GMT gate

d. Row 4

2 June 05

Point_Name	DO
R4-6-1	0.30
R4-6-4	0.60
R4-6-7	1.10
R4-6-10	2.60
R4-6-13	2.30
R4-5-1	0.20
R4-5-4	0.40
R4-5-7	0.60

R4-5-10	0.80
R4-5-13	1.30
R4-4-1	0.50
R4-4-4	0.40
R4-4-7	0.20
R4-4-10	2.10
R4-4-13	2.30
R4-3-1	0.10
R4-3-4	0.20
R4-3-7	0.30
R4-3-10	0.10
R4-3-13	0.40
R4-2-1	0.20
R4-2-4	0.10
R4-2-7	0.30
R4-2-10	0.40
R4-2-13	1.40
R4-1-1	0.30
R4-1-4	0.20
R4-1-7	0.30
R4-1-10	0.30
R4-1-13	1.40

2. E10 gate

a. Row 1

12 Dec. 04

Point_Name	DO
R1-1-1	4.70
R1-1-2	3.90
R1-1-3	5.40
R1-1-4	6.10
R1-1-5	6.60
R1-1-6	5.70
R1-1-7	4.60
R1-1-8	3.60
R1-1-9	3.10
R1-1-10	3.60
R1-1-11	3.60
R1-1-12	3.80
R1-1-13	4.20
R1-1-14	3.70
R1-1-15	3.70
R1-2-1	6.20
R1-2-2	6.20
R1-2-3	7.30
R1-2-4	6.40
R1-2-5	6.70
R1-2-6	6.00
R1-2-7	4.80
R1-2-8	4.10
R1-2-9	3.80
R1-2-10	3.60
R1-2-11	3.70
R1-2-12	4.20
R1-2-13	4.30
R1-2-14	4.10
R1-2-15	4.10
R1-3-1	6.70
R1-3-2	5.70
R1-3-3	6.30
R1-3-4	7.20
R1-3-5	6.00
R1-3-6	5.60
R1-3-7	4.90
R1-3-8	4.80
R1-3-9	4.40
R1-3-10	4.60
R1-3-11	3.70
R1-3-12	3.60
R1-3-13	2.40
R1-3-14	2.10
R1-3-15	2.10
R1-4-1	6.70
R1-4-2	6.70
R1-4-3	6.90
R1-4-4	5.80
R1-4-5	6.20
R1-4-6	5.60
R1-4-7	5.20
R1-4-8	5.00
R1-4-9	4.10
R1-4-10	4.10
R1-4-11	3.70
R1-4-12	3.20
R1-4-13	3.40
R1-4-14	4.00
R1-4-15	4.00
R1-5-1	6.00
R1-5-2	5.50
R1-5-3	5.60
R1-5-4	5.10
R1-5-5	5.10
R1-5-6	5.00
R1-5-7	6.60

R1-5-8	4.00
R1-5-9	3.80
R1-5-10	3.50
R1-5-11	3.60
R1-5-12	4.00
R1-5-13	4.00
R1-5-14	3.80
R1-5-15	3.80
R1-6-1	6.80
R1-6-2	7.70
R1-6-3	7.30
R1-6-4	6.60
R1-6-5	7.20
R1-6-6	5.70
R1-6-7	5.10
R1-6-8	4.00
R1-6-9	3.50
R1-6-10	3.20
R1-6-11	3.40
R1-6-12	3.60
R1-6-13	4.10
R1-6-14	4.00
R1-6-15	4.00

3. E10 gate

a. Row 2

24 Nov. 04

Point_Name	DO
R2-1-2	1.2
R2-1-4	1.2
R2-1-7	4.8
R2-1-10	4.0
R2-1-13	3.3
R2-2-1	2.3
R2-2-4	4.1
R2-2-7	4.7
R2-2-10	1.2
R2-2-13	1.0
R2-3-1	1.1
R2-3-4	4.8
R2-3-7	2.8
R2-3-10	0.9
R2-3-13	1.2
R2-4-1	1.4
R2-4-4	4.0
R2-4-7	4.3
R2-4-10	1.5
R2-4-13	1.6
R2-5-1	3.6
R2-5-4	6.3
R2-5-7	6.0
R2-5-10	4.0
R2-5-13	3.4
R2-6-1	4.3
R2-6-4	5.8
R2-6-7	5.3
R2-6-10	3.5
R2-6-13	3.9

9 Dec. 04

Point_Name	DO
R2-1-1	0.8
R2-1-4	1.1
R2-1-7	4.6
R2-1-10	4.2
R2-1-13	3.1
R2-2-1	2.2
R2-2-4	5.6
R2-2-7	4.4
R2-2-10	0.8
R2-2-13	0.9
R2-3-1	0.6
R2-3-4	5.4
R2-3-7	0.8
R2-3-10	0.6
R2-3-13	0.5
R2-4-1	2
R2-4-4	3.3
R2-4-7	5.5
R2-4-10	0.5
R2-4-13	0.6
R2-5-1	5
R2-5-4	6.1
R2-5-7	6
R2-5-10	4.4
R2-5-13	3.6
R2-6-1	4.7
R2-6-4	6

R2-6-7	6.4
R2-6-10	5
R2-6-13	3.3

8 June 05

Point_Name	DO
R2-6-1	4.70
R2-6-4	5.30
R2-6-7	5.10
R2-6-10	3.50
R2-6-13	2.90
R2-5-1	3.30
R2-5-4	8.40
R2-5-7	6.50
R2-5-10	6.10
R2-5-13	7.30
R2-4-1	1.10
R2-4-4	4.20
R2-4-7	4.20
R2-4-10	0.90
R2-4-13	0.40
R2-3-1	3.30
R2-3-4	3.40
R2-3-7	3.20
R2-3-10	2.20
R2-3-13	0.50
R2-2-1	6.10
R2-2-4	6.30
R2-2-7	7.80
R2-2-10	8.80
R2-2-13	4.30
R2-1-1	0.20
R2-1-4	4.40
R2-1-7	6.30
R2-1-10	5.40
R2-1-13	7.60

4. E10 gate

c. Row 3

7 June 05

Point_Name	DO
R3-6-1	1.00
R3-6-4	3.30
R3-6-7	4.20
R3-6-10	3.80
R3-6-13	3.10
R3-5-1	0.20
R3-5-4	4.00
R3-5-7	3.90
R3-5-10	4.00
R3-5-13	3.50
R3-4-1	0.10
R3-4-4	2.50
R3-4-7	0.70
R3-4-10	0.10
R3-4-13	0.10
R3-3-1	0.20
R3-3-4	1.20
R3-3-7	0.80
R3-3-10	0.10
R3-3-13	0.10
R2-2-1	0.10
R2-2-4	1.10
R2-2-7	2.60
R2-2-10	0.20
R2-2-13	0.10
R2-1-1	0.20
R2-1-4	1.80
R2-1-7	3.90
R2-1-10	2.00
R2-1-13	3.20

5. E10 gate

d. Row 4

2 June 05

Point_Name	DO
R4-6-4	4.4
R4-6-7	5.1
R4-6-10	2.5

R4-6-13	3
R4-5-1	0.5
R4-5-4	2.1
R4-5-7	5
R4-5-10	3.2
R4-5-13	3.1
R4-4-1	6.2
R4-4-4	2.8
R4-4-7	5.8
R4-4-10	0.9
R4-4-13	0.3
R4-3-1	0.7
R4-3-4	0.9
R4-3-7	0.4
R4-3-10	0.4
R4-3-13	0.4
R4-2-1	1.1
R4-2-4	4.1
R4-2-7	1.6
R4-2-10	1
R4-2-13	0.3
R4-1-1	0.5
R4-1-4	0.4
R4-1-7	2
R4-1-10	4.6
R4-1-13	3.1

3. E95 gate

b. Row 1

29 Nov. 04

Point_Name	DO
R1-1-1	1.60
R1-1-2	0.80
R1-1-3	0.90
R1-1-4	1.80
R1-1-5	2.50
R1-1-6	3.60
R1-1-7	3.90
R1-1-8	4.50
R1-1-9	5.20
R1-1-10	6.00
R1-1-11	5.60
R1-1-12	4.20
R1-1-13	2.40
R1-1-14	1.00
R1-1-15	1.00
R1-2-1	2.80
R1-2-2	2.10
R1-2-3	1.80
R1-2-4	2.30
R1-2-5	3.40
R1-2-6	3.00
R1-2-7	3.50
R1-2-8	4.20
R1-2-9	4.80
R1-2-10	5.50
R1-2-11	5.10
R1-2-12	4.50
R1-2-13	3.50
R1-2-14	1.70
R1-2-15	1.70
R1-3-1	4.20
R1-3-2	3.80
R1-3-3	2.30
R1-3-4	3.40
R1-3-5	3.00
R1-3-6	2.90
R1-3-7	2.90
R1-3-8	3.20
R1-3-9	4.20
R1-3-10	4.80
R1-3-11	3.60
R1-3-12	2.00
R1-3-13	1.20
R1-3-14	1.40
R1-3-15	1.40
R1-4-1	3.10
R1-4-2	3.20
R1-4-3	3.50
R1-4-4	2.60
R1-4-5	2.70
R1-4-6	3.00
R1-4-7	3.60
R1-4-8	3.80
R1-4-9	4.30
R1-4-10	4.50
R1-4-11	3.50
R1-4-12	3.50
R1-4-13	2.30
R1-4-14	2.50
R1-4-15	2.50

R1-5-1	3.40
R1-5-2	3.70
R1-5-3	3.20
R1-5-4	3.30
R1-5-5	2.60
R1-5-6	2.50
R1-5-7	3.10
R1-5-8	3.60
R1-5-9	2.00
R1-5-10	3.60
R1-5-11	3.80
R1-5-12	2.60
R1-5-13	1.50
R1-5-14	1.50
R1-5-15	1.50
R1-6-1	0.70
R1-6-2	1.80
R1-6-3	3.00
R1-6-4	3.00
R1-6-5	3.20
R1-6-6	3.10
R1-6-7	3.00
R1-6-8	3.20
R1-6-9	3.80
R1-6-10	4.70
R1-6-11	3.90
R1-6-12	3.30
R1-6-13	2.10
R1-6-14	1.30
R1-6-15	1.30

4. E95 gate

a. Row 2

24 Nov. 04

Point_Name	DO
R2-1-1	3.7
R2-1-4	4.4
R2-1-6	5.4
R2-1-10	4.9
R2-1-13	4.4
R2-2-1	6.7
R2-2-4	4
R2-2-7	5.5
R2-2-10	4.4
R2-2-13	4.5
R2-3-1	3.8
R2-3-4	2.3
R2-3-7	2.5
R2-3-10	3.8
R2-3-13	2.2
R2-4-1	2
R2-4-4	1.2
R2-4-7	2.3
R2-4-10	1.6
R2-4-13	1.1
R2-5-1	1.8
R2-5-4	3.8
R2-5-6	4.7
R2-5-10	4.6
R2-5-13	2.3
R2-6-1	2.9
R2-6-4	4.4
R2-6-10	2.9
R2-6-13	2.1

9 Dec. 04

Point_Name	DO
R2-1-1	4.1
R2-1-4	2.6
R2-1-6	4
R2-1-10	4.4
R2-1-13	4
R2-2-1	6.4
R2-2-4	3.3
R2-2-7	4.9
R2-2-10	3.7
R2-2-13	4.6
R2-3-1	4.7
R2-3-4	2.3
R2-3-7	1
R2-3-10	1
R2-3-13	1.7
R2-4-1	2.6

R2-4-4	1.1
R2-4-7	0.9
R2-4-10	1.5
R2-4-13	0.7
R2-5-1	0.9
R2-5-4	1.9
R2-5-6	1
R2-5-10	3.7
R2-5-13	2.4
R2-6-1	0.7
R2-6-4	3.4
R2-6-7	2.9
R2-6-10	2.2
R2-6-13	2.1

9 June 05

Point_Name	DO
R2-6-1	1.7
R2-6-4	2.7
R2-6-7	2.3
R2-6-10	3.6
R2-6-13	1.3
R2-5-1	4
R2-5-4	3
R2-5-8	3.3
R2-5-10	3.5
R2-5-13	1.9
R2-4-1	2.9
R2-4-4	0.1
R2-4-7	1
R2-4-10	0.6
R2-4-13	0.1
R2-3-1	2.6
R2-3-4	0.3
R2-3-7	0.1
R2-3-10	0.1
R2-3-13	1.8
R2-2-1	2.9
R2-2-4	0.1
R2-2-7	1
R2-2-10	0.6
R2-2-13	0.1
R2-1-1	3.5
R2-1-4	2
R2-1-8	5.3
R2-1-10	4
R2-1-13	4.2

5. E95 gate

c. Row 3

7 June 05

Point_Name	DO
R3-6-1	0.2
R3-6-4	1.4
R3-6-7	1.2
R3-6-10	2.3
R3-6-13	0.2
R3-5-1	0.2
R3-5-4	1.6
R3-5-7	0.9
R3-5-10	2.6
R3-5-13	1.5
R3-4-1	2
R3-4-4	1.7
R3-4-7	0.2
R3-4-10	0.1
R3-4-13	0.1
R3-3-1	4
R3-3-4	0.1
R3-3-7	0.1
R3-3-10	0.1
R3-2-1	3.6
R3-2-4	0.1
R3-1-1	4.4
R3-1-4	3.1
R3-1-7	2.1
R3-1-10	3.3
R3-1-13	3

6. E95 gate

d. Row 4

3 June 05

Point_Name	DO
R4-6-1	0.2
R4-6-4	0.3
R4-6-7	1.1
R4-6-10	3.3
R4-6-13	1.2
R4-5-1	0.4
R4-5-4	0.3
R4-5-7	2.6
R4-5-10	2.9
R4-5-13	1.2
R4-4-1	0.2
R4-4-4	0.2
R4-4-7	0.1
R4-4-10	0.2
R4-4-13	1.5
R4-3-1	2.5
R4-3-4	0.1
R4-3-7	0.3
R4-3-10	0.2
R4-3-13	0.2
R4-2-1	5.9
R4-2-4	0.9
R4-2-7	0.4
R4-2-10	0.3
R4-2-13	0.2
R4-1-1	3.5
R4-1-4	4.4
R4-1-7	3.6
R4-1-10	4.1
R4-1-13	4.4

Appendix 1

D. Inorganics (mg/L)

1. GMT gate

a. Row 1

20 Nov. 04

Point_Name	NO3	SO4	Fe	Mn
R1-1-1	0.00	7.90	0.05	0.00
R1-1-4	0.00	11.65	0.00	0.00
R1-1-7	0.00	11.24	0.05	0.02
R1-1-10	0.00	10.50	0.05	0.00
R1-1-14	0.00	13.77	0.02	0.00
R1-2-1	0.00	6.73	0.00	0.00
R1-2-4	0.00	11.06	0.05	0.00
R1-2-7	0.00	12.74	0.05	0.00
R1-2-10	0.00	10.85	0.05	0.00
R1-2-13	0.00	14.19	0.03	0.00
R1-3-1	0.00	23.52	0.05	0.00
R1-3-4	0.00	11.75	0.05	0.00
R1-3-7	0.00	10.85	0.01	0.00
R1-3-10	0.00	11.36	0.04	0.00
R1-3-13	0.00	15.41	0.07	0.00
R1-4-1	0.00	9.11	0.02	0.01
R1-4-4	0.00	13.94	0.00	0.01
R1-4-7	0.00	12.44	0.05	0.00
R1-4-10	0.00	12.55	0.05	0.01
R1-4-13	0.00	12.91	0.00	0.01
R1-5-1	0.00	7.85	0.05	0.00
R1-5-4	0.00	15.32	0.05	0.00
R1-5-7	0.00	13.23	0.05	0.00
R1-5-10	0.00	12.15	0.01	0.00
R1-5-13	0.00	14.01	0.00	0.01
R1-6-1	0.00	7.89	0.05	0.00
R1-6-4	0.00	13.65	0.02	0.01
R1-6-7	0.00	12.77	0.00	0.00
R1-6-10	0.00	12.41	0.05	0.00
R1-6-13	0.00	13.24	0.03	0.01

17 May 05

Point_Name	SO4	Fe
R2-1-2	6	0.03
R2-1-4	11	0.01
R2-1-6	11	0.04
R2-1-8	10	0.01
R2-1-10	10	0.02
R2-1-12	10	0.03
R2-1-14	12	0.07
R2-2-2	9	0
R2-2-4	11	0.02
R2-2-6	14	0.01
R2-2-8	11	0.01
R2-2-10	9	0.02
R2-2-12	13	0.01
R2-3-2	12	0.04
R2-3-4	15	0.01
R2-3-6	16	0
R2-3-8	11	0.02
R2-3-10	15	0.04
R2-3-12	12	0.06
R2-3-14	11	0
R2-4-2	13	0.01
R2-4-4	10	0.01
R2-4-6	13	0.02
R2-4-8	13	0.02
R2-4-10	13	0
R2-4-12	11	0.01
R2-4-14	11	0
R2-5-2	13	0.01
R2-5-4	12	0
R2-5-6	14	0
R2-5-8	14	0
R2-5-10	11	0
R2-5-12	12	0
R2-5-14	13	0
R2-6-2	17	0.01
R2-6-4	11	0.02
R2-6-6	11	0.03
R2-6-8	12	0
R2-6-10	10	0.05
R2-6-12	9	0.04
R2-6-14	12	0

1. GMT gate

b. Row 2

20 Nov. 04

Point_Name	NO3	SO4	Fe	Mn
R2-6-10	0.00	16.61	0.03	0.00
R2-6-13	0.00	15.65	0.03	0.00
R2-1-1	0.00	5.79	0.04	0.04
R2-1-4	0.00	12.03	0.04	0.01
R2-1-7	0.12	13.09	0.60	0.01
R2-1-10	0.00	12.41	0.00	0.00
R2-1-13	0.00	13.94	0.03	0.00
R2-2-1	0.00	39.42	0.07	0.54
R2-2-4	0.00	11.77	0.05	0.00
R2-2-7	0.00	11.90	0.05	0.00
R2-2-10	0.00	11.54	0.05	0.00
R2-2-13	0.00	15.91	0.05	0.00
R2-3-1	0.00	35.37	0.06	0.90
R2-3-4	0.32	14.25	0.00	0.00
R2-3-7	0.00	11.86	0.07	0.00
R2-3-10	0.00	11.35	0.04	0.00
R2-3-13	0.00	19.19	0.05	0.00
R2-4-1	0.00	31.28	0.13	0.00
R2-4-5	0.00	12.68	0.01	0.00
R2-4-10	0.00	8.04	0.01	0.00
R2-4-13	0.00	18.36	0.00	0.00
R2-6-1	0.00	10.48	0.01	0.00
R2-6-4	0.00	14.56	0.04	0.00
R2-6-7	0.00	14.40	0.02	0.00
R2-6-10	0.00	12.54	0.05	0.01

11 Dec. 04

Point_Name	NO3	SO4	Fe	Mn
R2-1-1	0.00	14.41	0.00	0.03
R2-1-4	0.00	11.07	0.00	0.00
R2-1-7	0.00	11.94	0.00	0.00
R2-1-10	0.00	12.93	0.00	0.00
R2-1-13	0.00	11.70	0.00	0.00
R2-2-1	0.00	30.00	0.01	0.00
R2-2-4	0.00	12.08	0.00	0.01
R2-2-7	0.00	13.52	0.01	0.00
R2-2-10	0.00	10.87	0.00	0.00
R2-2-13	0.00	11.95	0.00	0.00
R2-3-1	0.00	29.89	0.00	0.14
R2-3-4	0.00	8.42	0.00	0.00

R2-3-7	0.00	12.40	0.01	0.00
R2-3-10	0.00	12.00	0.00	0.00
R2-3-13	0.00	10.39	0.00	0.00
R2-4-1	0.00	16.79	0.00	0.06
R2-4-4	0.00	12.43	0.00	0.01
R2-4-7	0.00	12.75	0.00	0.00
R2-4-10	0.00	12.71	0.01	0.04
R2-4-13	0.00	9.83	0.00	0.00
R2-5-1	0.00	6.19	0.01	0.00
R2-5-4	0.00	12.81	0.09	0.00
R2-5-7	0.00	13.05	0.00	0.00
R2-5-10	0.00	12.81	0.09	0.00
R2-5-13	0.00	15.20	0.01	0.19
R2-6-1	0.00	10.33	0.00	0.00
R2-6-4	0.00	14.06	0.00	0.00
R2-6-7	0.00	12.65	0.00	0.00
R2-6-10	0.00	12.67	0.00	0.00
R2-6-13	0.00	14.16	0.01	0.00

17 May 05

Point_Name	SO4	Fe
R2-6-1	9.00	0.04
R2-6-4	13.00	0.02
R2-6-7	14.00	0.03
R2-6-10	14.00	0.05
R2-5-1	16.00	0.01
R2-5-7	13.00	0.05
R2-5-10	14.00	0.04
R2-5-13	13.00	0.03
R2-4-1	17.00	0.05
R2-4-4	19.00	0.03
R2-4-7	17.00	0.03
R2-4-10	15.00	0.05
R2-4-13	14.00	0.04
R2-3-1	16.00	0.04
R2-3-4	18.00	0.04
R2-3-7	19.00	0.03
R2-3-10	15.00	0.01
R2-3-13	12.00	0.04
R2-2-1	18.00	0.05
R2-2-4	14.00	0.02
R2-2-7	12.00	0.03
R2-2-10	15.00	0.02

R2-2-13	13.00	0.04
R2-1-1	6.00	0.01
R2-1-4	11.00	0.07
R2-1-7	14.00	0.08
R2-1-10	16.00	0.01
R2-1-13	11.00	0.05

1. GMT gate

c. Row 3

6 June 05

Point_Name	SO4	Fe
R2-6-1	7.00	0.04
R2-6-4	15.00	0.03
R2-6-7	10.00	0.02
R2-6-10	14.00	0.00
R2-6-13	13.00	0.02
R2-5-1	3.00	0.06
R2-5-4	14.00	0.03
R2-5-7	9.00	0.02
R2-5-10	15.00	0.02
R2-5-13	15.00	0.00
R2-4-1	3.00	0.34
R2-4-4	30.00	0.12
R2-4-7	12.00	0.03
R2-4-10	15.00	0.02
R2-4-13	13.00	0.03
R2-3-1	13.00	0.04
R2-3-4	35.00	0.05
R2-3-7	20.00	0.03
R2-3-10	19.00	0.04
R2-3-13	13.00	0.04
R2-2-1	5.00	0.09
R2-2-4	11.00	0.05
R2-2-7	26.00	0.05
R2-2-10	14.00	0.04
R2-2-13	12.00	0.07
R2-1-1	1.00	0.08
R2-1-4	12.00	0.04
R2-1-7	19.00	0.06

R2-1-10	12.00	0.06
R2-1-13	15.00	0.03

1. GMT gate

d. Row 4

2 June 05

Point_Name	SO4	Fe
R2-6-1	5.00	1.70
R2-6-4	9.00	0.15
R2-6-7	10.00	0.11
R2-6-10	14.00	0.09
R2-6-13	14.00	0.08
R2-5-1	10.00	0.17
R2-5-4	8.00	0.09
R2-5-7	10.00	0.11
R2-5-10	12.00	0.09
R2-5-13	11.00	0.08
R2-4-1	4.00	0.14
R2-4-3	34.00	0.10
R2-4-4	30.00	0.14
R2-4-7	2.00	0.08
R2-4-9	10.00	0.05
R2-4-10	16.00	0.10
R2-4-11	16.00	0.03
R2-4-13	12.00	0.08
R2-3-1	11.00	0.11
R2-3-4	27.00	0.11
R2-3-7	1.00	0.04
R2-3-8	5.00	0.03
R2-3-10	10.00	0.09
R2-3-11	12.00	0.03
R2-3-12	15.00	0.03
R2-3-13	15.00	0.01
R2-3-14	16.00	0.03
R2-2-1	8.00	1.00
R2-2-2	22.00	0.75
R2-2-4	38.00	0.19
R2-2-6	19.00	0.02
R2-2-7	16.00	0.09

R2-2-8	8.00	0.02
R2-2-10	11.00	0.08
R2-2-13	13.00	0.09
R2-1-1	1.00	0.08
R2-1-2	1.00	1.09
R2-1-4	19.00	0.11
R2-1-6	17.00	0.06
R2-1-7	2.00	0.07
R2-1-8	5.00	0.02
R2-1-10	9.00	0.18
R2-1-12	11.00	0.02
R2-1-13	13.00	0.09
R2-1-14	13.00	0.05

2. E10 gate

a. Row 1

20 Nov. 04

Point_Name	NO3	SO4	Fe	Mn
R1-1-2	0.00	9.27	0.04	0.03
R1-1-4	0.00	15.77	0.02	0.00
R1-1-7	0.00	14.29	0.02	0.00
R1-1-10	0.00	13.21	0.03	0.00
R1-1-13	0.00	13.76	0.03	0.01
R1-2-1	0.00	10.14	0.02	0.00
R1-2-4	0.00	14.28	0.04	0.01
R1-2-7	0.00	13.60	0.02	0.00
R1-2-10	0.00	13.79	0.03	0.00
R1-2-13	0.00	13.84	0.04	0.00
R1-3-1	0.00	11.61	0.04	0.00
R1-3-4	0.00	17.05	0.03	0.00
R1-3-7	0.00	16.16	0.05	0.01
R1-3-9	0.00	15.88	0.03	0.00
R1-3-13	0.00	15.22	0.03	0.00
R1-4-1	0.00	5.76	0.06	0.01
R1-4-4	0.00	15.70	0.01	0.02
R1-4-7	0.00	15.23	0.03	0.00
R1-4-10	0.00	15.30	0.05	0.00
R1-4-13	0.00	13.73	0.00	0.00
R1-5-1	0.00	3.84	0.06	0.01
R1-5-3	0.00	15.05	0.05	0.00
R1-5-6	0.00	14.77	0.05	0.00
R1-5-10	0.00	14.57	0.05	0.00
R1-5-13	0.00	13.80	0.05	0.03
R1-6-1	0.00	2.56	0.03	0.00
R1-6-5	0.00	16.42	0.04	0.00

R1-6-7	0.00	16.38	0.01	0.00
R1-6-10	0.00	13.63	0.06	0.01
R1-6-13	0.00	13.51	0.05	0.00

17 May 05

Point_Name	SO4	Fe
R2-1-2	19	0.01
R2-1-4	17	0.02
R2-1-6	12	0.01
R2-1-8	11	0.02
R2-1-10	11	0.05
R2-1-12	11	0.02
R2-1-14	12	0.01
R2-2-2	18	0.02
R2-2-4	12	0.02
R2-2-6	12	0.02
R2-2-8	10	0.02
R2-2-10	10	0.01
R2-2-12	9	0.02
R2-2-14	11	0.01
R2-3-2	9	0
R2-3-4	15	0.02
R2-3-6	12	0.01
R2-3-12	13	0
R2-3-14	12	0.01
R2-4-4	13	0.01
R2-4-6	14	0
R2-4-8	16	0.01
R2-4-10	13	0
R2-4-12	11	0
R2-4-14	14	0
R2-5-2	13	0.01
R2-5-4	15	0.02
R2-5-6	13	0.01
R2-5-8	15	0.02
R2-5-10	12	0.01
R2-5-12	12	0.02
R2-5-14	12	0.02
R2-6-2	12	0.02
R2-6-4	15	0
R2-6-6	14	0.01
R2-6-8	14	0.02
R2-6-10	14	0.02
R2-6-12	13	0.01

R2-6-14	13	0.02

3. E10 gate

a. Row 2

20 Nov. 04

Point_Name	NO3	SO4	Fe	Mn
R2-1-2	0.00	7.09	0.00	0.00
R2-1-4	0.00	11.12	0.01	0.00
R2-1-7	0.00	13.48	0.02	0.00
R2-1-10	0.00	12.73	0.05	0.00
R2-1-13	0.00	12.89	0.02	0.00
R2-2-1	0.00	7.76	0.05	0.00
R2-2-4	0.00	14.55	0.01	0.00
R2-2-7	0.00	14.62	0.01	0.01
R2-2-10	0.00	14.79	0.00	0.00
R2-2-13	0.00	10.56	0.02	0.00
R2-3-1	0.00	4.40	0.09	0.00
R2-3-4	0.00	14.18	0.01	0.00
R2-3-7	0.00	13.52	0.05	0.00
R2-3-10	0.00	14.73	0.02	0.00
R2-3-13	0.00	4.81	0.00	0.00
R2-4-1	0.00	4.70	0.10	0.13
R2-4-4	0.00	13.83	0.01	0.00
R2-4-7	0.00	14.80	0.02	0.00
R2-4-10	0.00	16.41	0.01	0.00
R2-4-13	0.00	14.81	0.00	0.00
R2-5-1	0.00	4.29	0.04	0.00
R2-5-4	0.00	16.36	0.08	0.00
R2-5-7	0.00	16.46	0.10	0.03
R2-5-10	0.00	18.37	0.03	0.01
R2-5-13	0.00	16.04	0.03	0.00
R2-6-1	0.00	5.84	0.01	0.00
R2-6-4	0.00	17.77	0.04	0.00
R2-6-7	0.00	18.13	0.01	0.03

11 Dec. 04

Point_Name	NO3	SO4	Fe	Mn
R2-1-1	0.00	19.51	0.00	0.01
R2-1-4	0.00	11.48	0.00	0.00
R2-1-7	0.00	13.98	0.01	0.00
R2-1-10	0.00	12.96	0.00	0.00
R2-1-13	0.00	12.98	0.01	0.00
R2-2-1	0.00	7.54	0.00	0.00
R2-2-4	0.00	13.14	0.00	0.00
R2-2-7	0.00	13.98	0.00	0.00
R2-2-10	0.00	2.05	0.01	0.00
R2-2-13	0.00	11.44	0.00	0.00
R2-3-1	0.00	5.21	0.04	0.01
R2-3-4	0.00	15.67	0.00	0.02
R2-3-7	0.00	11.72	0.02	0.07
R2-3-10	0.00	8.93	0.00	0.00
R2-3-13	0.00	13.35	0.00	0.00
R2-4-1	0.00	4.35	0.00	0.07
R2-4-4	0.00	12.73	0.00	0.00
R2-4-7	0.00	15.03	0.00	0.02
R2-4-10	0.00	12.53	0.00	0.02
R2-4-13	0.00	7.93	0.00	0.03
R2-5-1	0.00	3.57	0.00	0.00
R2-5-4	0.00	13.19	0.01	0.00
R2-5-7	0.00	15.59	0.00	0.00
R2-5-10	0.00	13.57	0.00	0.00
R2-5-13	0.00	16.58	0.01	0.00
R2-6-1	0.00	8.25	0.00	0.00
R2-6-4	0.00	11.91	0.00	0.00
R2-6-7	0.00	18.08	0.03	0.02
R2-6-10	0.00	17.14	0.00	0.00
R2-6-13	0.00	15.41	0.00	0.00

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Point_Name	SO4	Fe
R2-1-1	12	0.03
R2-1-4	17	0.01
R2-1-7	13	0.01
R2-1-10	13	0.02
R2-1-13	12	0.02
R2-2-1	16	0.02
R2-2-4	13	0.02
R2-2-7	12	0.06
R2-2-10	13	0.03
R2-2-13	14	0.04
R2-3-1	19	0.02
R2-3-4	15	0.02
R2-3-7	14	0.04
R2-3-10	15	0.03
R2-3-13	14	0.03
R2-4-1	9	0.02
R2-4-4	16	0.03
R2-4-7	15	0.04
R2-4-10	16	0.04
R2-4-13	13	0.04
R2-5-1	11	0.01
R2-5-4	14	0.09
R2-5-7	17	0.04
R2-5-10	16	0.03
R2-5-13	14	0.08
R2-6-1	14	0.04
R2-6-4	16	0.02
R2-6-7	16	0.06
R2-6-10	10	0.03
R2-6-13	13	0.05

4. E10 gate

c. Row 3

7 June 05

Point_Name	SO4	Fe
R2-1-1	17	0.06
R2-1-4	13	0.08
R2-1-7	16	0.00
R2-1-10	14	0.01
R2-1-13	13	0.01

R2-2-1	10	0.01
R2-2-4	11	0.02
R2-2-7	15	0.00
R2-2-10	16	0.01
R2-2-13	13	0.01
R2-3-1	10	0.02
R2-3-4	16	0.01
R2-3-7	15	0.01
R2-3-10	17	0.02
R2-3-13	16	0.02
R2-4-1	12	0.01
R2-4-4	15	0.00
R2-4-7	17	0.00
R2-4-10	17	0.01
R2-4-13	15	0.01
R2-5-1	12	0.01
R2-5-4	15	0.00
R2-5-7	16	0.01
R2-5-10	18	0.00
R2-5-13	16	0.00
R2-6-1	6	0.00
R2-6-4	10	0.01
R2-6-7	19	0.00
R2-6-10	16	0.03
R2-6-13	14	0.01

5. E10 gate

d. Row 4

2 June 05

Point_Name	SO4	Fe
R2-1-1	36	0.00
R2-1-4	30	0.00
R2-1-7	14	0.00
R2-1-10	15	0.00
R2-1-13	15	0.01
R2-2-1	15	0.00
R2-2-4	8	0.00
R2-2-7	11	0.00
R2-2-10	16	0.03
R2-2-13	2	0.01
R2-3-1	9	0.00
R2-3-4	12	0.00
R2-3-7	9	0.02
R2-3-10	2	0.08

R2-3-13	8	0.09
R2-4-1	15	0.01
R2-4-4	8	0.02
R2-4-7	17	0.02
R2-4-10	16	0.02
R2-4-13	16	0.03
R2-5-1	8	0.03
R2-5-4	9	0.03
R2-5-7	19	0.03
R2-5-10	20	0.03
R2-5-13	19	0.02
R2-6-4	17	0.02
R2-6-7	19	0.03
R2-6-10	18	0.02
R2-6-13	14	0.02

3. E95 gate

b. Row 1

20 Nov. 04

Point_Name	NO3	SO4	Fe	Mn
R1-1-1	0.00	12.43	0.02	0.00
R1-1-4	0.00	13.61	0.02	0.00
R1-1-7	0.00	14.66	0.05	0.00
R1-1-10	0.00	12.04	0.05	0.00
R1-1-13	0.29	18.96	0.00	0.02
R1-2-1	0.00	13.64	0.04	0.03
R1-2-4	0.00	17.36	0.03	0.03
R1-2-7	0.00	13.15	0.04	0.00
R1-2-10	0.00	13.13	0.02	0.00
R1-2-13	0.00	16.31	0.02	0.00
R1-3-1	0.00	16.01	0.02	0.00
R1-3-4	0.00	16.12	0.01	0.00
R1-3-7	0.00	12.53	0.03	0.00
R1-3-10	0.00	12.67	0.03	0.01
R1-3-13	0.00	17.48	0.04	0.00
R1-4-1	0.00	17.08	0.01	0.02
R1-4-4	0.00	14.58	0.02	0.01
R1-4-7	0.00	10.58	0.03	0.01
R1-4-10	0.00	11.16	0.03	0.00
R1-4-13	0.81	17.26	0.03	0.00
R1-5-1	0.00	18.04	0.02	0.00
R1-5-4	0.00	13.17	0.03	0.01
R1-5-7	0.00	10.33	0.02	0.00
R1-5-10	0.00	14.03	0.03	0.03

R1-5-13	0.14	17.58	0.00	0.00
R1-6-1	0.00	12.21	0.05	0.00
R1-6-4	0.00	12.87	0.03	0.05
R1-6-7	0.00	10.80	0.03	0.00
R1-6-10	0.00	14.05	0.02	0.00
R1-6-13	0.30	19.13	0.04	0.00

17 May 05

Point_Name	SO4	Fe
R2-1-2	13	0.01
R2-1-4	20	0.00
R2-1-6	18	0.00
R2-1-8	14	0.00
R2-1-10	14	0.01
R2-1-12	13	0.01
R2-1-14	21	0.01
R2-2-2	9	0.02
R2-2-4	17	0.01
R2-2-6	17	0.01
R2-2-8	15	0.02
R2-2-10	12	0.01
R2-2-12	13	0.02
R2-2-14	19	0.01
R2-3-2	15	0.02
R2-3-4	18	0.01
R2-3-6	17	0.01
R2-3-8	12	0.02
R2-3-10	12	0.01
R2-3-12	12	0.01
R2-3-14	18	0.01
R2-4-2	18	0.02
R2-4-4	18	0.01
R2-4-6	17	0.03
R2-4-8	15	0.02
R2-4-10	10	0.01
R2-4-12	12	0.01
R2-4-14	16	0.02
R2-5-2	14	0.01
R2-5-4	16	0.01
R2-5-6	13	0.01
R2-5-8	11	0.01
R2-5-10	11	0.01
R2-5-12	15	0.01
R2-5-14	19	0.01

R2-6-2	17	0.01
R2-6-4	16	0.01
R2-6-6	13	0.03
R2-6-8	10	0.01
R2-6-10	11	0.01
R2-6-12	14	0.01
R2-6-14	20	0.02

3. E95 gate

b. Row 2

20 Nov. 04

Point_Name	NO3	SO4	Fe	Mn
R2-1-1	0.00	8.58	0.01	0.00
R2-1-4	0.00	14.87	0.05	0.00
R2-1-6	0.00	12.75	0.01	0.00
R2-1-10	0.00	12.56	0.03	0.00
R2-1-13	0.00	16.98	0.00	0.00
R2-2-1	0.00	9.46	0.04	0.00
R2-2-4	0.00	15.28	0.05	0.00
R2-2-7	0.00	11.18	0.01	0.00
R2-2-10	0.21	11.27	0.01	0.00
R2-2-13	0.22	15.82	0.00	0.00
R2-3-1	0.00	11.02	0.02	0.11
R2-3-4	0.00	15.41	0.05	0.00
R2-3-7	0.00	10.52	0.04	0.00
R2-3-10	0.11	9.89	0.05	0.02
R2-3-13	0.00	10.84	0.01	0.03
R2-4-1	0.00	10.21	0.05	0.00
R2-4-4	0.00	13.50	0.05	0.00
R2-4-7	0.00	9.50	0.00	0.00
R2-4-10	0.00	8.50	0.05	0.01
R2-4-13	0.00	24.59	0.04	0.00
R2-5-1	0.00	9.80	0.05	0.01
R2-5-4	0.00	13.84	0.04	0.00
R2-5-6	0.00	10.76	0.00	0.00
R2-5-10	0.00	14.65	0.01	0.00
R2-5-13	0.00	24.10	0.01	0.00
R2-6-1	0.00	8.74	0.01	0.00
R2-6-4	0.00	14.85	0.01	0.00
R2-6-7	0.00	12.28	0.00	0.00
R2-6-10	0.00	14.55	0.05	0.00
R2-6-13	0.00	31.30	0.05	0.00

11 Dec 04

Point_Name	NO3	SO4	Fe	Mn
R2-1-1	0.00	8.75	0.00	0.01
R2-1-4	0.00	14.91	0.01	0.00
R2-1-7	0.00	12.59	0.00	0.00
R2-1-10	0.00	12.46	0.00	0.00
R2-1-13	0.47	15.87	0.00	0.00
R2-2-1	0.00	11.11	0.00	0.00
R2-2-4	0.00	16.36	0.00	0.00
R2-2-7	0.00	12.08	0.00	0.00
R2-2-10	0.00	11.15	0.00	0.00
R2-2-13	0.00	13.68	0.00	0.00
R2-3-1	0.00	11.11	0.01	0.00
R2-3-4	0.00	0.50	0.00	0.01
R2-3-7	0.00	8.69	0.00	0.00
R2-3-10	0.00	5.27	0.00	0.00
R2-3-13	0.00	4.49	0.00	0.27
R2-4-1	0.00	10.63	0.00	0.03
R2-4-4	0.00	0.00	0.00	0.00
R2-4-7	0.00	6.33	0.00	0.00
R2-4-10	0.04	3.10	0.01	0.39
R2-4-13	0.00	4.57	0.00	0.00
R2-5-1	0.00	9.18	0.00	0.00
R2-5-4	0.00	14.71	0.00	0.00
R2-5-6	0.00	11.05	0.00	0.00
R2-5-13	0.49	19.24	0.01	0.01
R2-5-1	0.00	8.72	0.00	0.02
R2-6-4	0.00	14.09	0.00	0.00
R2-6-7	0.00	10.97	0.02	0.03
R2-6-10	0.15	14.82	0.00	0.00
R2-6-13	0.00	19.17	0.01	0.00

17 May 05

Point_Name	SO4	Fe
R2-1-1	14.00	0.02
R2-1-4	15.00	0.01
R2-1-10	18.00	0.03
R2-1-13	14.00	0.01
R2-2-1	11.00	0.02
R2-2-4	19.00	0.02
R2-2-7	17.00	0.03
R2-2-10	13.00	0.03
R2-2-13	14.00	0.02

R2-3-1	11.00	0.01
R2-3-4	20.00	0.08
R2-3-7	16.00	0.08
R2-3-10	12.00	0.07
R2-3-13	13.00	0.04
R2-4-1	15.00	0.04
R2-4-4	22.00	0.12
R2-4-7	13.00	0.09
R2-4-10	12.00	0.08
R2-4-13	14.00	0.05
R2-5-1	16.00	0.02
R2-5-4	16.00	0.02
R2-5-10	12.00	0.03
R2-5-13	18.00	0.03
R2-5-1	13.00	0.02
R2-6-4	14.00	0.01
R2-6-7	10.00	0.02
R2-6-10	12.00	0.01
R2-6-13	18.00	0.01

3. E95 gate

c. Row 3

7 June 05

Point_Name	SO4	Fe
R2-1-1	16	0.02
R2-1-4	14	0.00
R2-1-10	18	0.00
R2-1-13	16	0.00
R2-2-1	15	0.00
R2-2-4	28	0.00
R2-2-7	11	0.03
R2-2-10	11	0.02
R2-2-13	1	0.07
R2-3-1	9	0.02
R2-3-4	2	0.03
R2-3-7	1	0.01
R2-3-10	0	0.02
R2-3-13	12	0.02
R2-4-1	10	0.01
R2-4-4	19	0.01
R2-4-7	1	0.02

R2-4-10	2	0.01
R2-4-13	16	0.07
R2-5-1	8	0.01
R2-5-4	16	0.01
R2-5-7	16	0.01
R2-5-10	12	0.02
R2-5-13	21	0.05
R2-5-1	9	0.01
R2-6-4	11	0.01
R2-6-7	15	0.02
R2-6-10	16	0.01
R2-6-13	37	0.05

3. E95 gate

d. Row 4

3 June 05

Point_Name	SO4	Fe
R2-1-1	6	0.00
R2-1-4	9	0.04
R2-1-7	10	0.01
R2-1-10	15	0.06
R2-1-13	16	0.02
R2-2-1	2	0.00
R2-2-4	6	0.00
R2-2-7	16	0.02
R2-2-10	2	0.00
R2-2-13	1	0.00
R2-3-1	0	0.00
R2-3-4	1	0.04
R2-3-7	2	0.02
R2-3-10	3	0.04
R2-3-13	0	0.04
R2-4-1	4	0.01
R2-4-4	3	0.04
R2-4-7	1	0.05
R2-4-10	1	0.07
R2-4-13	15	0.04
R2-5-1	8	0.07
R2-5-4	8	0.07

R2-5-7	15	0.06
R2-5-10	13	0.07
R2-5-13	27	0.07
R2-5-1	5	0.12
R2-6-4	2	0.09
R2-6-7	15	0.07
R2-6-10	15	0.08
R2-6-13	29	0.23

Appendix 1

E. Methane (ug/L)

1. GMT

a. Row 2

20 Nov. 04

Point_Name	CH4
R2-1-1	0.00
R2-1-4	0.00
R2-1-7	0.00
R2-1-10	0.00
R2-1-13	0.00
R2-2-1	101.92
R2-2-4	1.64
R2-2-7	3.89
R2-2-10	10.25
R2-2-13	1.48
R2-3-1	1.84
R2-3-4	0.64
R2-3-7	6.64
R2-3-10	36.26
R2-3-13	0.65
R2-4-1	1.00
R2-4-4	2.43
R2-4-7	2.40
R2-4-10	31.72
R2-4-13	0.55
R2-5-1	0.00
R2-5-4	0.00
R2-5-6	0.00
R2-5-10	0.00
R2-5-13	0.00
R2-6-1	0.00
R2-6-4	0.00
R2-6-7	0.00
R2-6-10	0.00
R2-6-13	0.00

16 Dec. 04

Point_Name	CH4
R2-1-1	0.43
R2-1-4	0.25
R2-1-7	0.13
R2-1-10	0.00
R2-1-13	0.00
R2-2-1	226.73
R2-2-4	1.64
R2-2-7	1.21
R2-2-10	56.72
R2-2-13	118.90
R2-3-1	0.95
R2-3-4	0.30
R2-3-7	25.99
R2-3-10	41.36
R2-3-13	191.28
R2-4-1	0.58
R2-4-4	0.00
R2-4-7	3.06
R2-4-10	25.08
R2-4-13	183.16
R2-5-1	0.24
R2-5-7	0.00
R2-5-10	0.00
R2-5-13	0.00
R2-6-1	0.41
R2-6-4	0.00
R2-6-7	0.00
R2-6-10	0.00
R2-6-13	0.00

8 June 04

Point_Name	CH4
R2-1-5	0
R2-1-10	0
R2-1-14	0

R2-2-5	1.918716
R2-2-10	0.367791
R2-2-14	1.081955
R2-3-5	0.703086
R2-3-10	0.424658
R2-3-14	0.888606
R2-4-5	0.511067
R2-4-14	0.635879
R2-4-10	0.364837
R2-5-5	0.560549
R2-5-10	0.592306
R2-5-14	1.804243
R2-6-5	0.183157
R2-6-10	0
R2-6-14	0.183895

2. **GMT gate**

   b. **Row 3**

6 June 05

Point_Name	CH4
R3-1-5	7.53
R3-1-10	0.00
R3-1-14	0.00
R3-2-5	51.68
R3-2-10	0.25
R3-2-14	1.53
R3-3-5	11.59
R3-3-10	0.16
R3-3-14	0.00
R3-4-5	4.87
R3-4-14	0.00
R3-4-10	0.00
R3-5-5	0.00
R3-5-10	0.00
R3-5-14	0.00
R3-6-5	0.00
R3-6-10	0.00
R3-6-14	0.00

3. **GMT gate**

   c. **Row 4**

1 June 05

Point_Name	CH4
R4-1-5	31.1
R4-1-10	1.3
R4-1-14	2.5
R4-2-5	15.5
R4-2-10	7.8
R4-2-14	2.8
R4-3-5	158.0
R4-3-10	6.9
R4-3-14	5.7
R4-4-5	25.1
R4-4-14	0.2
R4-5-5	0.3
R4-5-10	0.3
R4-5-14	0.2
R4-6-5	15.9
R4-6-10	3.2
R4-6-14	6.7

4. **GMT gate**

   d. **Row 4**

1 June 05

Point_Name	CH4
R4-1-5	31.1
R4-1-10	1.3
R4-1-14	2.5
R4-2-5	15.5
R4-2-10	7.8
R4-2-14	2.8

R4-3-5	158.0
R4-3-10	6.9
R4-3-14	5.7
R4-4-5	25.1
R4-4-14	0.2
R4-5-5	0.3
R4-5-10	0.3
R4-5-14	0.2
R4-6-5	15.9
R4-6-10	3.2
R4-6-14	6.7

2. E10 gate

a. Row 2

20 Nov. 04

Point_Name	CH4
R2-1-1	0
R2-1-4	0
R2-1-7	0
R2-1-10	0
R2-1-13	0
R2-2-1	0.2
R2-2-4	0.3
R2-2-7	0.2
R2-2-10	4.0
R2-2-13	121.1
R2-3-1	1.1
R2-3-4	0.5
R2-3-7	26.0
R2-3-10	34.8
R2-3-13	319.8
R2-4-1	0.0
R2-4-4	0.1
R2-4-7	0.4
R2-4-10	30.6
R2-4-13	12.1
R2-5-1	0.0
R2-5-4	0.0
R2-5-7	0.0
R2-5-10	0.0
R2-5-13	0.0
R2-6-1	0.0
R2-6-3	0.0
R2-6-7	0.0
R2-6-10	0.0
R2-6-13	0.0

11 Dec. 04

Point_Name	CH4
R2-1-1	1.7
R2-1-4	0.0
R2-1-7	0.0
R2-1-10	0.0
R2-1-13	0.0
R2-2-1	0.4
R2-2-4	0.0
R2-2-7	1.7
R2-2-10	29.8
R2-2-13	42.5
R2-3-1	2.1
R2-3-4	0.0
R2-3-7	43.9
R2-3-10	141.8
R2-3-13	75.3
R2-4-1	0.3
R2-4-4	0.0
R2-4-7	0.2
R2-4-10	57.2
R2-4-13	175.0
R2-5-1	0.0
R2-5-4	0.0
R2-5-7	0.0
R2-5-10	0.2
R2-5-13	1.2
R2-6-1	0.4
R2-6-3	0.3
R2-6-7	0.2

R2-6-10	0.0
R2-6-13	0.0

8 June 05

Point_Name	CH4
R2-1-5	0.23
R2-1-10	0.24
R2-2-5	0.00
R2-2-10	0.00
R2-2-14	0.00
R2-3-5	5.15
R2-3-10	2.40
R2-3-14	3.23
R2-4-5	0.00
R2-4-14	0.00
R2-4-10	0.00
R2-5-5	0.00
R2-5-10	0.00
R2-5-14	0.00
R2-6-5	0.22
R2-6-10	0.15
R2-6-14	0.23

3. E10 gate

b. Row 3

7 June 05

Point_Name	CH4
R3-1-5	0.00
R3-1-10	0.00
R3-1-14	0.00
R3-2-5	0.00
R3-2-10	0.00
R3-2-14	0.00
R3-3-5	0.00
R3-3-10	0.31
R3-3-14	0.00
R3-4-5	0.00
R3-4-10	0.00
R3-4-14	0.00
R3-5-5	0.00
R3-5-10	0.00
R3-5-14	0.00
R3-6-5	0.00
R3-6-10	0.00
R3-6-14	0.00

4. E10 gate

a. Row 4

2 June 05

Point_Name	CH4
R4-1-5	5.07
R4-1-10	0.95
R4-1-14	0.59
R4-2-5	0.75
R4-2-10	0.82
R4-2-14	1.28
R4-3-5	1.37
R4-3-10	106.35
R4-3-14	52.44
R4-4-5	2.19
R4-4-14	18.46
R4-4-10	26.59
R4-5-5	0.67
R4-5-10	1.42
R4-5-14	1.13
R4-6-5	2.22
R4-6-10	1.58
R4-6-14	1.66

5. E10 gate

d. Row 4

2 June 05

Point_Name	CH4
R4-1-5	5.07
R4-1-10	0.95
R4-1-14	0.59
R4-2-5	0.75
R4-2-10	0.82
R4-2-14	1.28
R4-3-5	1.37
R4-3-10	106.35
R4-3-14	52.44
R4-4-5	2.19
R4-4-14	18.46
R4-4-10	26.59
R4-5-5	0.67
R4-5-10	1.42
R4-5-14	1.13
R4-6-5	2.22
R4-6-10	1.58
R4-6-14	1.66

3. E95 gate

a. Row 2

20 Nov. 04

Point_Name	CH4
R2-1-1	0.0
R2-1-4	0.0
R2-1-6	0.0
R2-1-10	0.0
R2-1-13	0.0
R2-2-1	0.0
R2-2-7	0.0
R2-2-10	0.0
R2-2-13	0.4
R2-3-1	0.0
R2-3-4	0.8
R2-3-7	3.5
R2-3-10	12.0
R2-3-13	56.9
R2-4-1	0.0
R2-4-4	0.8
R2-4-7	104.1
R2-4-10	17.3
R2-4-13	15.3
R2-5-1	0.0
R2-5-4	0.3
R2-5-6	4.5
R2-5-10	0.0
R2-5-13	0.2
R2-6-1	0.0
R2-6-4	0.0
R2-6-7	0.0
R2-6-10	0.0
R2-6-13	0.0

11 Dec. 04

Point_Name	CH4
R2-1-1	0.0
R2-1-4	0.0
R2-1-6	0.0
R2-1-10	0.3
R2-1-13	0.0
R2-2-1	0.9
R2-2-4	0.2
R2-2-7	0.2
R2-2-10	0.0
R2-2-13	0.0
R2-3-1	0.0
R2-3-4	3.7
R2-3-7	70.7
R2-3-10	130.7
R2-3-13	59.7

R2-4-1	0.7
R2-4-4	13.9
R2-4-7	119.6
R2-4-10	33.8
R2-4-13	41.0
R2-5-1	2.4
R2-5-4	0.5
R2-5-6	1.3
R2-5-10	1.6
R2-5-13	0.2
R2-6-1	5.2
R2-6-4	0.4
R2-6-7	0.2
R2-6-10	0.2
R2-6-13	0.0

8 June 04

Point_Name	CH4
R2-1-5	0.00
R2-1-10	0.25
R2-1-14	0.00
R2-2-5	0.00
R2-2-10	0.20
R2-2-14	0.19
R2-3-5	3.77
R2-3-10	0.40
R2-3-14	0.51
R2-4-5	109.30
R2-4-14	1.99
R2-4-10	1.48
R2-5-5	0.00
R2-5-10	0.00
R2-5-14	0.00
R2-6-5	0.00
R2-6-10	0.00
R2-6-14	1.71

4. E95 gate

b. Row 3

6 June 05

Point_Name	CH4
R3-1-5	0.28
R3-1-10	0.27
R3-1-14	0.38
R3-2-5	0.82
R3-2-10	16.62
R3-2-14	1.43
R3-3-5	25.94
R3-3-10	4.70
R3-3-14	5.01
R3-4-5	7.05
R3-4-10	8.69
R3-5-5	4.19
R3-5-10	2.42
R3-5-14	9.38
R3-6-5	0.46
R3-6-10	0.65
R3-6-14	32.84

5. E95 gate

a. Row 4

3 June 05

Point_Name	CH4
R4-1-5	0.99
R4-1-10	0.80
R4-1-14	2.11
R4-2-5	0.56

R4-2-10	28.31
R4-2-14	27.33
R4-3-5	48.74
R4-3-10	5.07
R4-4-14	8.12
R4-4-5	15.51
R4-4-10	5.17
R4-4-14	0.65
R4-5-5	0.57
R4-5-10	0.44
R4-5-14	0.45
R4-6-5	0.65
R4-6-10	0.34
R4-6-14	0.88

R4-6-14	0.88

6. E95 gate

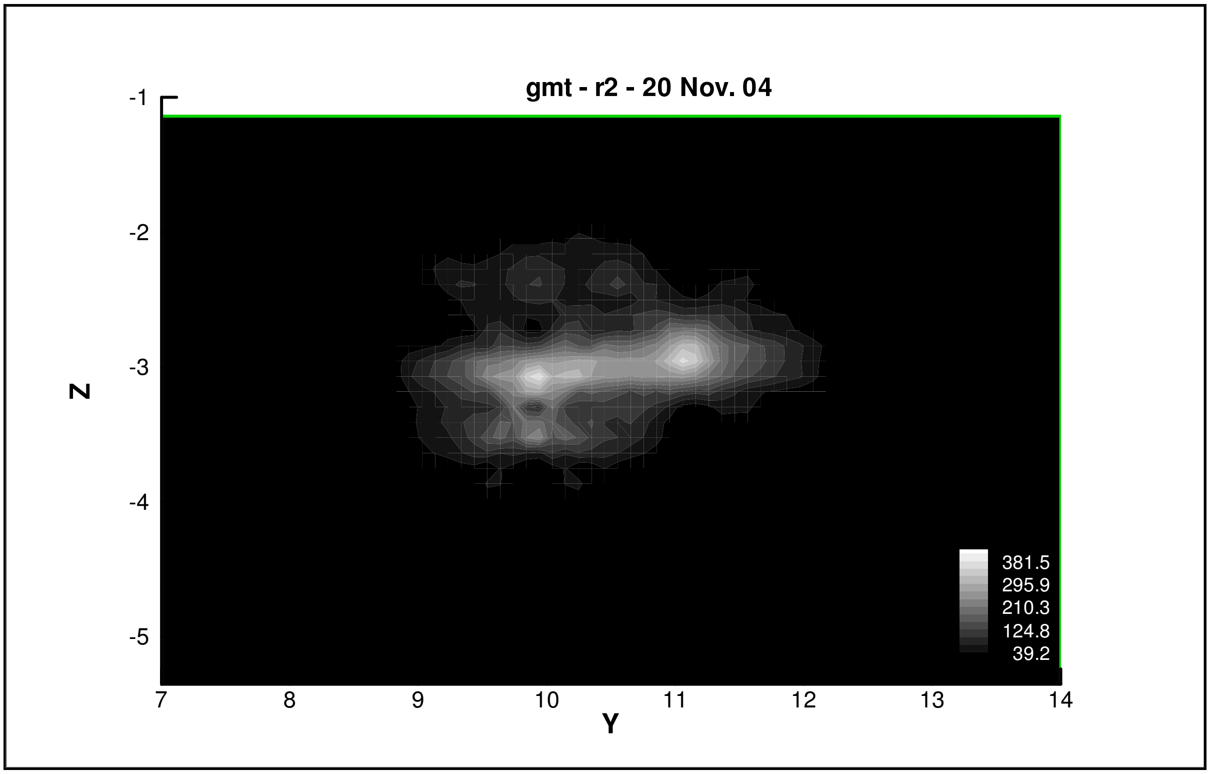
d. Row 4

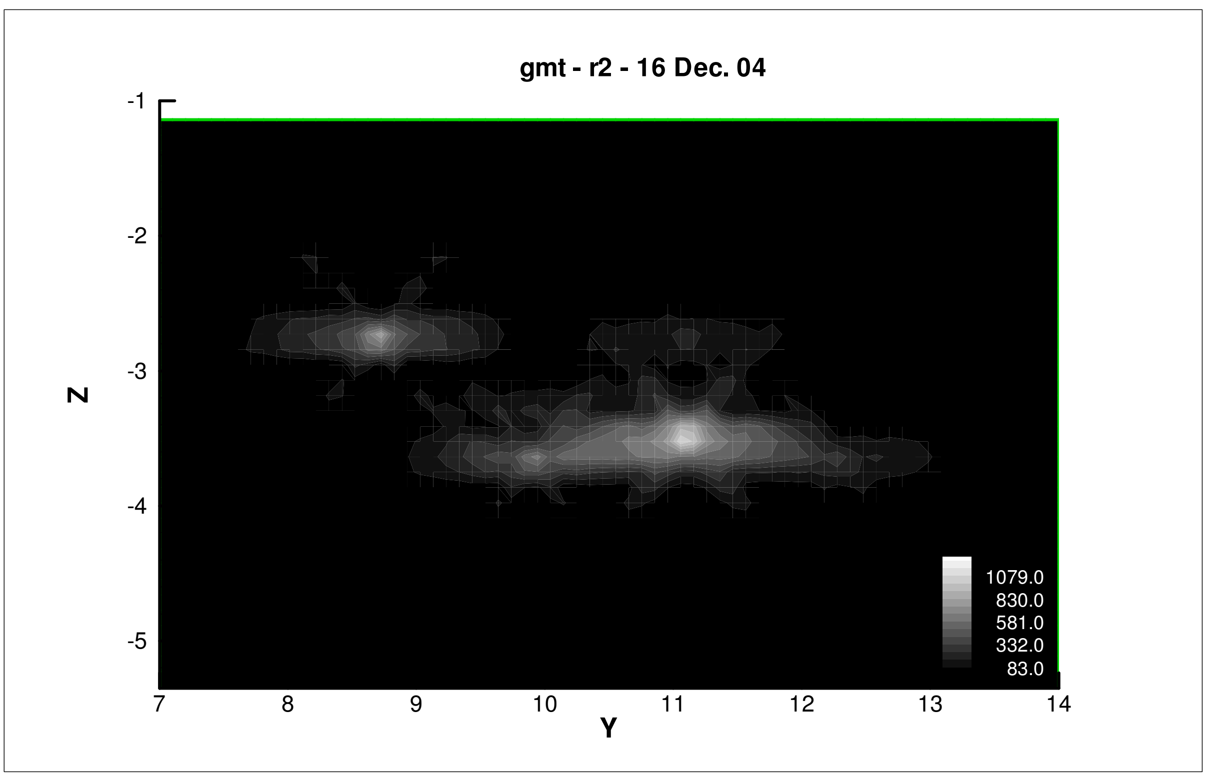
3 June 05

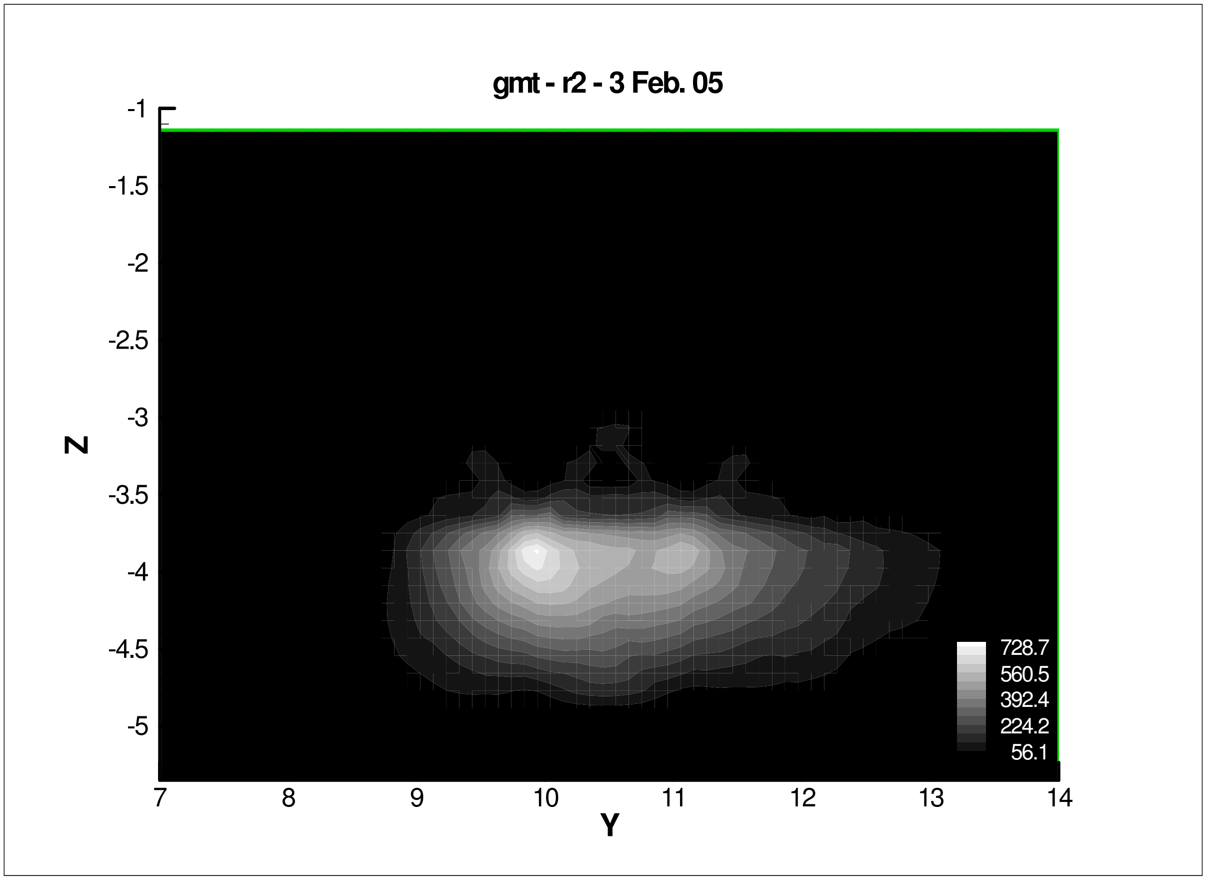
Point_Name	CH4
R4-1-5	0.99
R4-1-10	0.80
R4-1-14	2.11
R4-2-5	0.56
R4-2-10	28.31
R4-2-14	27.33
R4-3-5	48.74
R4-3-10	5.07
R4-4-14	8.12
R4-4-5	15.51
R4-4-10	5.17
R4-4-14	0.65
R4-5-5	0.57
R4-5-10	0.44
R4-5-14	0.45
R4-6-5	0.65
R4-6-10	0.34

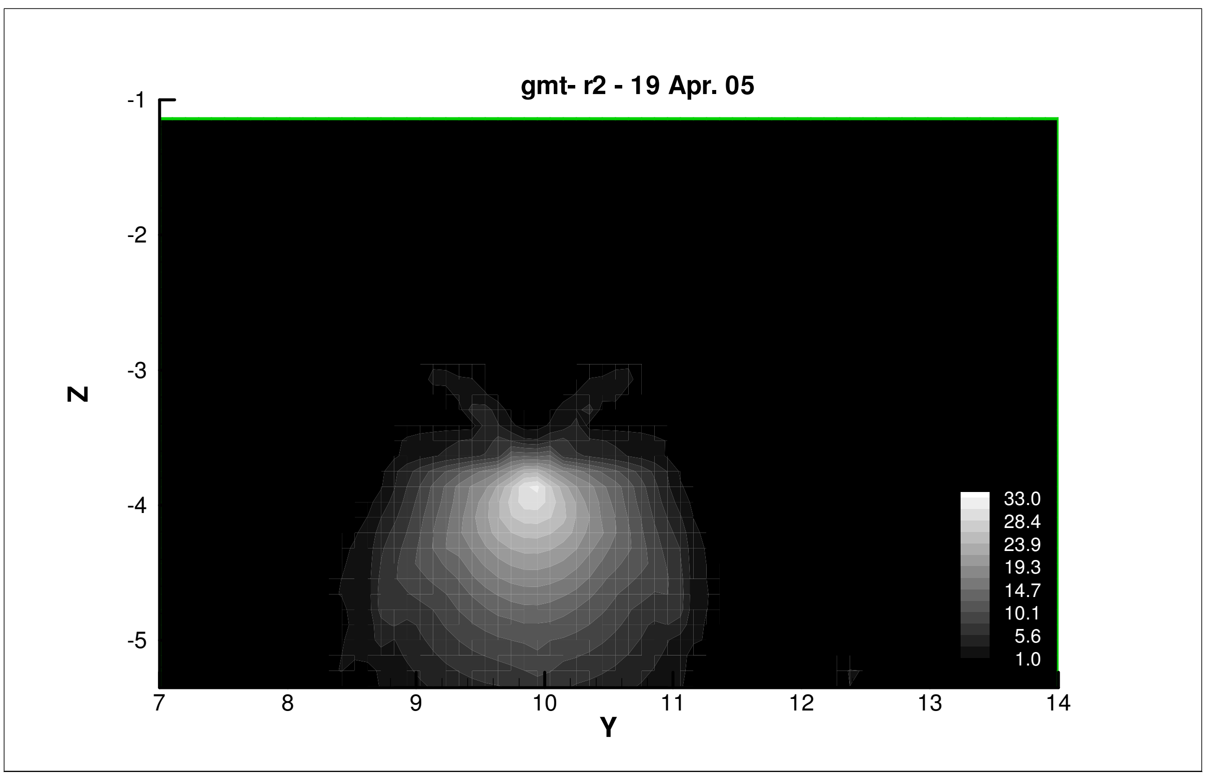
Appendix 2 A – Field Cross Sections

A. Oxygenates 1. GMT a. Row 2 MTBE (mg/l)



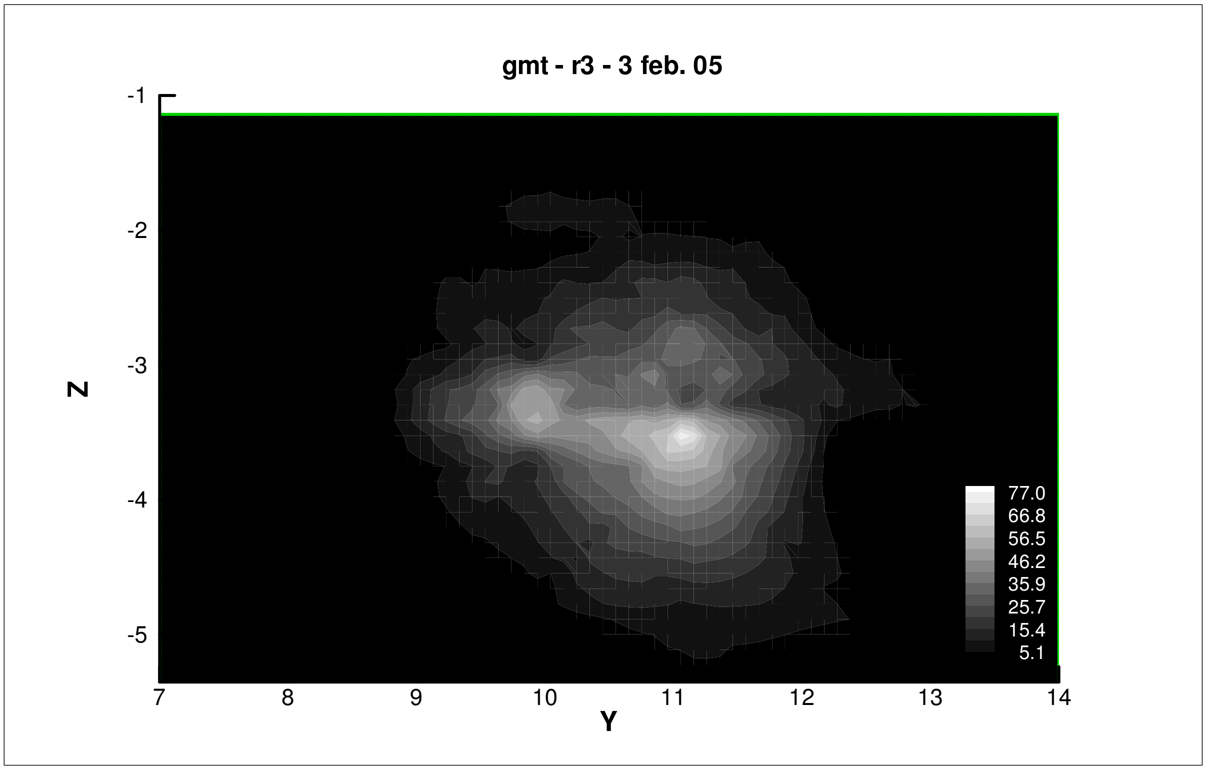


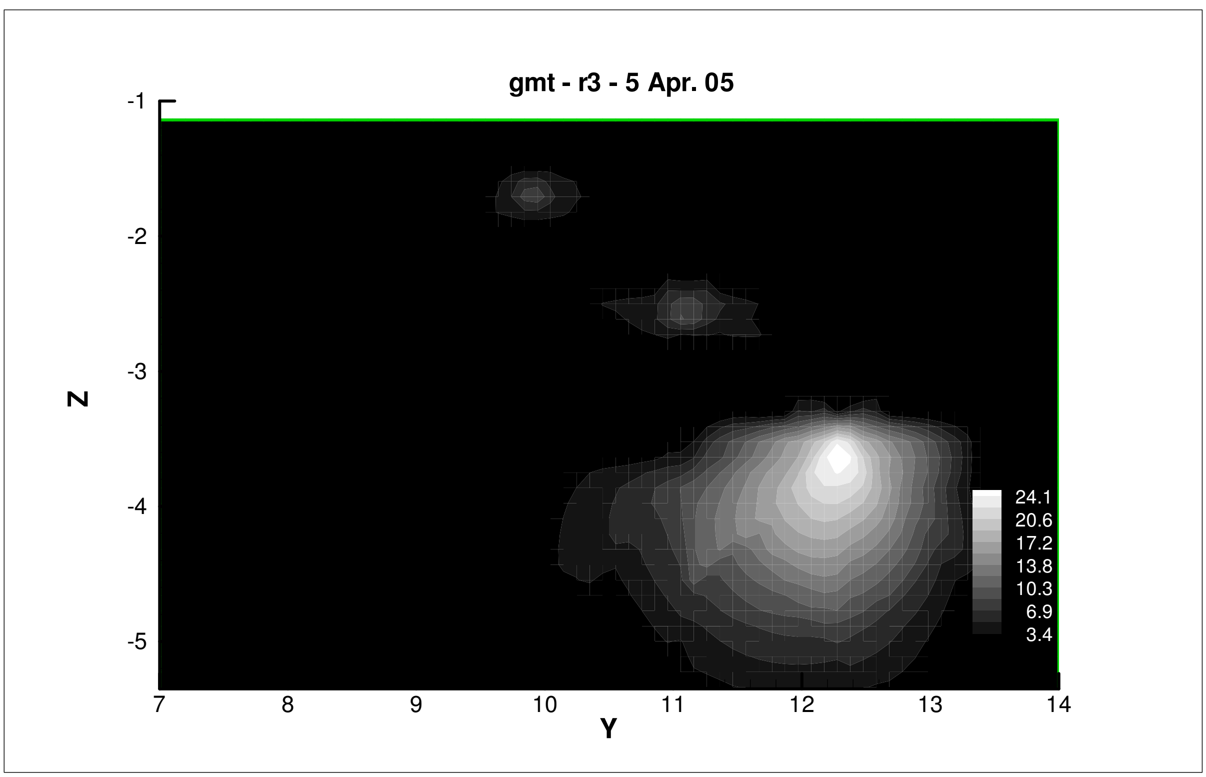


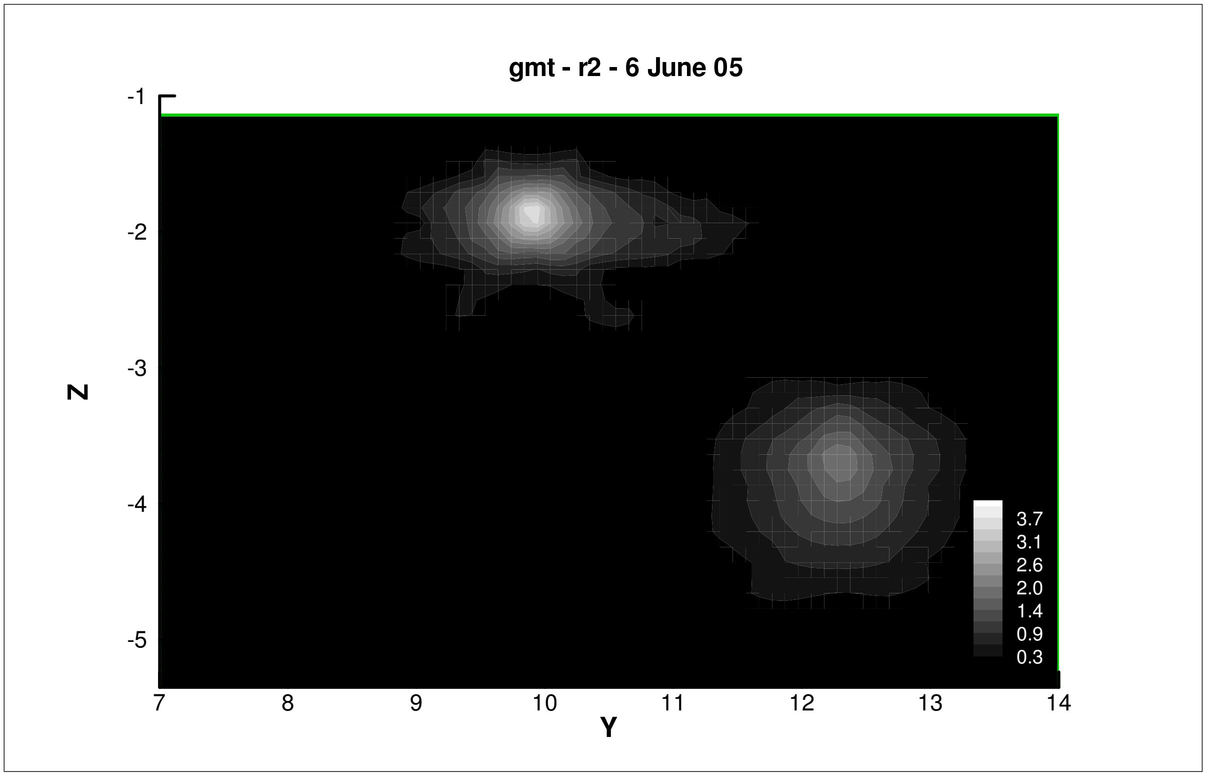


June 05 and Nov. 05 - zero.

A. Oxygenates 1. GMT b. Row 3 MTBE (mg/l)

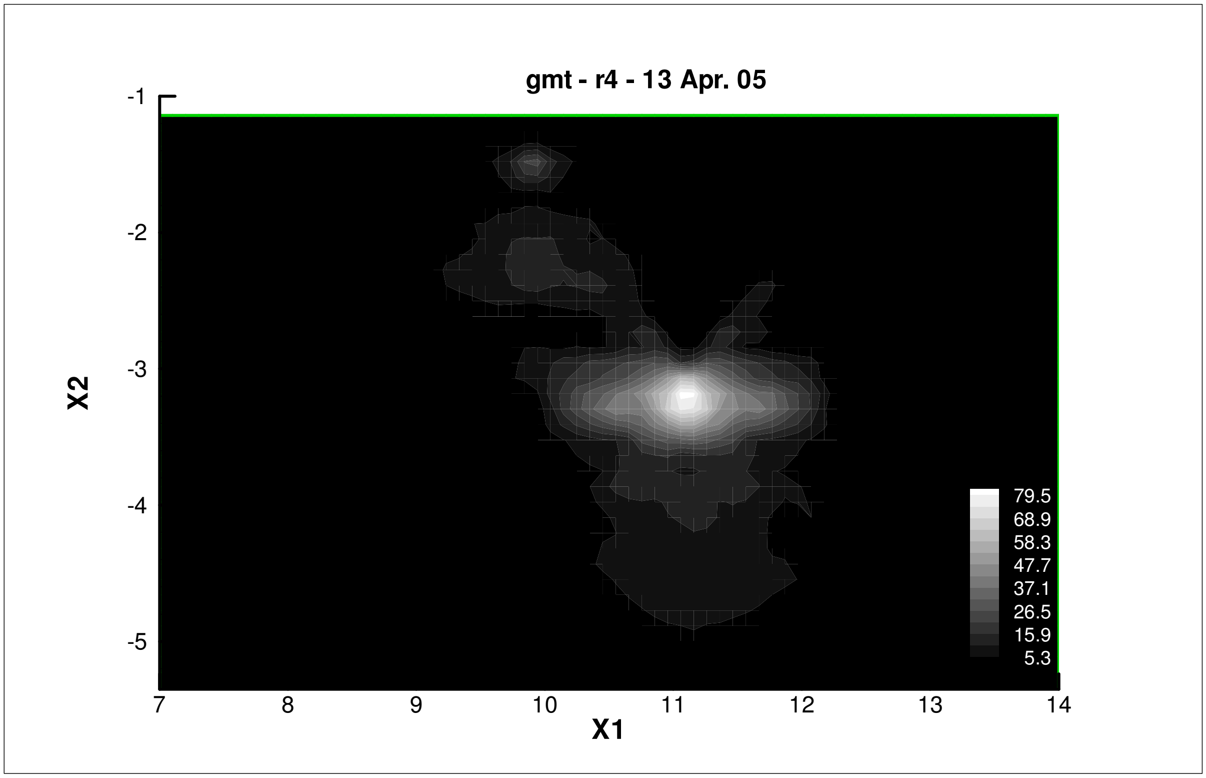




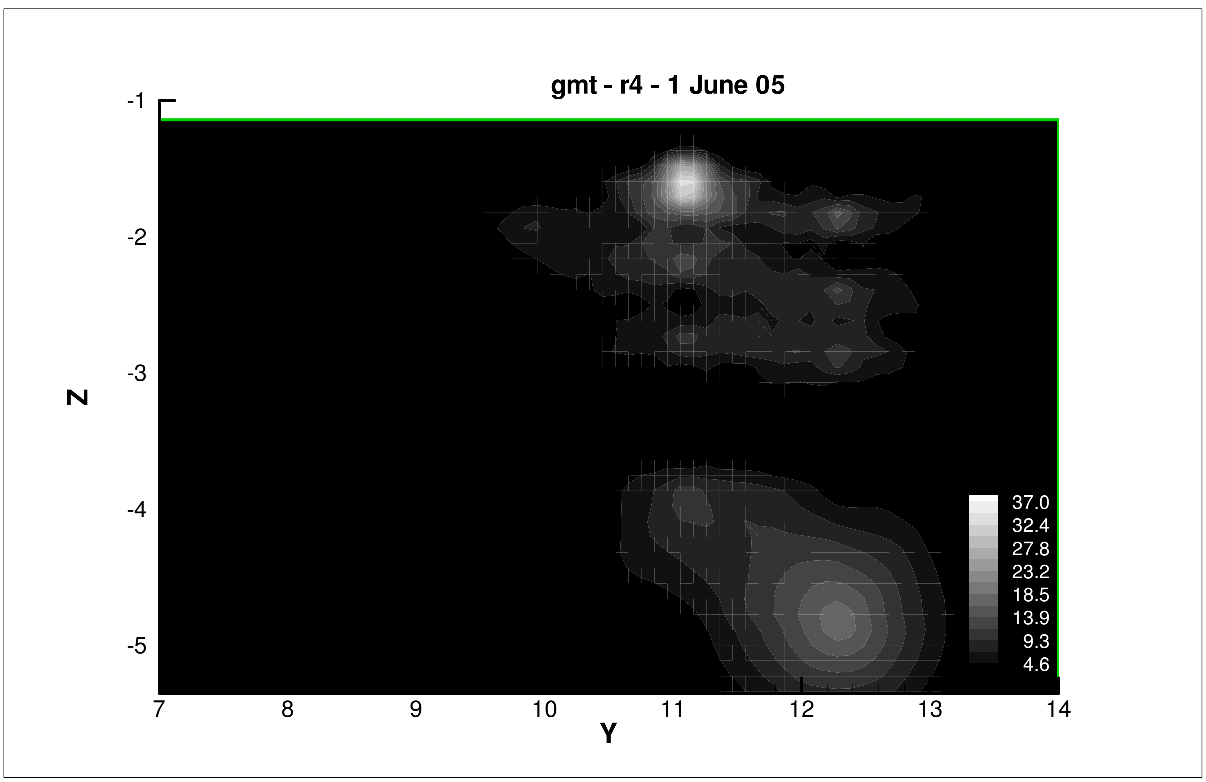


Aug. 05 and Nov. 05 - zero.

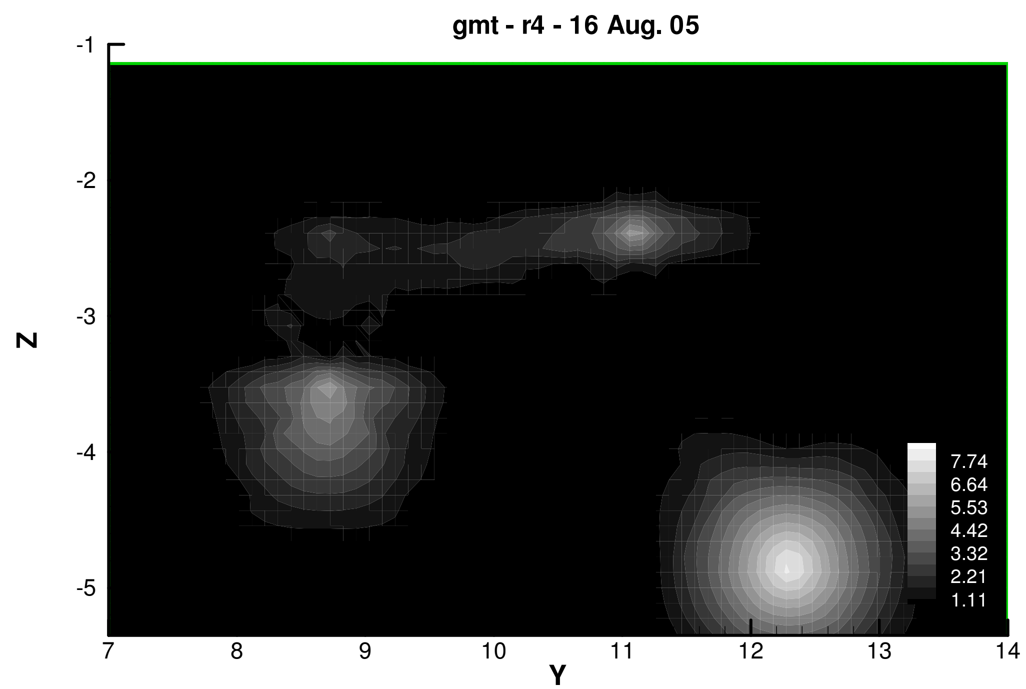
A. Oxygenates 1. GMT c. Row 4 MTBE (mg/l)



gmt - r4 - 13 Apr. 05
X2
X1
-1
-2
-3
-4
-5
7
8
9
10
11
12
13
14
79.5
68.9
58.3
47.7
37.1
26.5
15.9
5.3

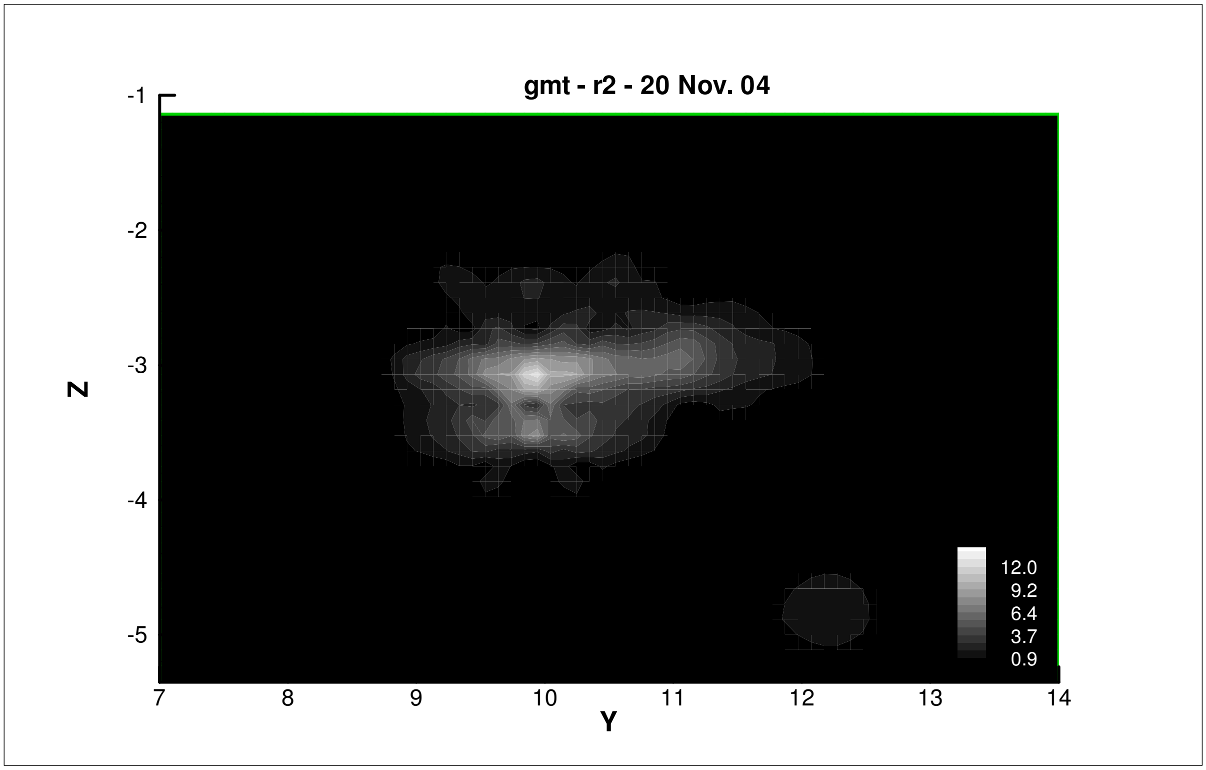


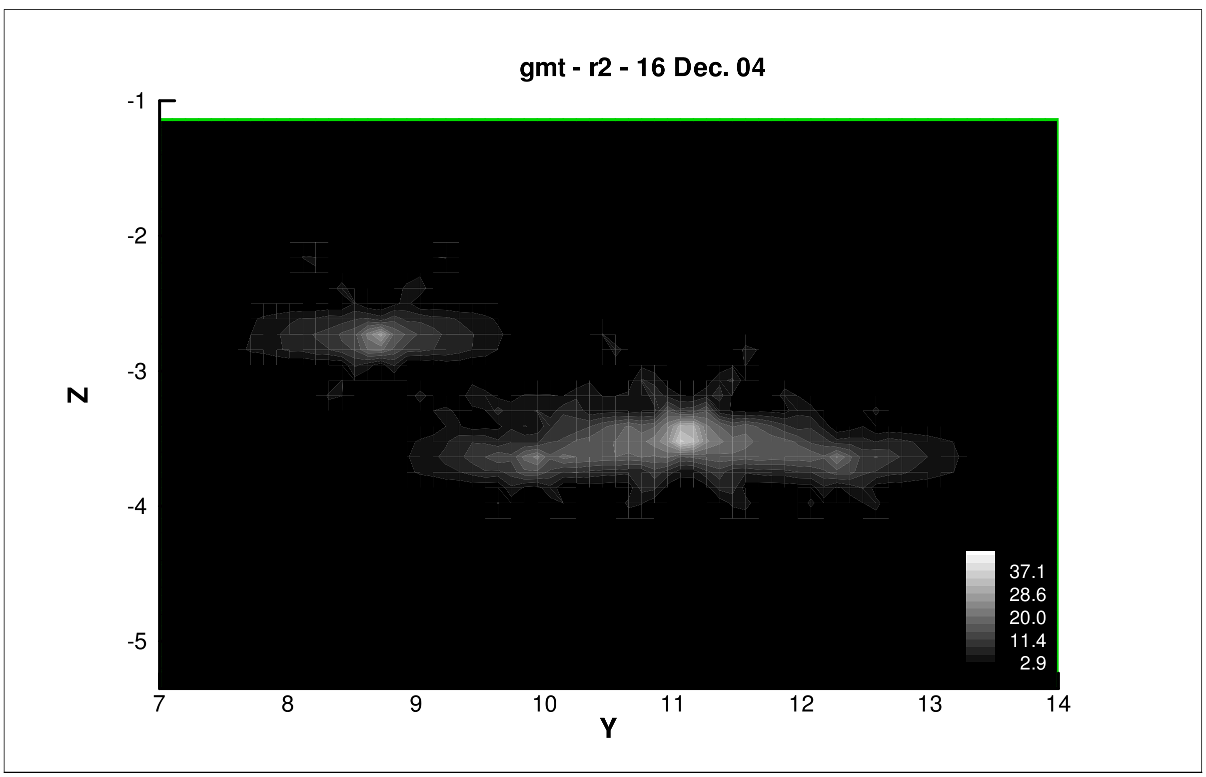
gmt - r4 - 1 June 05
Z
Y
-1
-2
-3
-4
-5
7
8
9
10
11
12
13
14
37.0
32.4
27.8
23.2
18.5
13.9
9.3
4.6

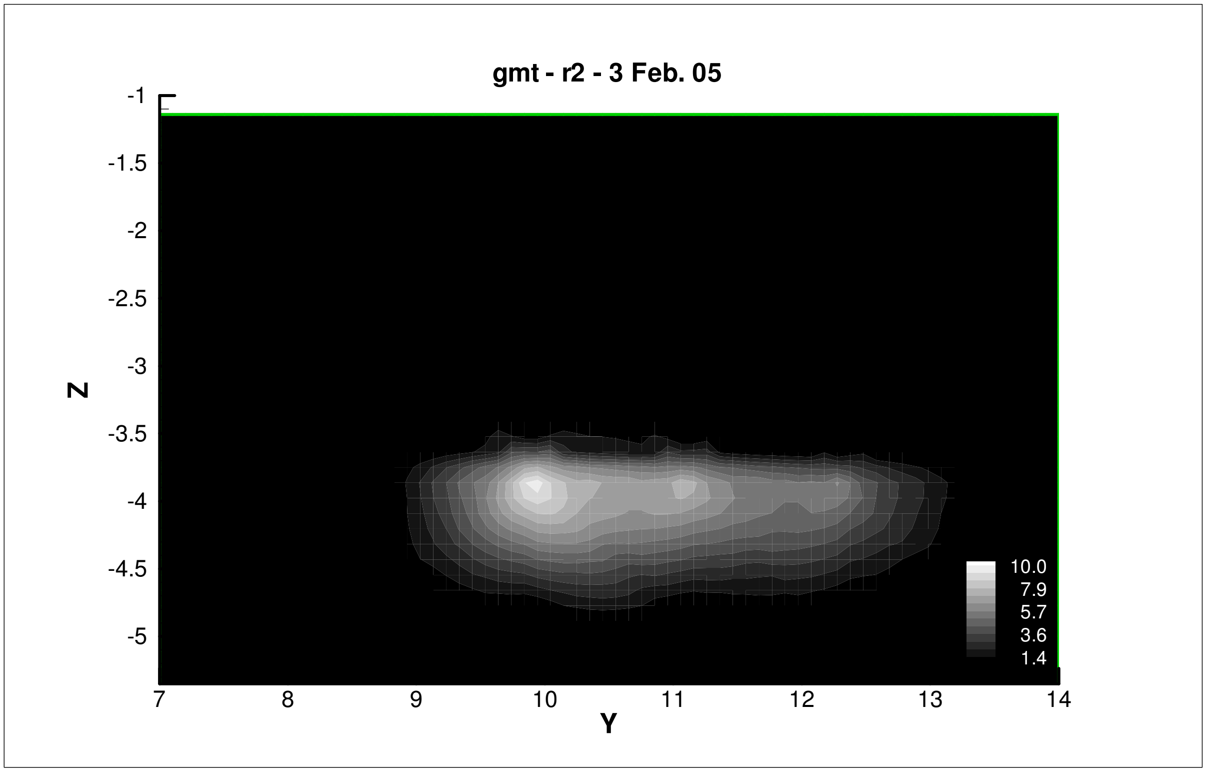


Nov. 05 - zero.

A. Oxygenates 1. GMT a. Row 2 TBA (mg/l)

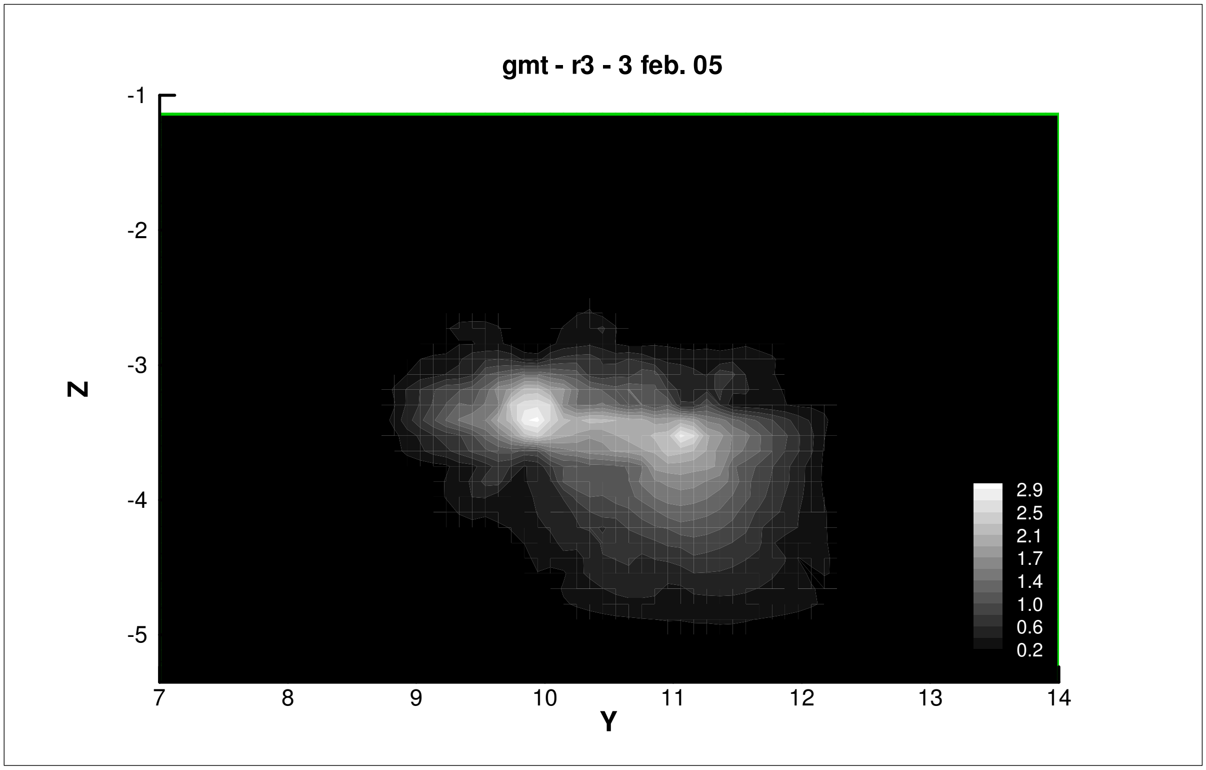

gmt - r2 - 20 Nov. 04
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
12.0
9.2
6.4
3.7
0.9

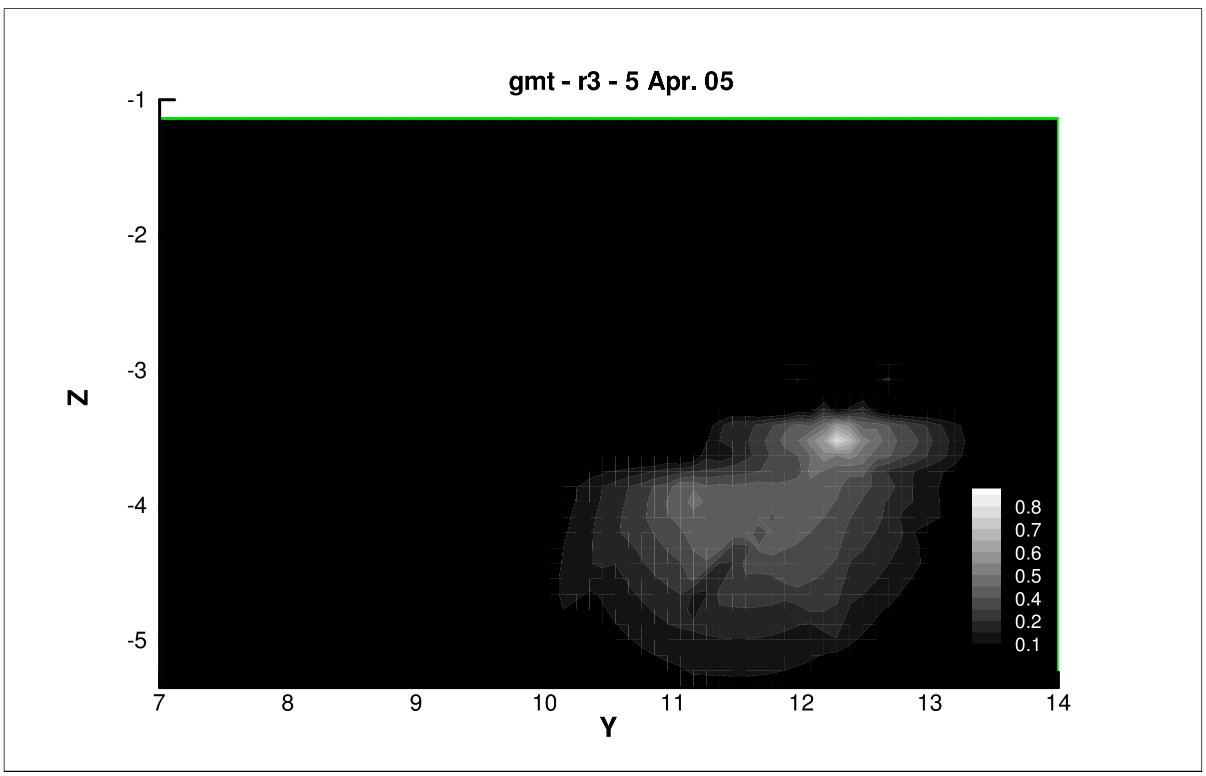

gmt - r2 - 16 Dec. 04
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
37.1
28.6
20.0
11.4
2.9



Apr. 05, June 05, and Nov. 05 - zero.

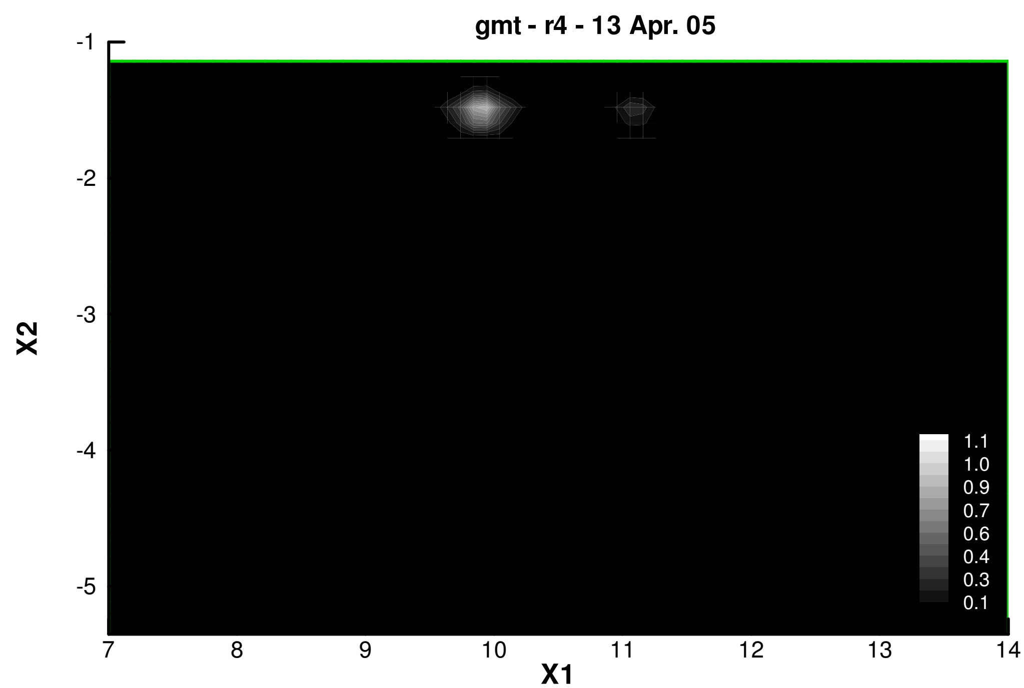
A. Oxygenates 1. GMT b. Row 3 TBA (mg/l)

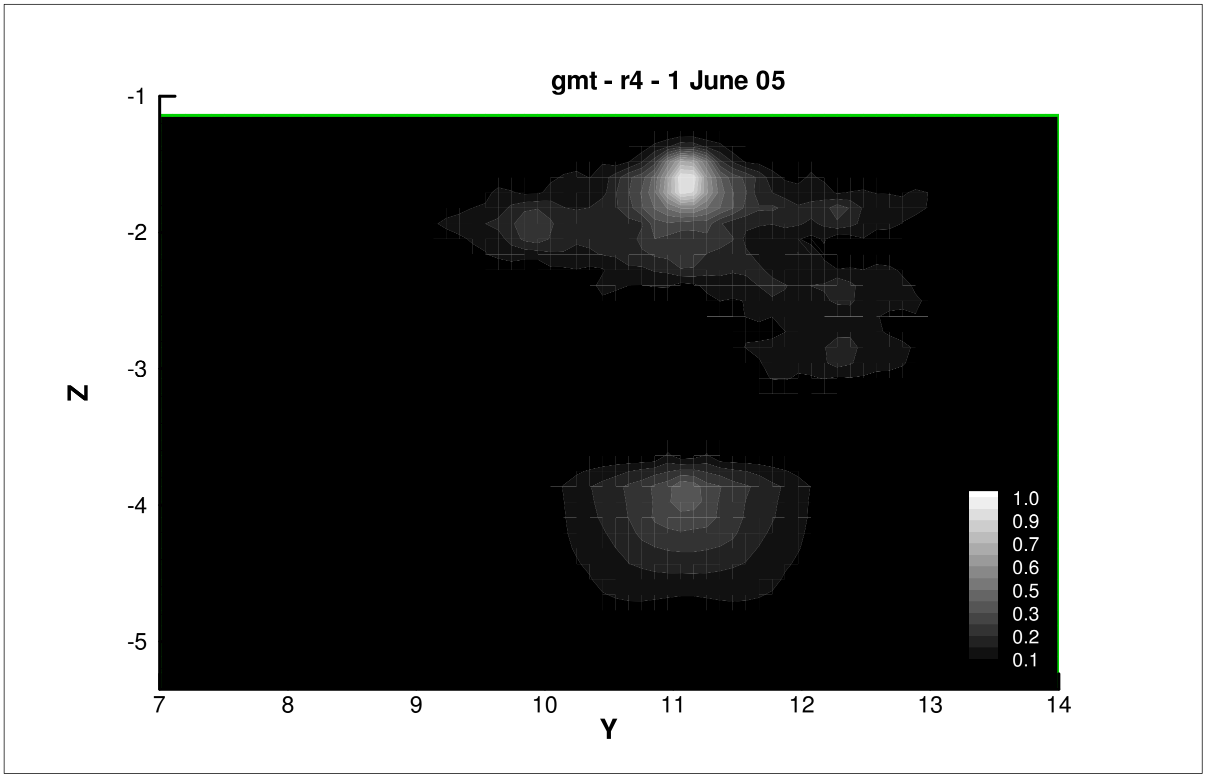

gmt - r3 - 3 feb. 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
2.9
2.5
2.1
1.7
1.4
1.0
0.6
0.2

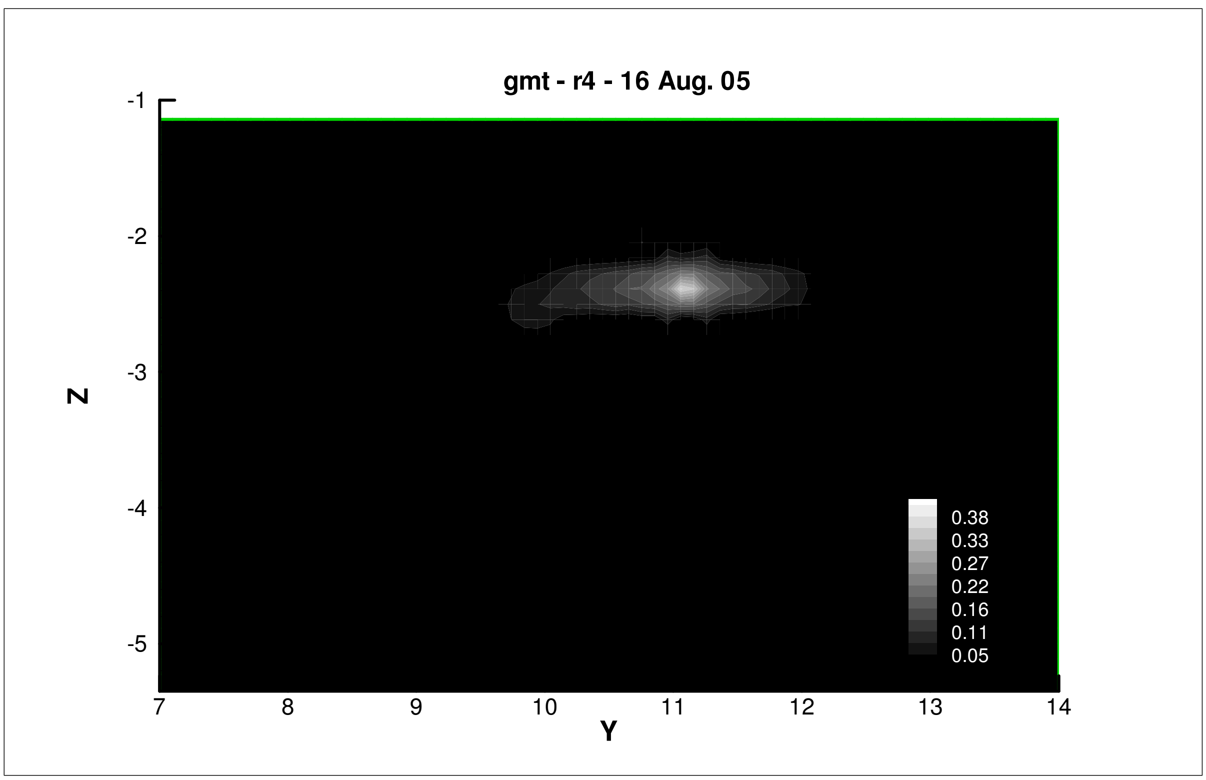

gmt - r3 - 5 Apr. 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
0.8
0.7
0.6
0.5
0.4
0.2
0.1

June 05, Aug. 05, and Nov. 05 - zero.

A. Oxygenates 1. GMT c. Row 4 TBA (mg/l)

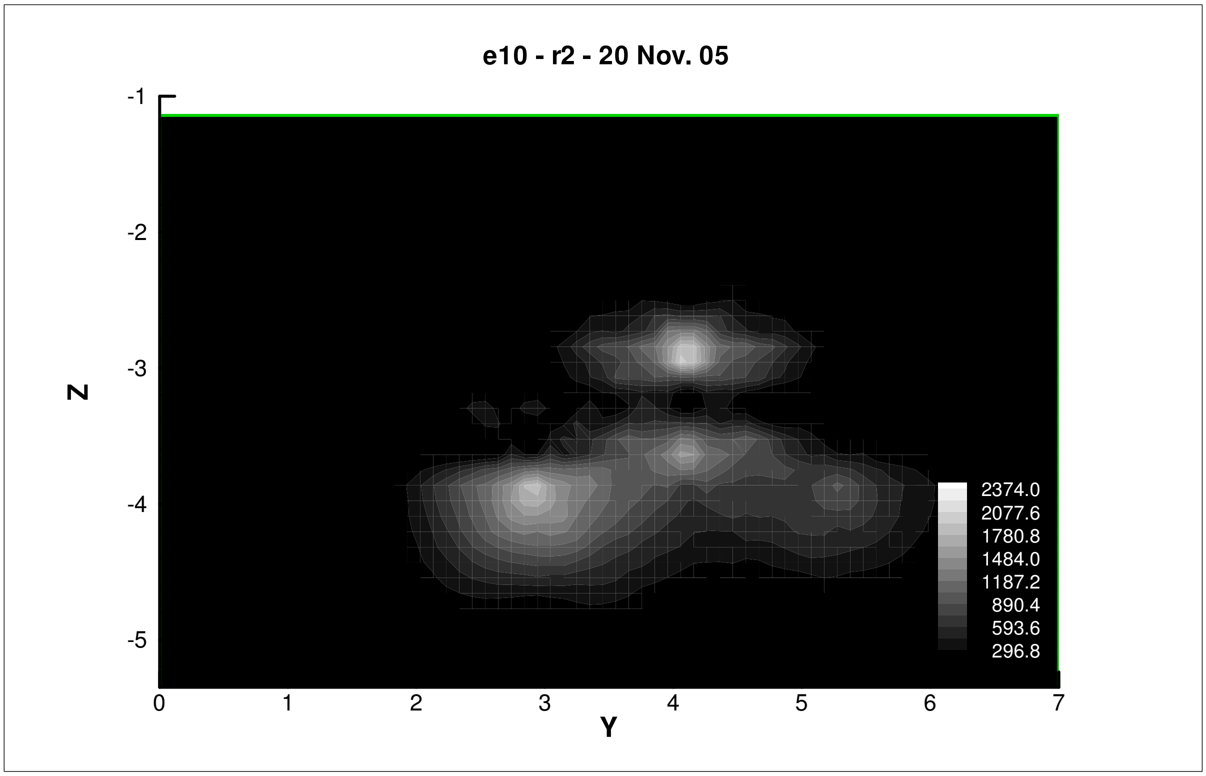


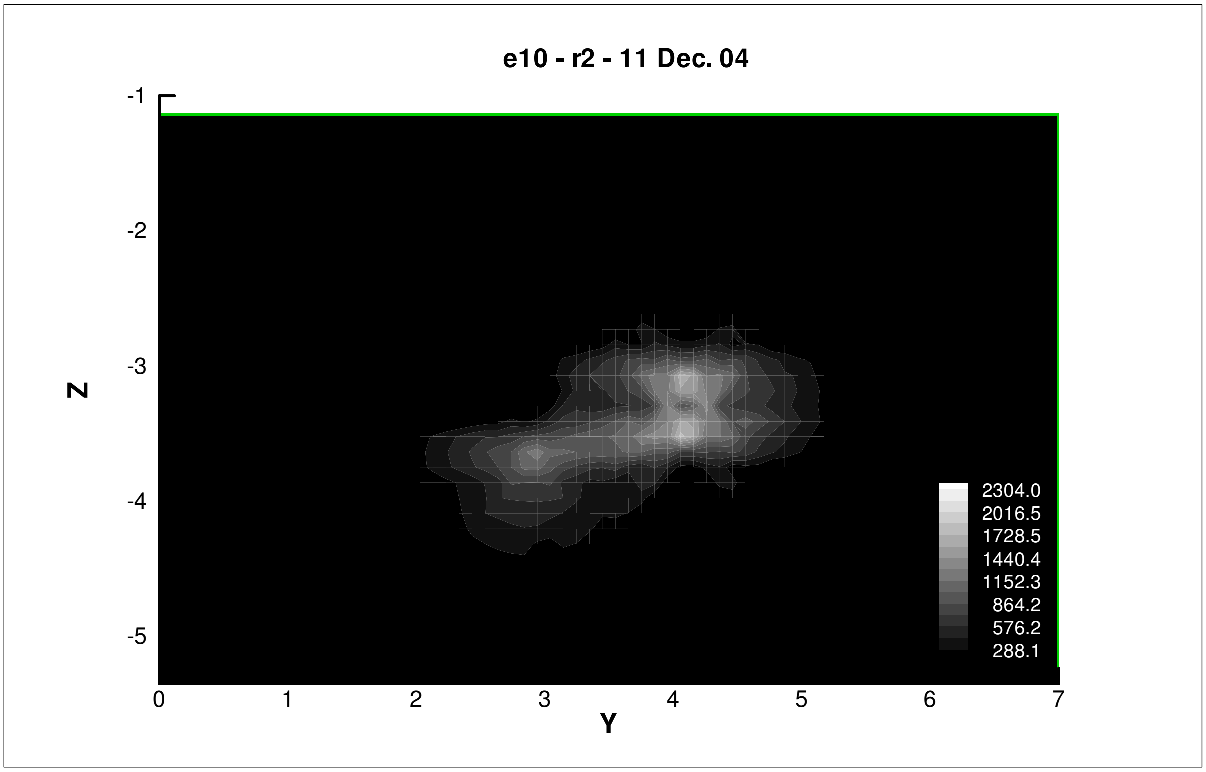

gmt - r4 - 1 June 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
1.0
0.9
0.7
0.6
0.5
0.3
0.2
0.1

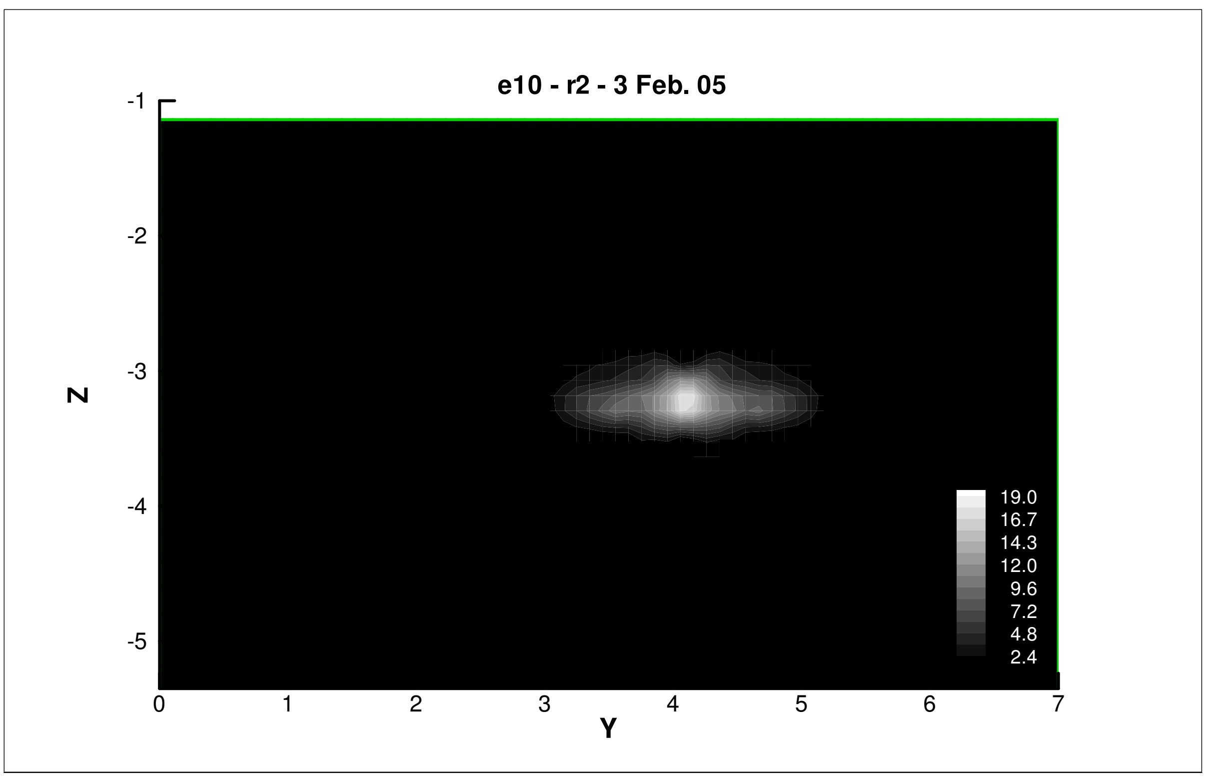

gmt - r4 - 16 Aug. 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
0.38
0.33
0.27
0.22
0.16
0.11
0.05

Nov. 05 - zero.

A. Oxygenates 2. E10 a. Row 2 Ethanol (mg/l)

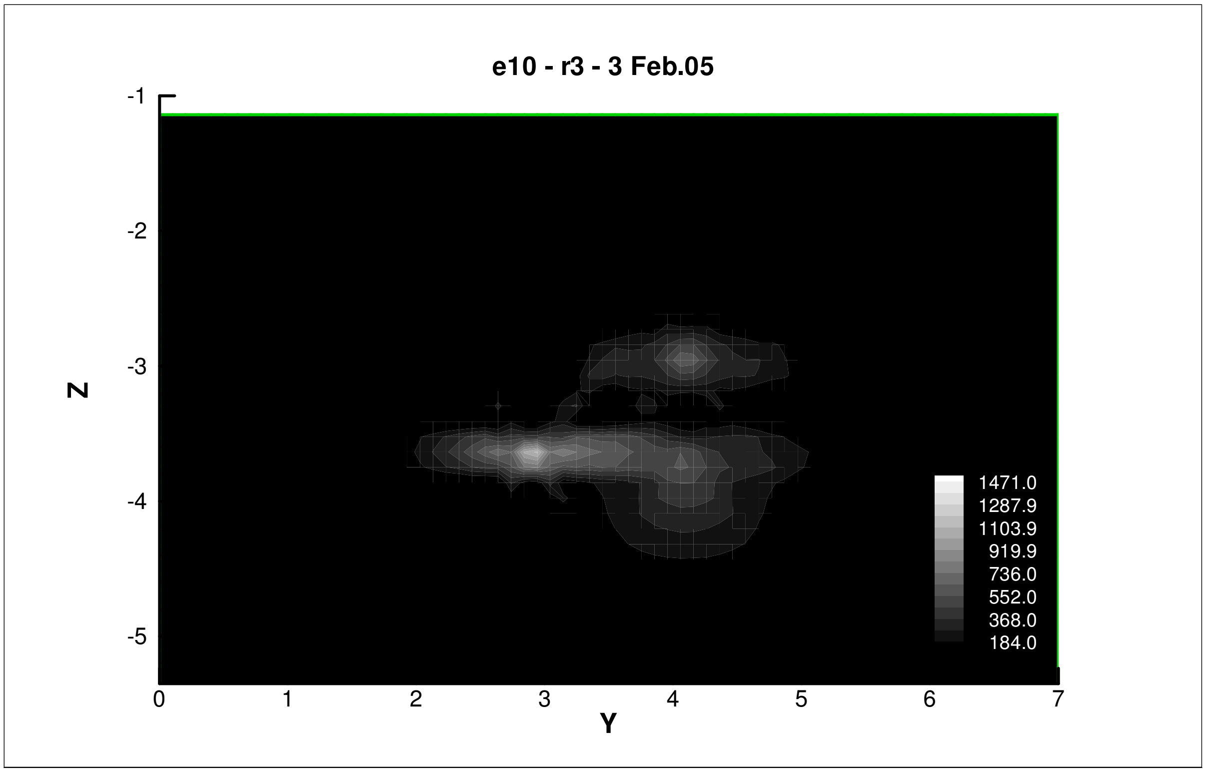


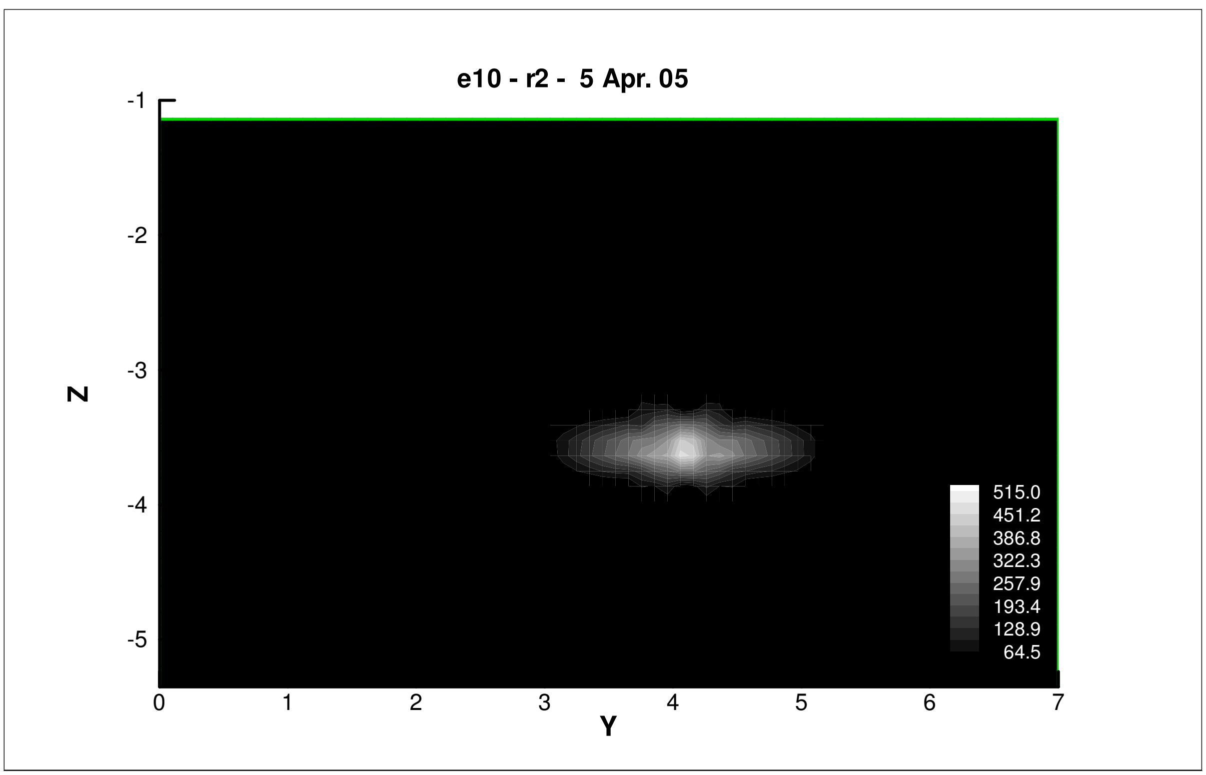




Apr. 05 and June 05 - zero.

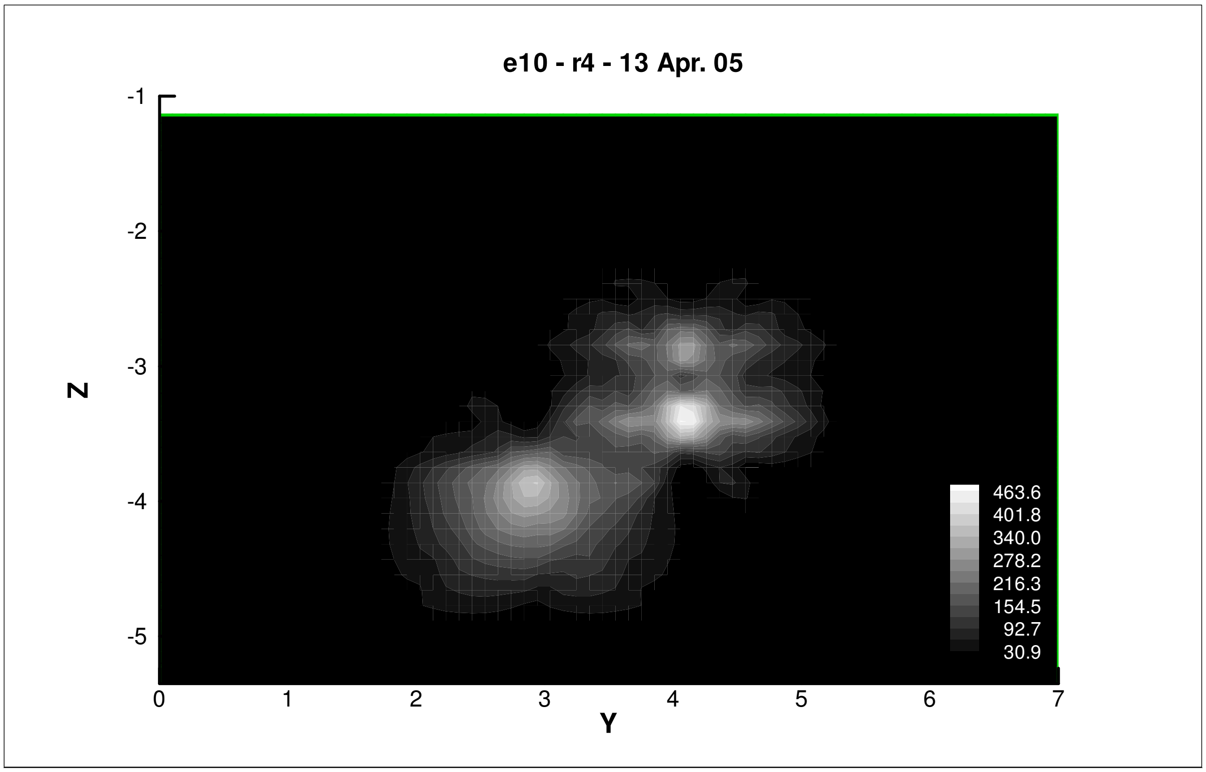
A. Oxygenates 2. E10 b. Row 3 Ethanol (mg/l)

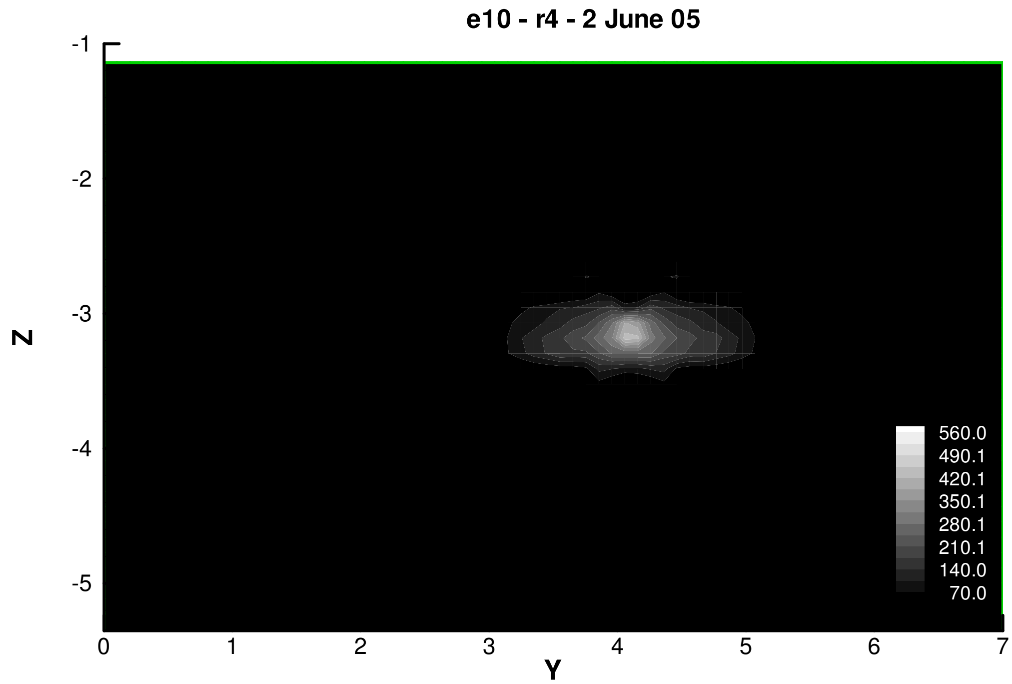




Jun. 05 and Aug. 05 - zero.

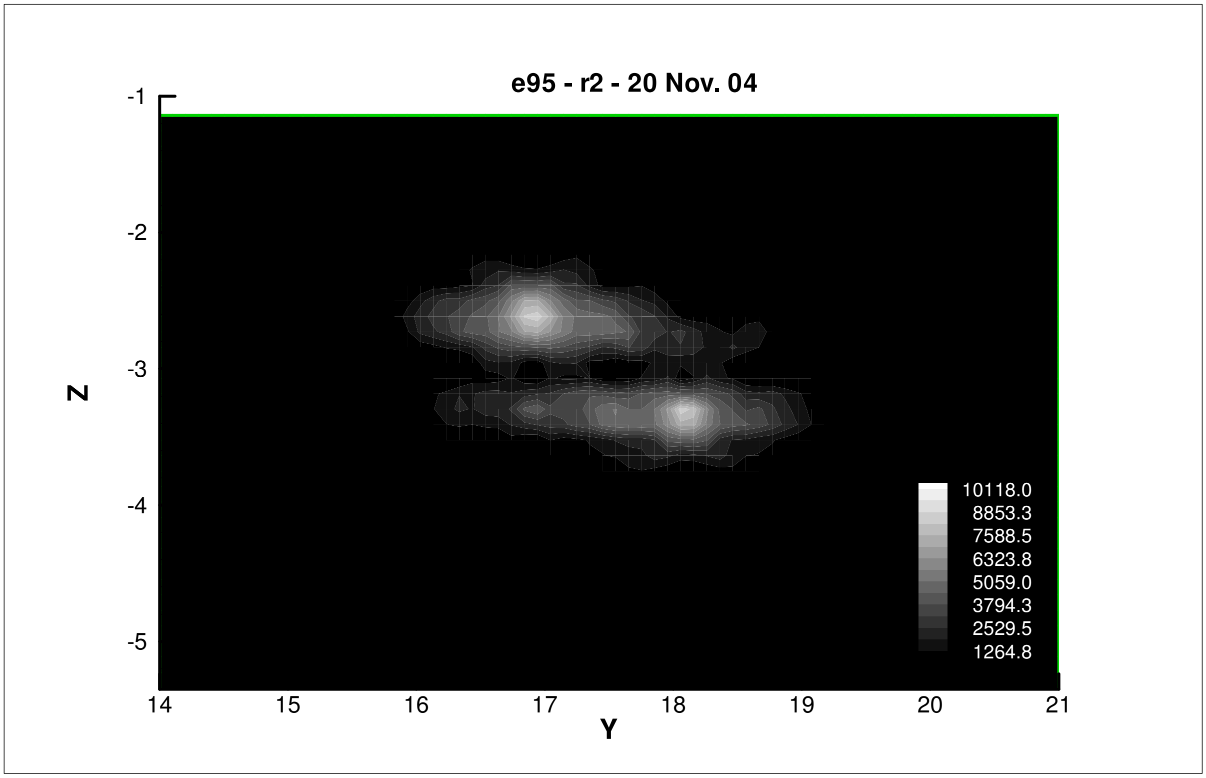
A. Oxygenates 2. E10 c. Row 4 Ethanol (mg/l)

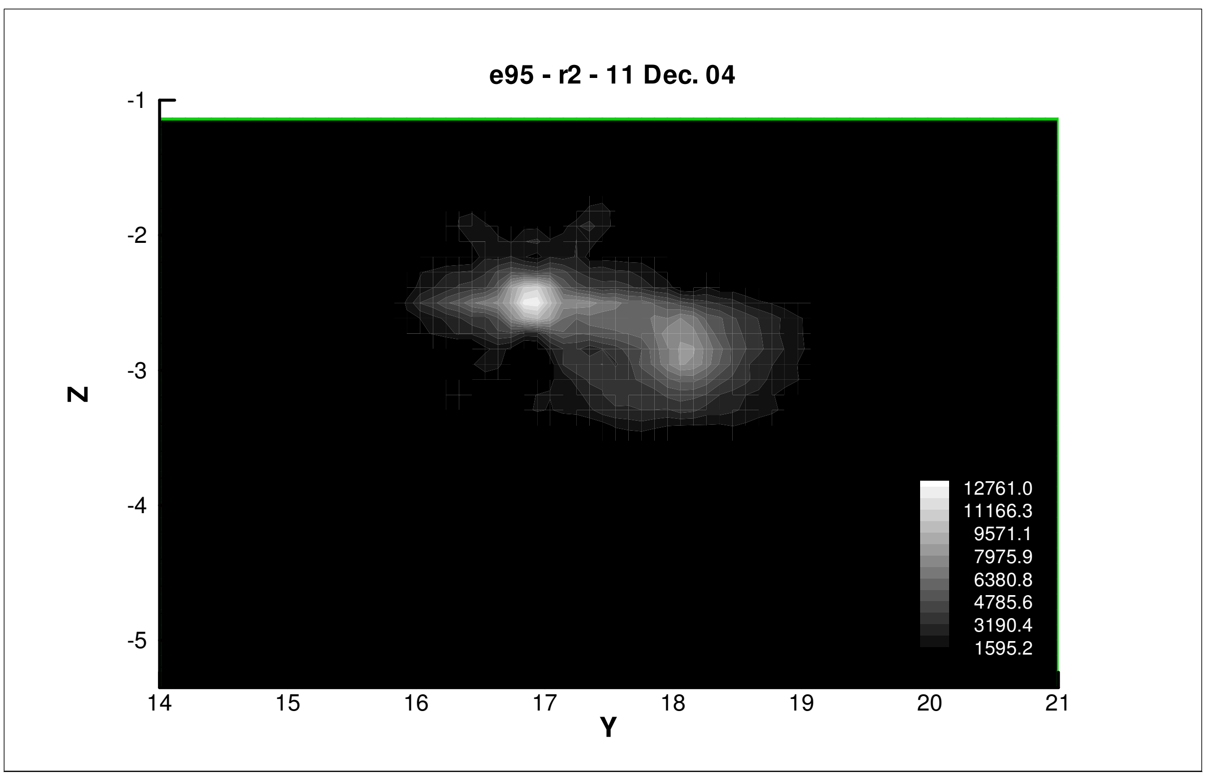


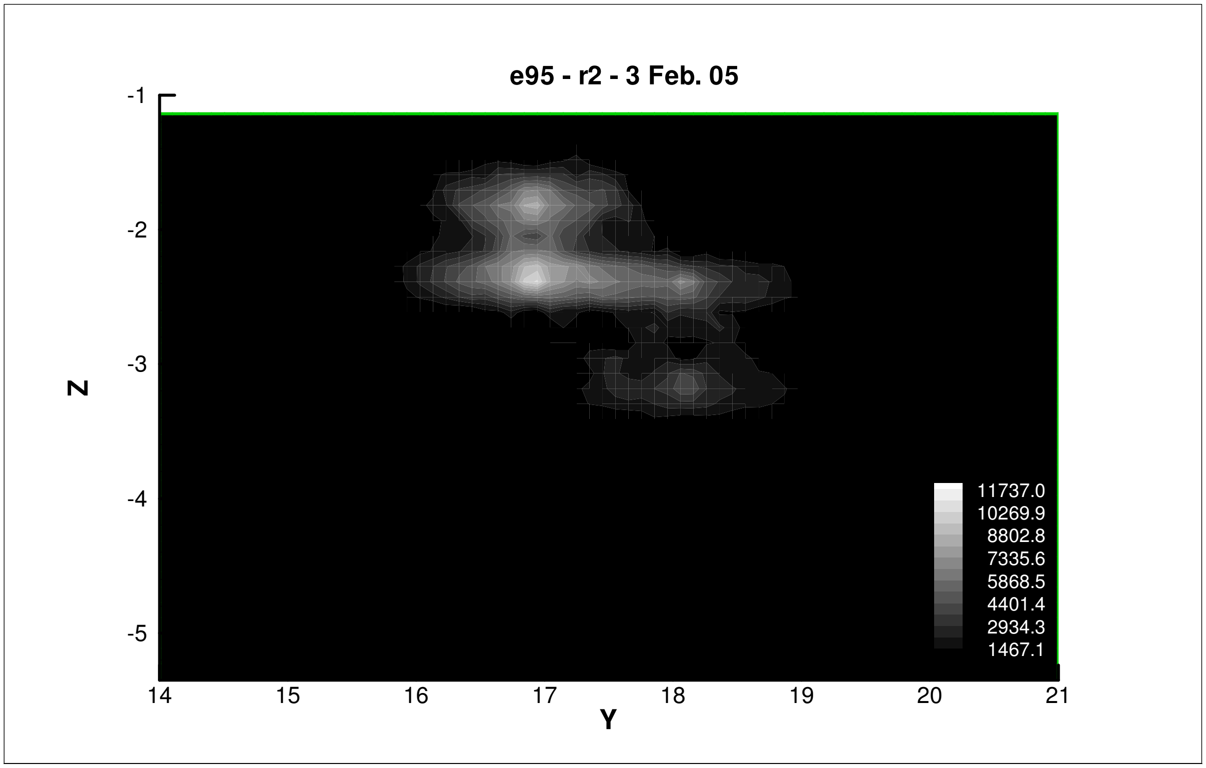


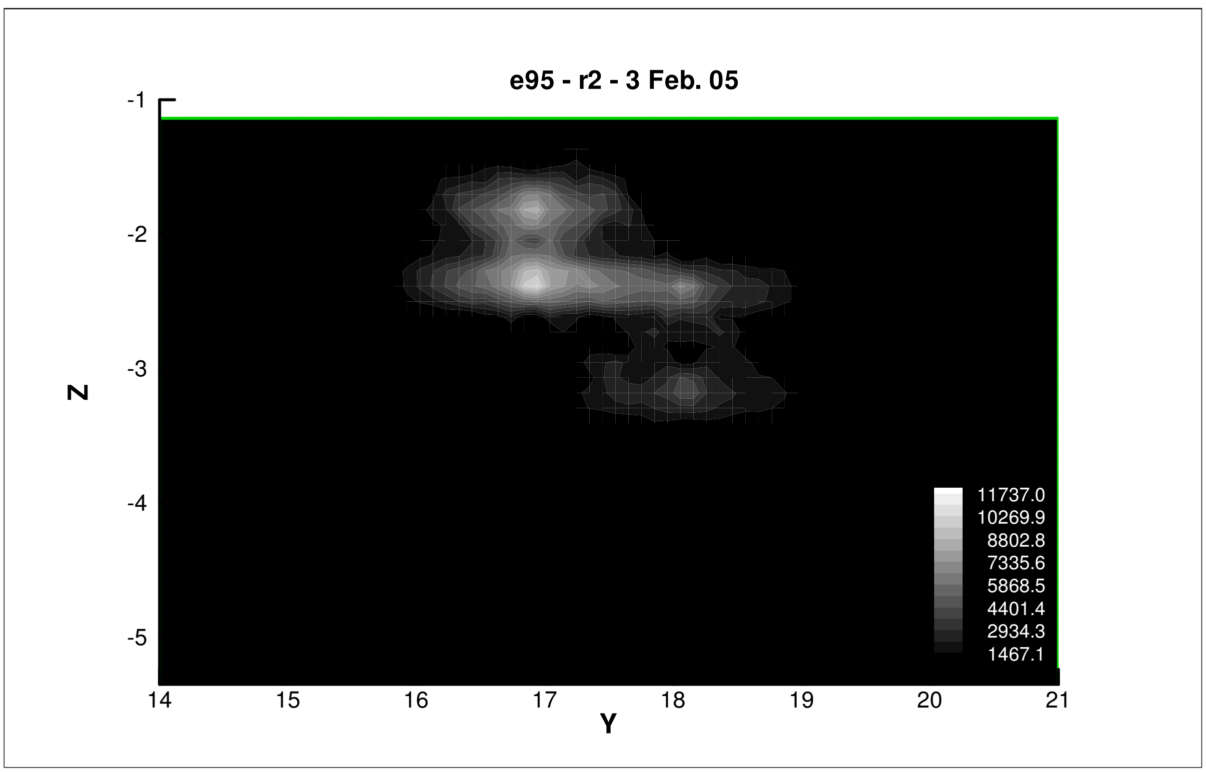
Aug. 05 and Nov. 05 - zero.

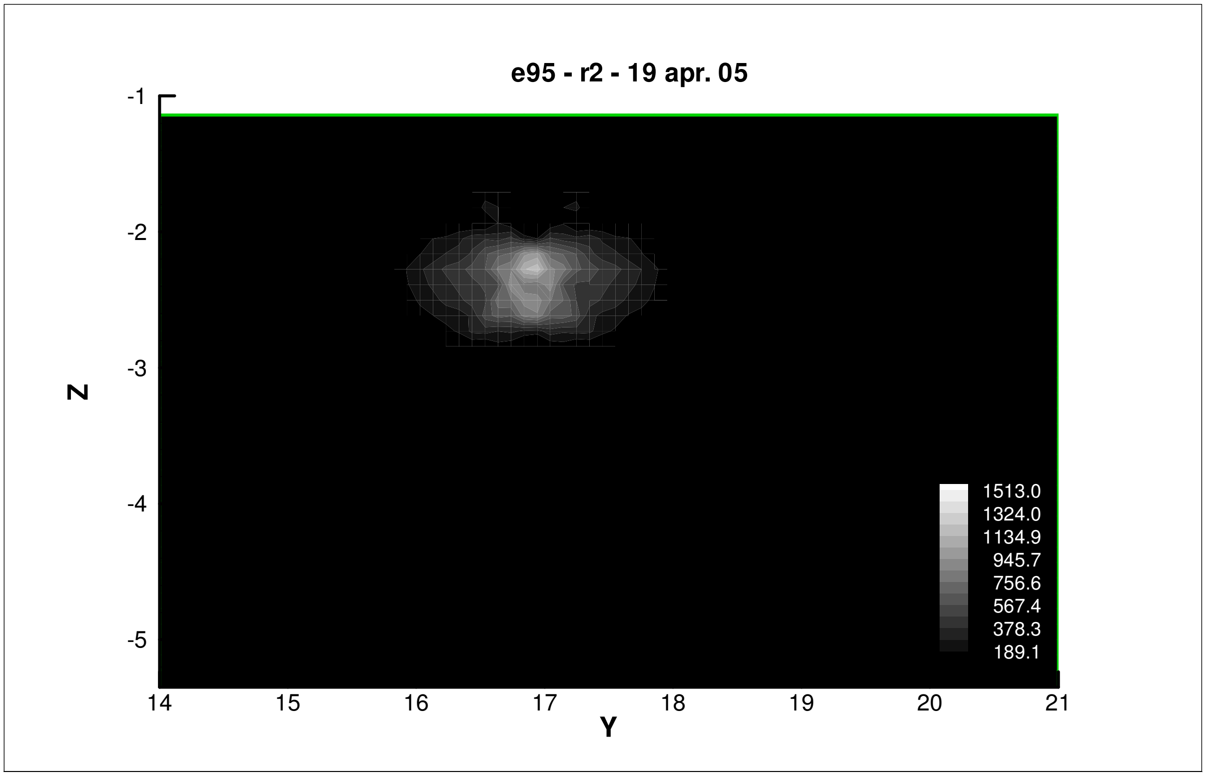
A. Oxygenates 3. E95 a. Row 2 Ethanol (mg/l)


e95 - r2 - 20 Nov. 04
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
10118.0
8853.3
7588.5
6323.8
5059.0
3794.3
2529.5
1264.8


e95 - r2 - 11 Dec. 04
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
12761.0
11166.3
9571.1
7975.9
6380.8
4785.6
3190.4
1595.2

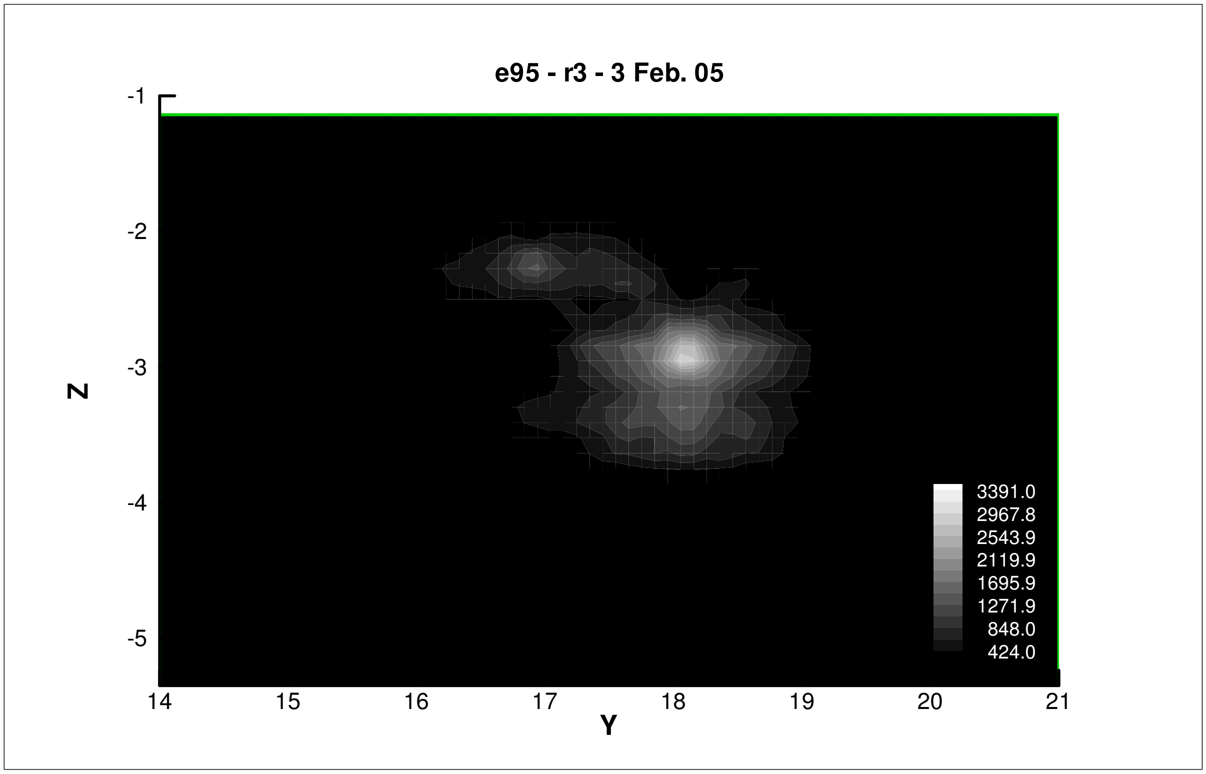

e95 - r2 - 3 Feb. 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
11737.0
10269.9
8802.8
7335.6
5868.5
4401.4
2934.3
1467.1

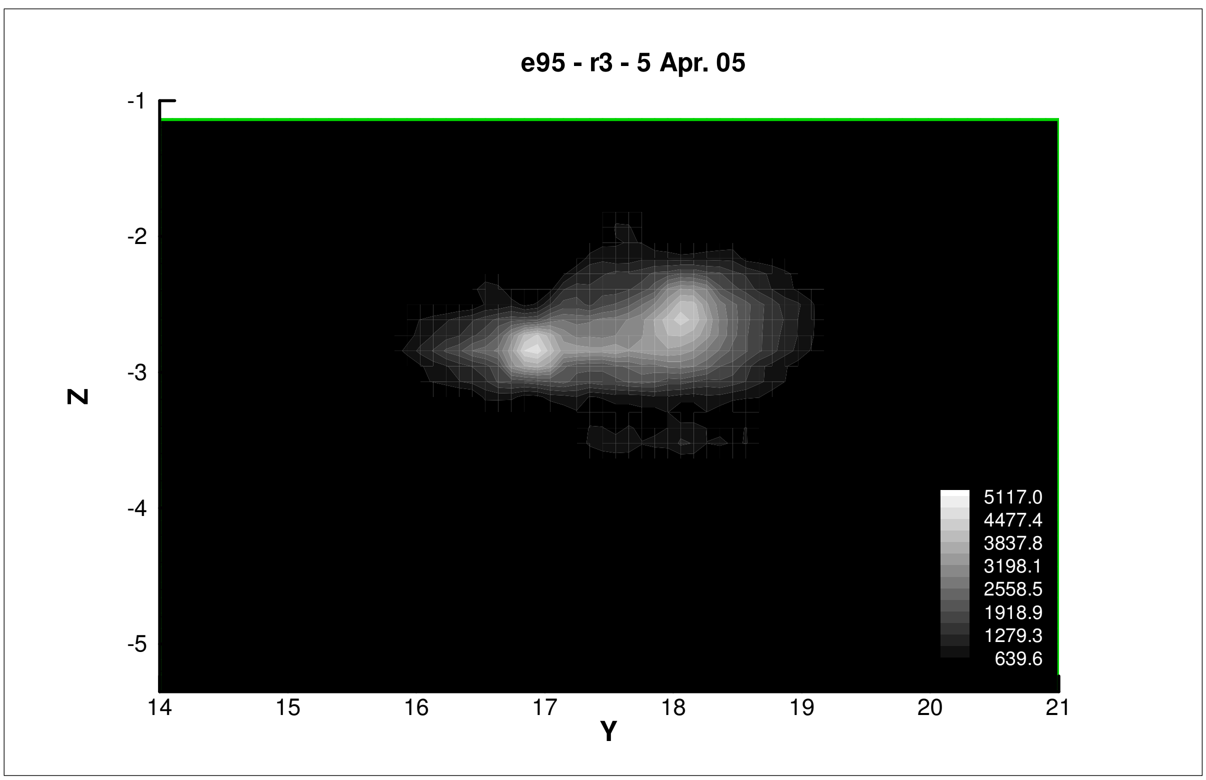

e95 - r2 - 3 Feb. 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
11737.0
10269.9
8802.8
7335.6
5868.5
4401.4
2934.3
1467.1

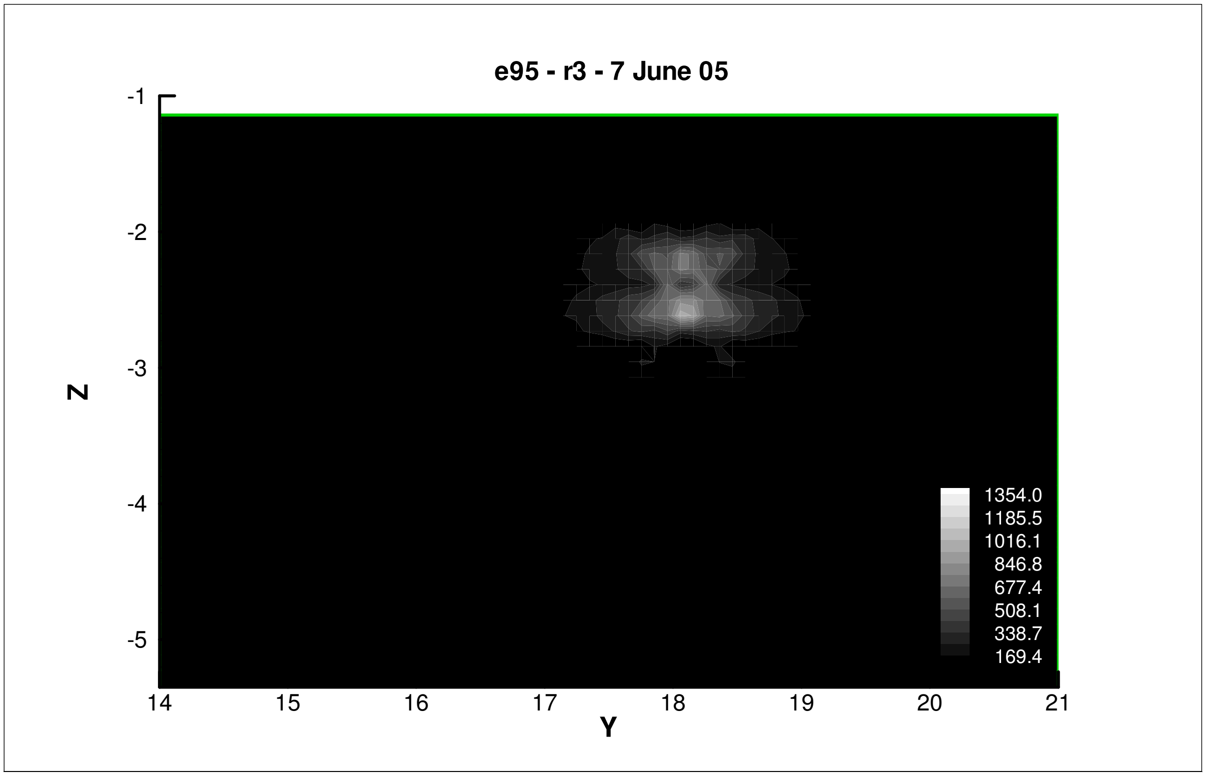


June 05 - zero.

A. Oxygenates 3. E95 b. Row 3 Ethanol (mg/l)

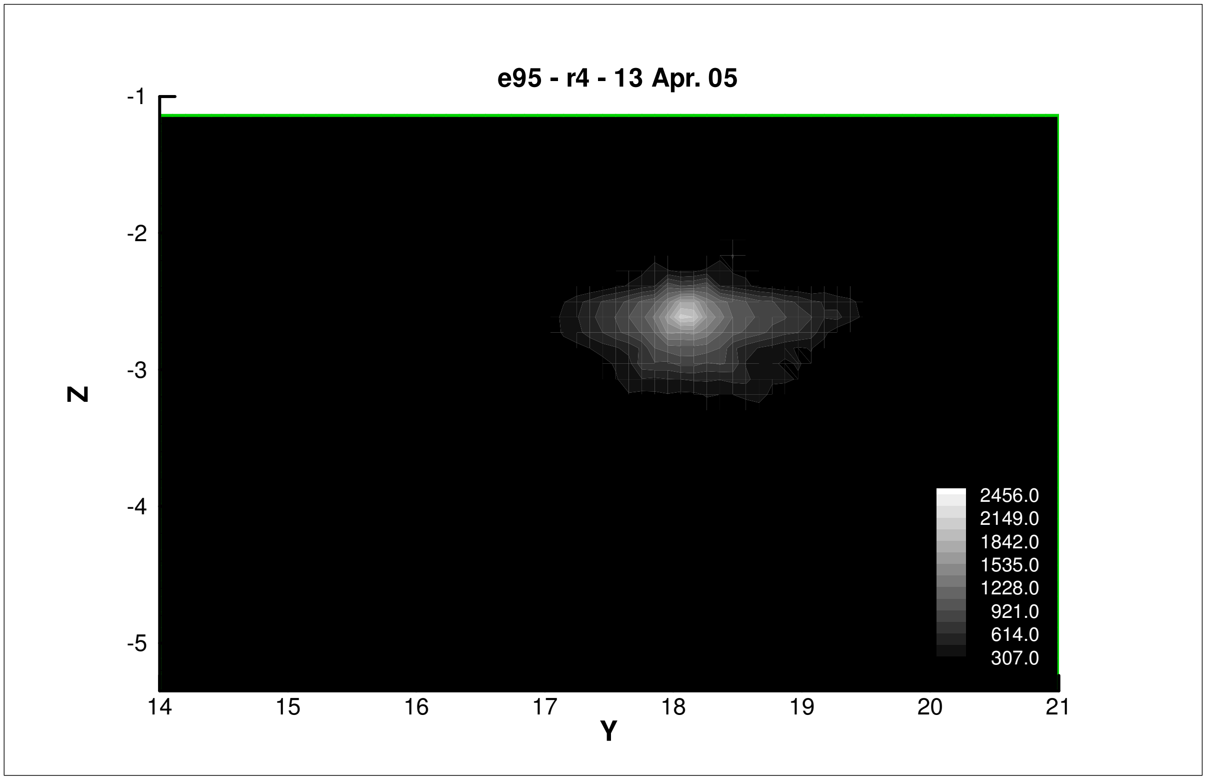

e95 - r3 - 3 Feb. 05
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
3391.0
2967.8
2543.9
2119.9
1695.9
1271.9
848.0
424.0

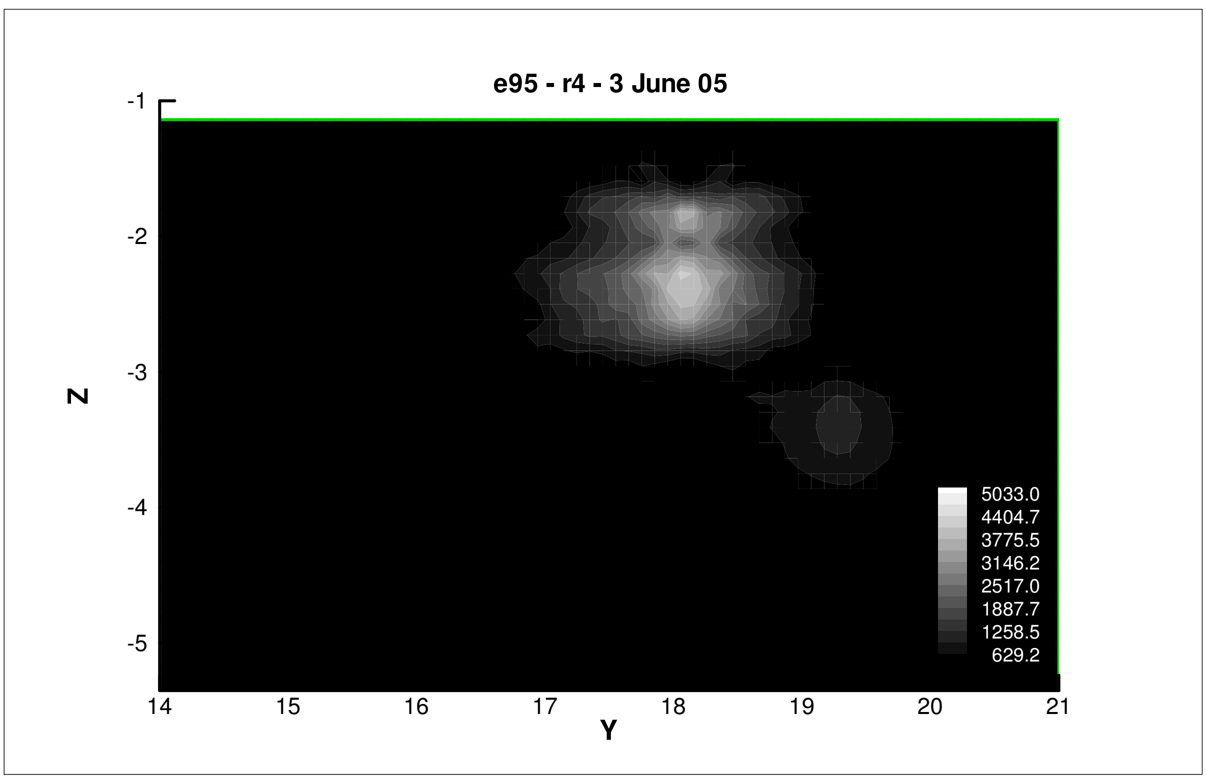

e95 - r3 - 5 Apr. 05
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
5117.0
4477.4
3837.8
3198.1
2558.5
1918.9
1279.3
639.6

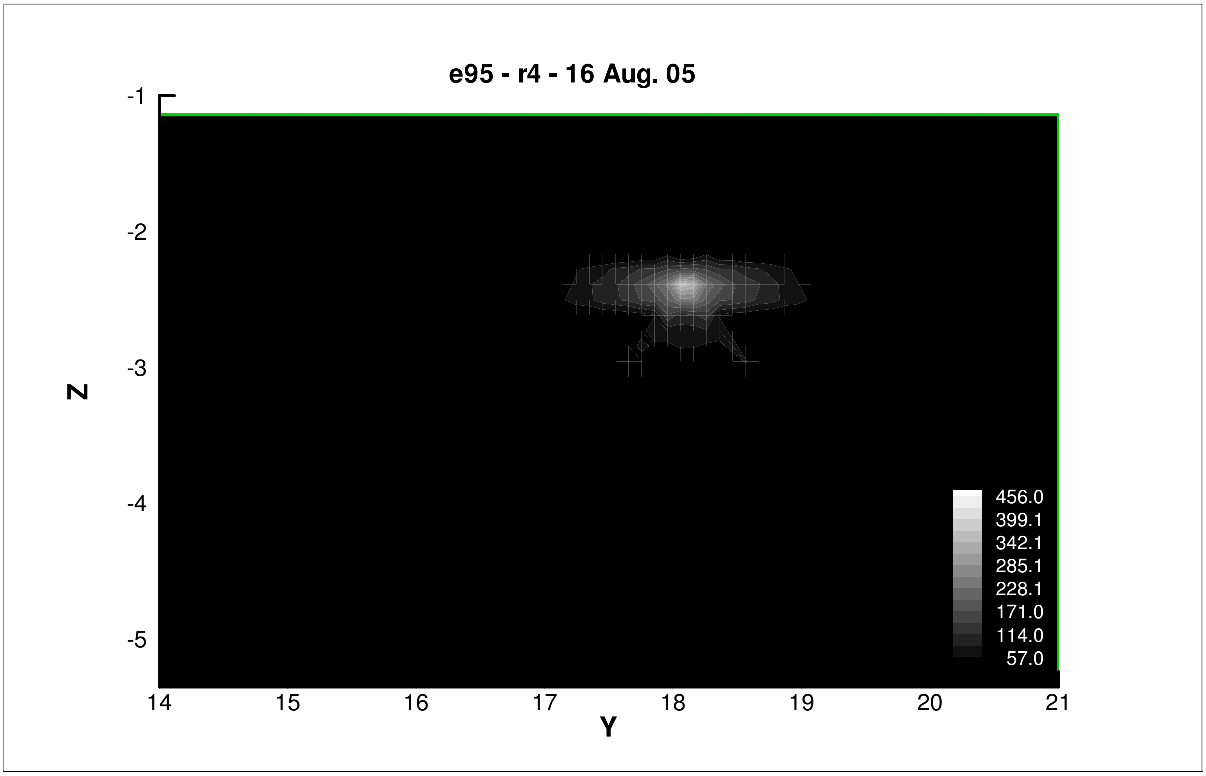


Aug. 05 - zero.

A. Oxygenates 3. E95 c. Row 4 Ethanol (mg/l)


e95 - r4 - 13 Apr. 05
Z
-1
-2
-3
-4
-5
Y
14
15
16
17
18
19
20
21
2456.0
2149.0
1842.0
1535.0
1228.0
921.0
614.0
307.0

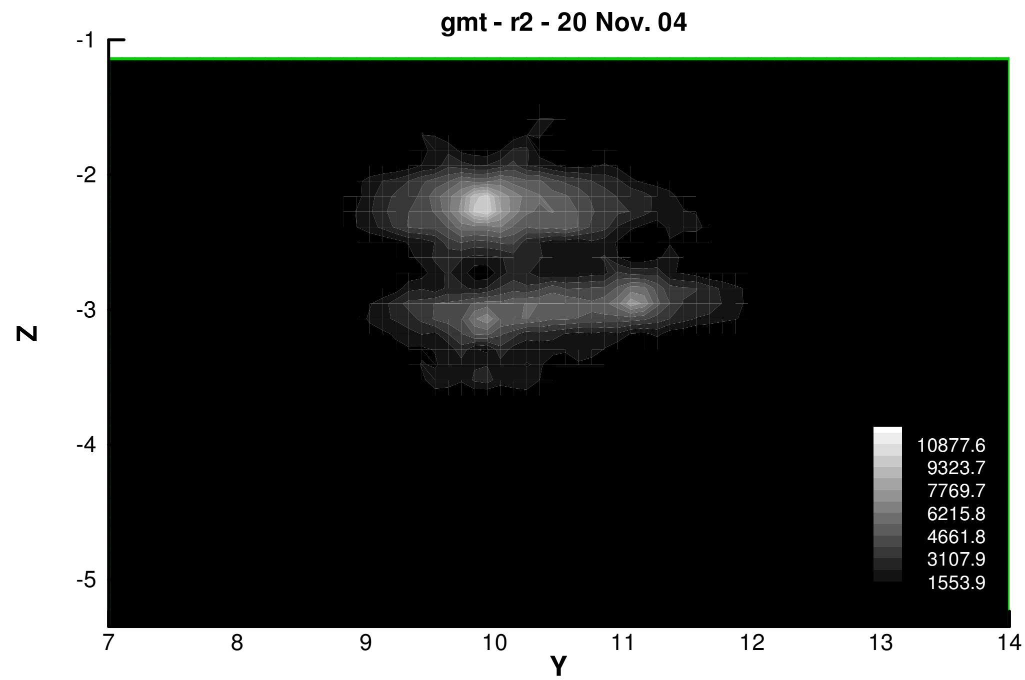

e95 - r4 - 3 June 05
Z
-1
-2
-3
-4
-5
Y
14
15
16
17
18
19
20
21
5033.0
4404.7
3775.5
3146.2
2517.0
1887.7
1258.5
629.2

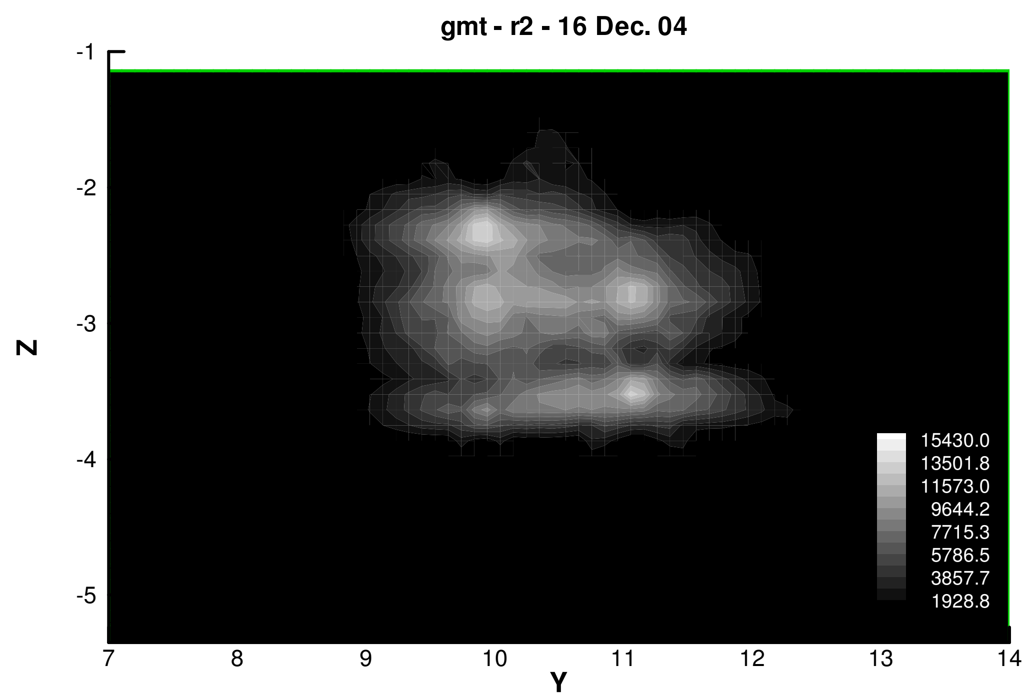

e95 - r4 - 16 Aug. 05
Z
-1
-2
-3
-4
-5
Y
14
15
16
17
18
19
20
21
456.0
399.1
342.1
285.1
228.1
171.0
114.0
57.0

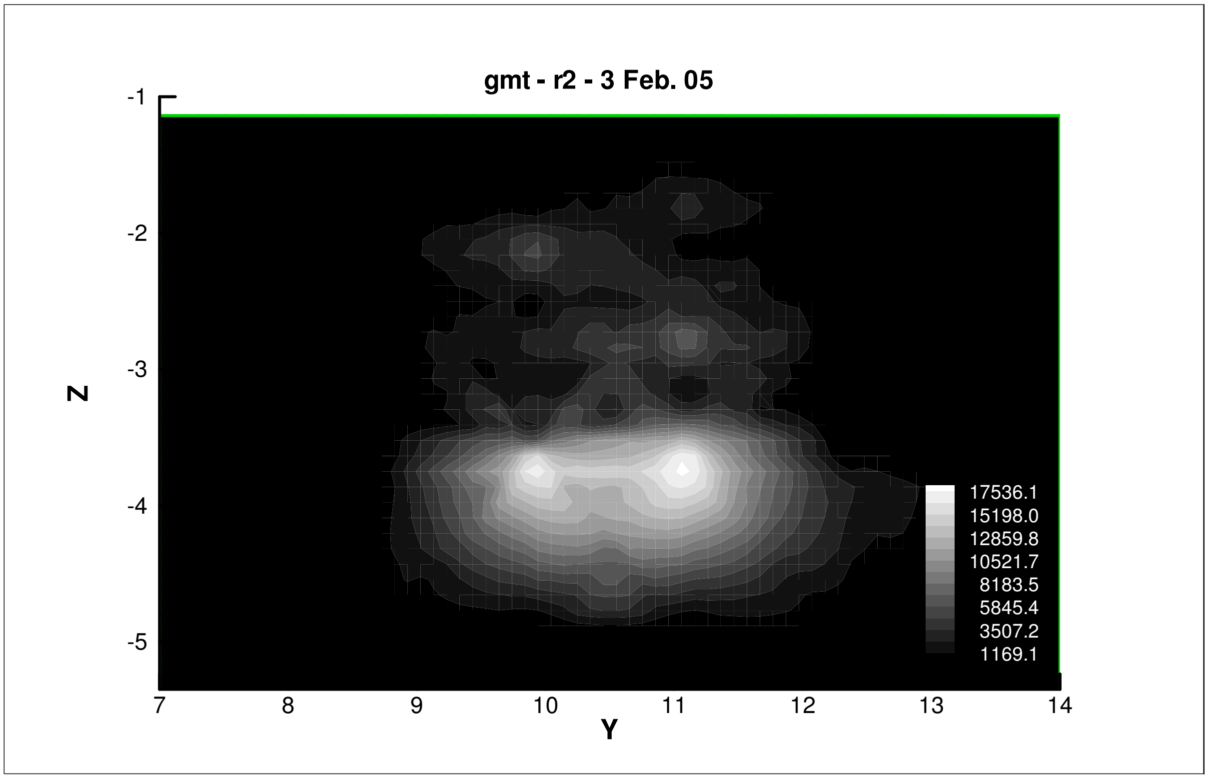
Aug. 05 - zero.

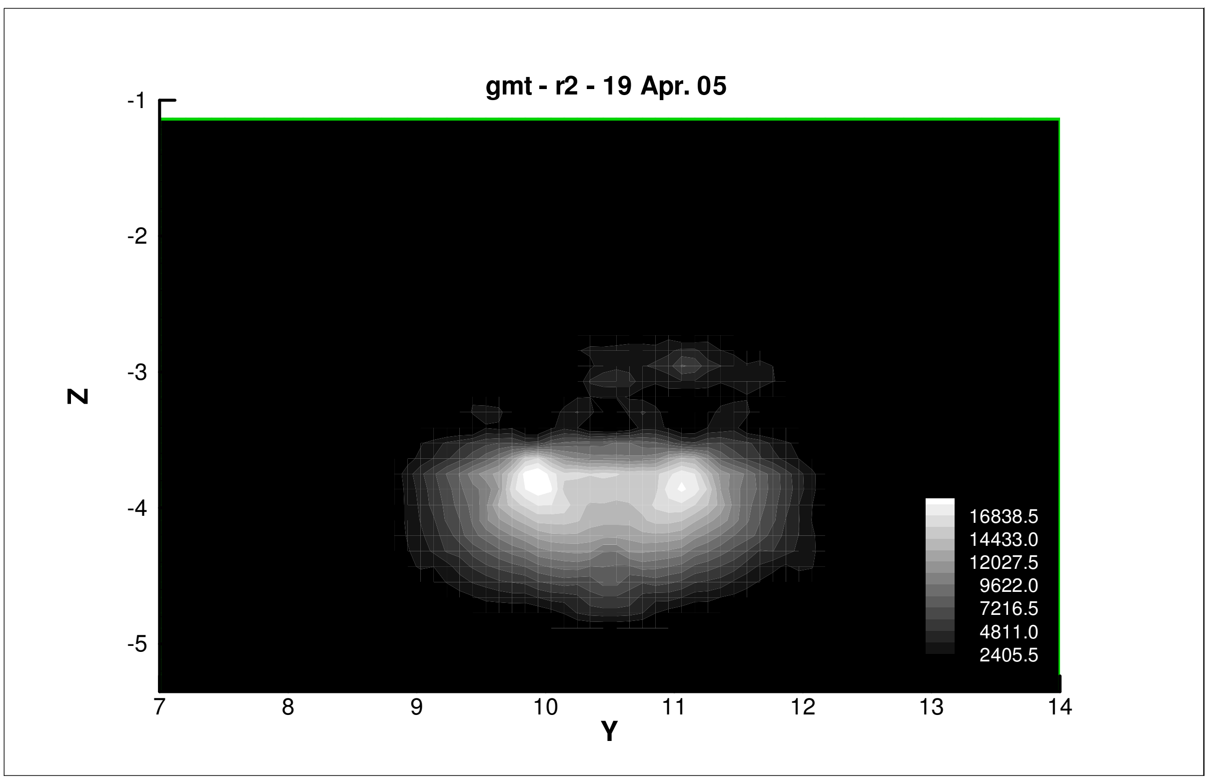
Appendix 2.B.1 (Cross Sections)

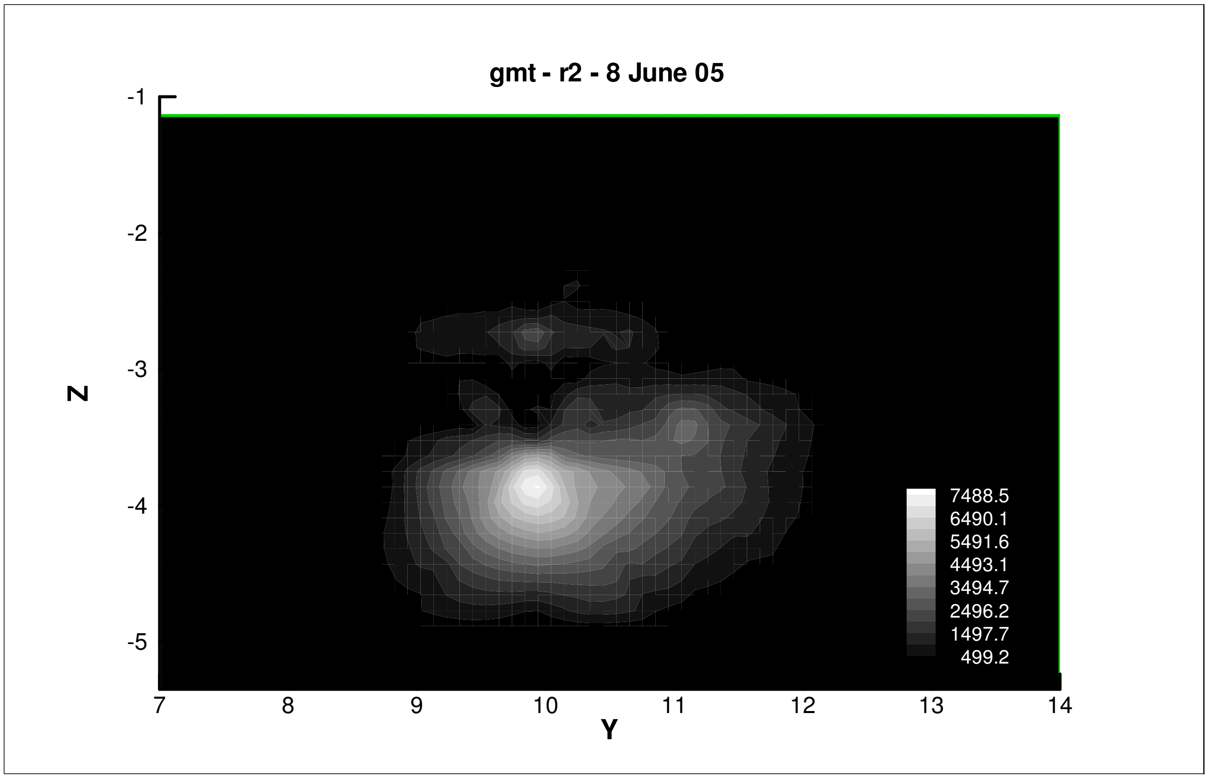
B. BTEX 1. GMT a. Row 2 1. Benzene (ug/l)



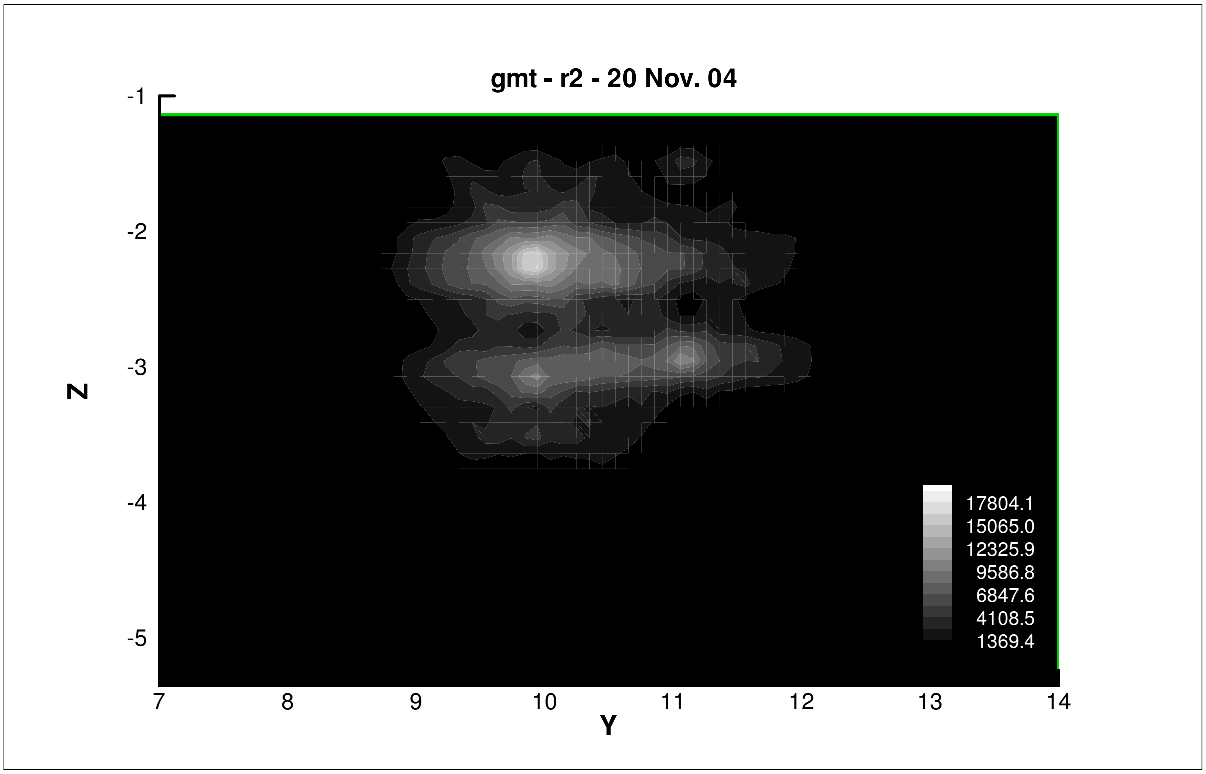


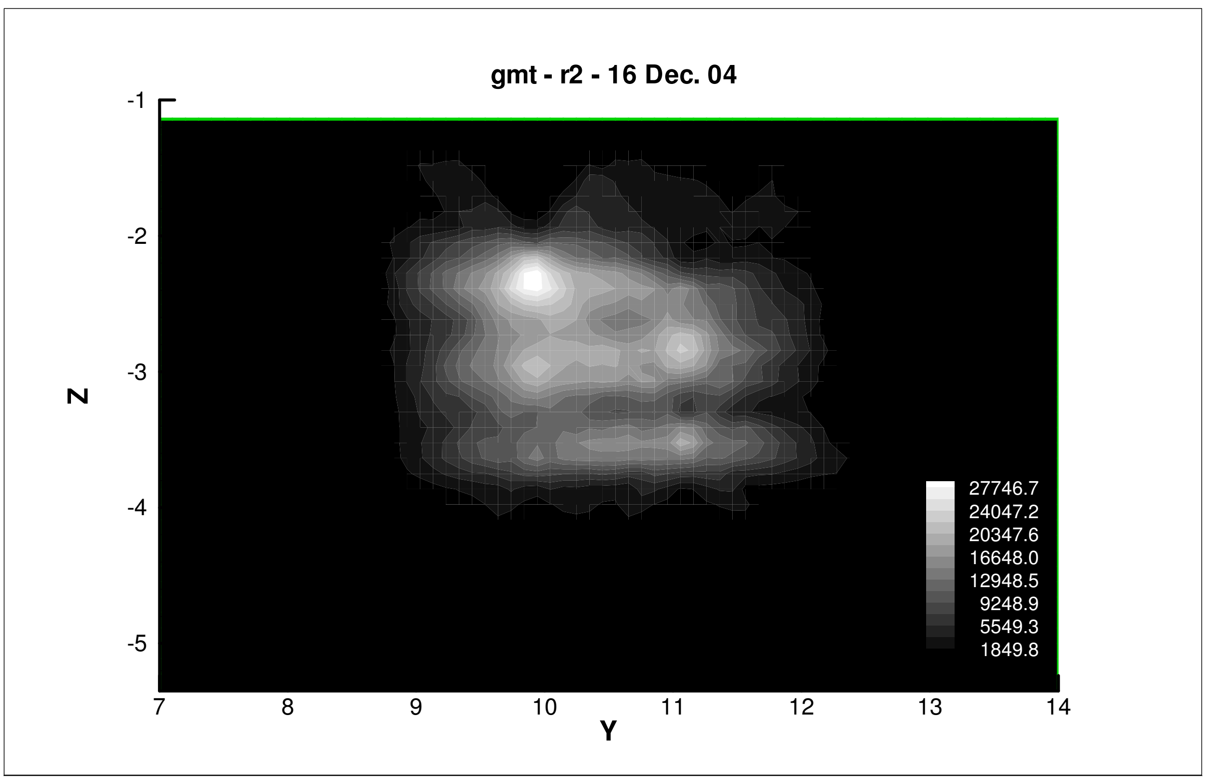

gmt - r2 - 3 Feb. 05
Z
Y
-1
-2
-3
-4
-5
7
8
9
10
11
12
13
14
17536.1
15198.0
12859.8
10521.7
8183.5
5845.4
3507.2
1169.1

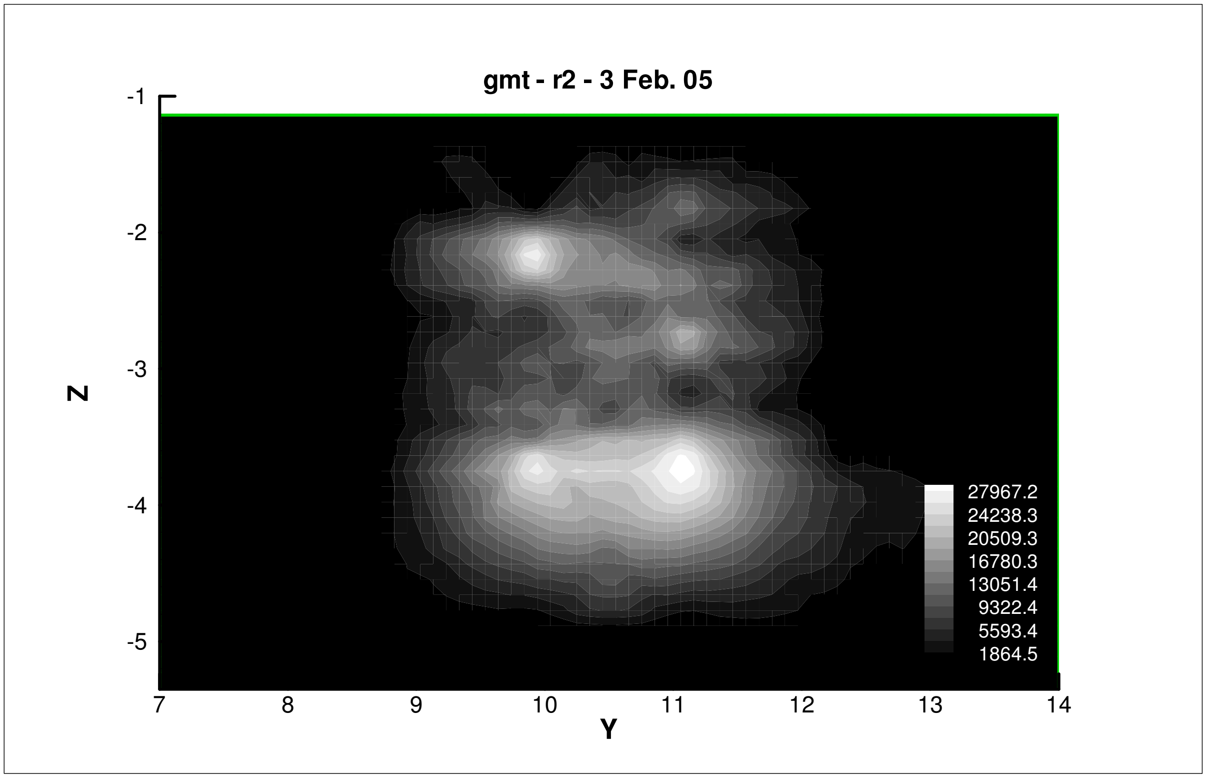

gmt - r2 - 19 Apr. 05
Z
Y
-1
-2
-3
-4
-5
7
8
9
10
11
12
13
14
16838.5
14433.0
12027.5
9622.0
7216.5
4811.0
2405.5

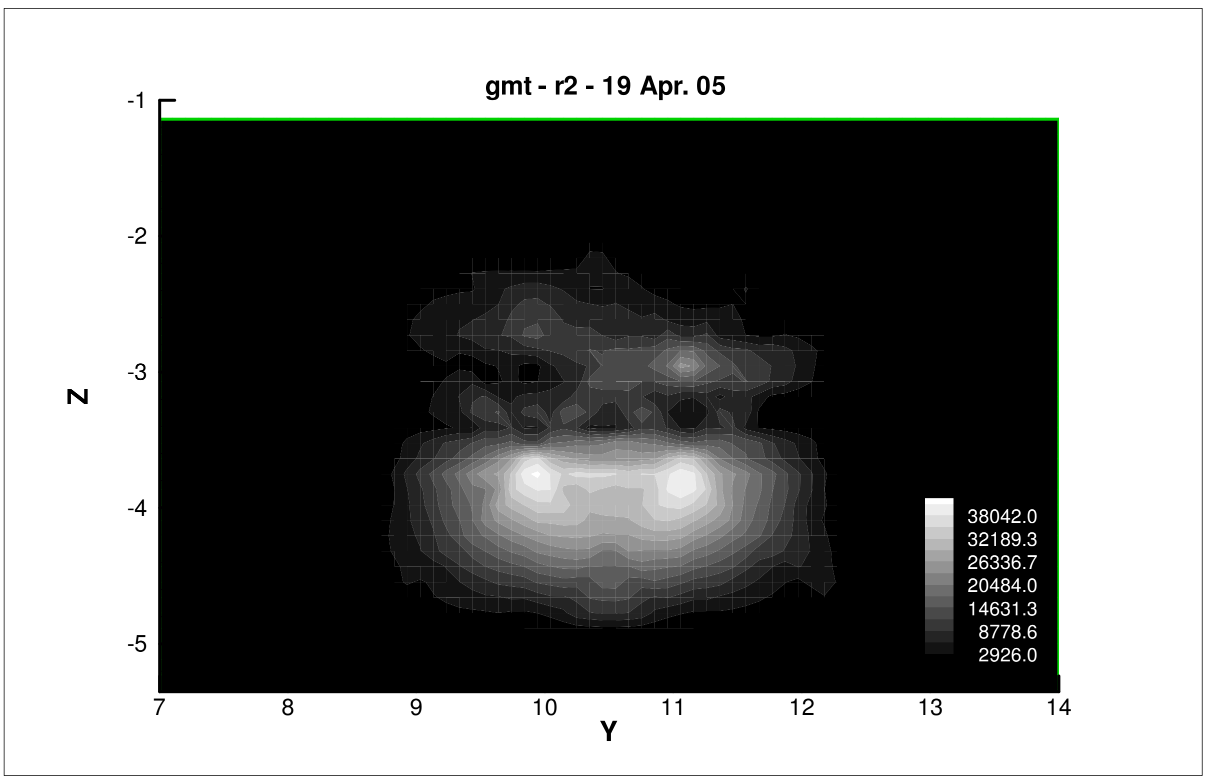


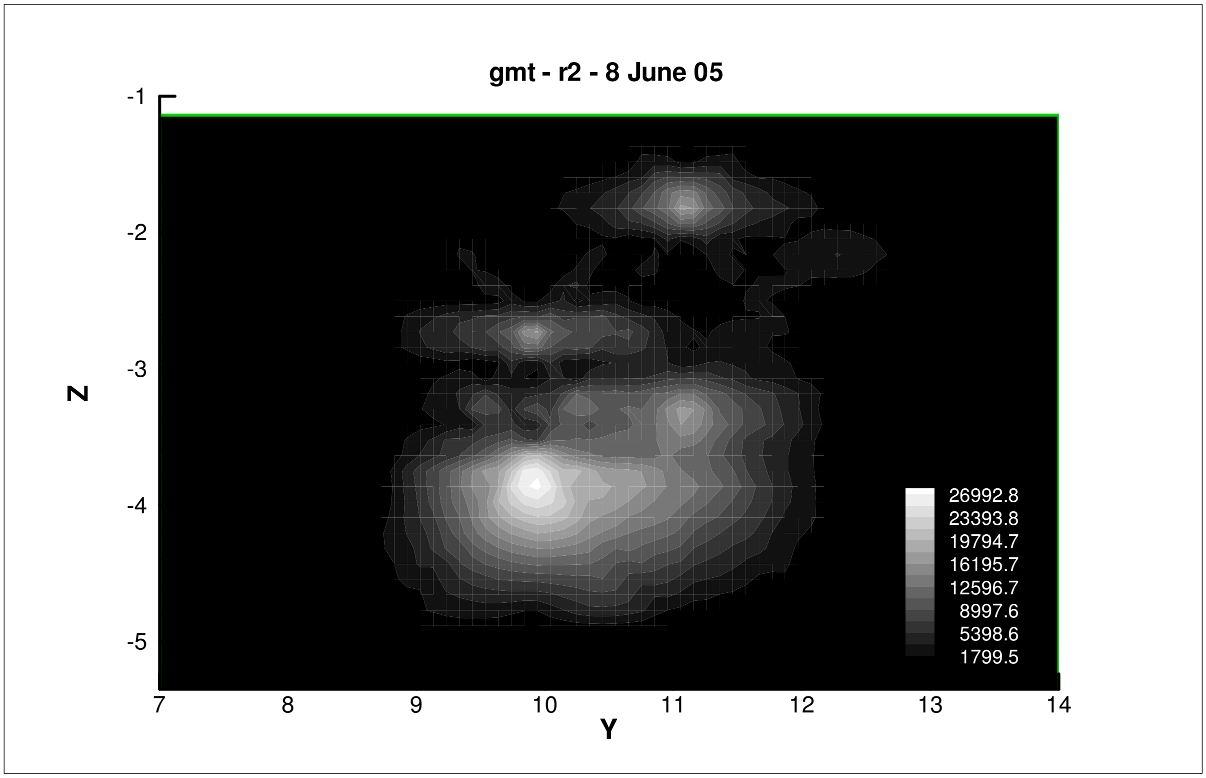
B. BTEX 1. GMT a. Row 2 2. Toluene (µg/l)


gmt - r2 - 20 Nov. 04
-1
-2
-3
-4
-5
Z
7
8
9
10
11
12
13
14
Y
17804.1
15065.0
12325.9
9586.8
6847.6
4108.5
1369.4

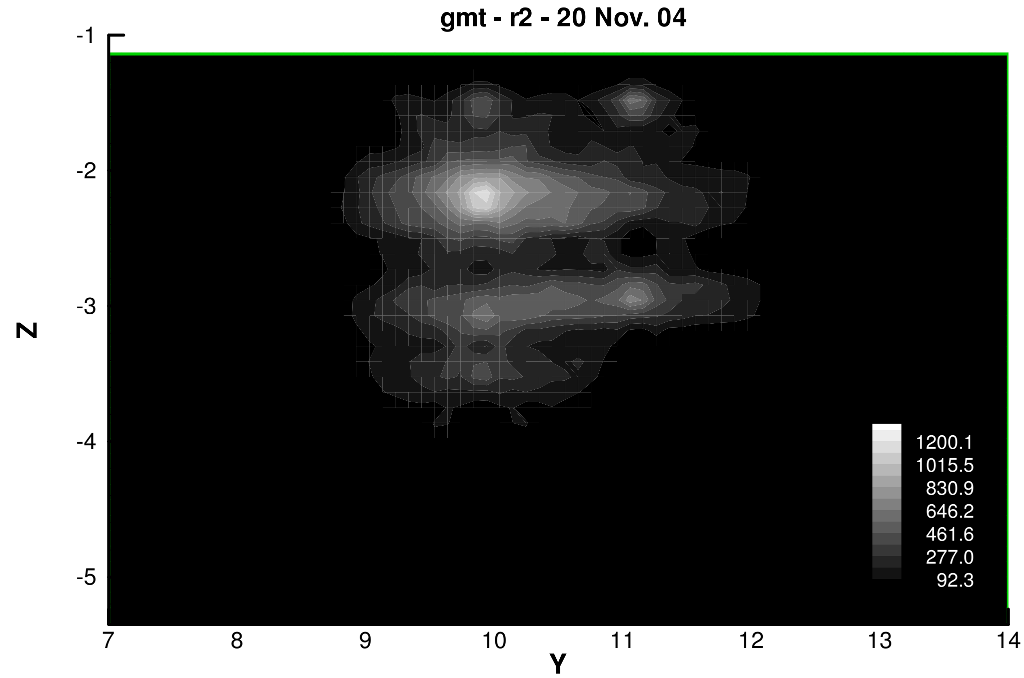

gmt - r2 - 16 Dec. 04
-1
-2
-3
-4
-5
Z
7
8
9
10
11
12
13
14
Y
27746.7
24047.2
20347.6
16648.0
12948.5
9248.9
5549.3
1849.8

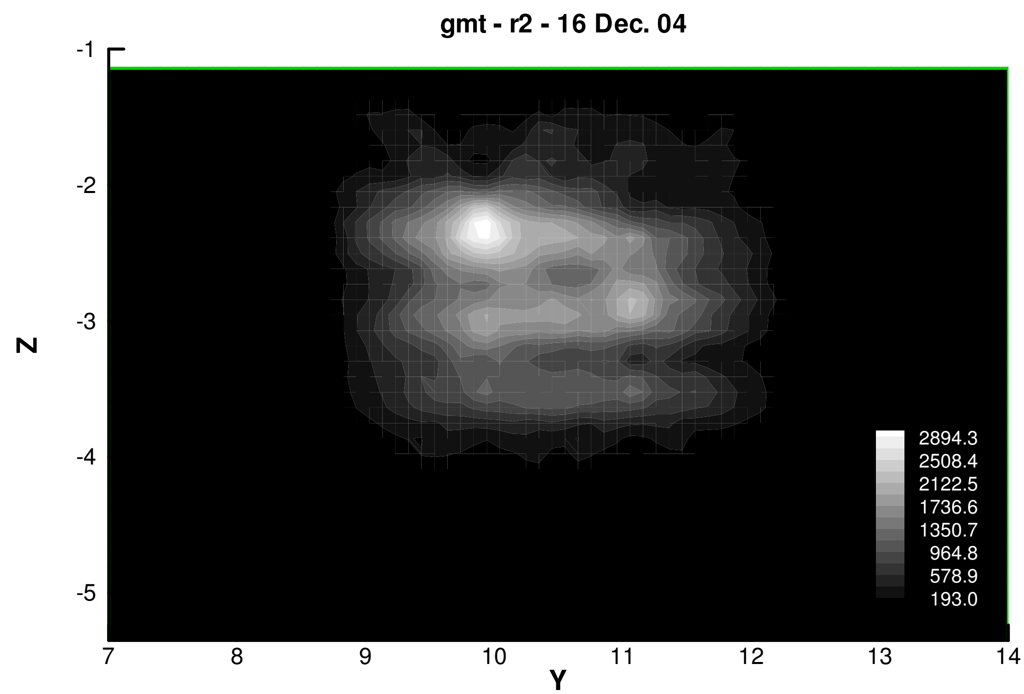

gmt - r2 - 3 Feb. 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
27967.2
24238.3
20509.3
16780.3
13051.4
9322.4
5593.4
1864.5

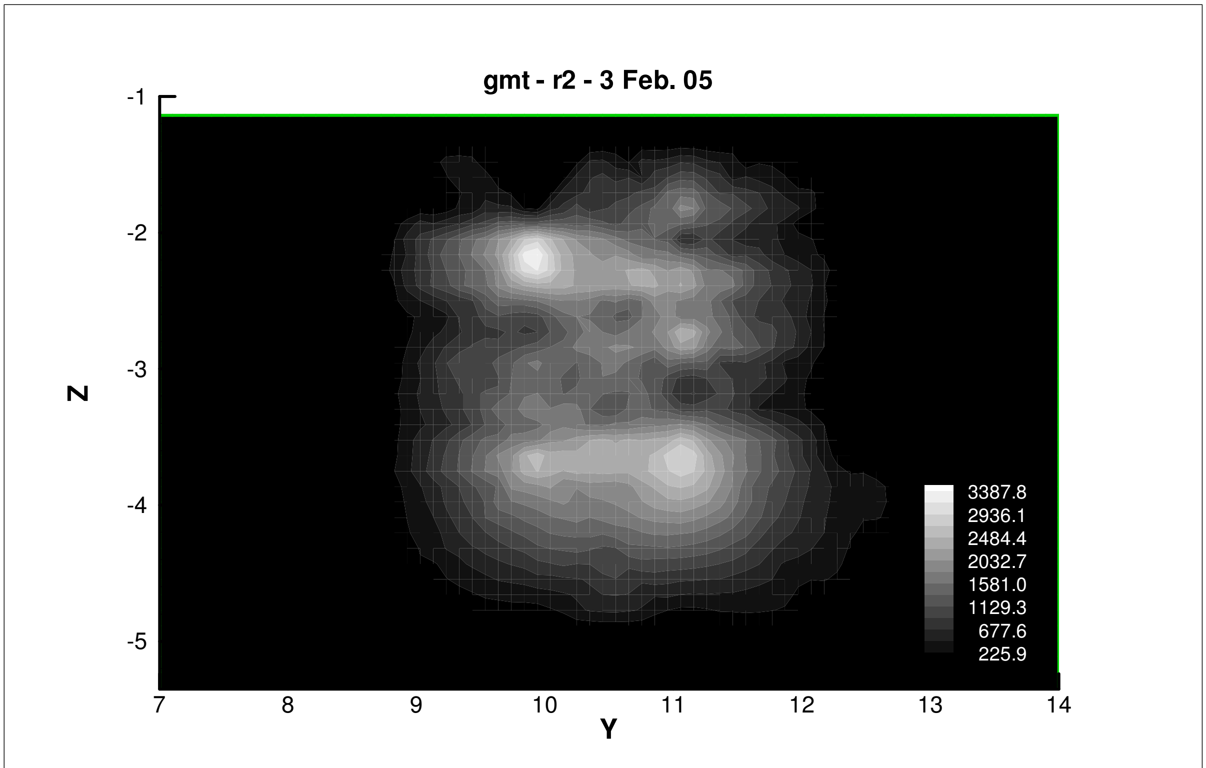

gmt - r2 - 19 Apr. 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
38042.0
32189.3
26336.7
20484.0
14631.3
8778.6
2926.0

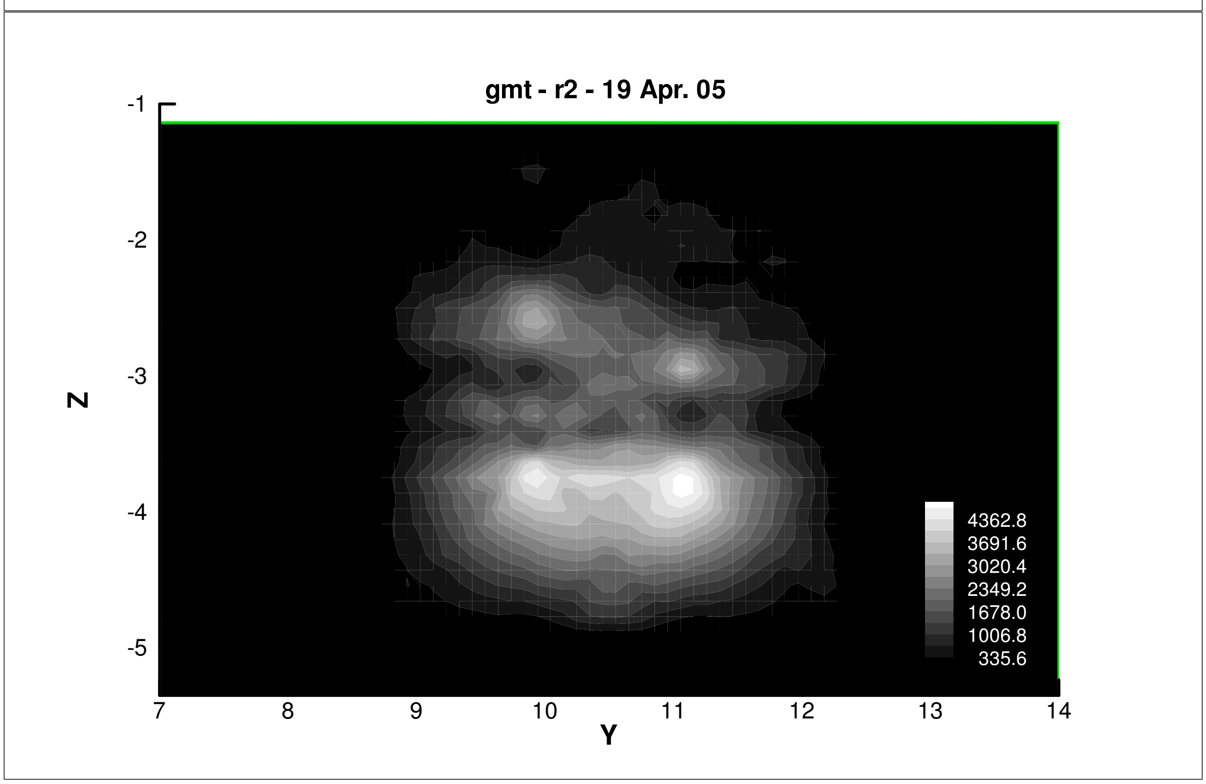


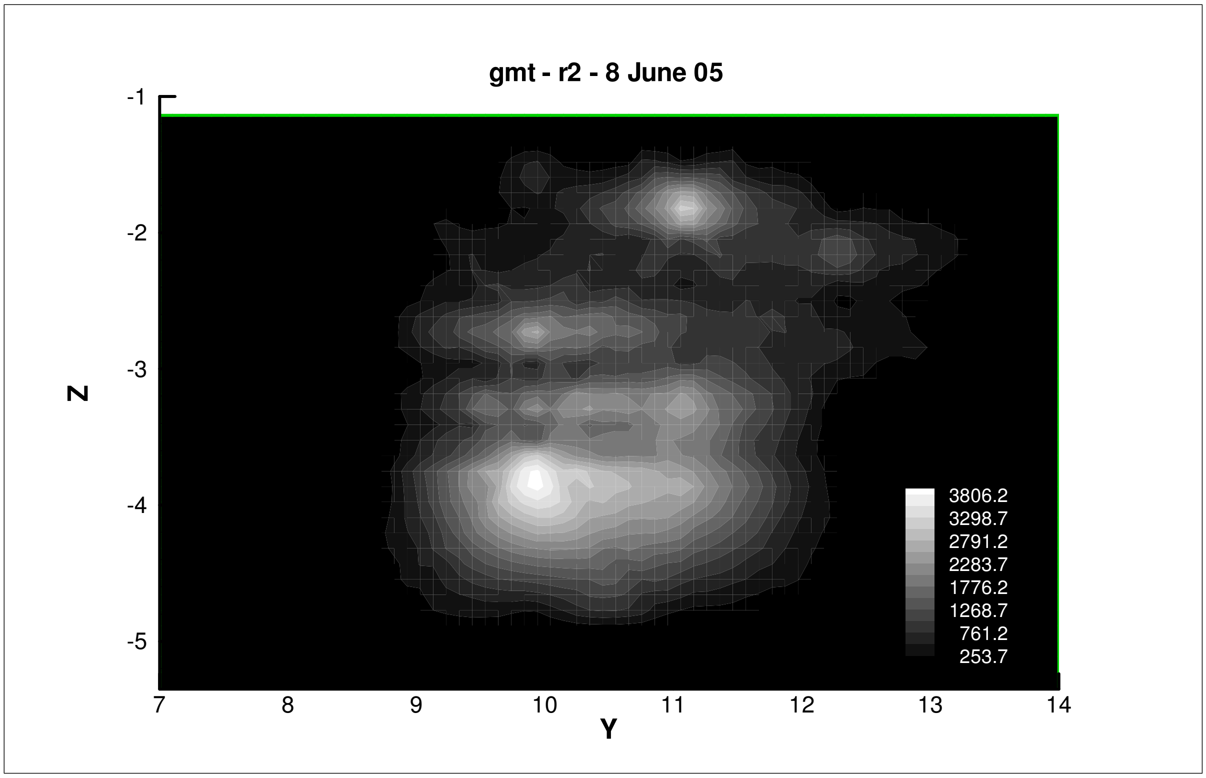
B. BTEX 1. GMT a. Row 2 3. O-Xylene (µg/l)


gmt - r2 - 20 Nov. 04
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
1200.1
1015.5
830.9
646.2
461.6
277.0
92.3

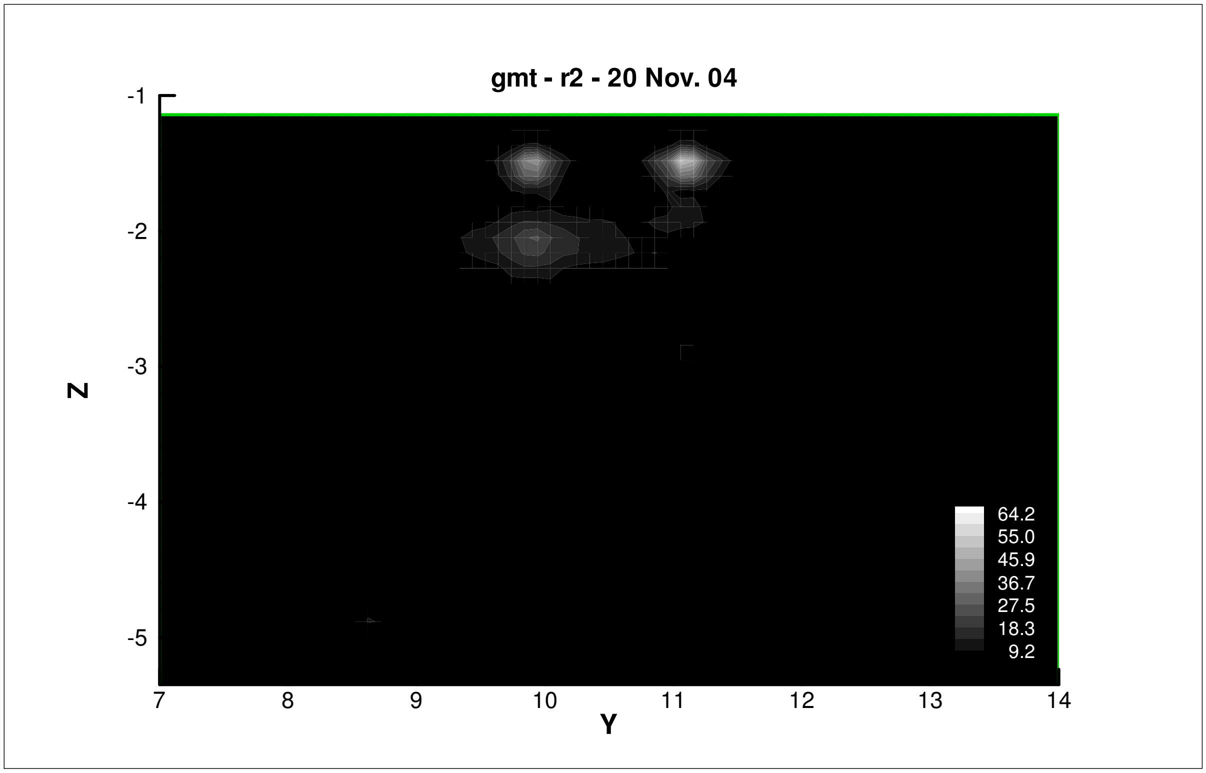

gmt - r2 - 16 Dec. 04
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
2894.3
2508.4
2122.5
1736.6
1350.7
964.8
578.9
193.0

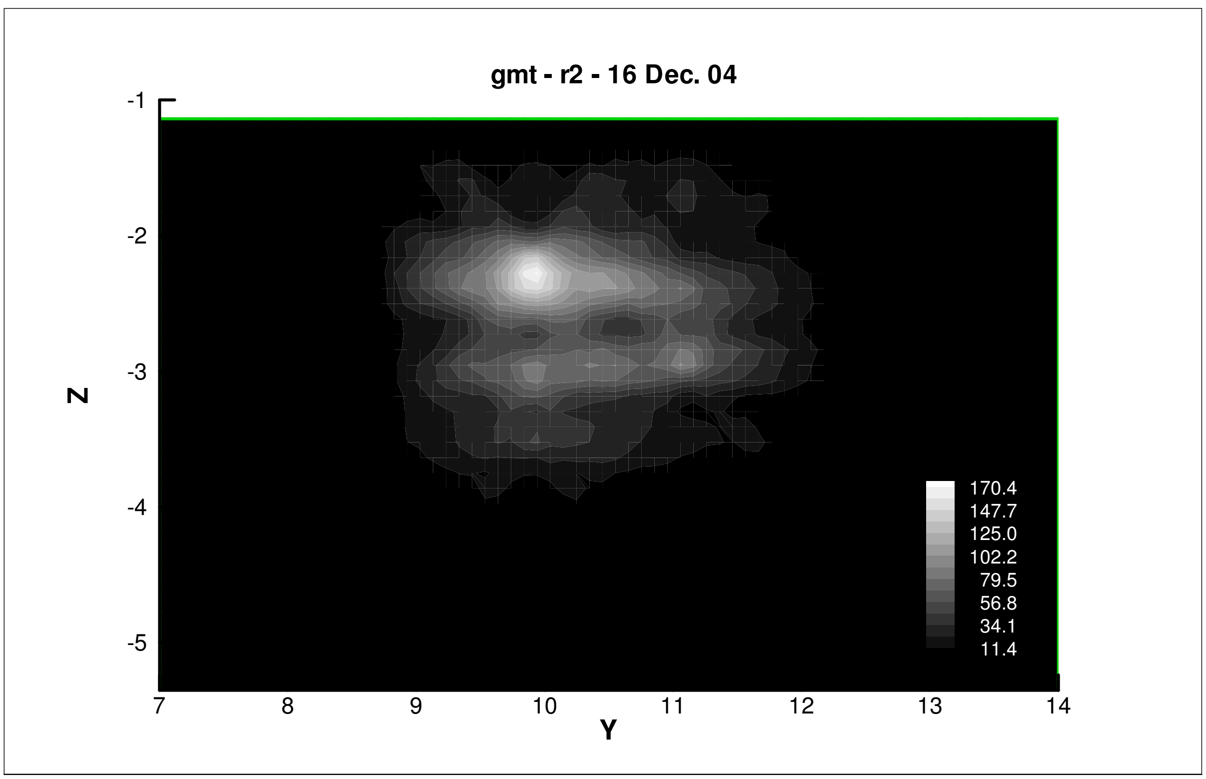

gmt - r2 - 3 Feb. 05
Z
Y
-1
-2
-3
-4
-5
7
8
9
10
11
12
13
14
3387.8
2936.1
2484.4
2032.7
1581.0
1129.3
677.6
225.9

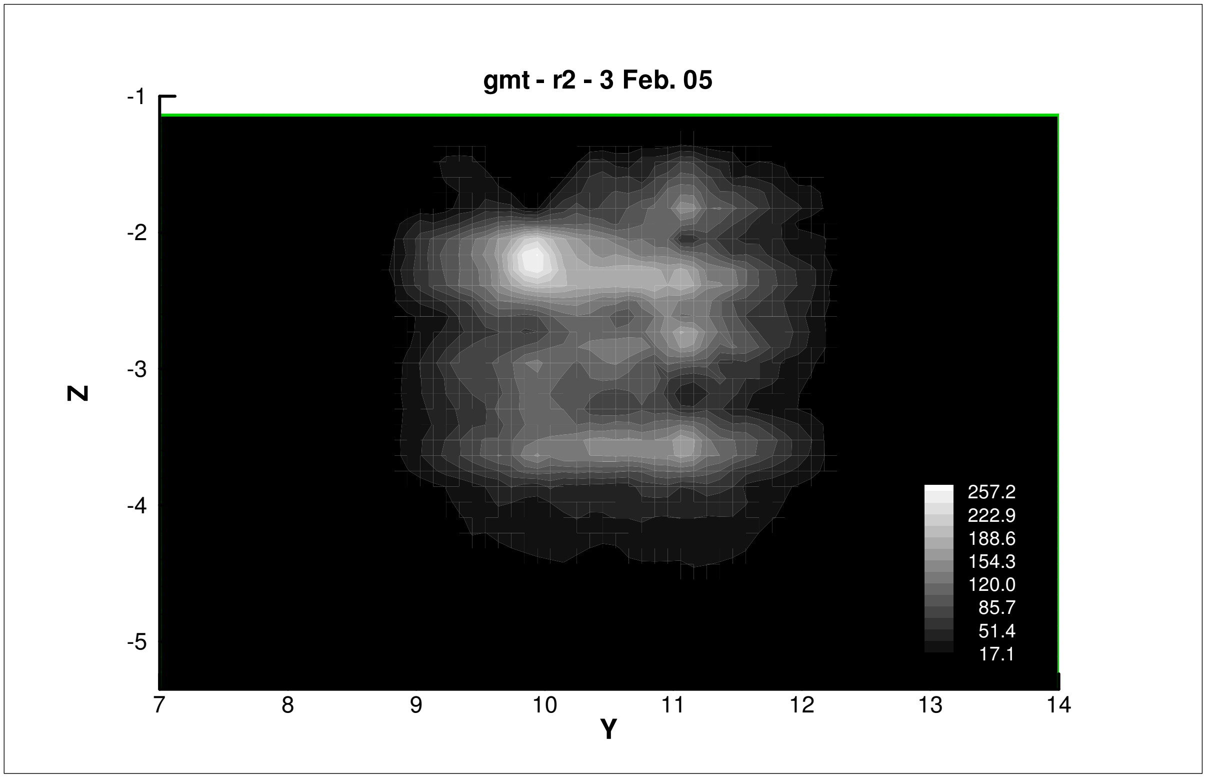

gmt - r2 - 19 Apr. 05
Z
Y
-1
-2
-3
-4
-5
7
8
9
10
11
12
13
14
4362.8
3691.6
3020.4
2349.2
1678.0
1006.8
335.6

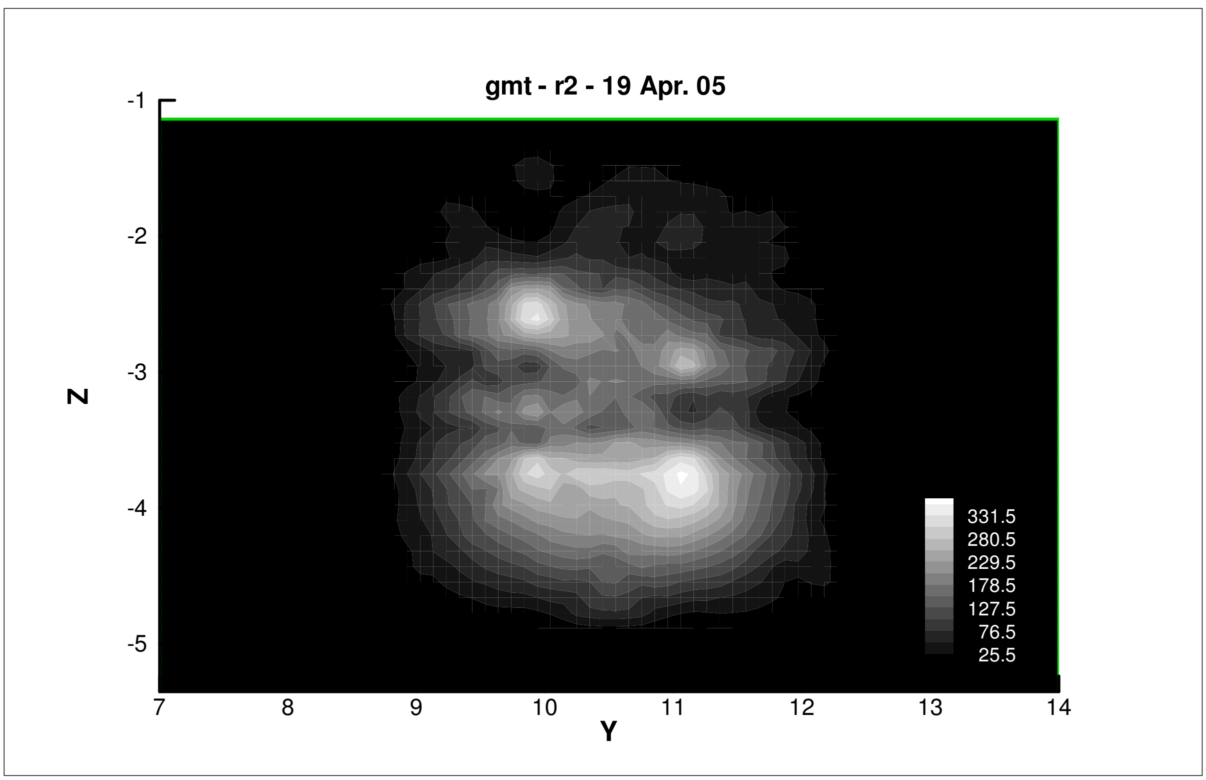


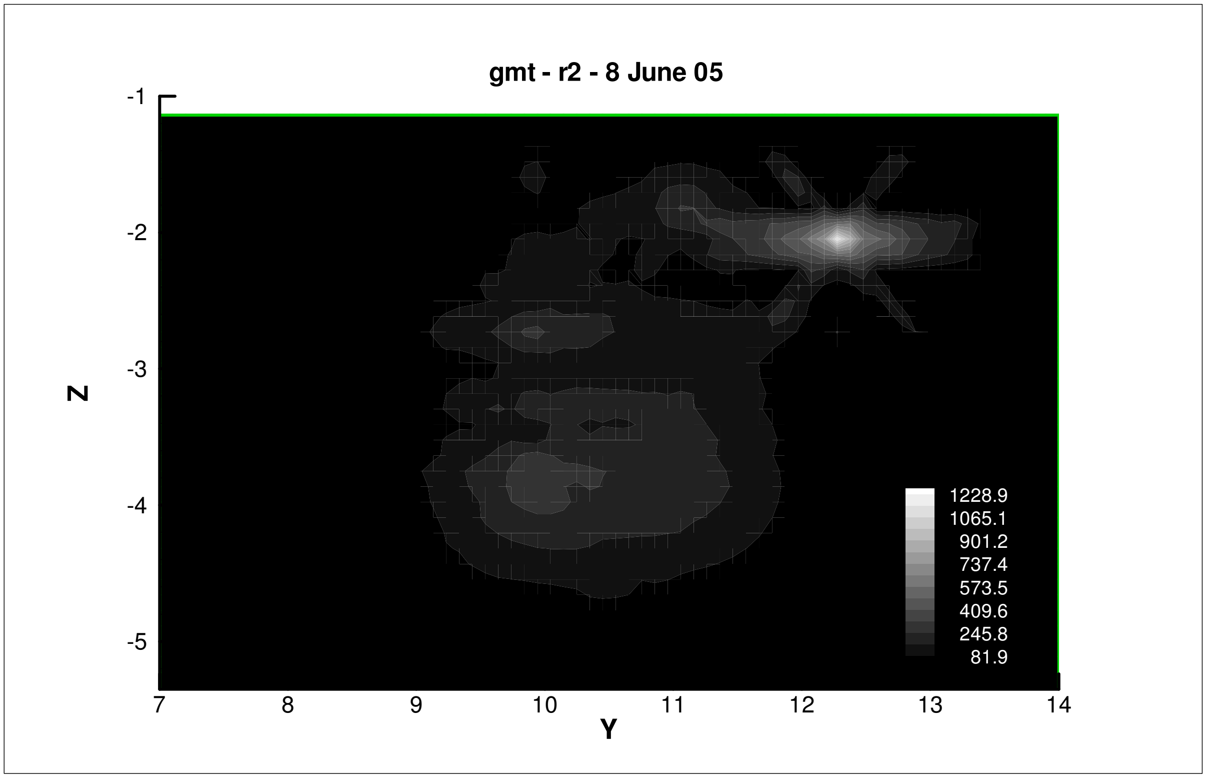
B. BTEX 1. GMT a. Row 2 4. Tri-Methyl Benzene (µg/l)


gmt - r2 - 20 Nov. 04
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
64.2
55.0
45.9
36.7
27.5
18.3
9.2

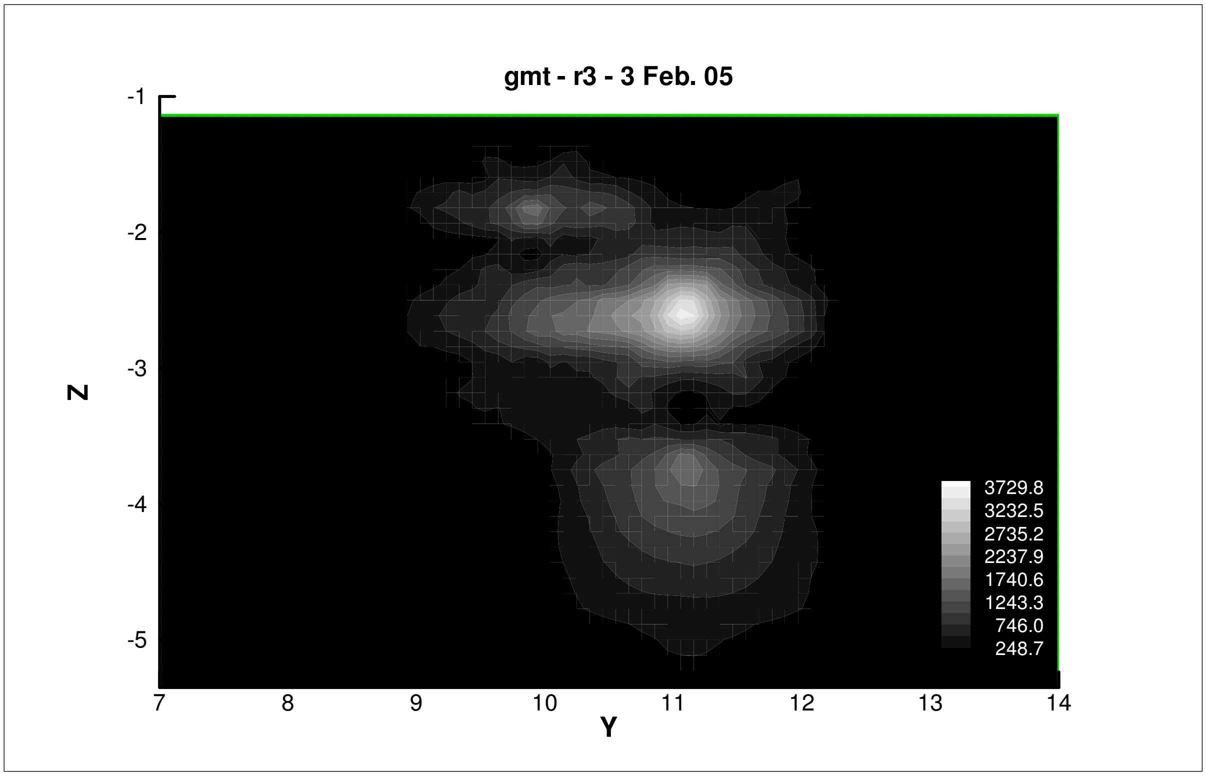

gmt - r2 - 16 Dec. 04
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
170.4
147.7
125.0
102.2
79.5
56.8
34.1
11.4

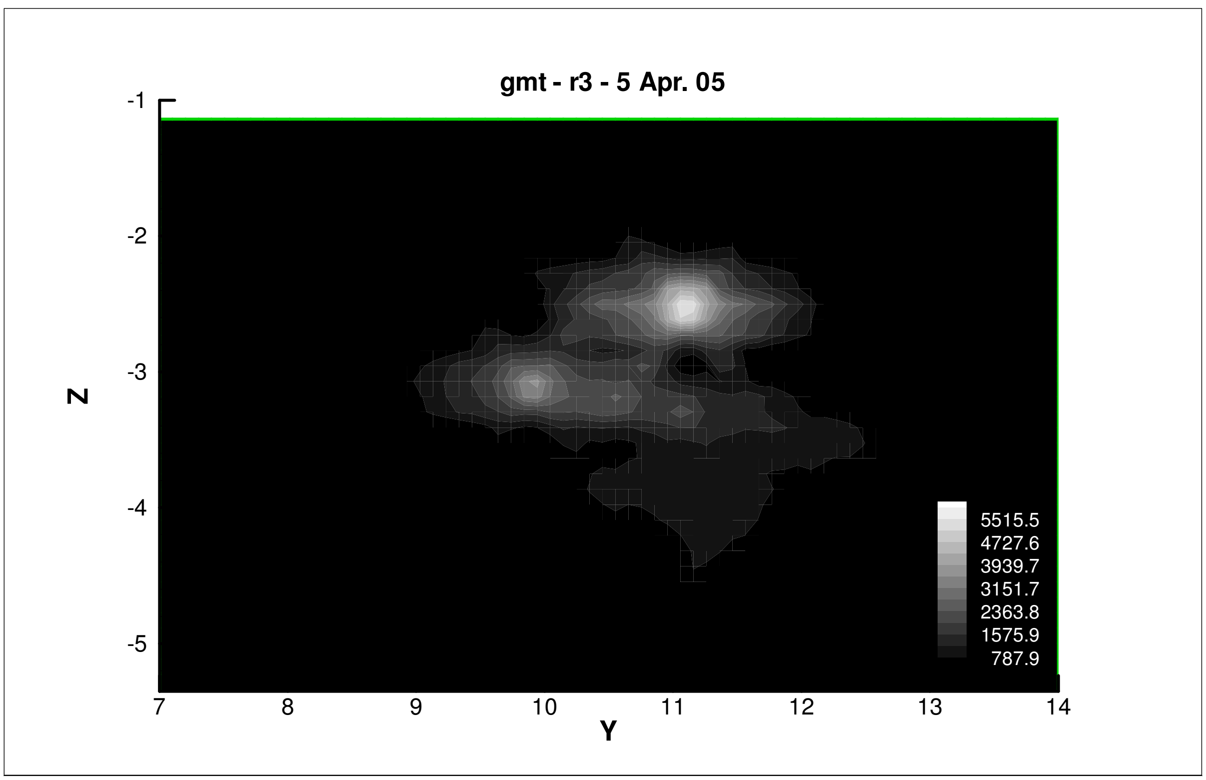

gmt - r2 - 3 Feb. 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
257.2
222.9
188.6
154.3
120.0
85.7
51.4
17.1

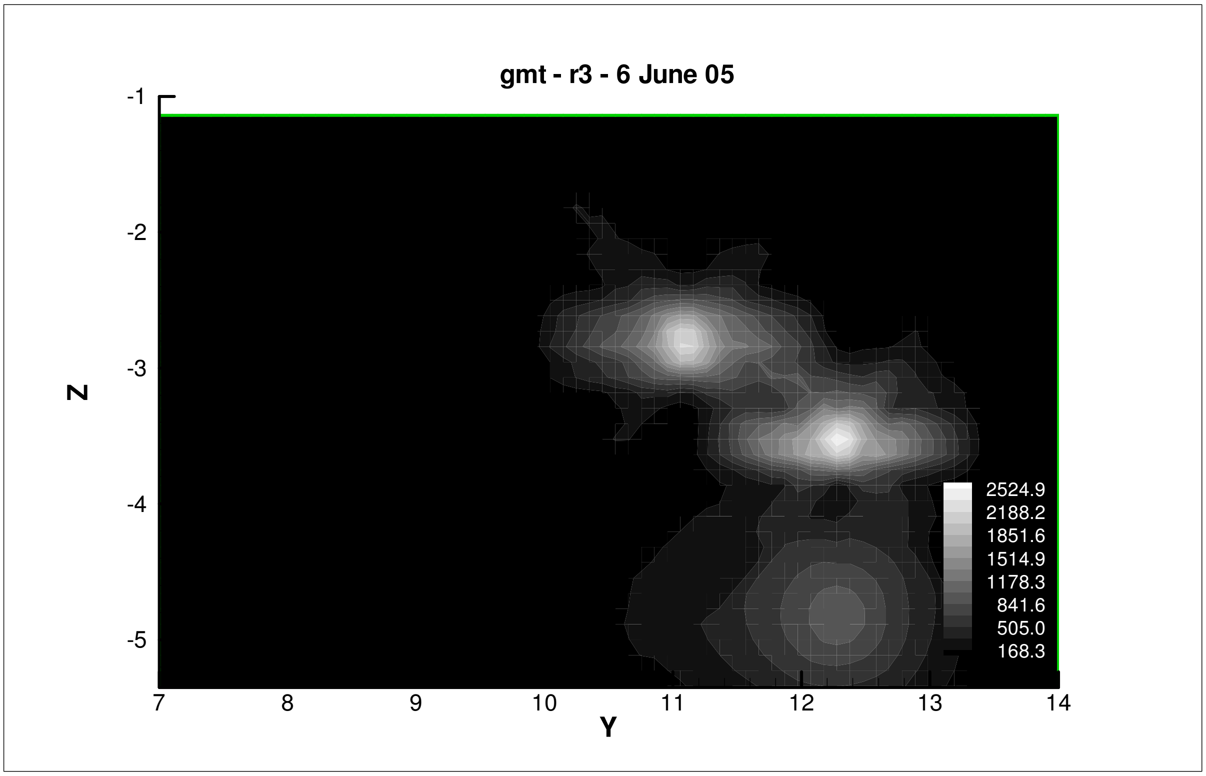

gmt - r2 - 19 Apr. 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
331.5
280.5
229.5
178.5
127.5
76.5
25.5



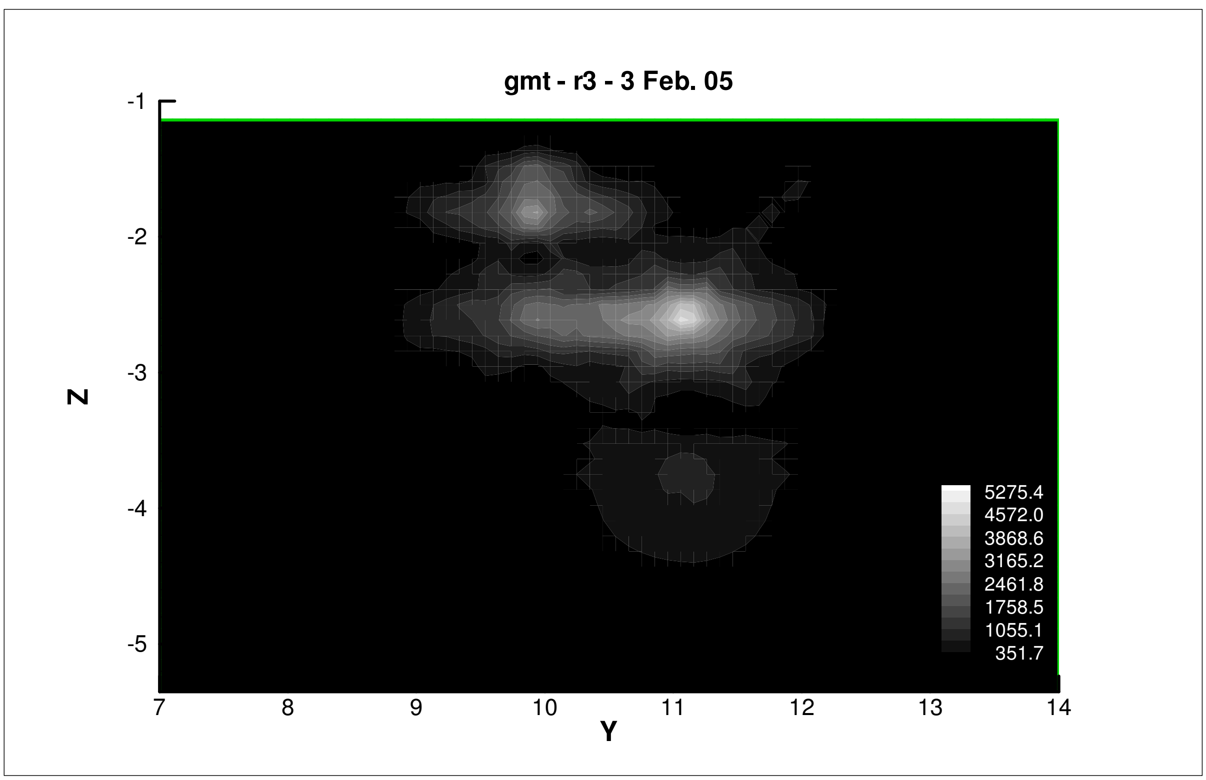
B. BTEX 1. GMT b. Row 3 1. Benzene (µg/l)

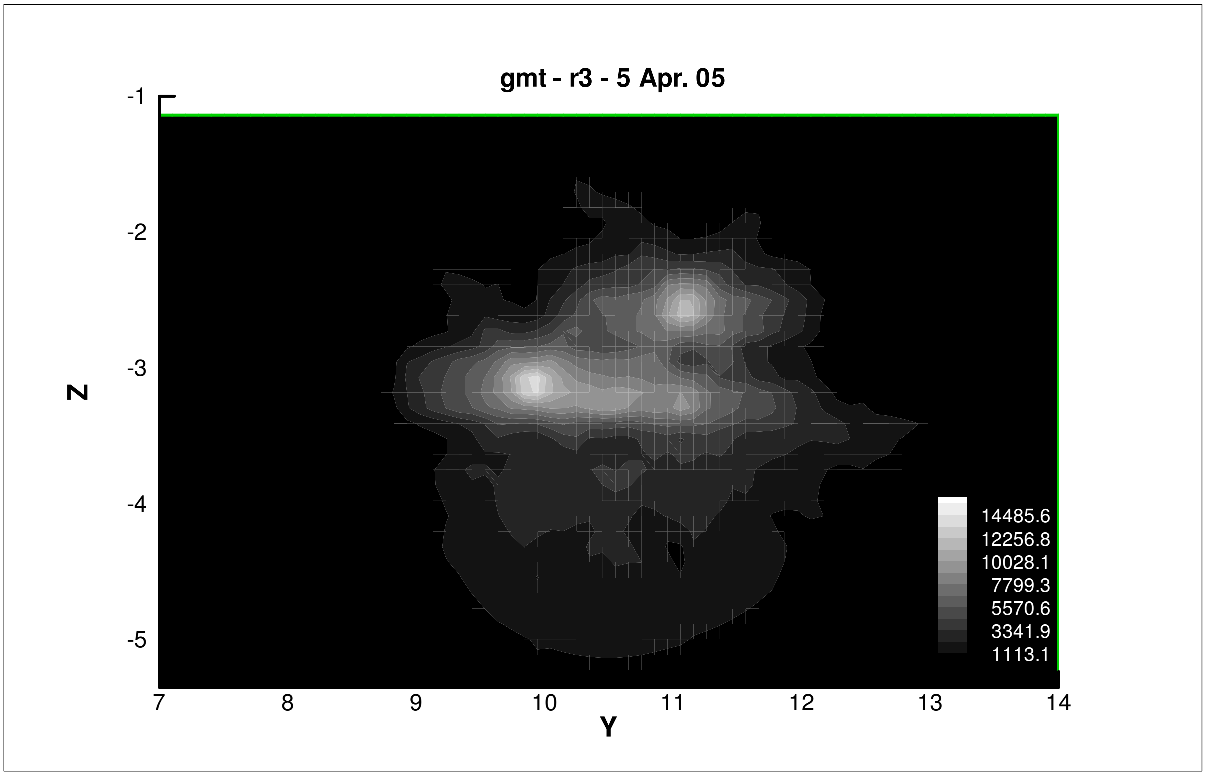

gmt - r3 - 3 Feb. 05
-1
-2
-3
-4
-5
Z
7
8
9
10
11
12
13
14
Y
3729.8
3232.5
2735.2
2237.9
1740.6
1243.3
746.0
248.7

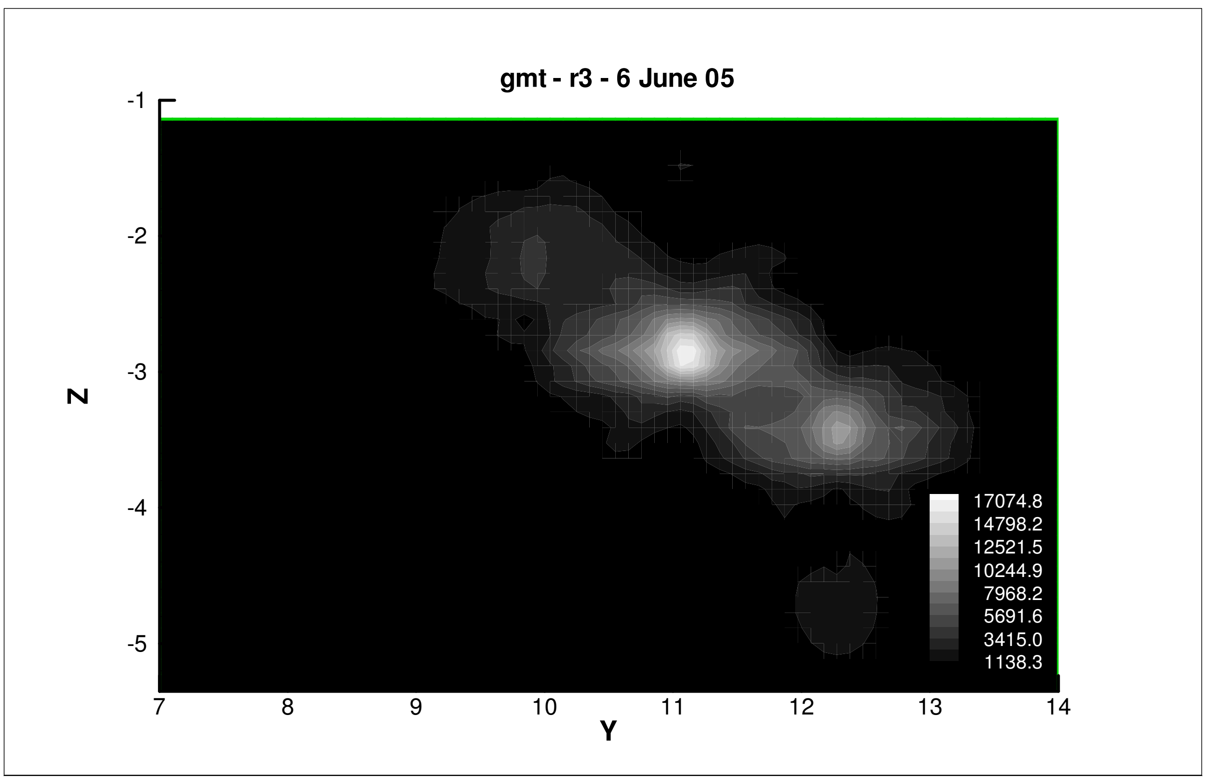

gmt - r3 - 5 Apr. 05
-1
-2
-3
-4
-5
Z
7
8
9
10
11
12
13
14
Y
5515.5
4727.6
3939.7
3151.7
2363.8
1575.9
787.9

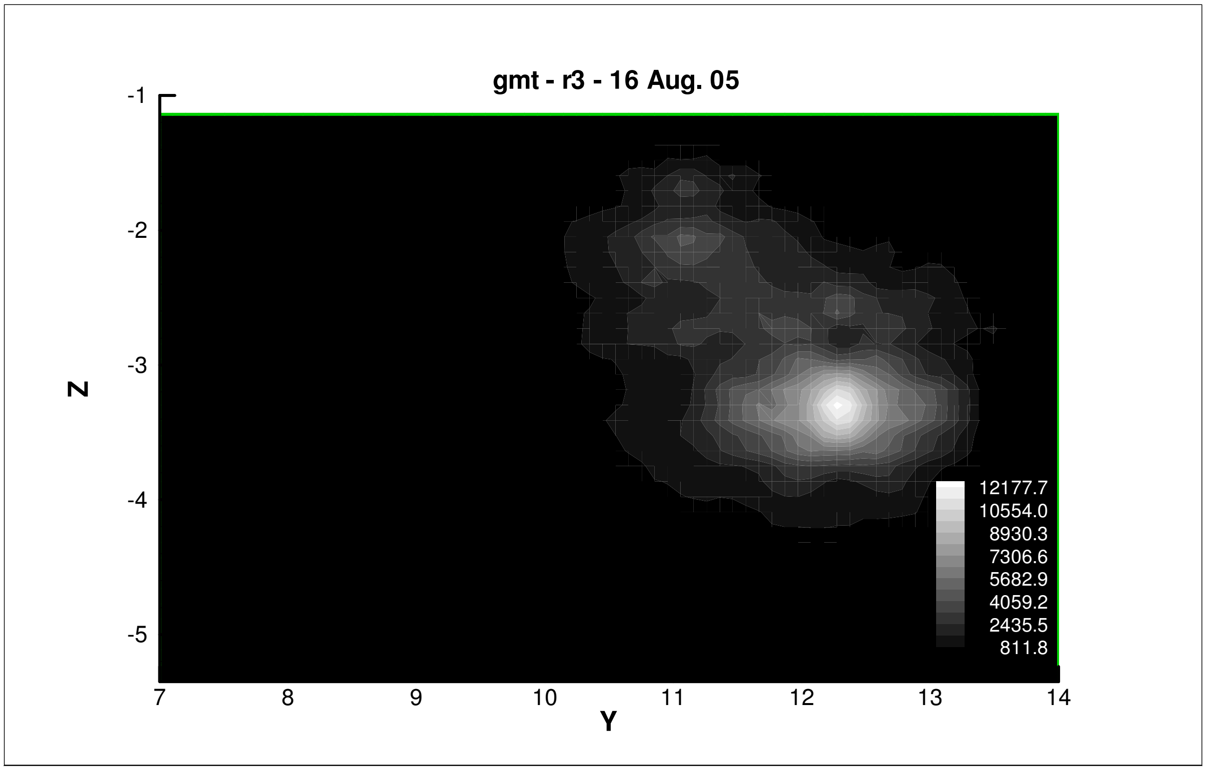


B. BTEX 1. GMT b. Row 3 2. Toluene (µg/l)

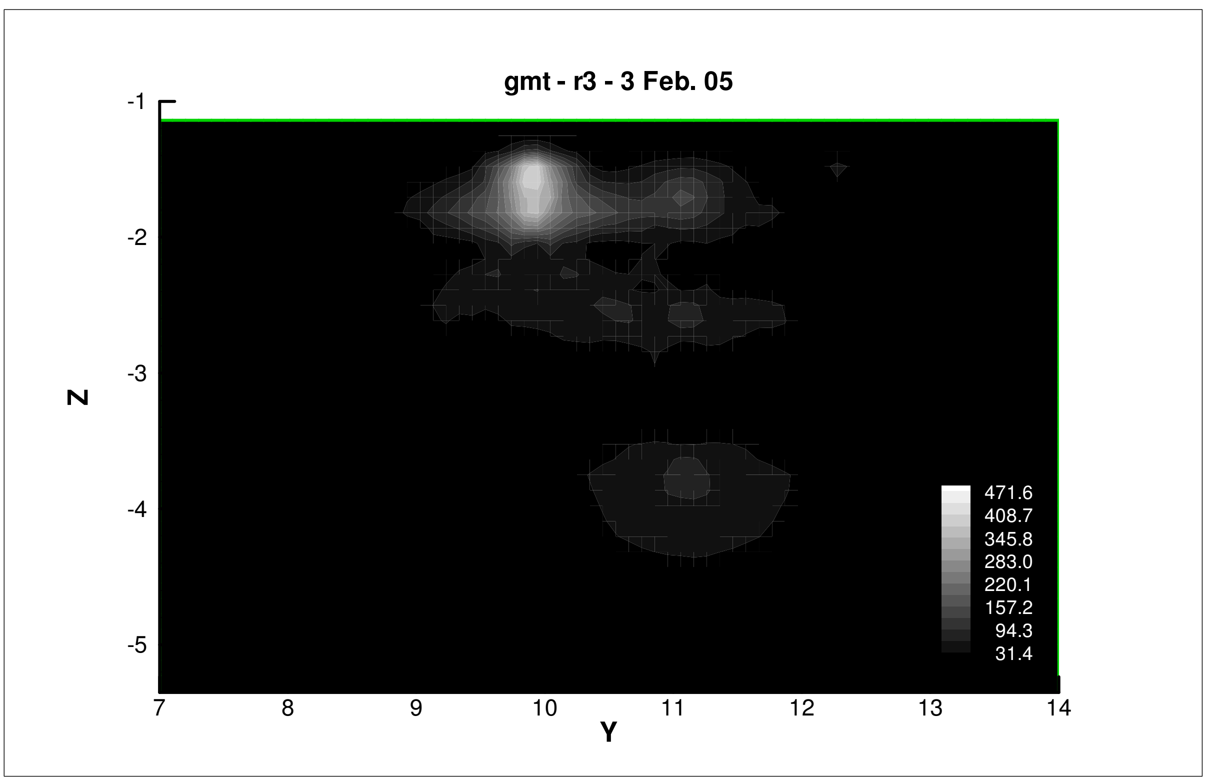


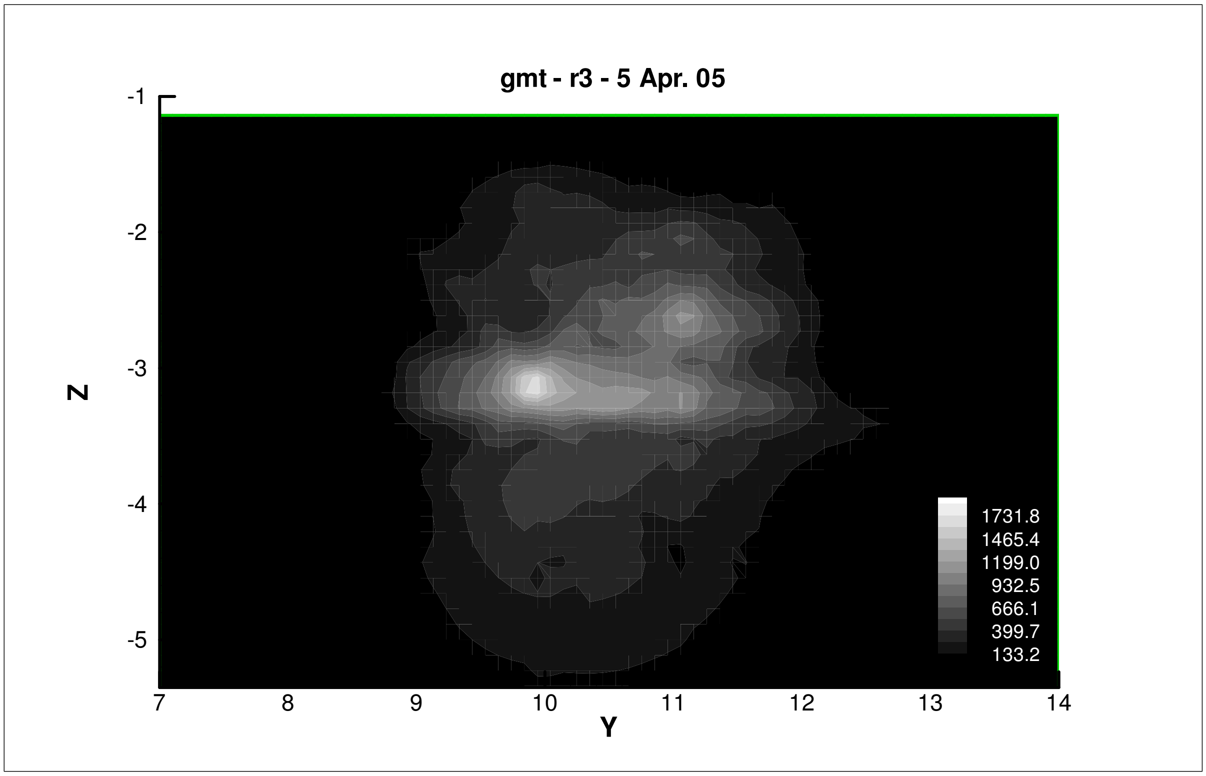

gmt - r3 - 5 Apr. 05
-1
-2
-3
-4
-5
Z
7
8
9
10
11
12
13
14
Y
14485.6
12256.8
10028.1
7799.3
5570.6
3341.9
1113.1

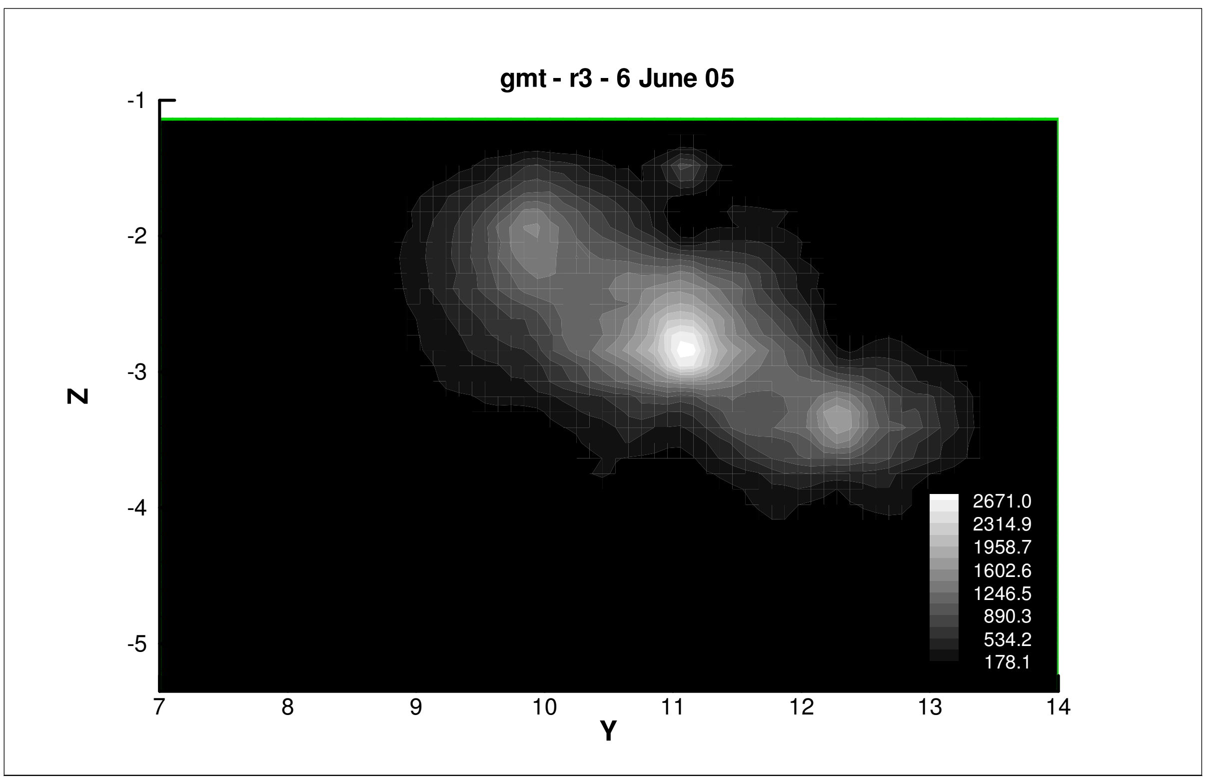

gmt - r3 - 6 June 05
-1
-2
-3
-4
-5
Z
7
8
9
10
11
12
13
14
Y
17074.8
14798.2
12521.5
10244.9
7968.2
5691.6
3415.0
1138.3



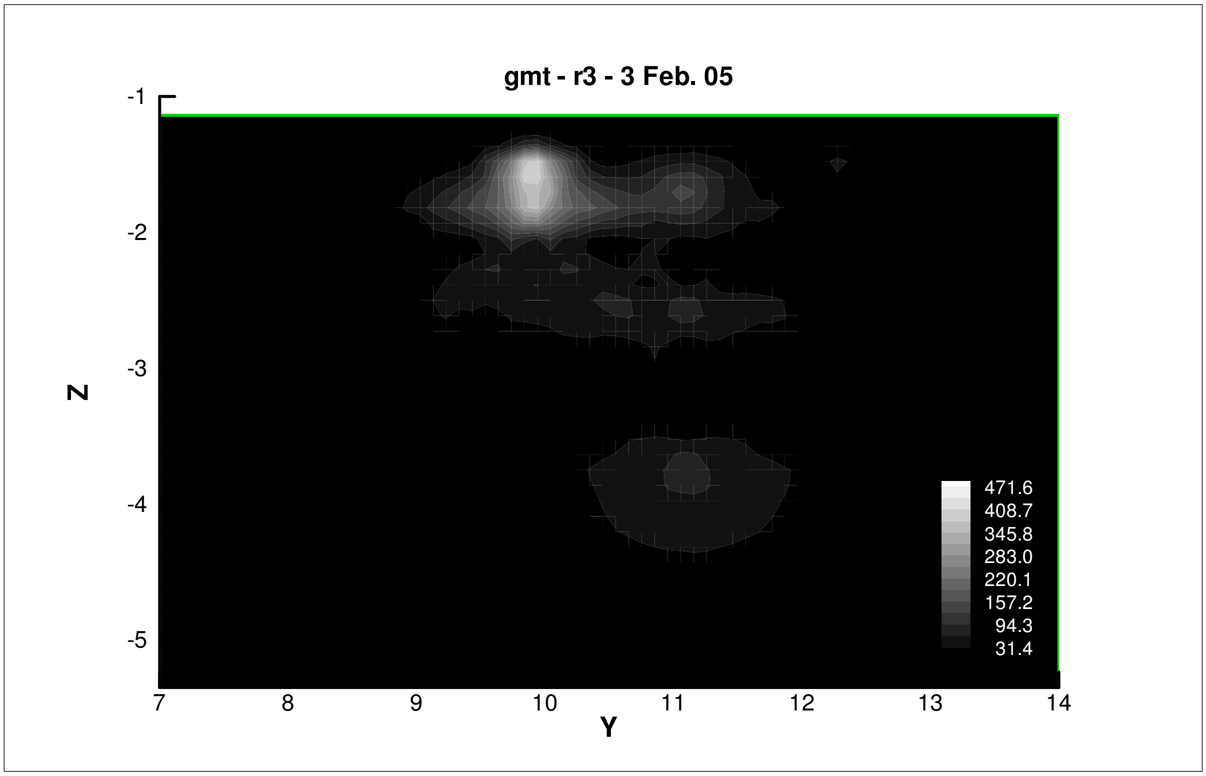
B. BTEX 1. GMT b. Row 3 3. O-Xylene (µg/l)

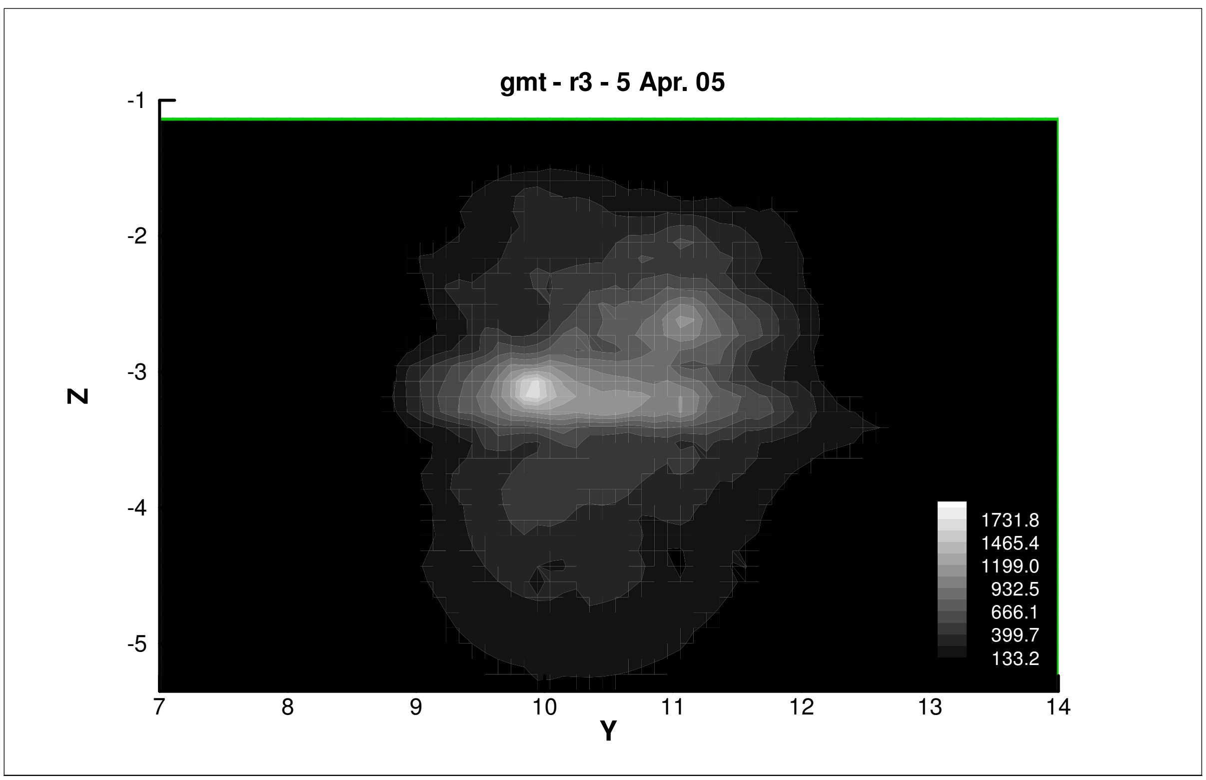


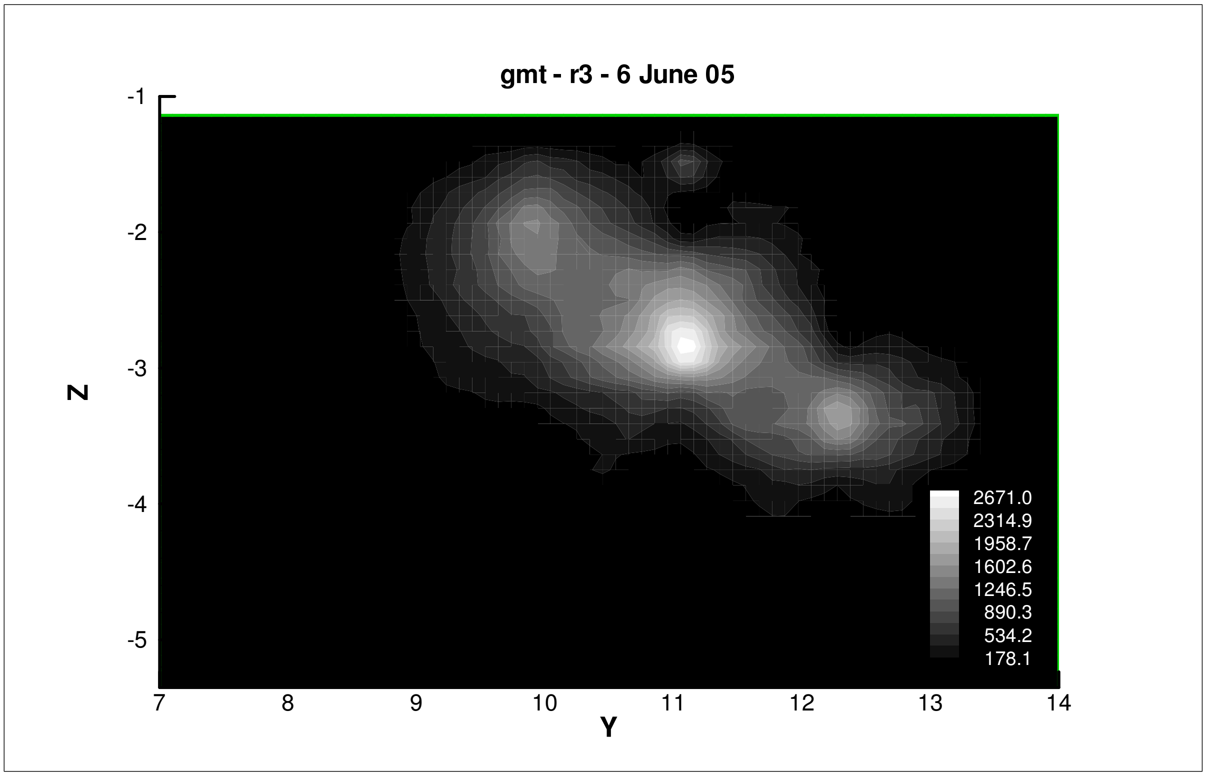


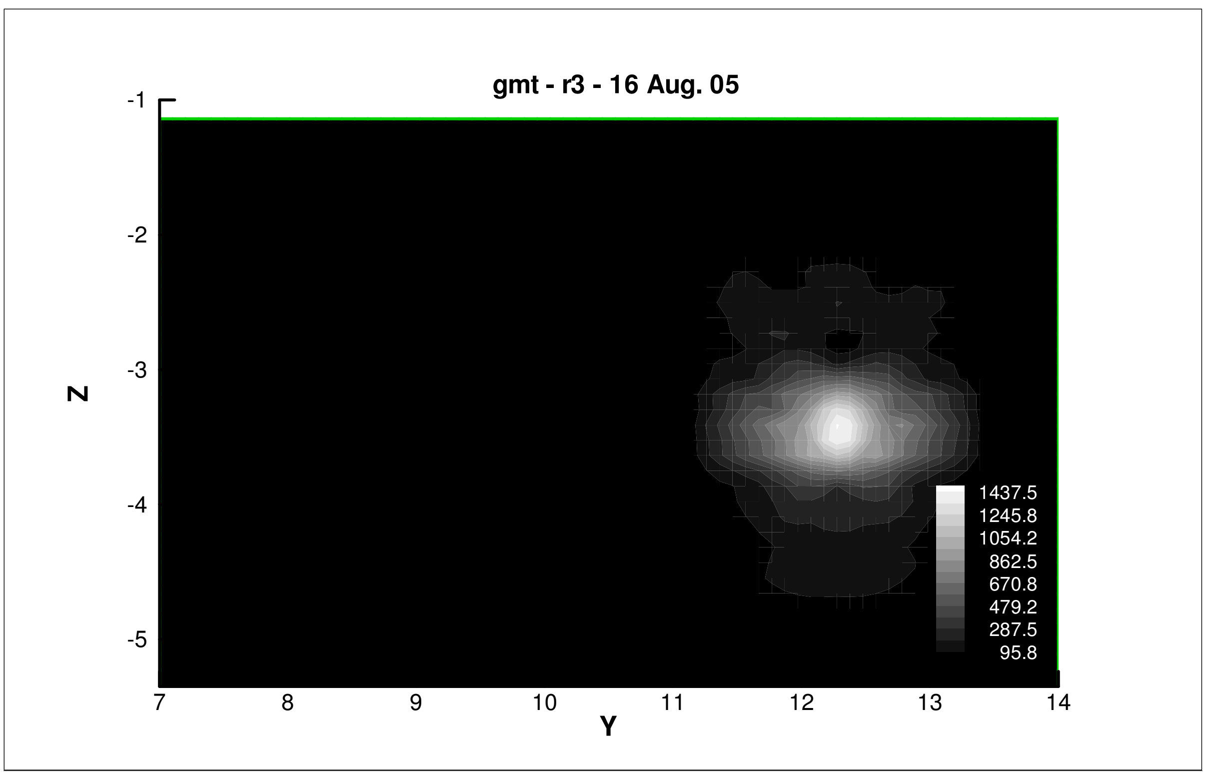


B. BTEX 1. GMT b. Row 3 3. O-Xylene (µg/l)

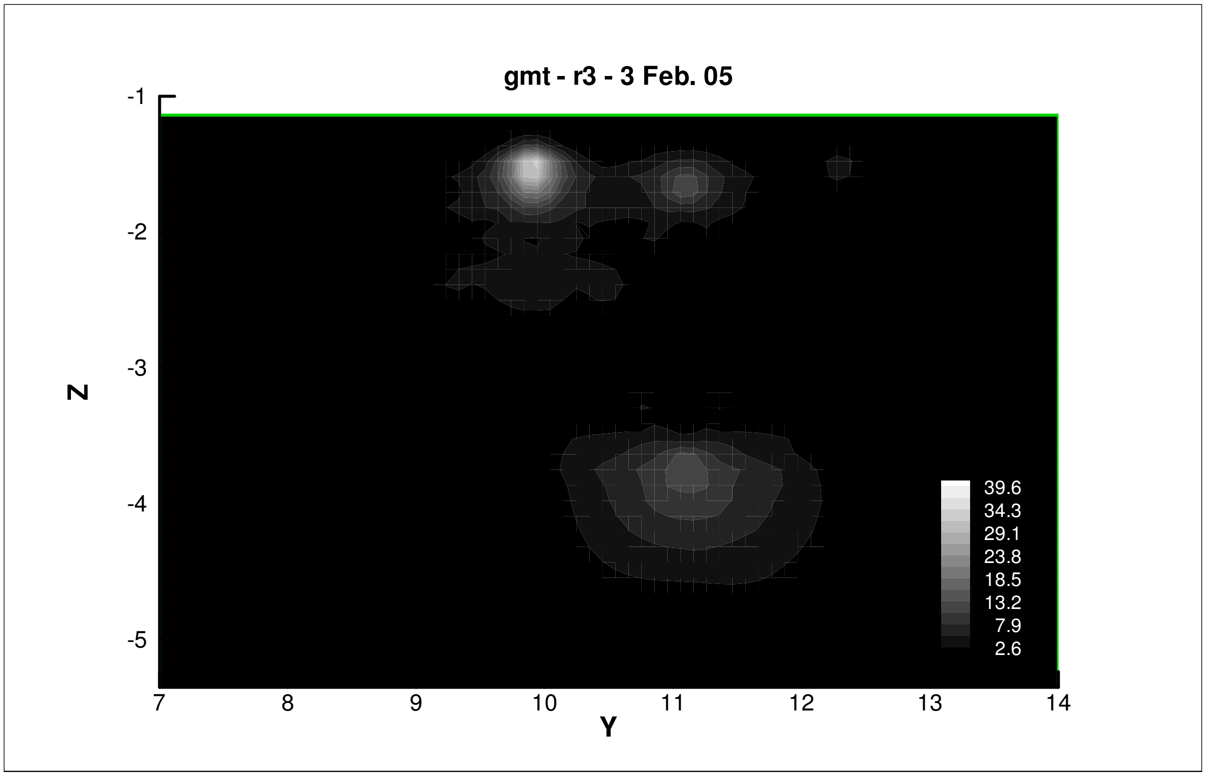

gmt - r3 - 3 Feb. 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
471.6
408.7
345.8
283.0
220.1
157.2
94.3
31.4

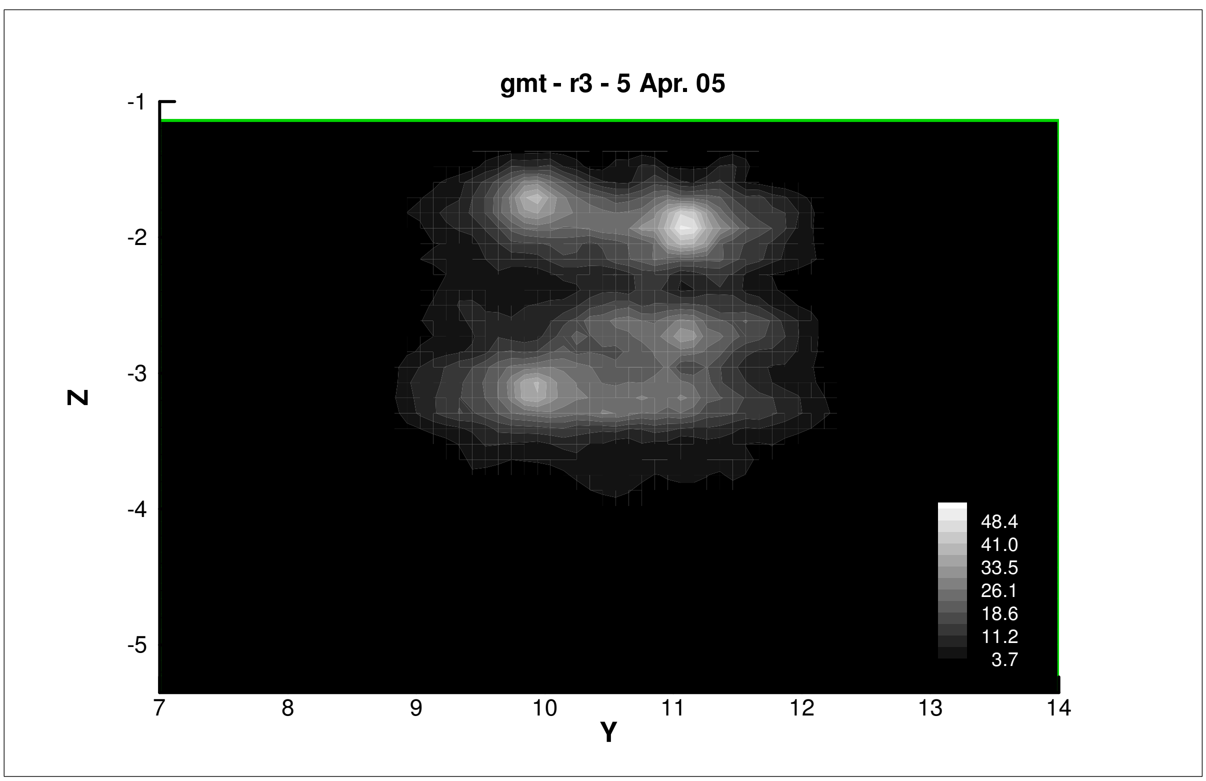

gmt - r3 - 5 Apr. 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
1731.8
1465.4
1199.0
932.5
666.1
399.7
133.2

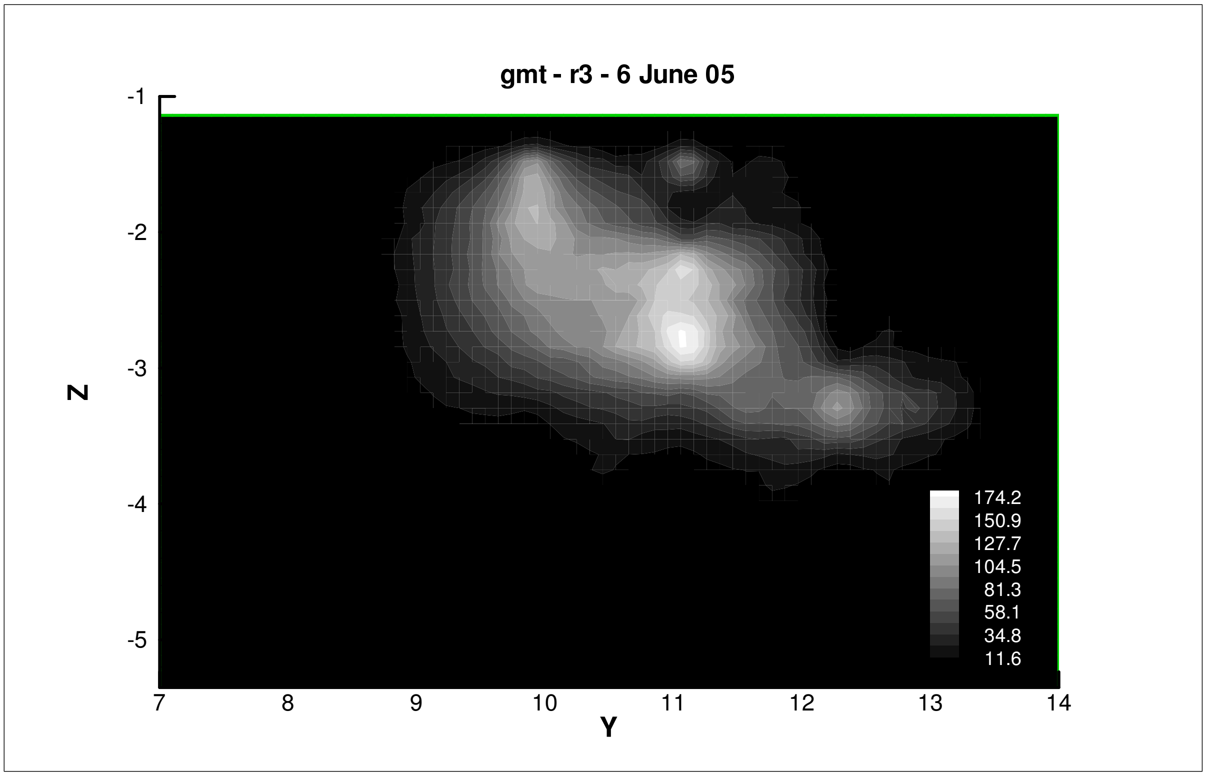

gmt - r3 - 6 June 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
2671.0
2314.9
1958.7
1602.6
1246.5
890.3
534.2
178.1

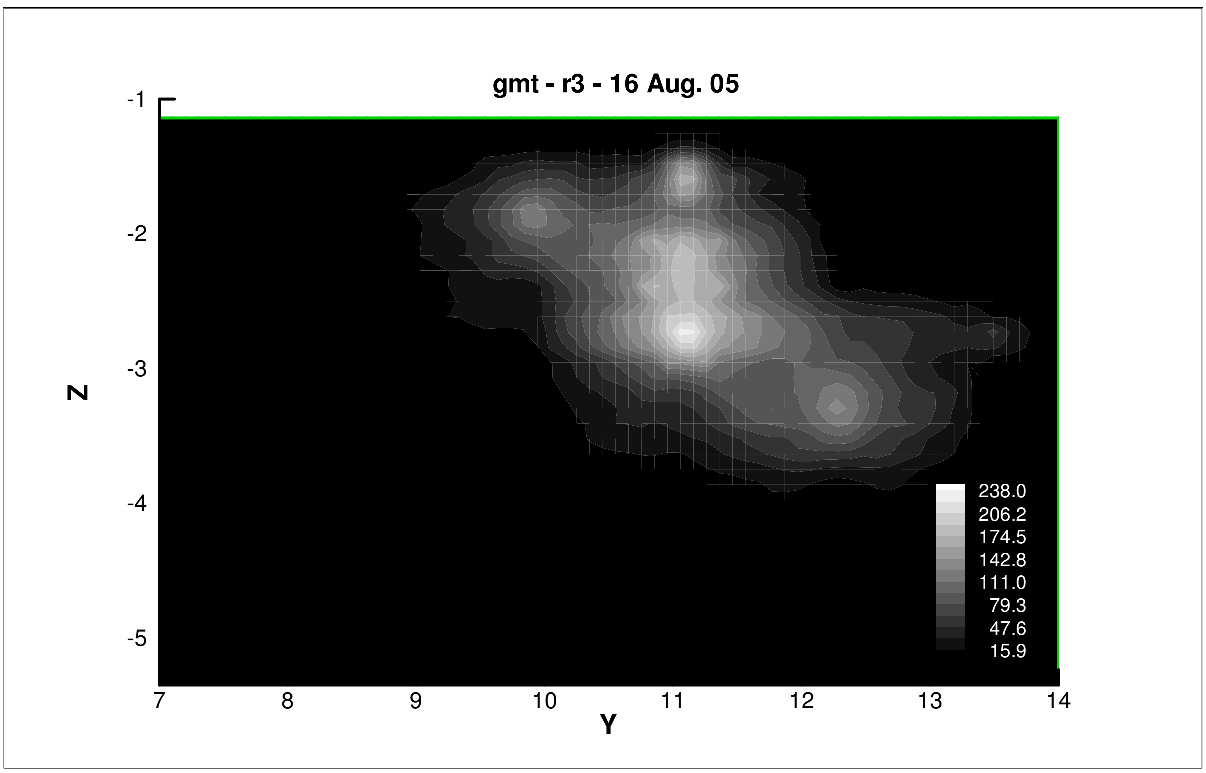

gmt - r3 - 16 Aug. 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
1437.5
1245.8
1054.2
862.5
670.8
479.2
287.5
95.8

B. BTEX 1. GMT b. Row 3 4. Tri-Methyl Benzene (µg/l)

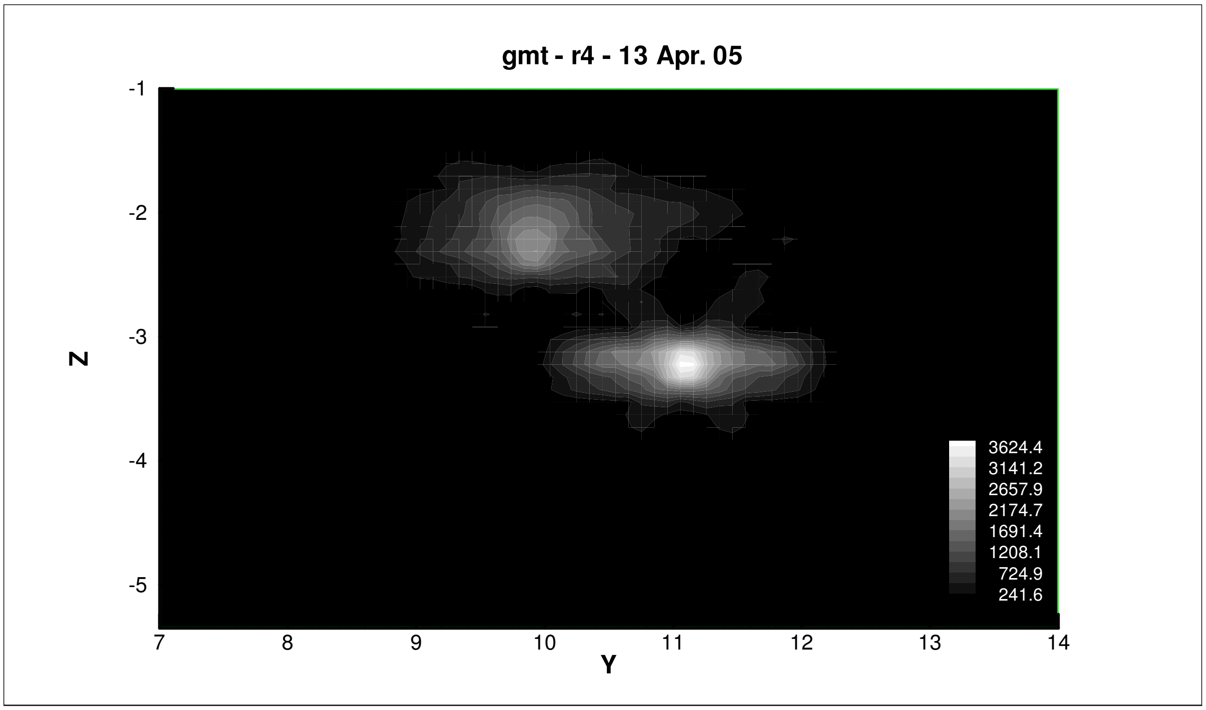


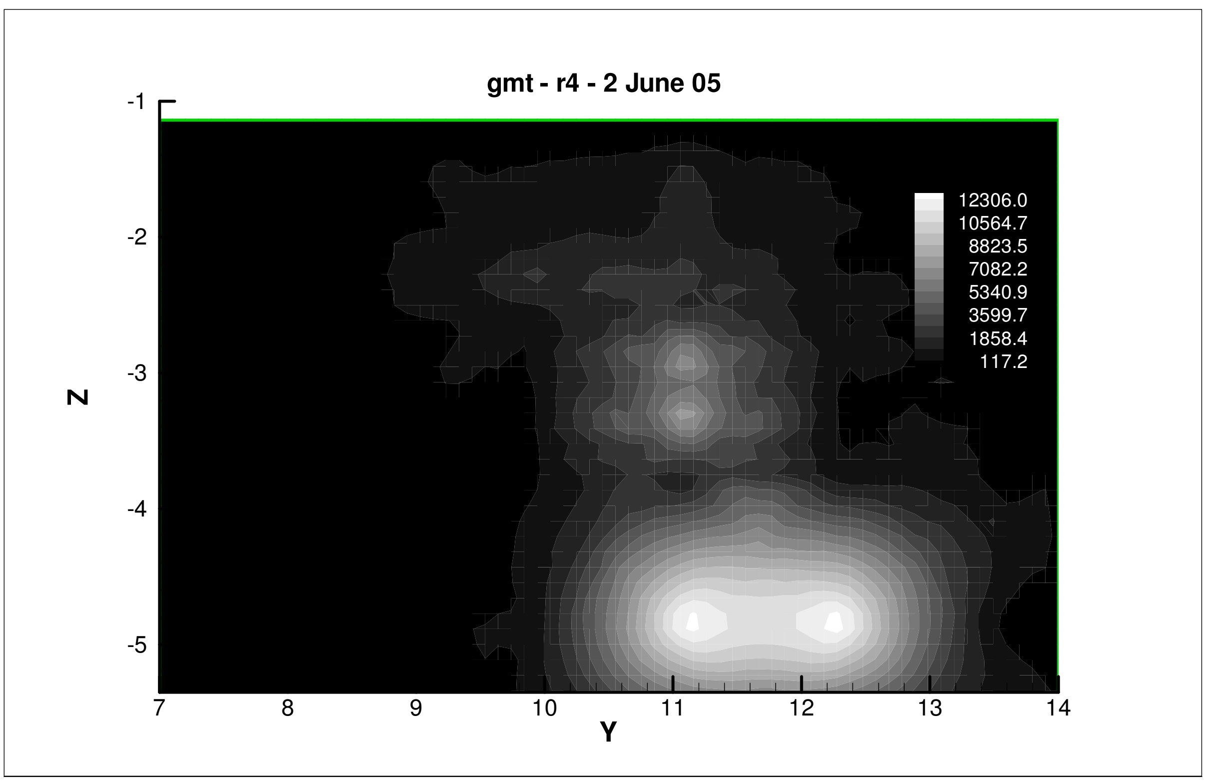


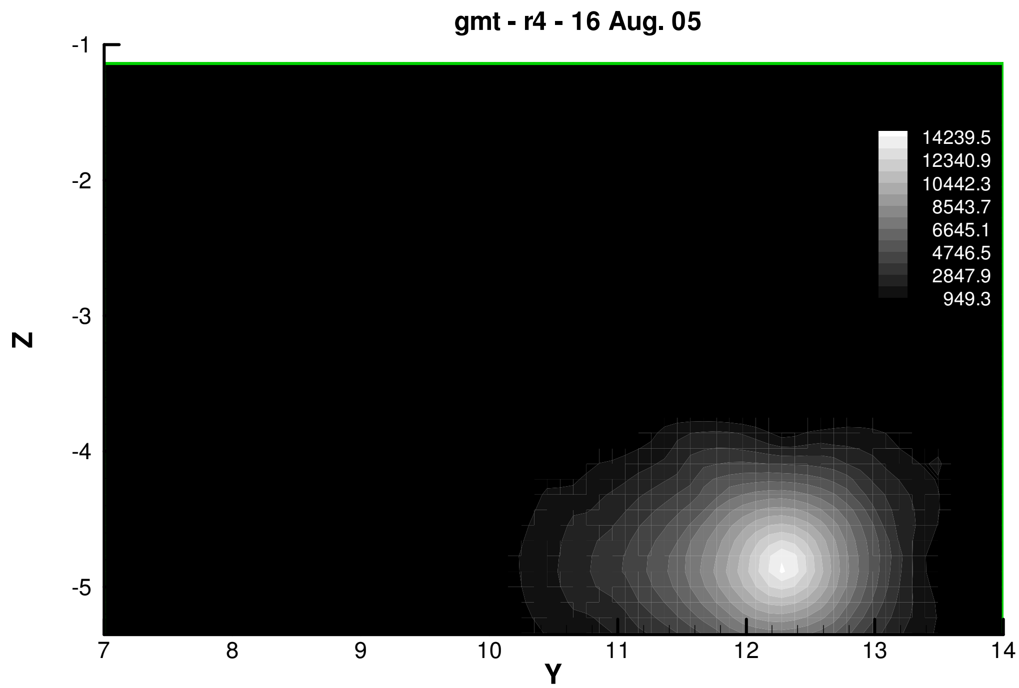

gmt - r3 - 6 June 05
-1
-2
-3
-4
-5
Z
7
8
9
10
11
12
13
14
Y
174.2
150.9
127.7
104.5
81.3
58.1
34.8
11.6


gmt - r3 - 16 Aug. 05
-1
-2
-3
-4
-5
Z
7
8
9
10
11
12
13
14
Y
238.0
206.2
174.5
142.8
111.0
79.3
47.6
15.9

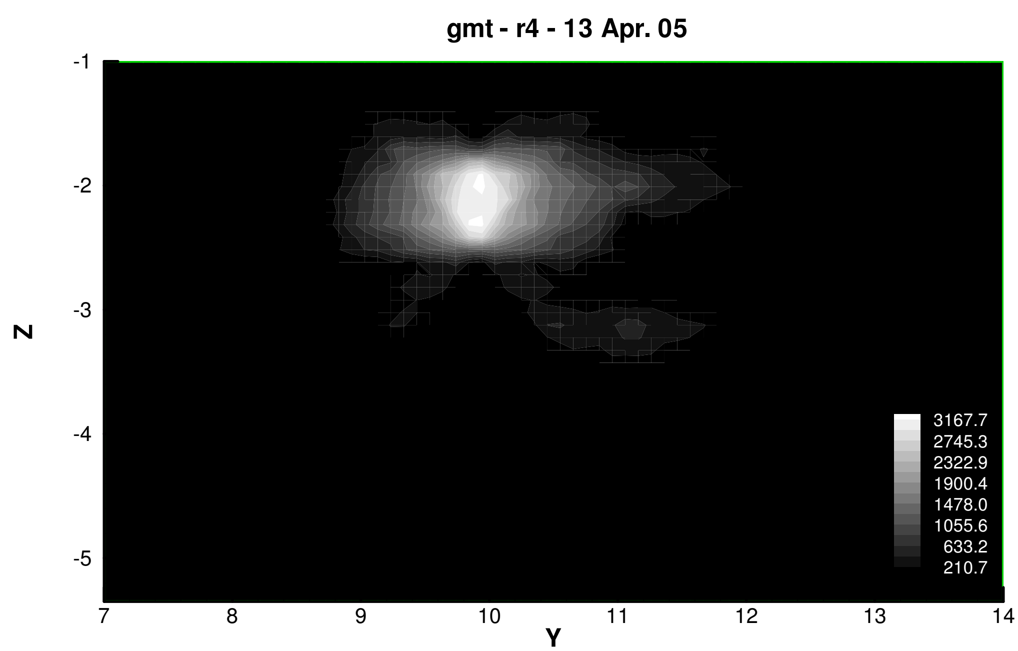
B. BTEX 1. GMT c. Row 4 1. Benzene (µg/l)

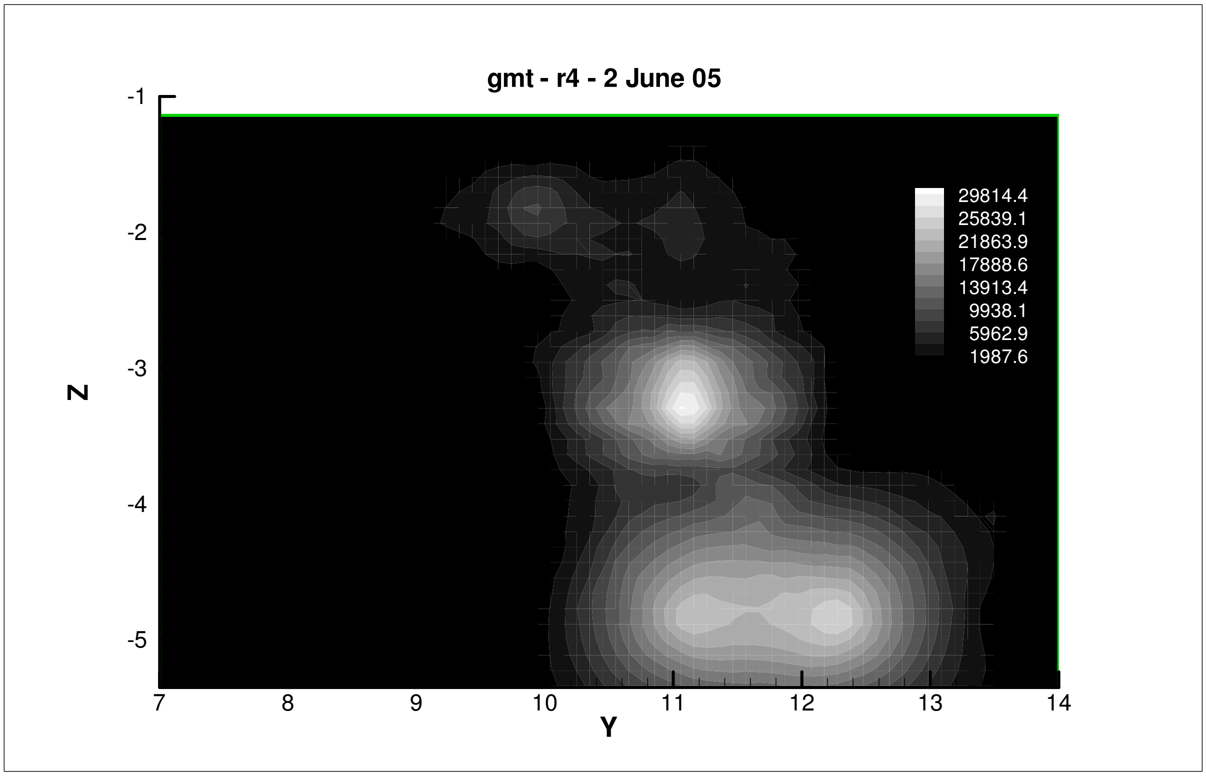


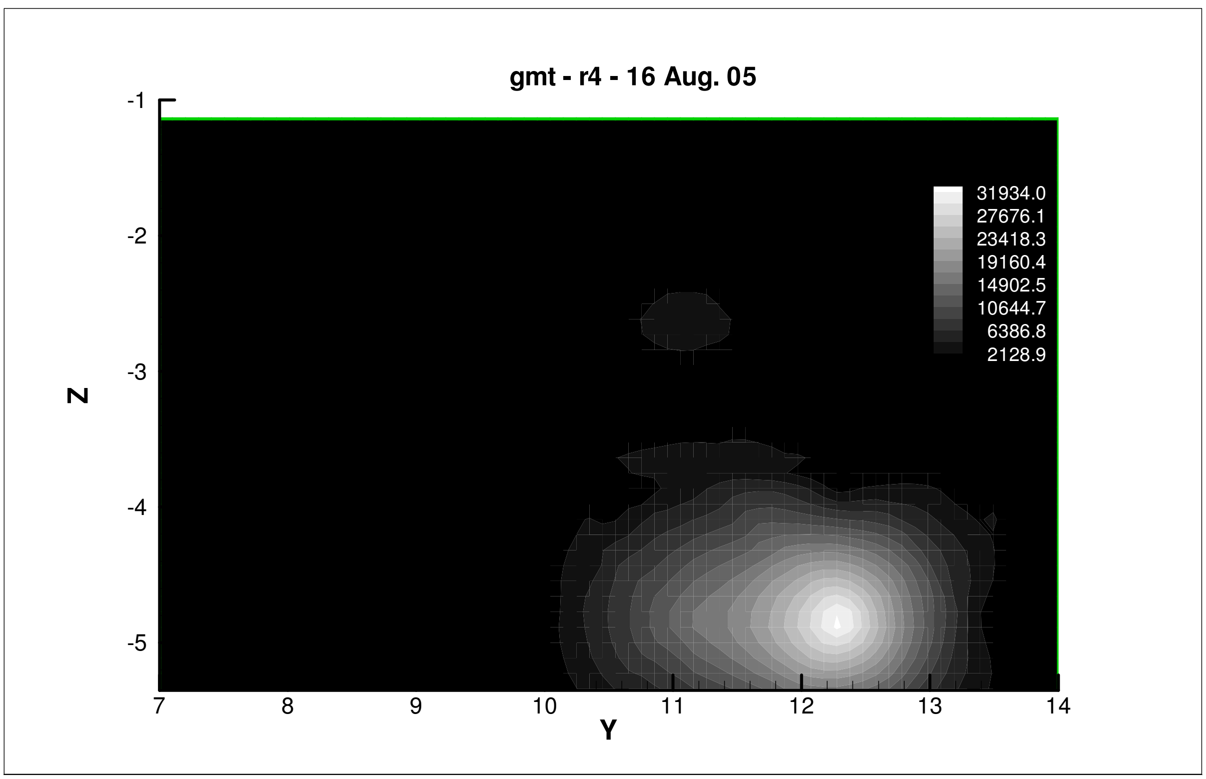




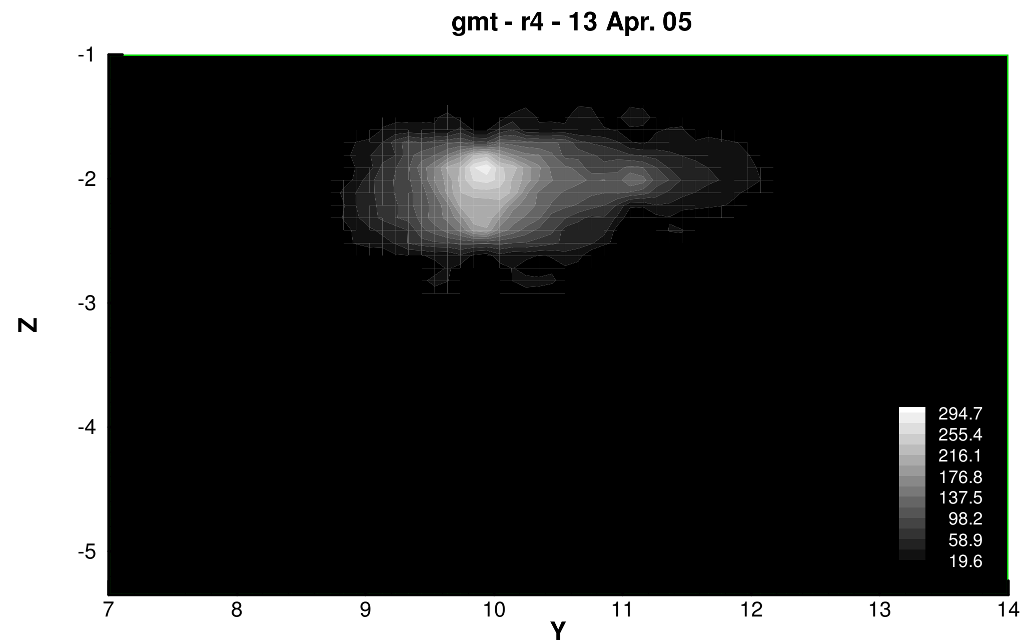
B. BTEX 1. GMT c. Row 4 2. Toluene (µg/l)

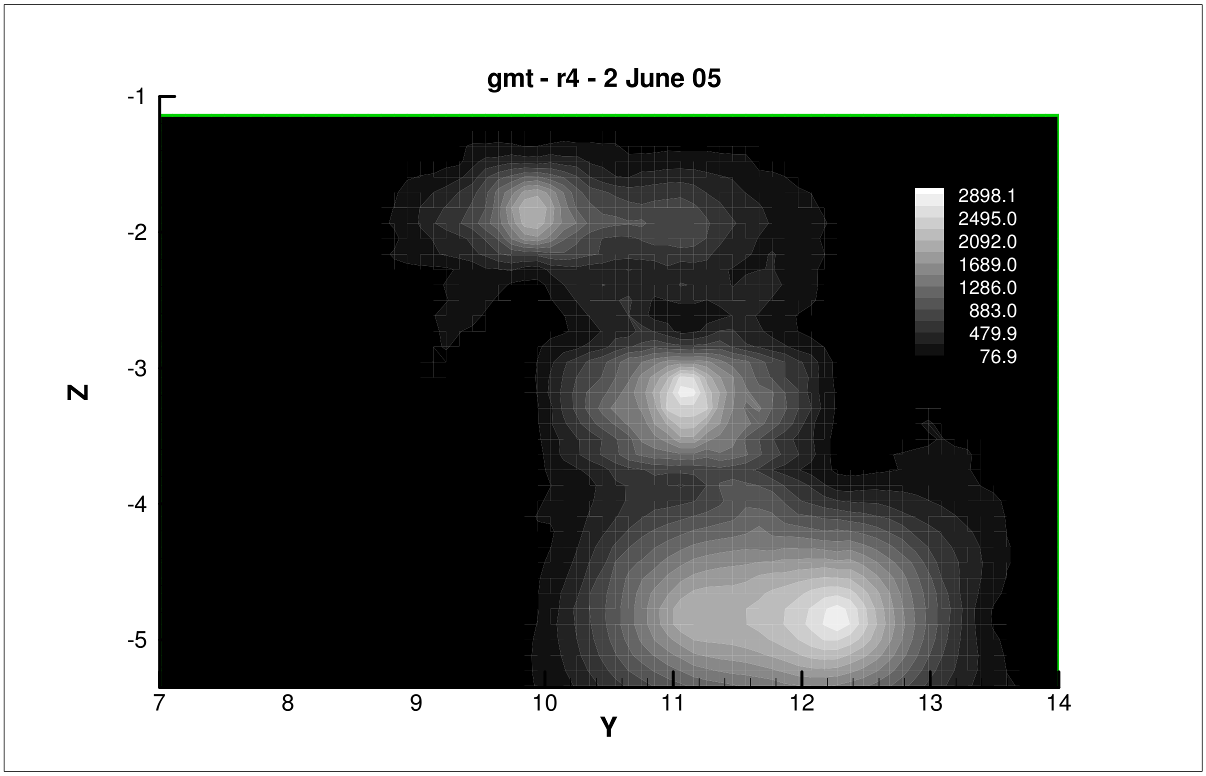


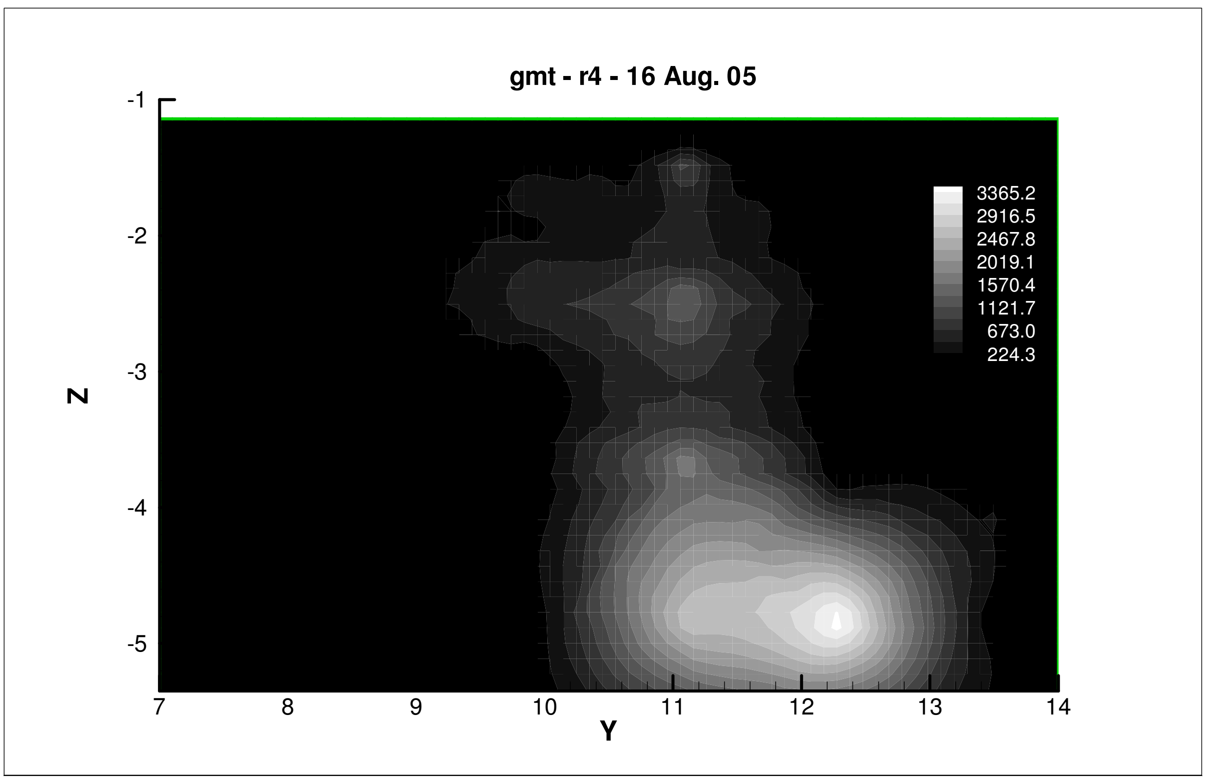

gmt - r4 - 2 June 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
29814.4
25839.1
21863.9
17888.6
13913.4
9938.1
5962.9
1987.6


gmt - r4 - 16 Aug. 05
Z
-1
-2
-3
-4
-5
Y
7
8
9
10
11
12
13
14
31934.0
27676.1
23418.3
19160.4
14902.5
10644.7
6386.8
2128.9

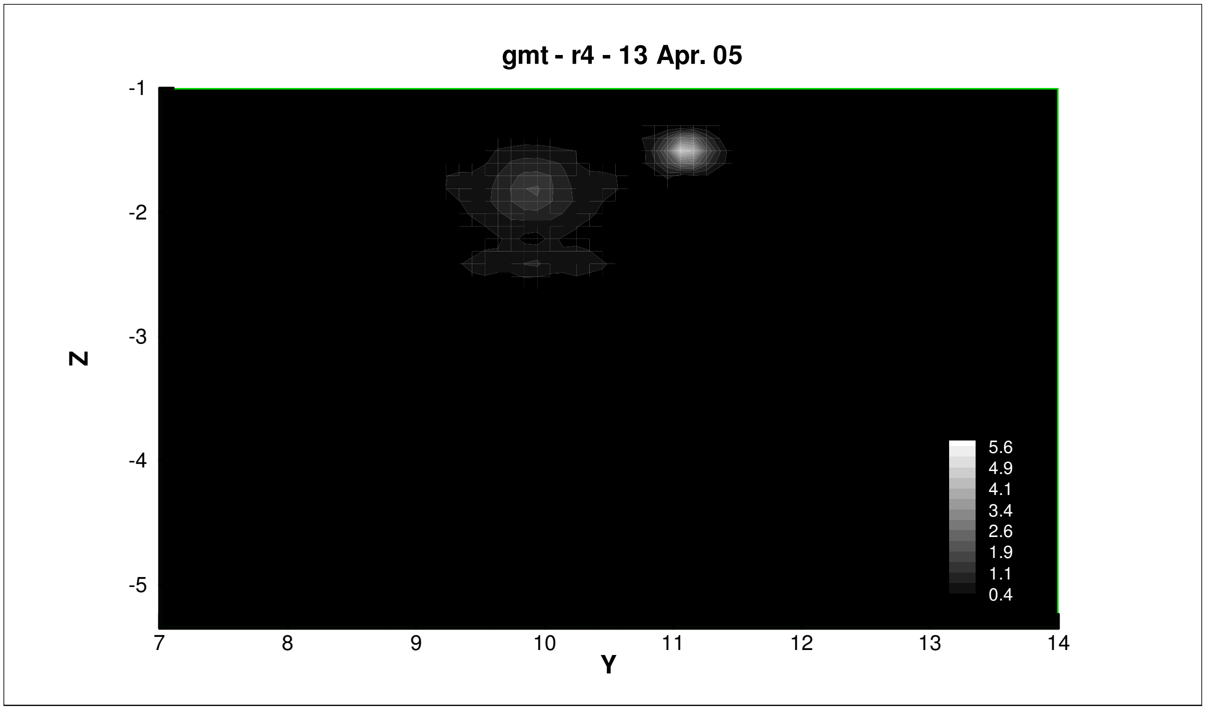
B. BTEX 1. GMT c. Row 4 3. O-Xylene (µg/l)

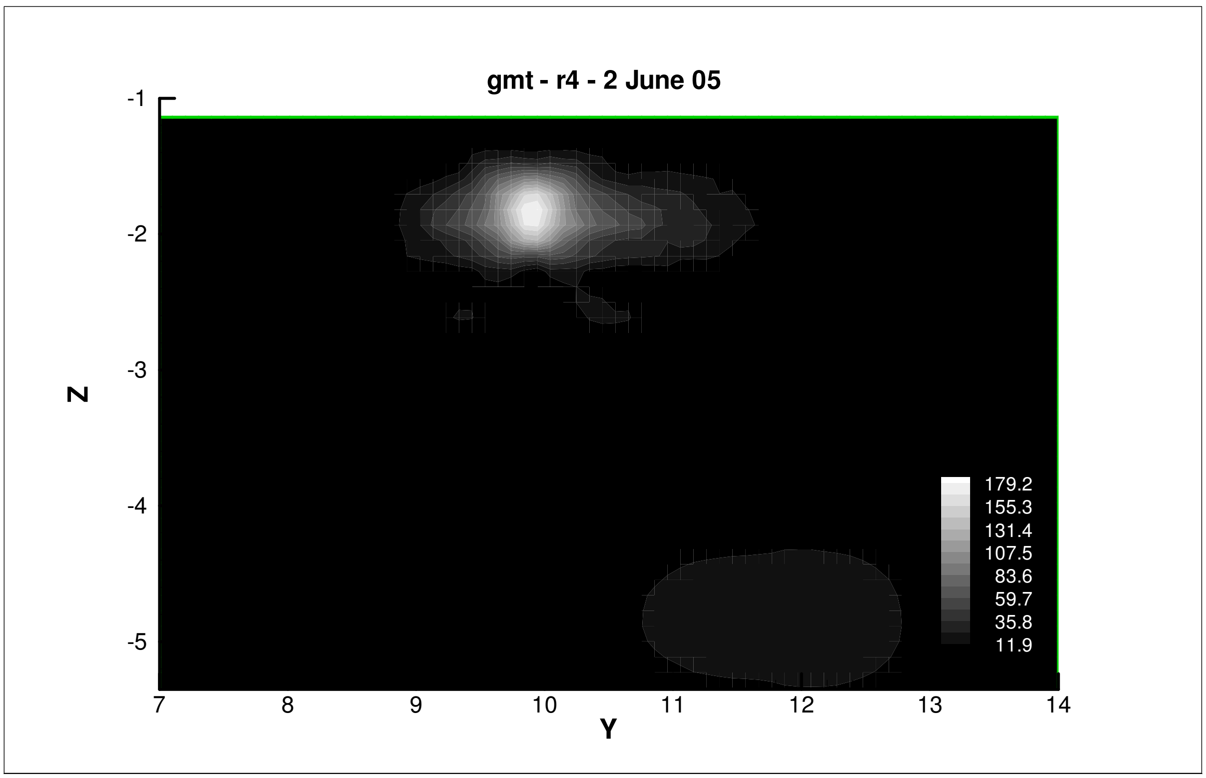


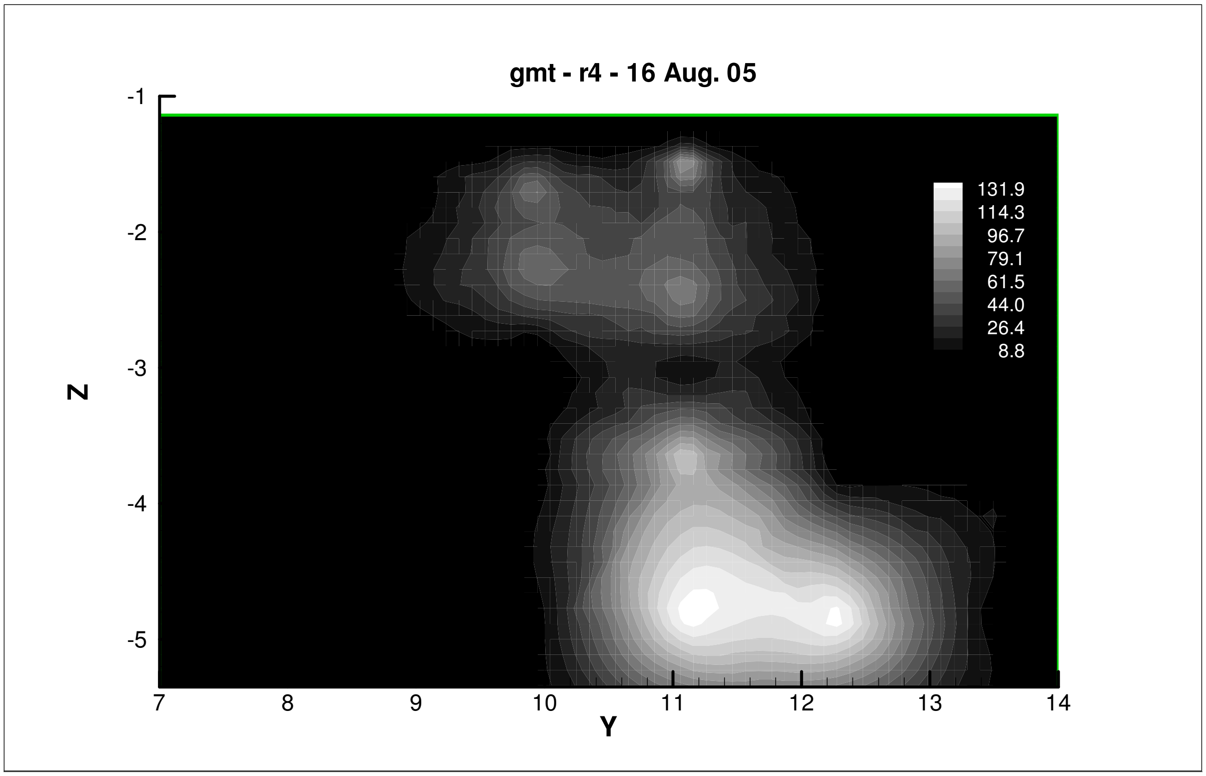




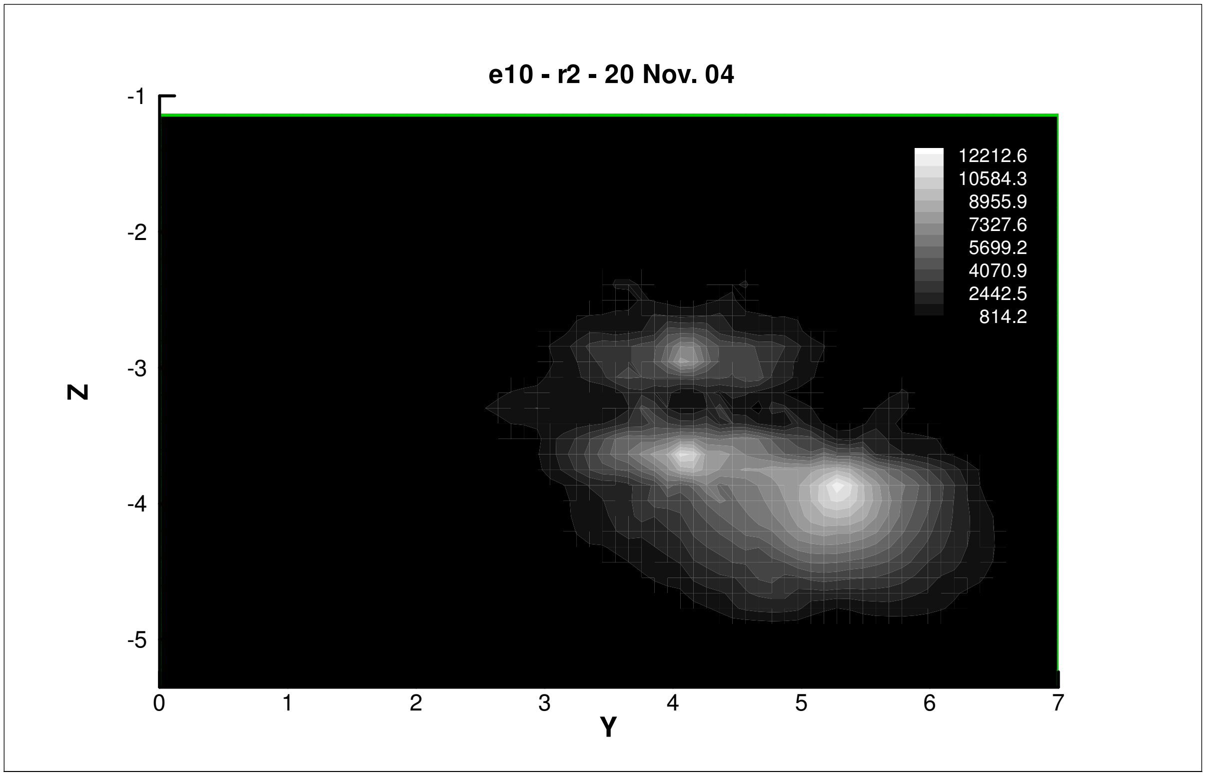
B. BTEX 1. GMT c. Row 4 4. Tri-Methyl Benzene (µg/l)

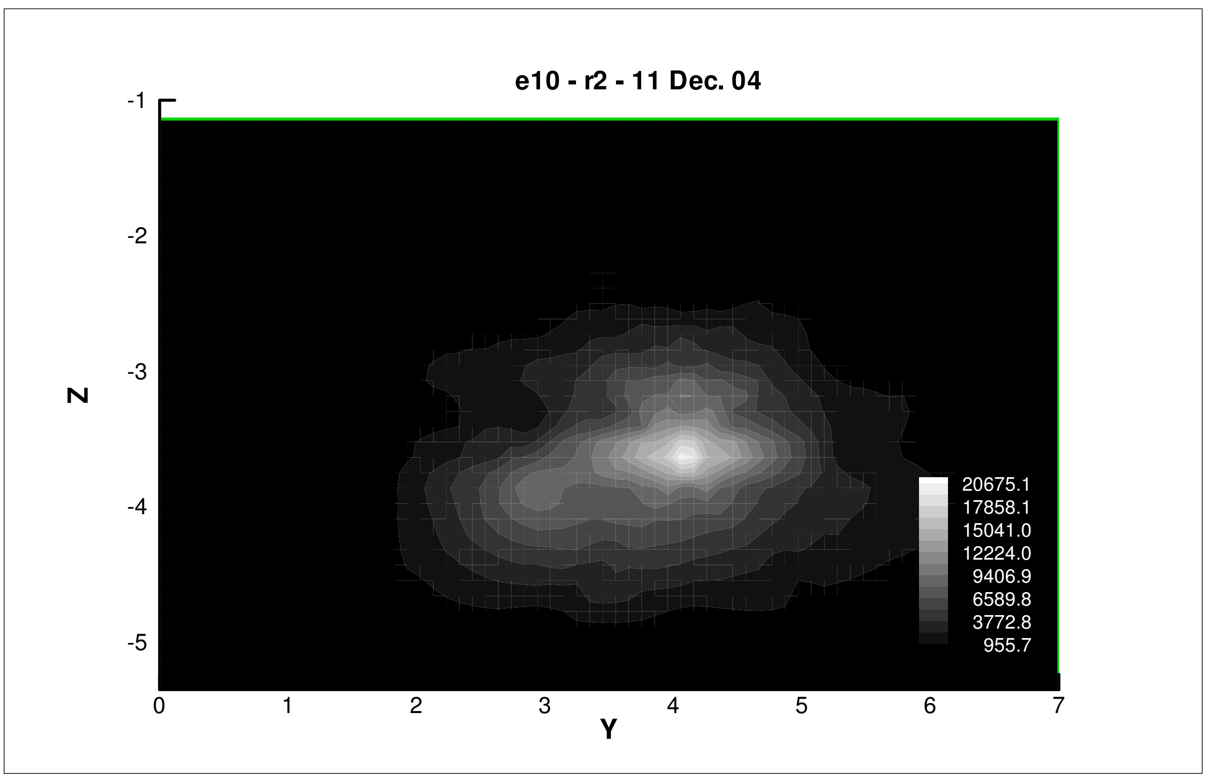

gmt - r4 - 13 Apr. 05
-1
-2
-3
-4
-5
Z
7
8
9
10
11
12
13
14
Y
5.6
4.9
4.1
3.4
2.6
1.9
1.1
0.4

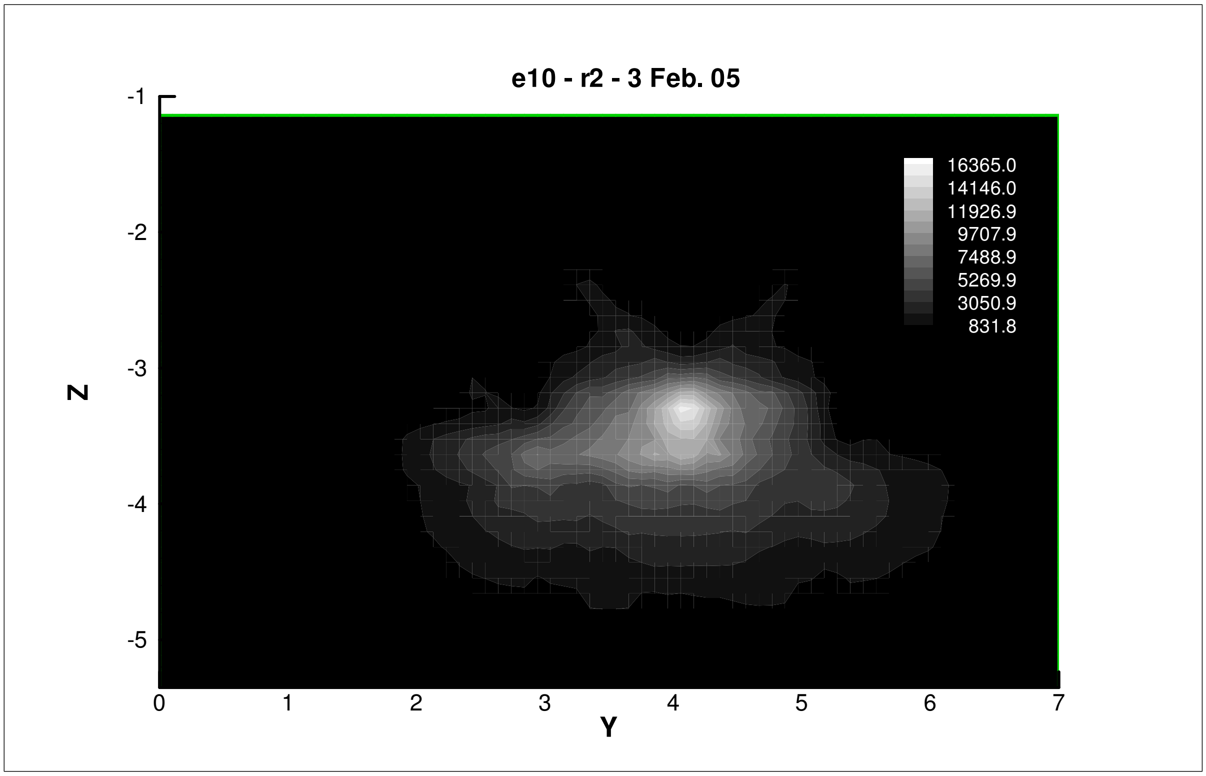

gmt - r4 - 2 June 05
-1
-2
-3
-4
-5
Z
7
8
9
10
11
12
13
14
Y
179.2
155.3
131.4
107.5
83.6
59.7
35.8
11.9

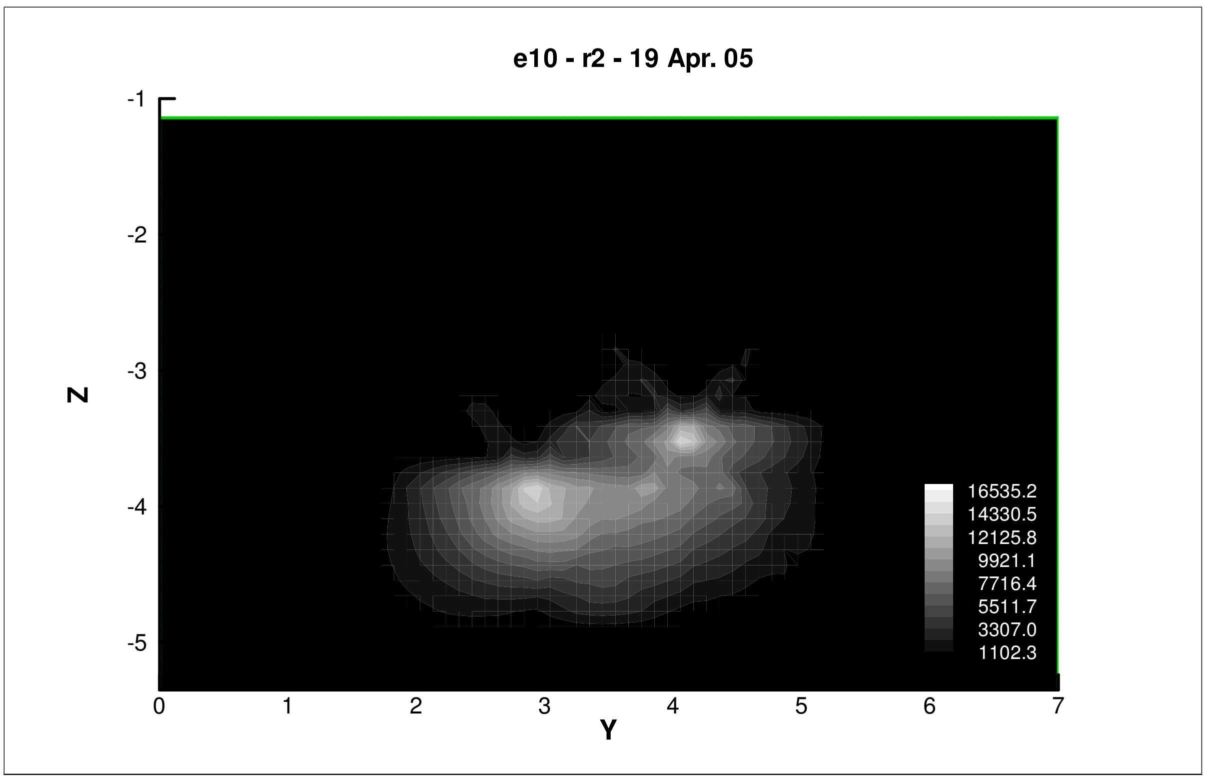


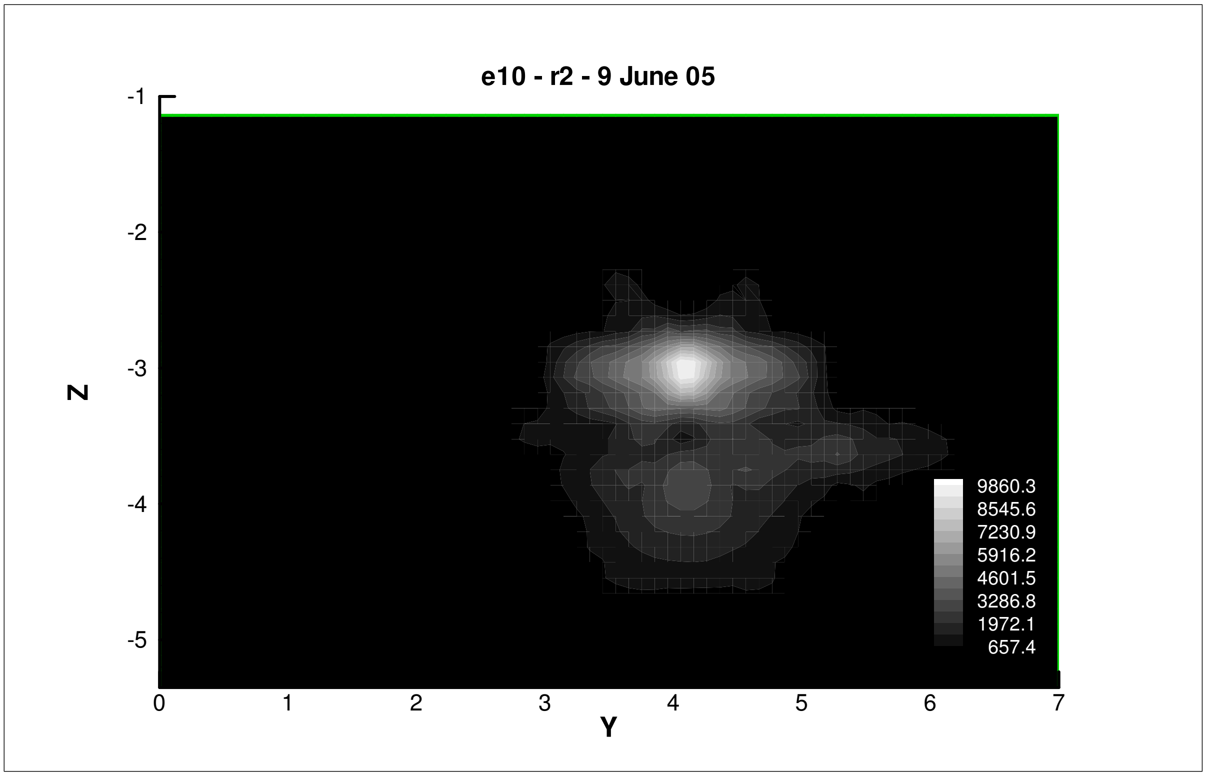
B. BTEX 2. E10 a. Row 2 1. Benzene (µg/l)


e10 - r2 - 20 Nov. 04
-1
-2
-3
-4
-5
Z
0 1 2 3 4 5 6 7
Y
12212.6
10584.3
8955.9
7327.6
5699.2
4070.9
2442.5
814.2

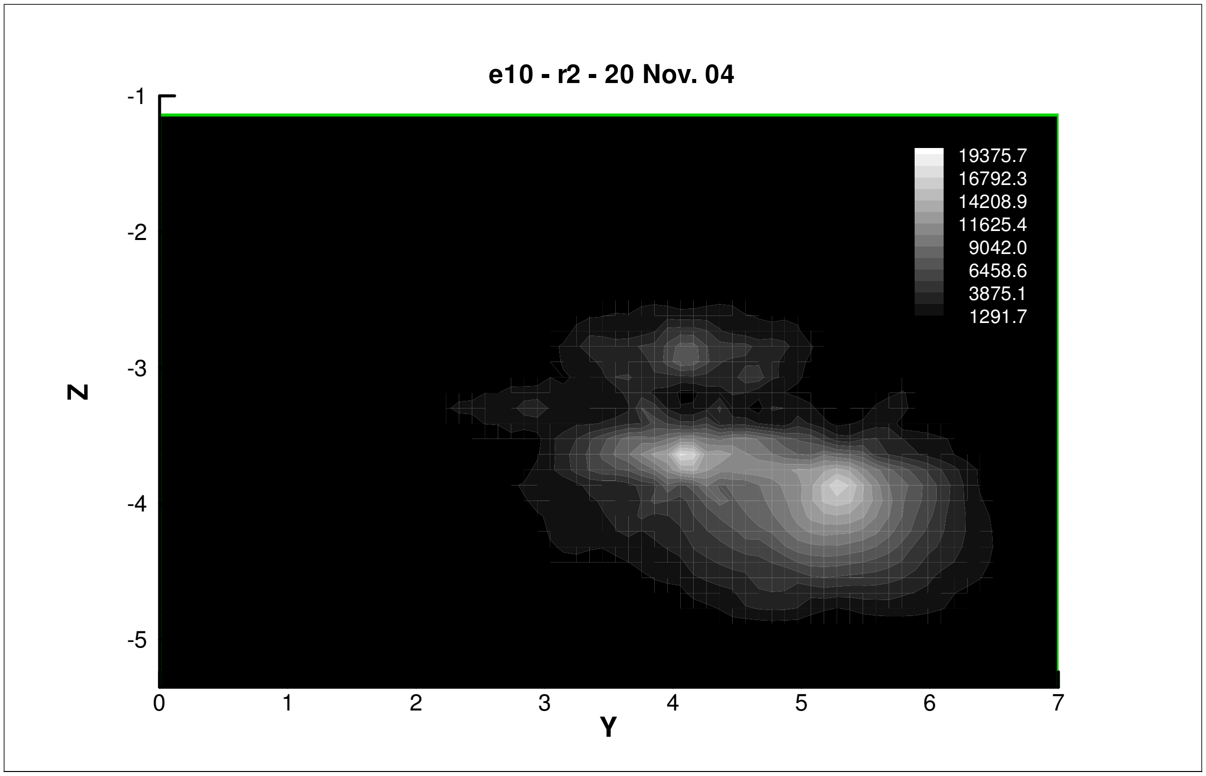

e10 - r2 - 11 Dec. 04
-1
-2
-3
-4
-5
Z
0 1 2 3 4 5 6 7
Y
20675.1
17858.1
15041.0
12224.0
9406.9
6589.8
3772.8
955.7

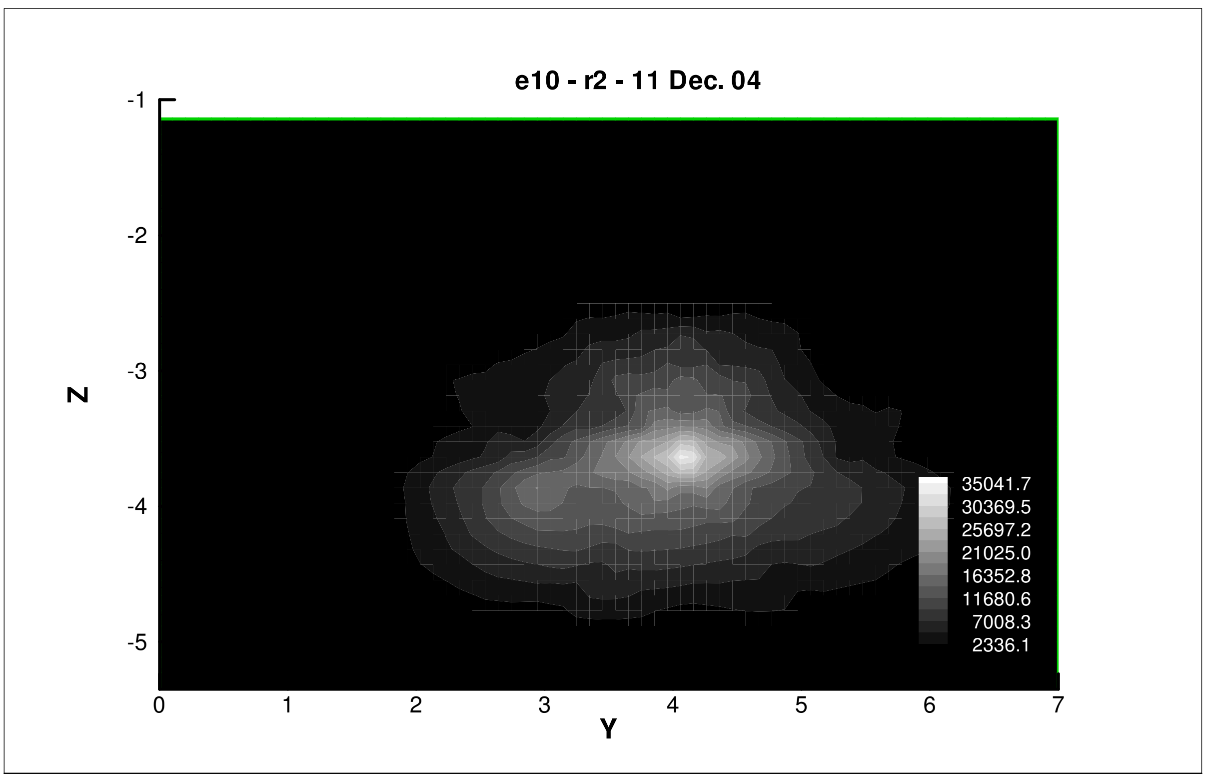

e10 - r2 - 3 Feb. 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
16365.0
14146.0
11926.9
9707.9
7488.9
5269.9
3050.9
831.8

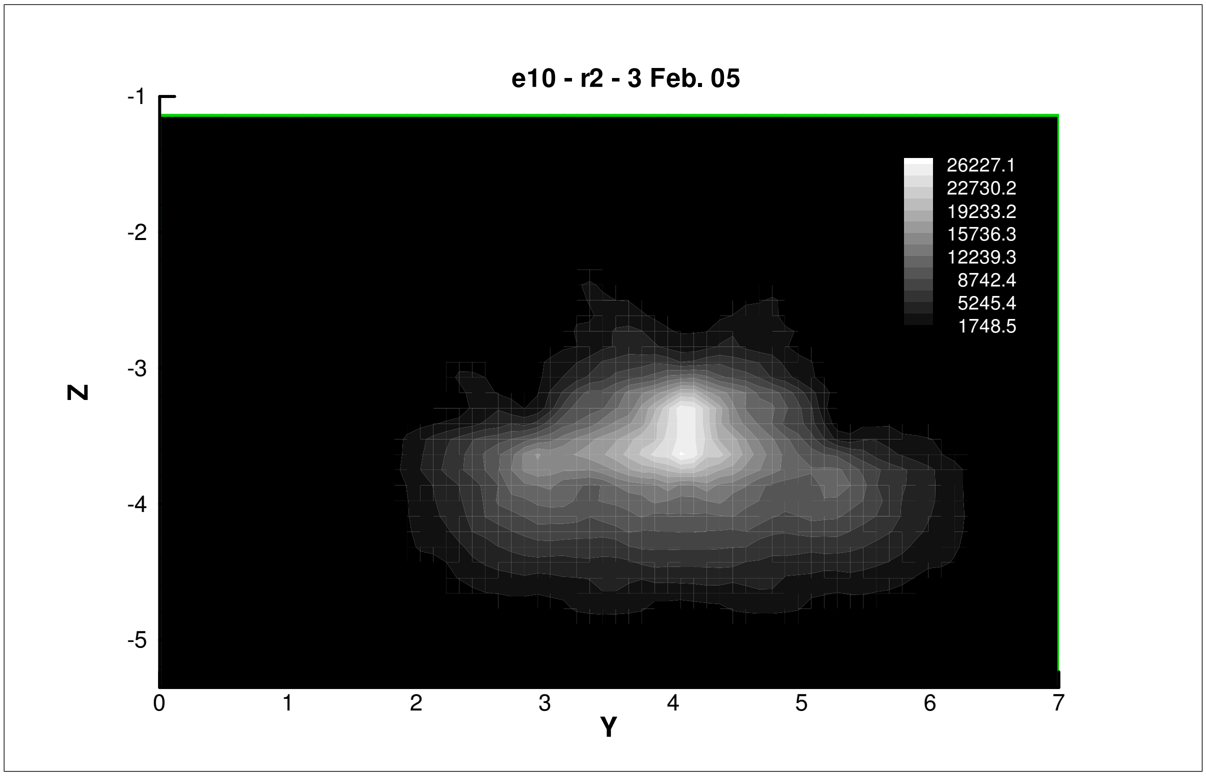

e10 - r2 - 19 Apr. 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
16535.2
14330.5
12125.8
9921.1
7716.4
5511.7
3307.0
1102.3

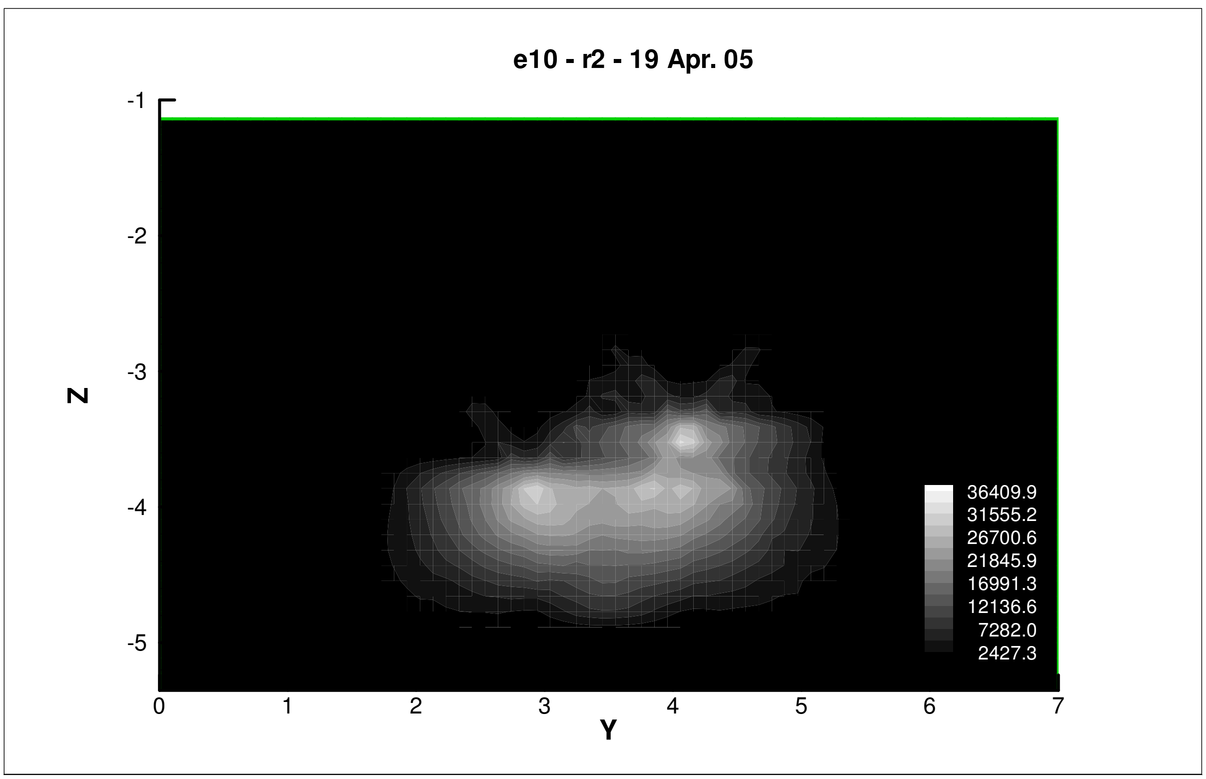


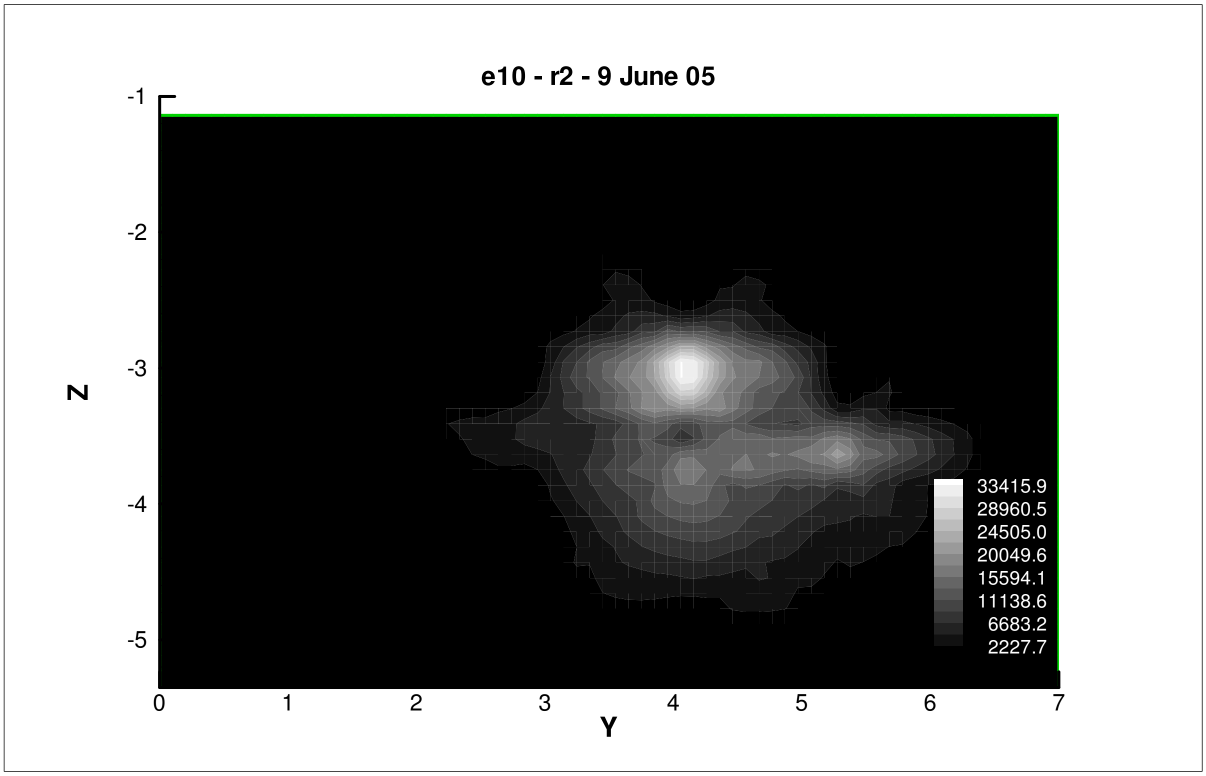
B. BTEX 2. E10 a. Row 2 2. Toluene (µg/l)


e10 - r2 - 20 Nov. 04
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
19375.7
16792.3
14208.9
11625.4
9042.0
6458.6
3875.1
1291.7

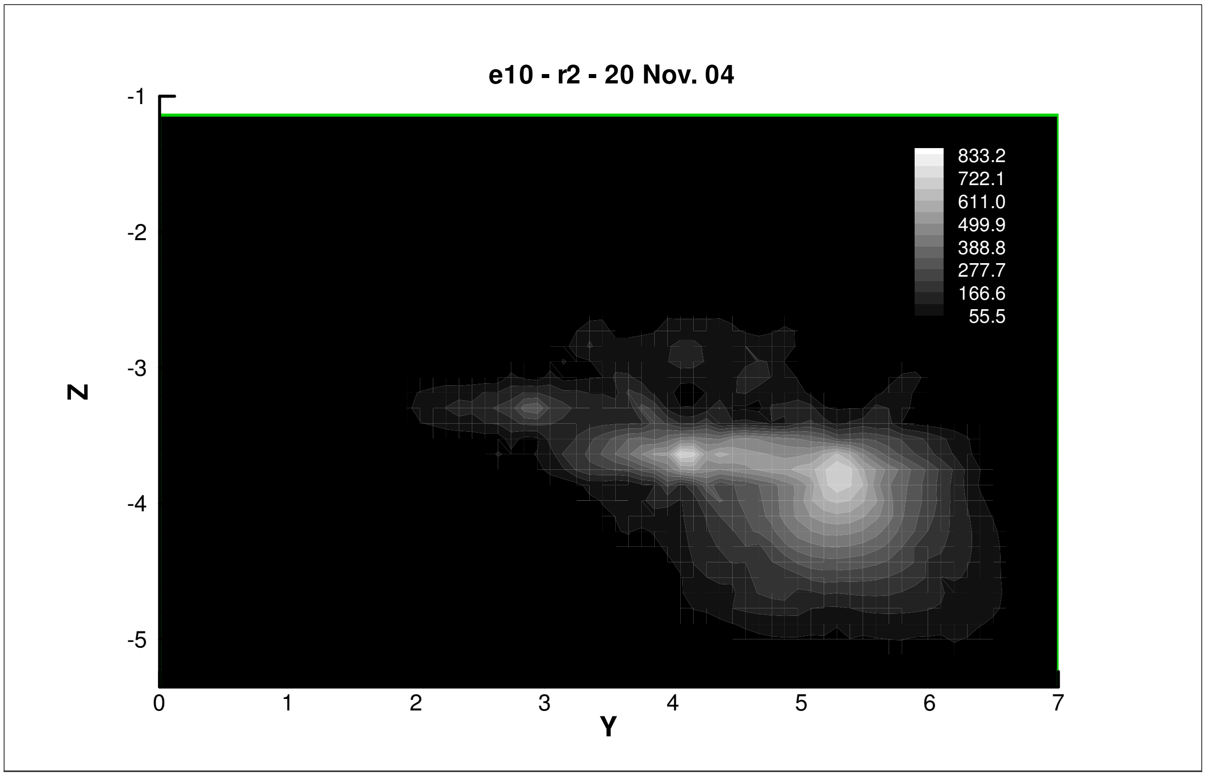

e10 - r2 - 11 Dec. 04
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
35041.7
30369.5
25697.2
21025.0
16352.8
11680.6
7008.3
2336.1

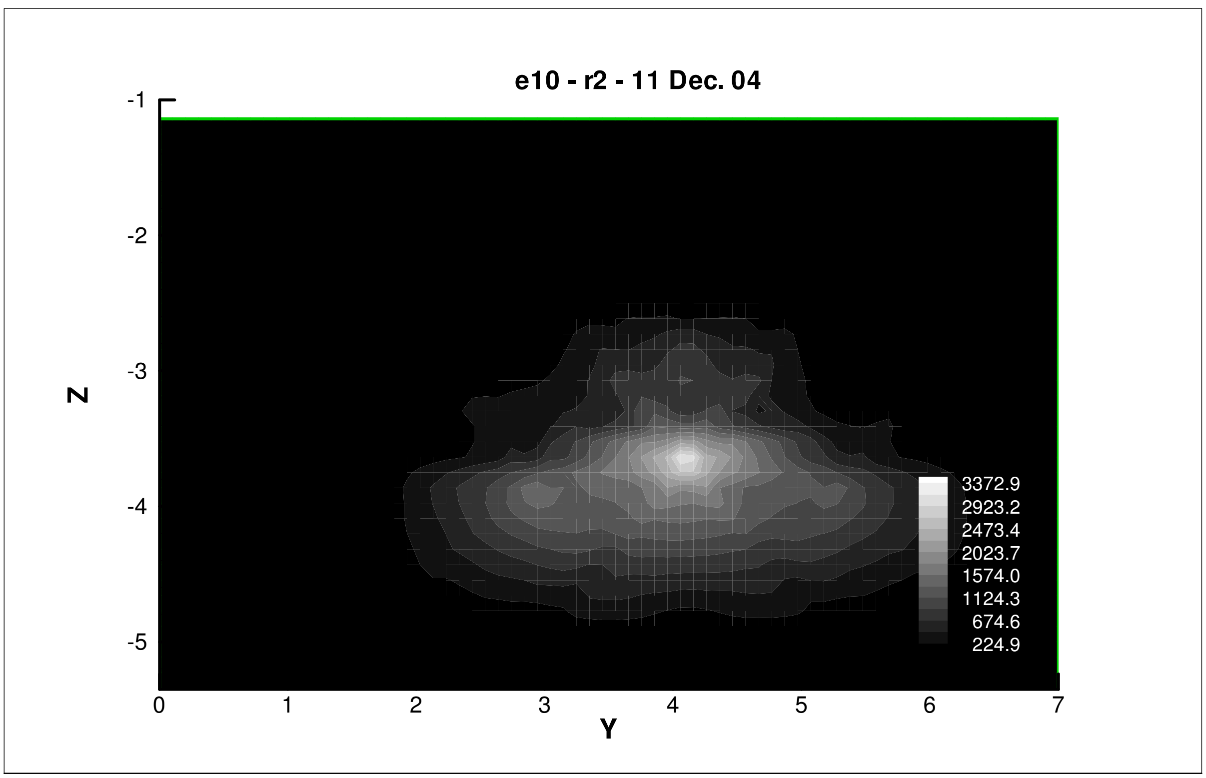

e10 - r2 - 3 Feb. 05
26227.1
22730.2
19233.2
15736.3
12239.3
8742.4
5245.4
1748.5
-1
-2
-3
-4
-5
Z
0
1
2
3
4
5
6
7
Y

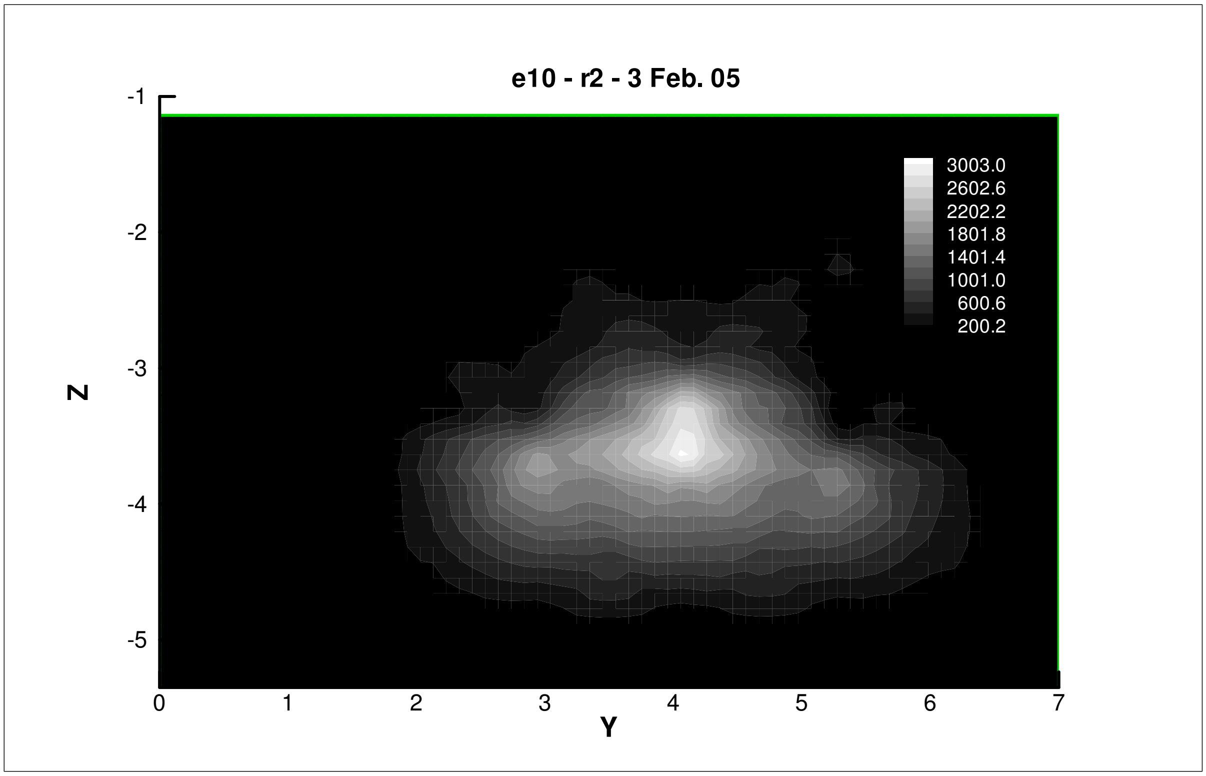

e10 - r2 - 19 Apr. 05
36409.9
31555.2
26700.6
21845.9
16991.3
12136.6
7282.0
2427.3
-1
-2
-3
-4
-5
Z
0
1
2
3
4
5
6
7
Y

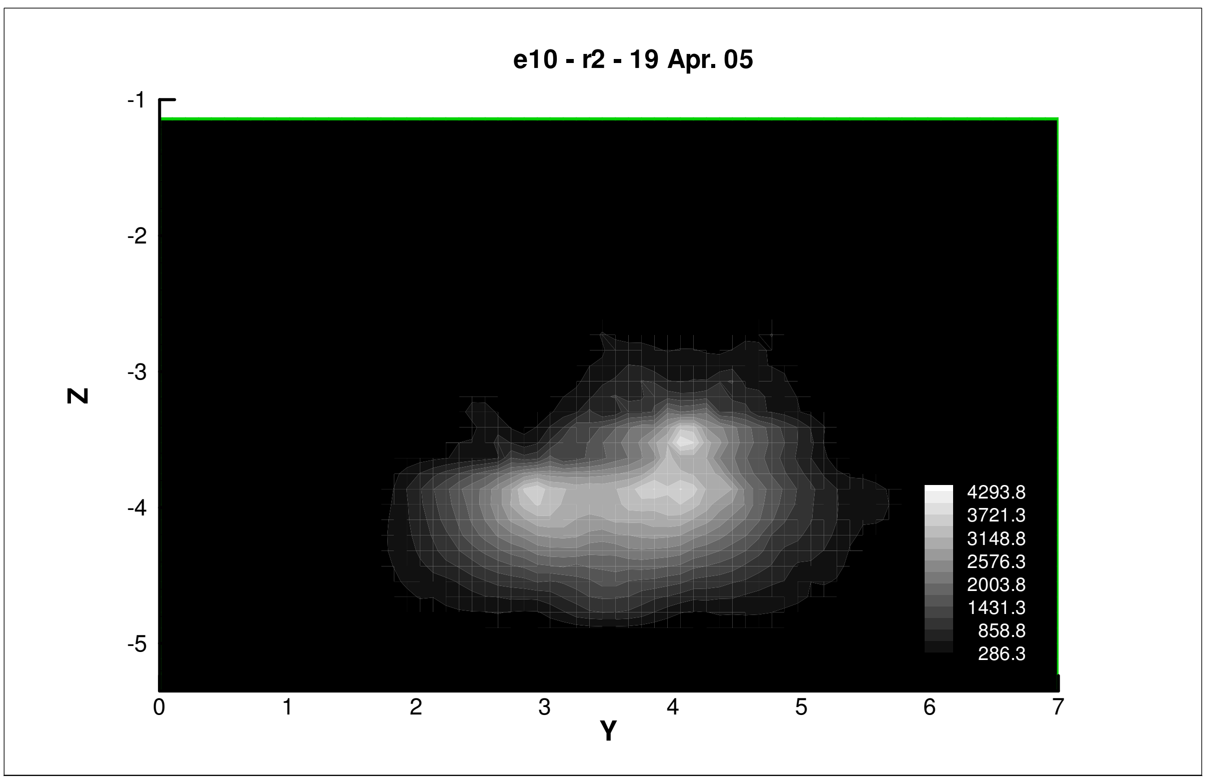


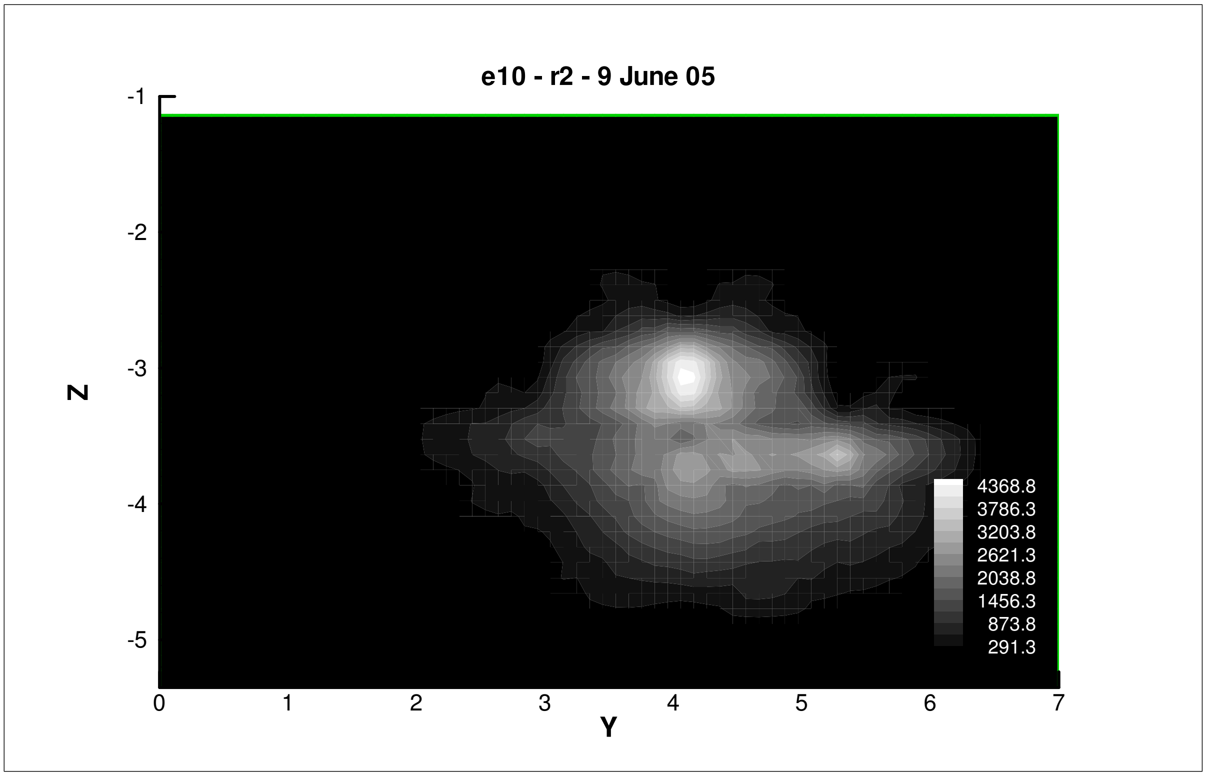
B. BTEX 2. E10 a. Row 2 3. O-Xylene (µg/l)


e10 - r2 - 20 Nov. 04
833.2
722.1
611.0
499.9
388.8
277.7
166.6
55.5
Z
-1
-2
-3
-4
-5
Y
0
1
2
3
4
5
6
7

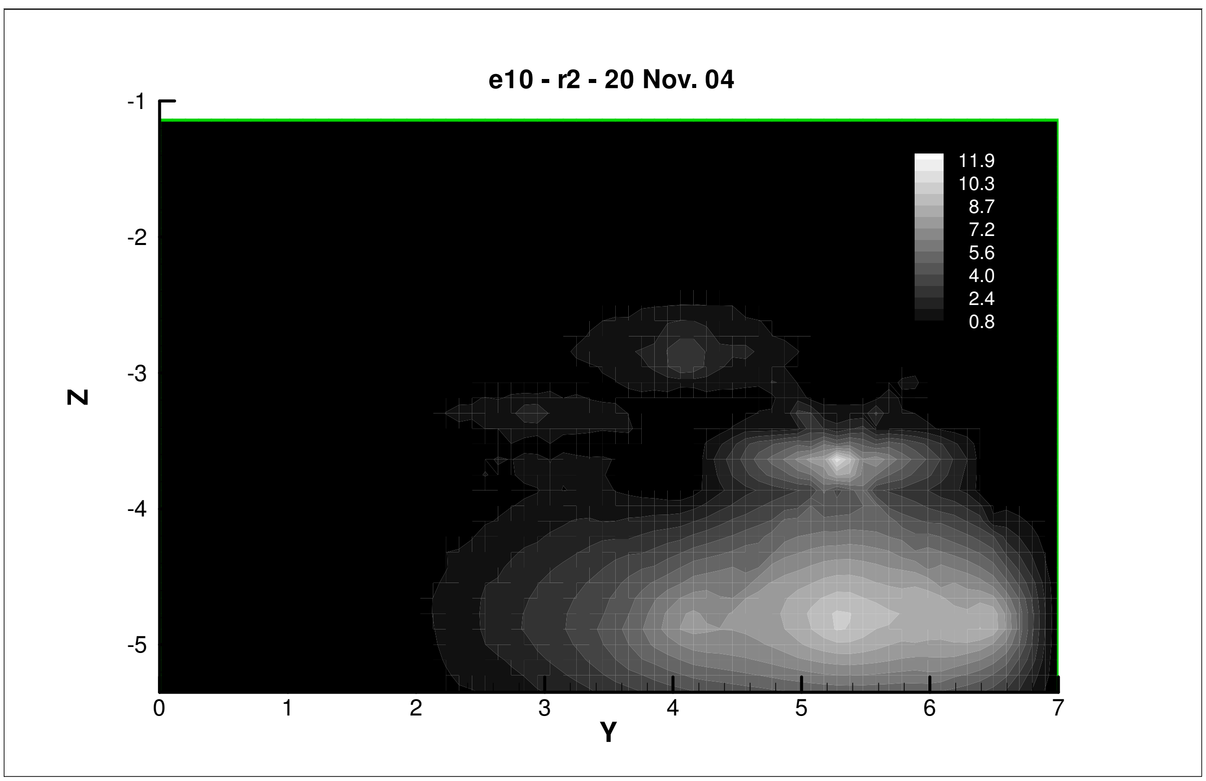

e10 - r2 - 11 Dec. 04
3372.9
2923.2
2473.4
2023.7
1574.0
1124.3
674.6
224.9
Z
-1
-2
-3
-4
-5
Y
0
1
2
3
4
5
6
7

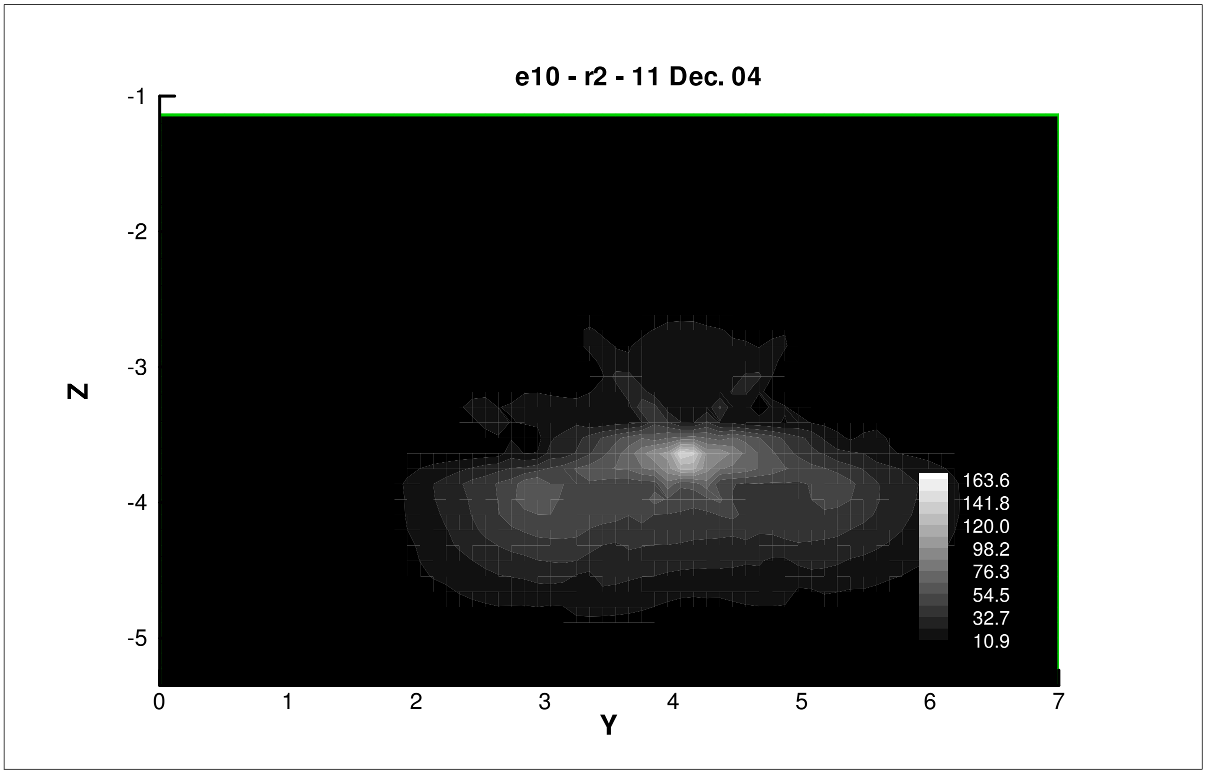

e10 - r2 - 3 Feb. 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
3003.0
2602.6
2202.2
1801.8
1401.4
1001.0
600.6
200.2

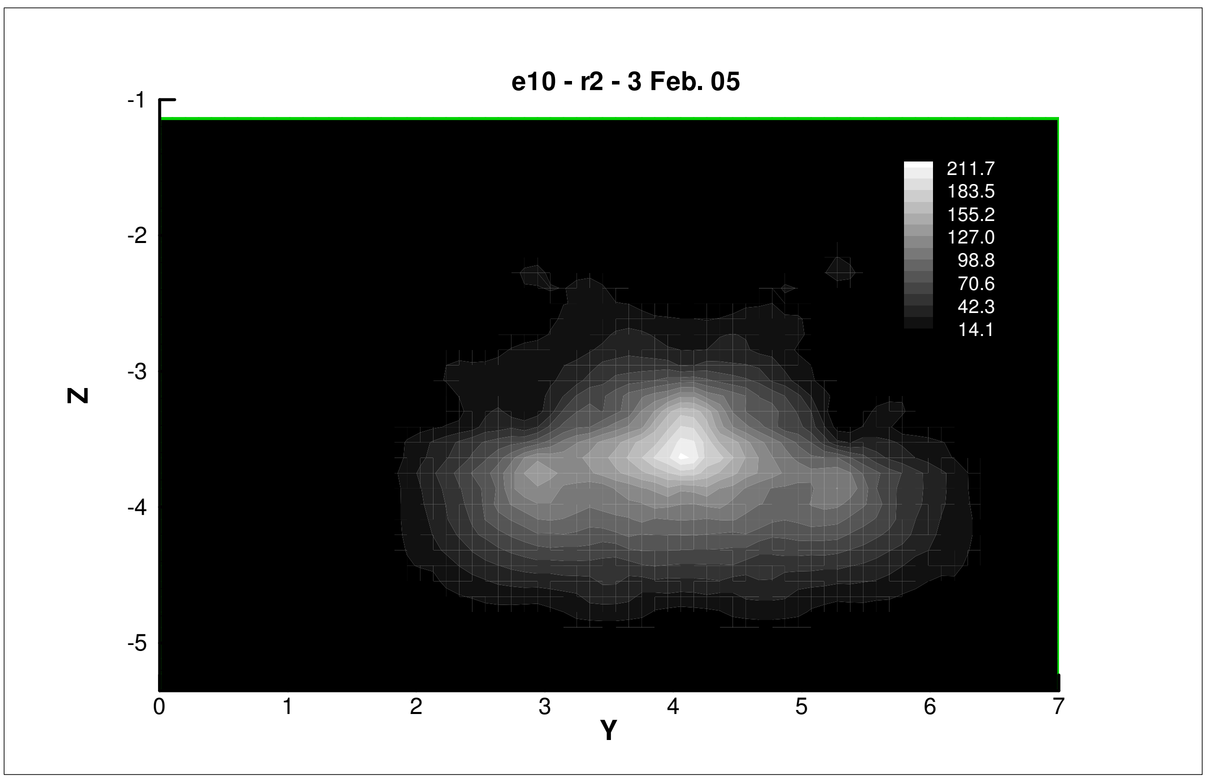

e10 - r2 - 19 Apr. 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
4293.8
3721.3
3148.8
2576.3
2003.8
1431.3
858.8
286.3

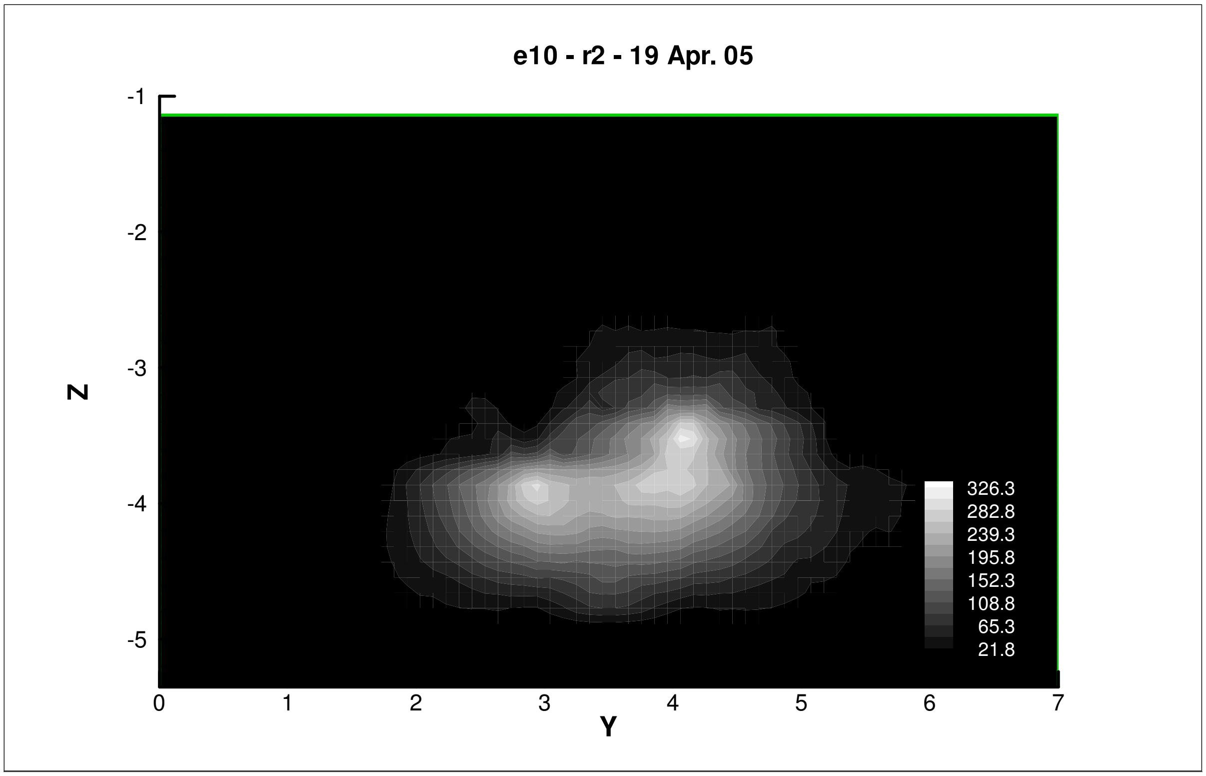


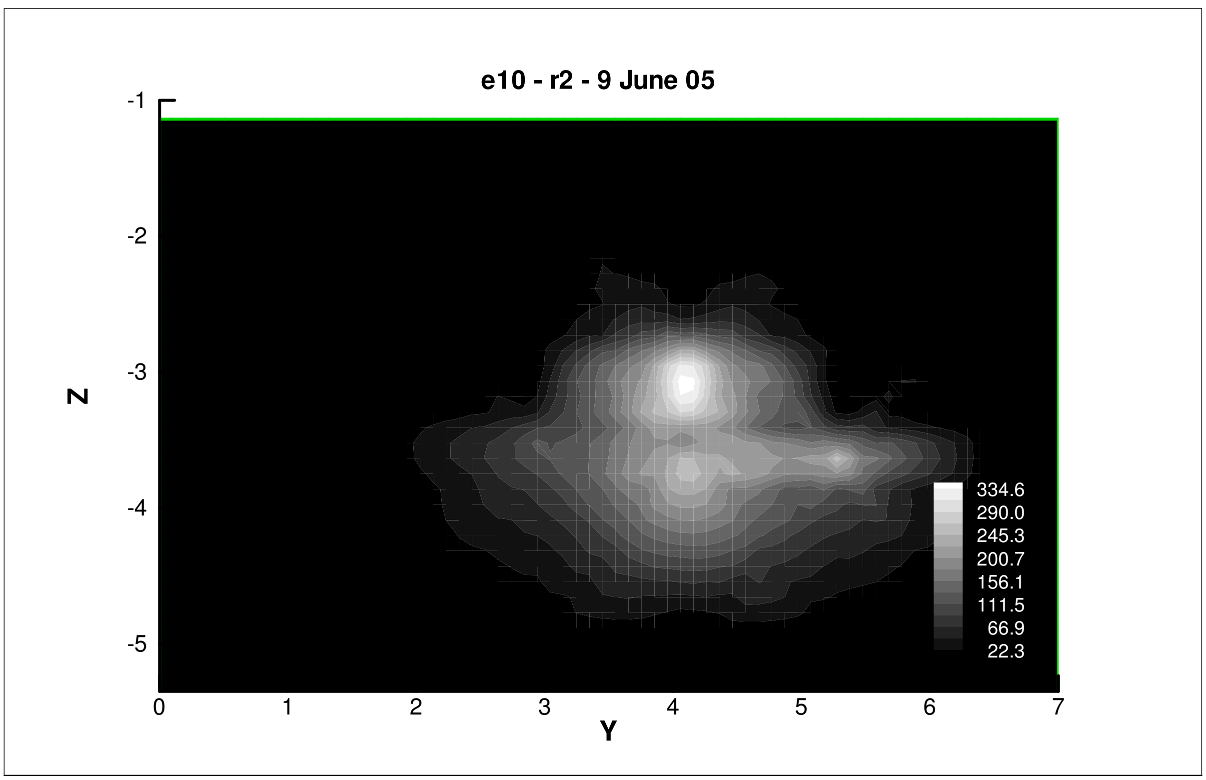
B. BTEX 2. E10 a. Row 2 4. Tri-Methyl Benzene (µg/l)



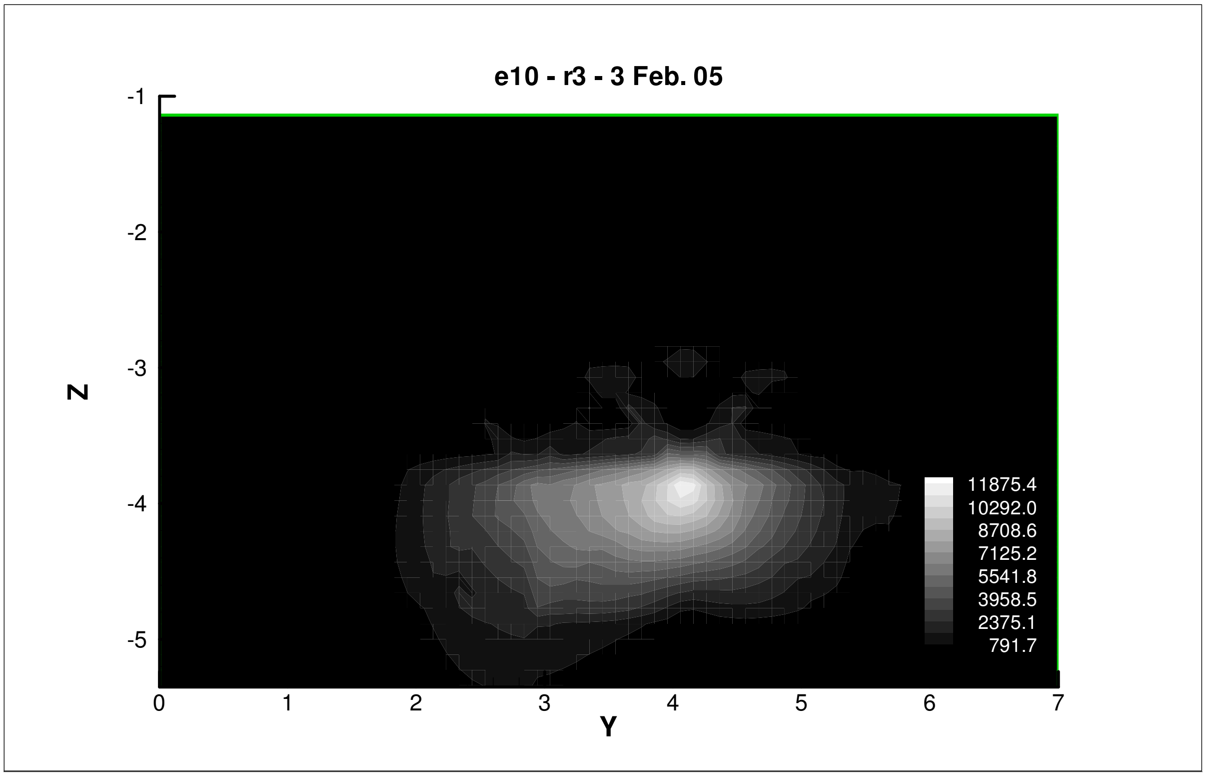

e10 - r2 - 11 Dec. 04
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
163.6
141.8
120.0
98.2
76.3
54.5
32.7
10.9

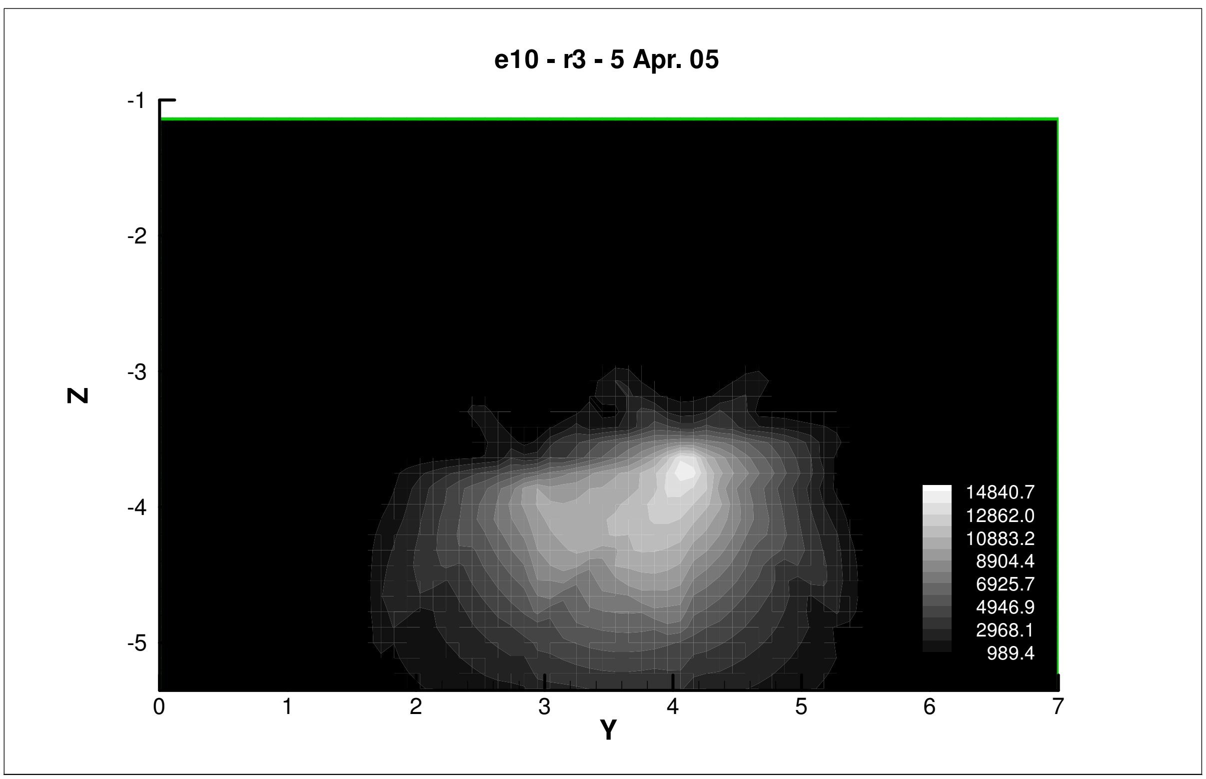

e10 - r2 - 3 Feb. 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
211.7
183.5
155.2
127.0
98.8
70.6
42.3
14.1

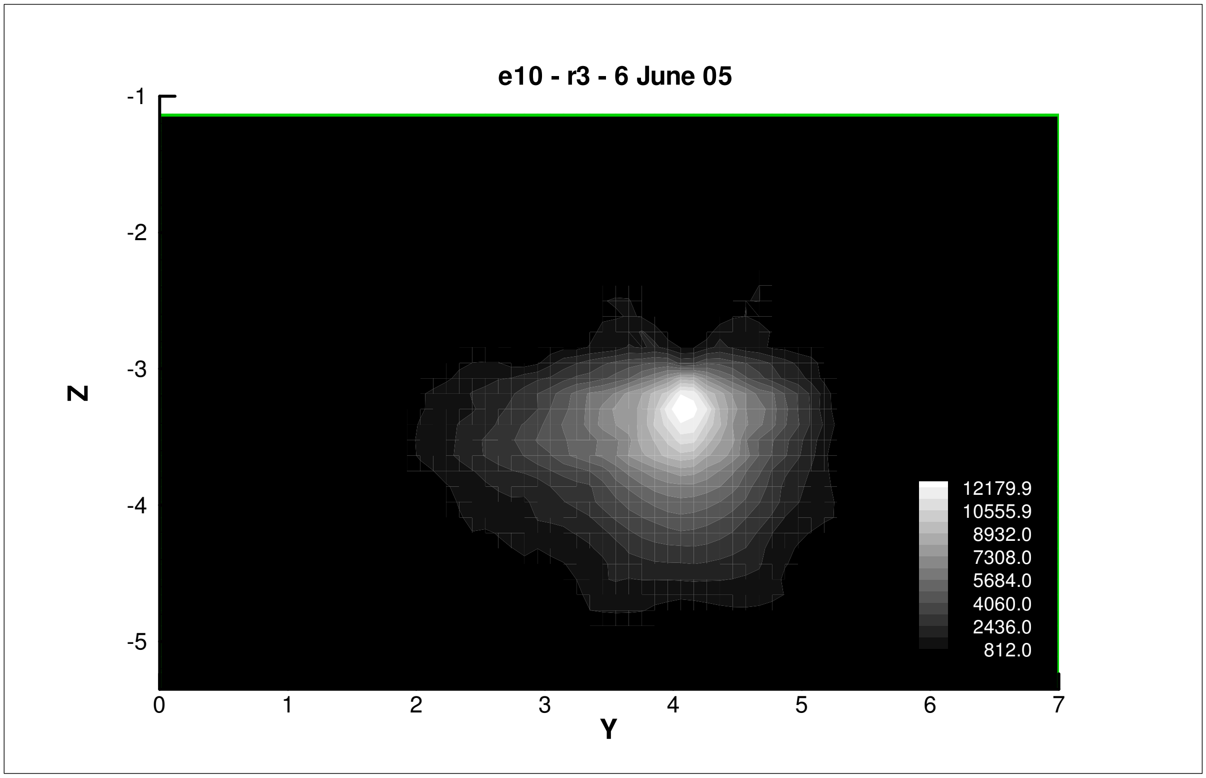


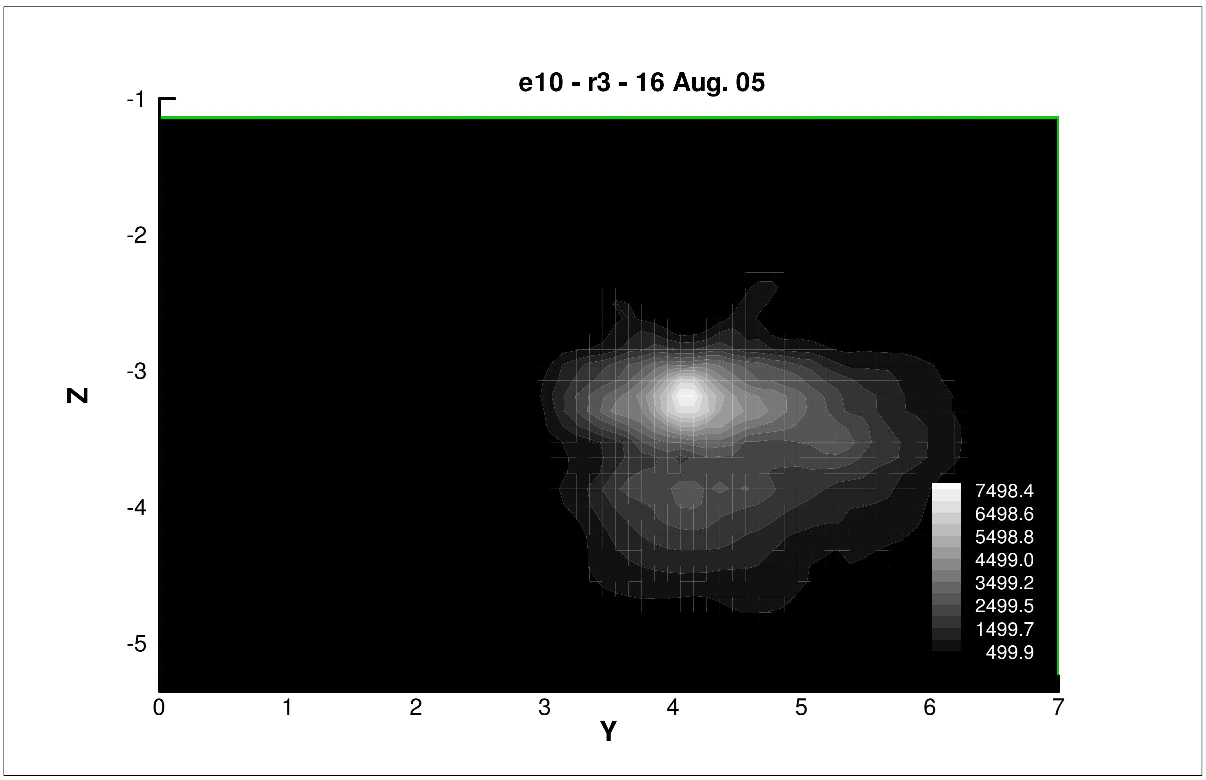


B. BTEX 2. E10 b. Row 3 1. Benzene (µg/l)

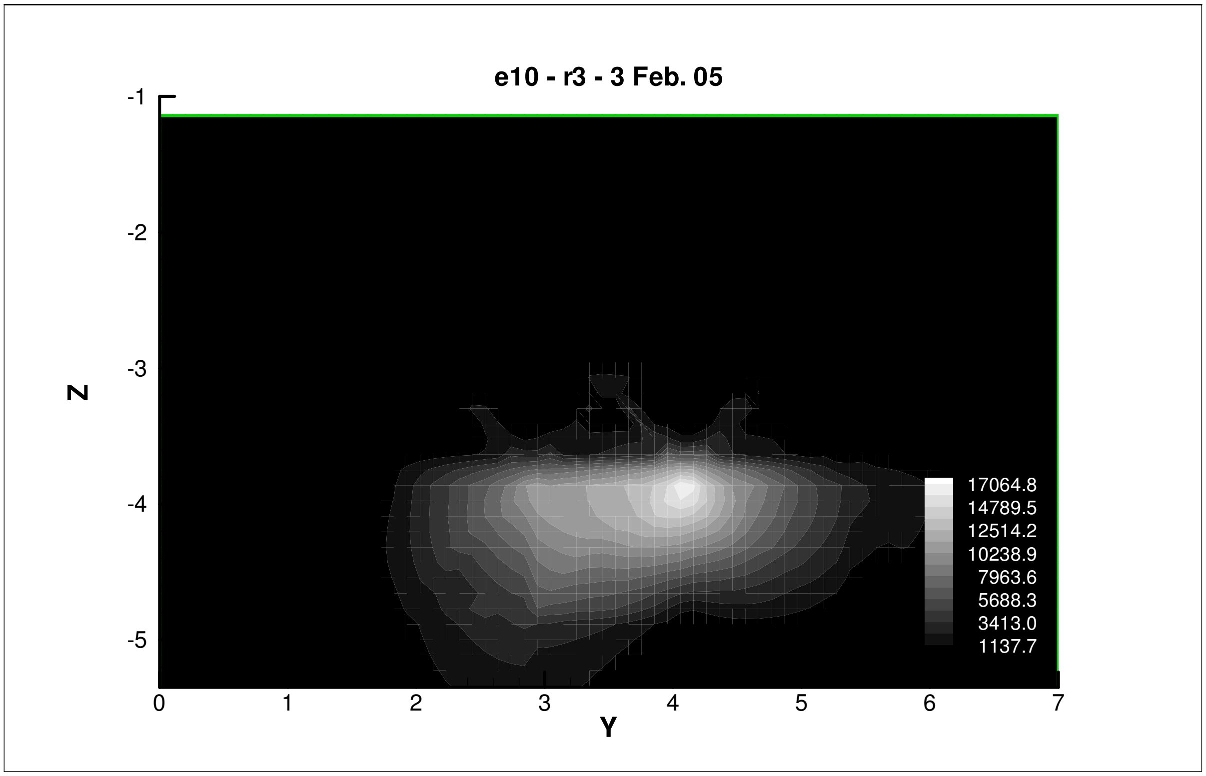

e10 - r3 - 3 Feb. 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
11875.4
10292.0
8708.6
7125.2
5541.8
3958.5
2375.1
791.7

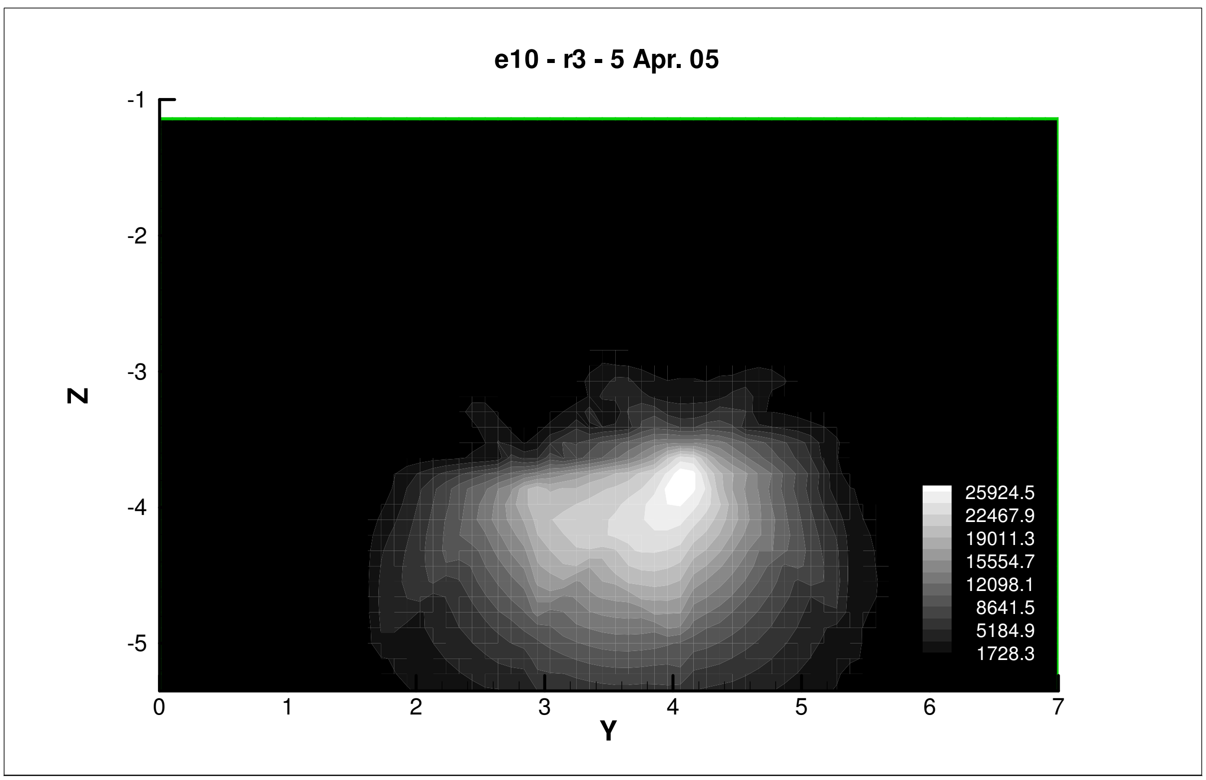

e10 - r3 - 5 Apr. 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
14840.7
12862.0
10883.2
8904.4
6925.7
4946.9
2968.1
989.4

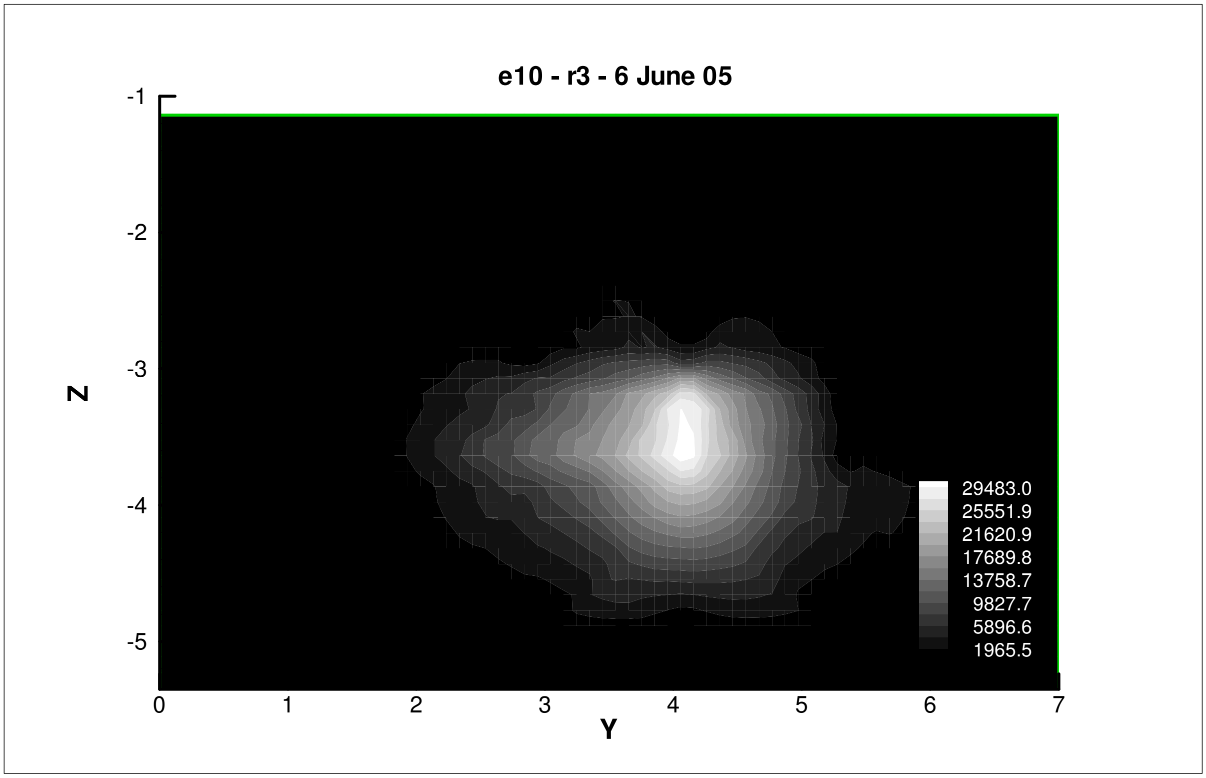

e10 - r3 - 6 June 05
Z
-1
-2
-3
-4
-5
Y
0
1
2
3
4
5
6
7
12179.9
10555.9
8932.0
7308.0
5684.0
4060.0
2436.0
812.0

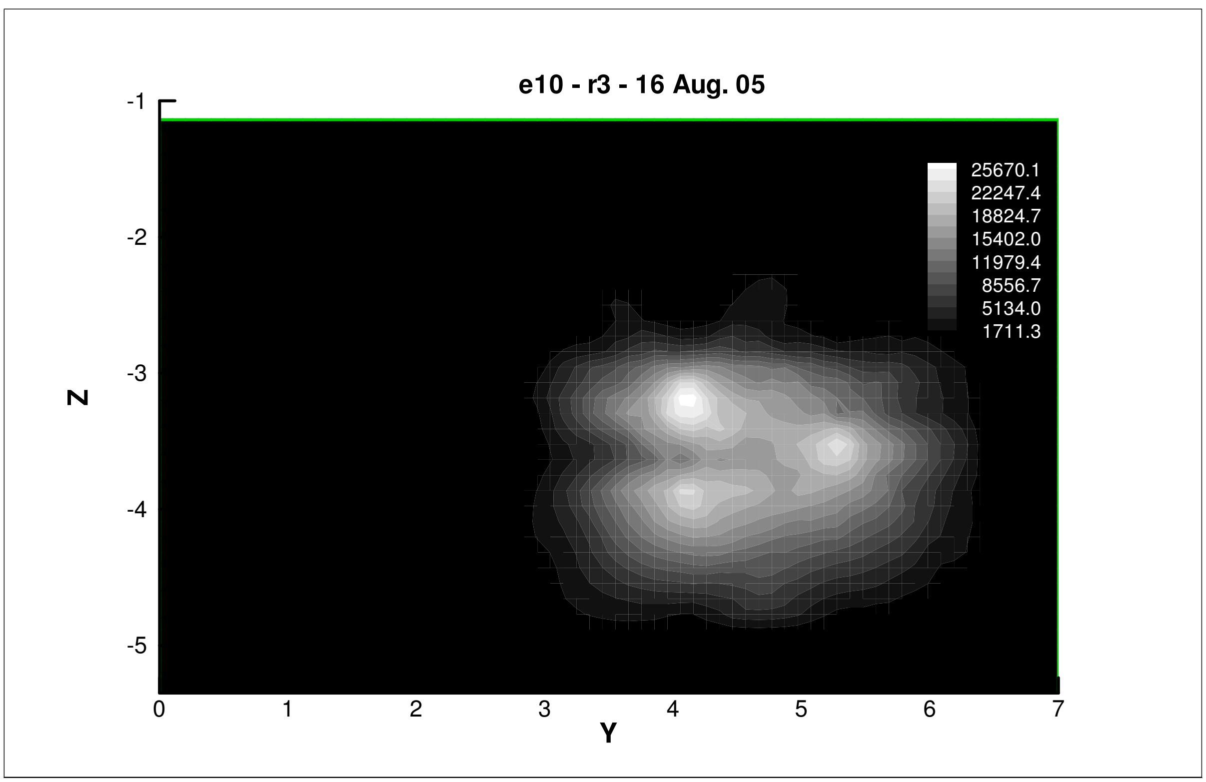

e10 - r3 - 16 Aug. 05
Z
-1
-2
-3
-4
-5
Y
0
1
2
3
4
5
6
7
7498.4
6498.6
5498.8
4499.0
3499.2
2499.5
1499.7
499.9

B. BTEX 2. E10 b. Row 3 2. Toluene (µg/l)

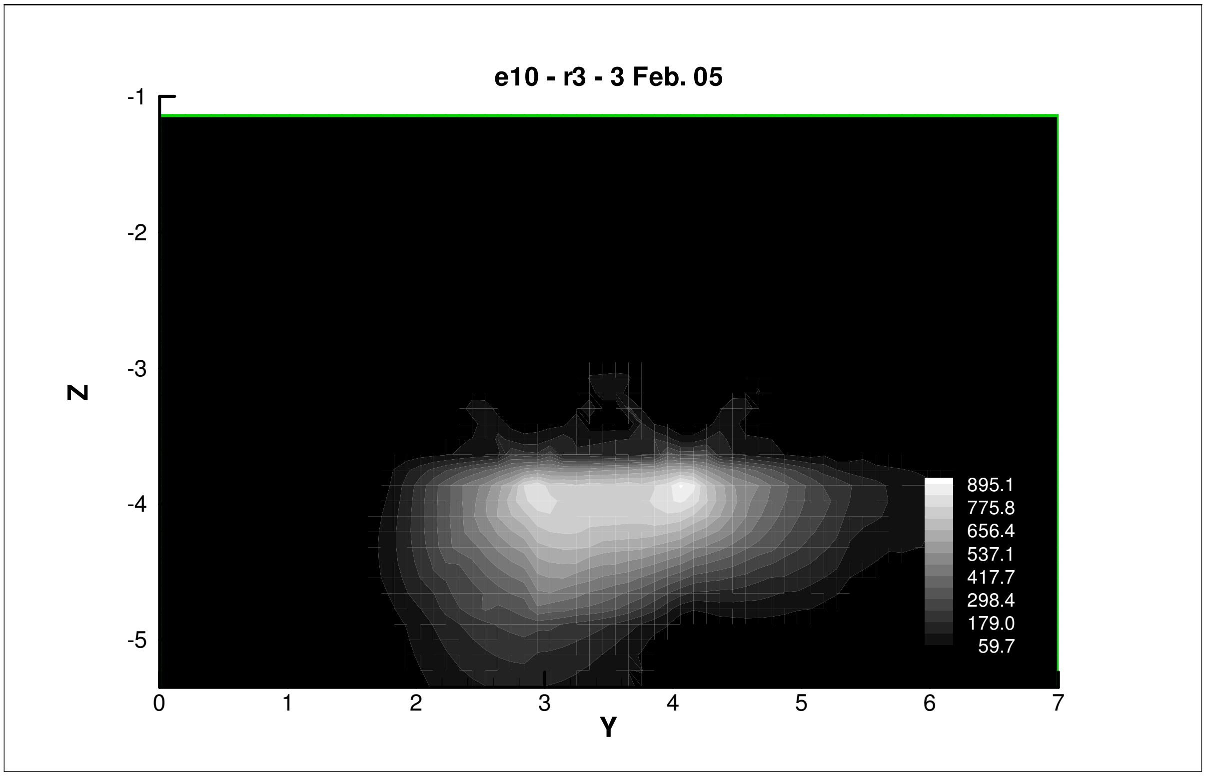


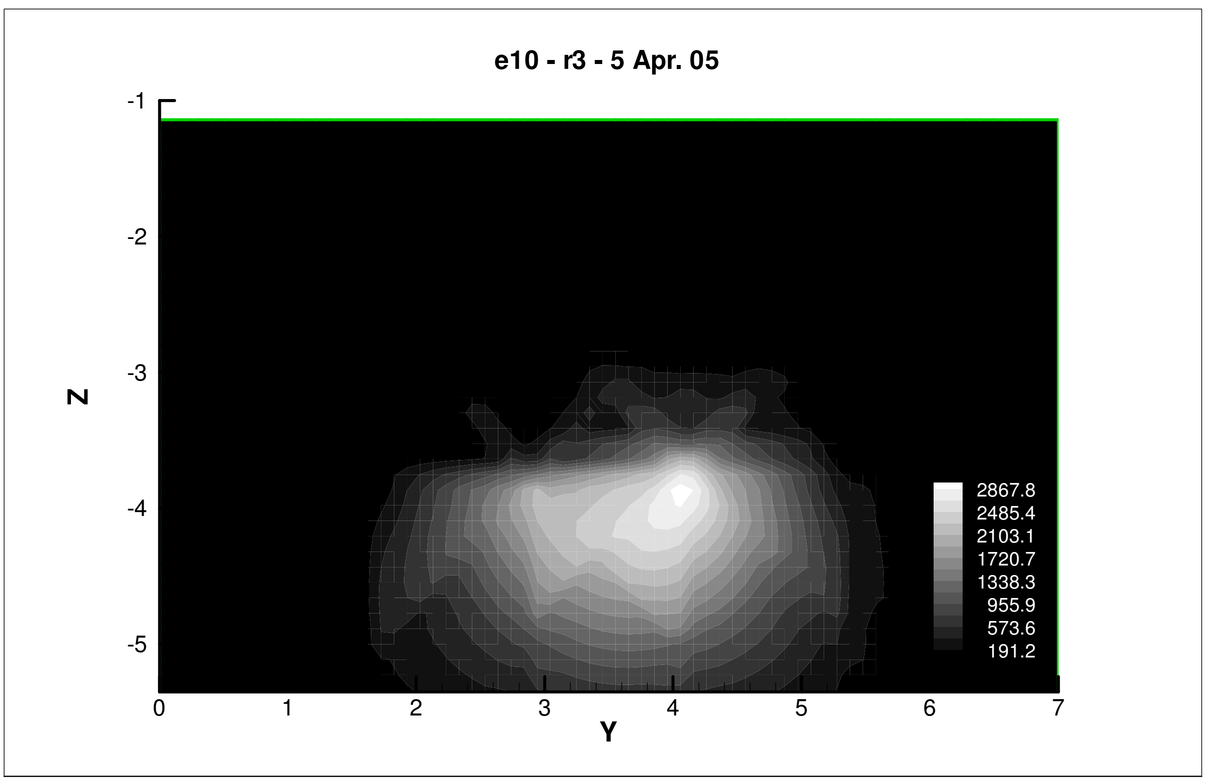


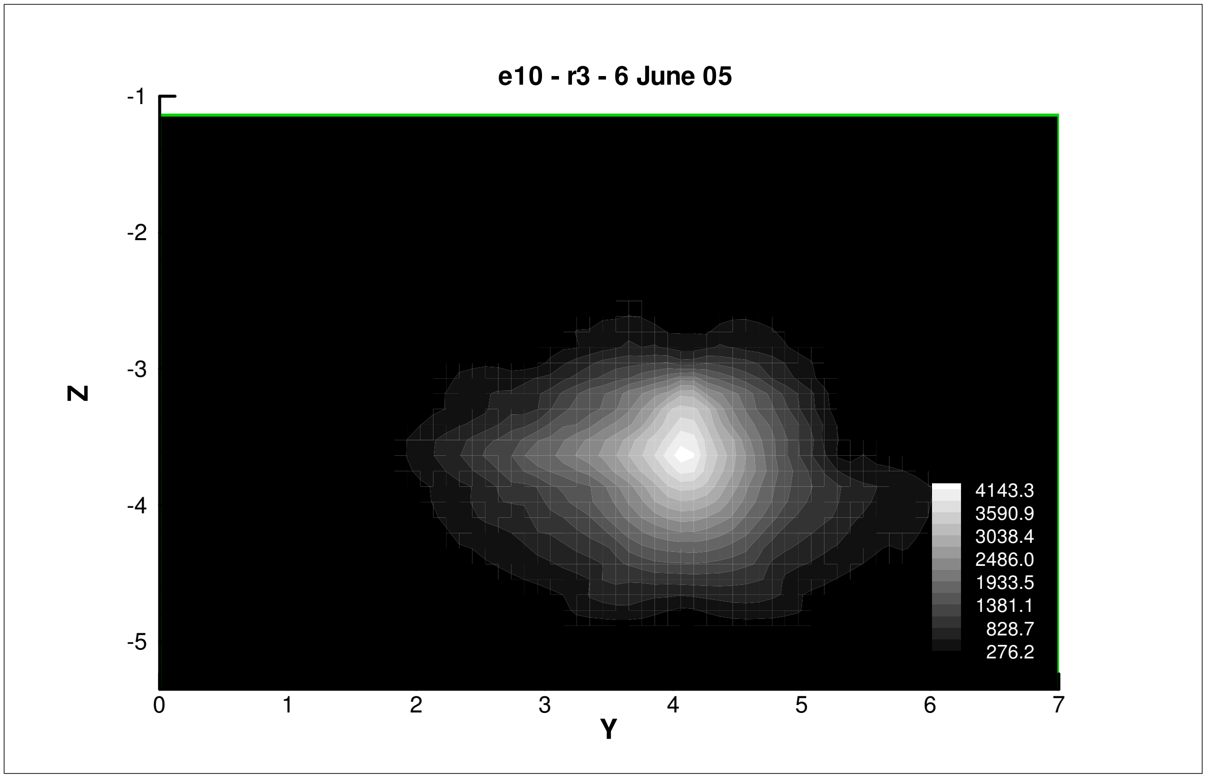

e10 - r3 - 6 June 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
29483.0
25551.9
21620.9
17689.8
13758.7
9827.7
5896.6
1965.5

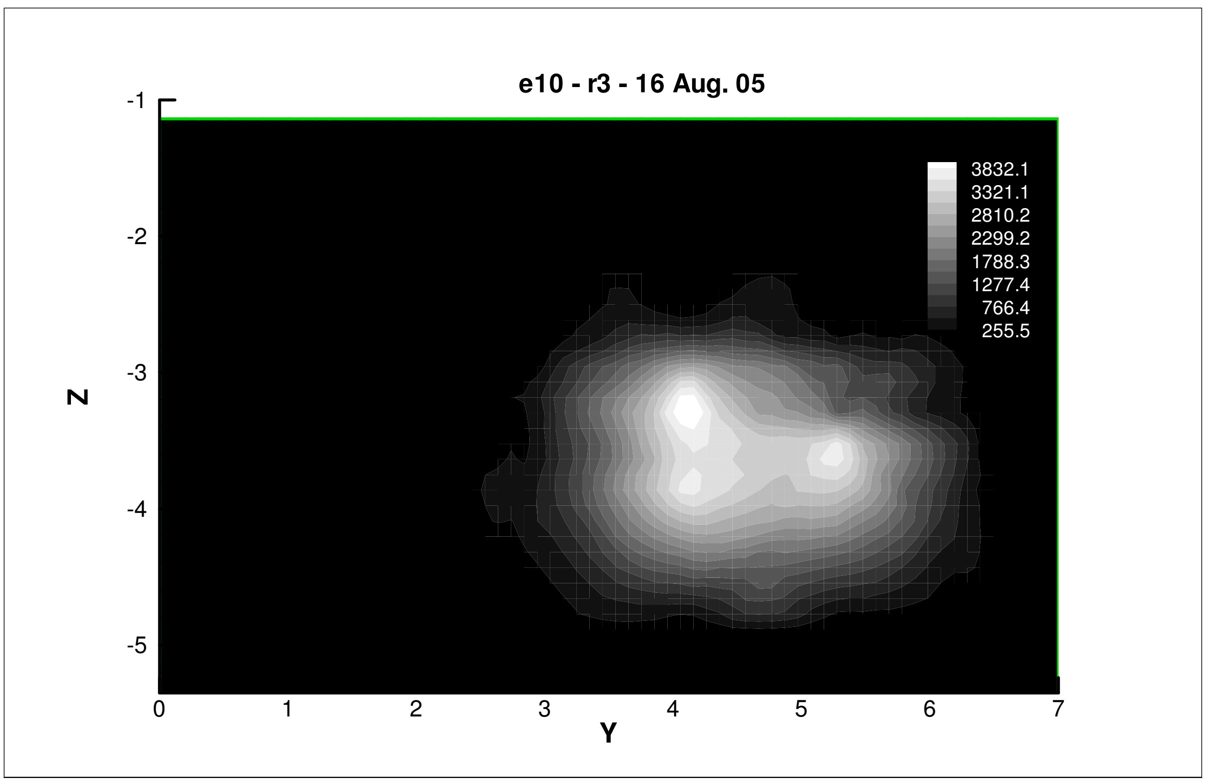

e10 - r3 - 16 Aug. 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
25670.1
22247.4
18824.7
15402.0
11979.4
8556.7
5134.0
1711.3

B. BTEX 2. E10 b. Row 3 3. O-Xylene (µg/l)

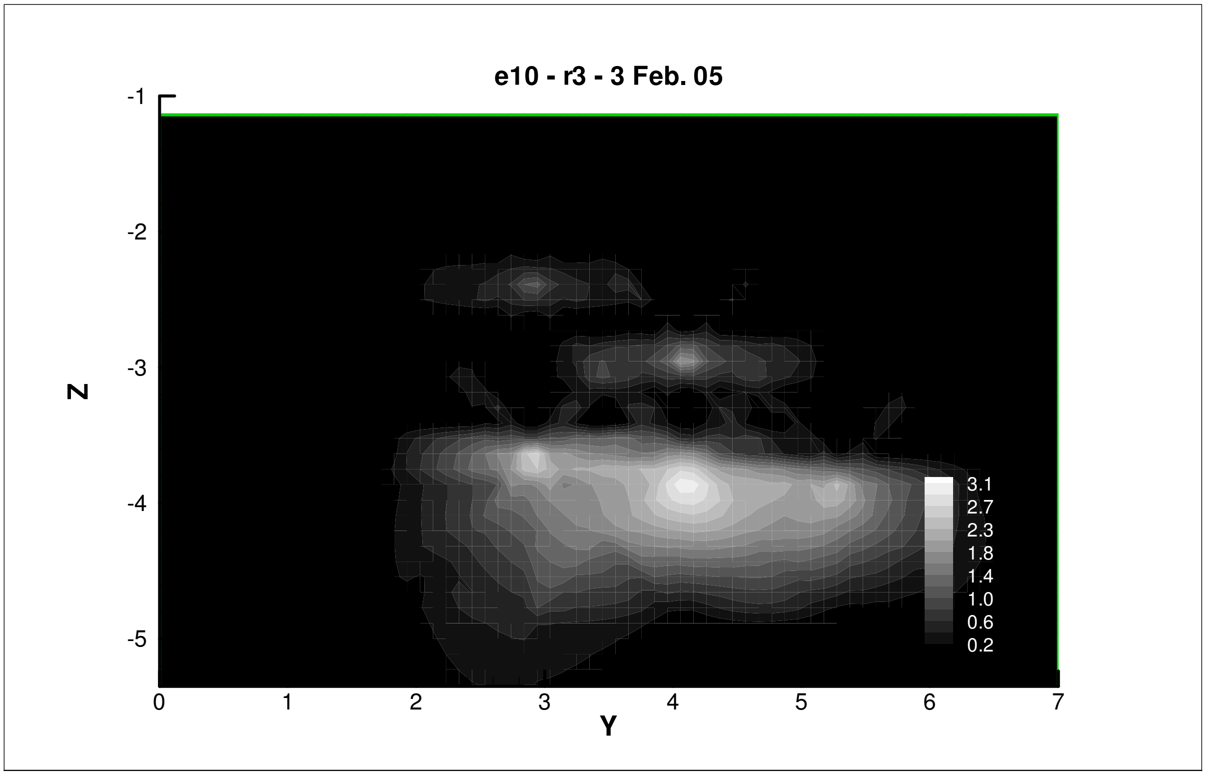


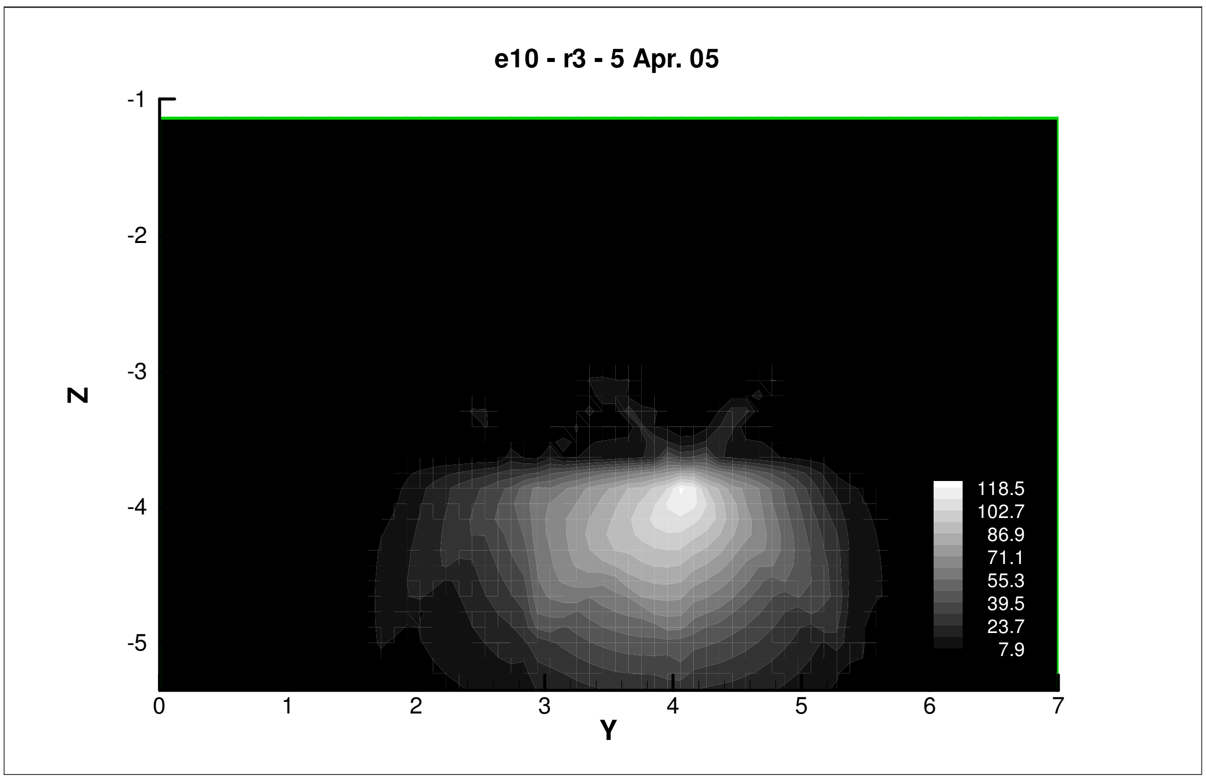


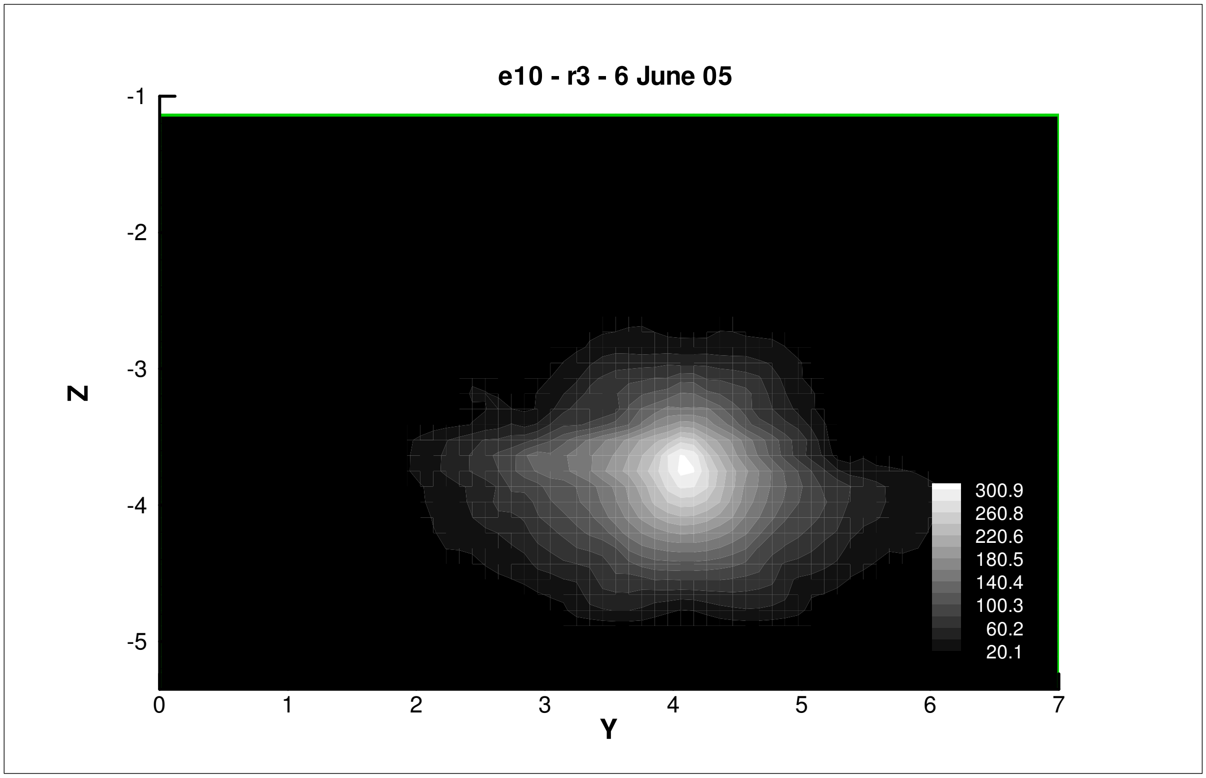

e10 - r3 - 6 June 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
4143.3
3590.9
3038.4
2486.0
1933.5
1381.1
828.7
276.2

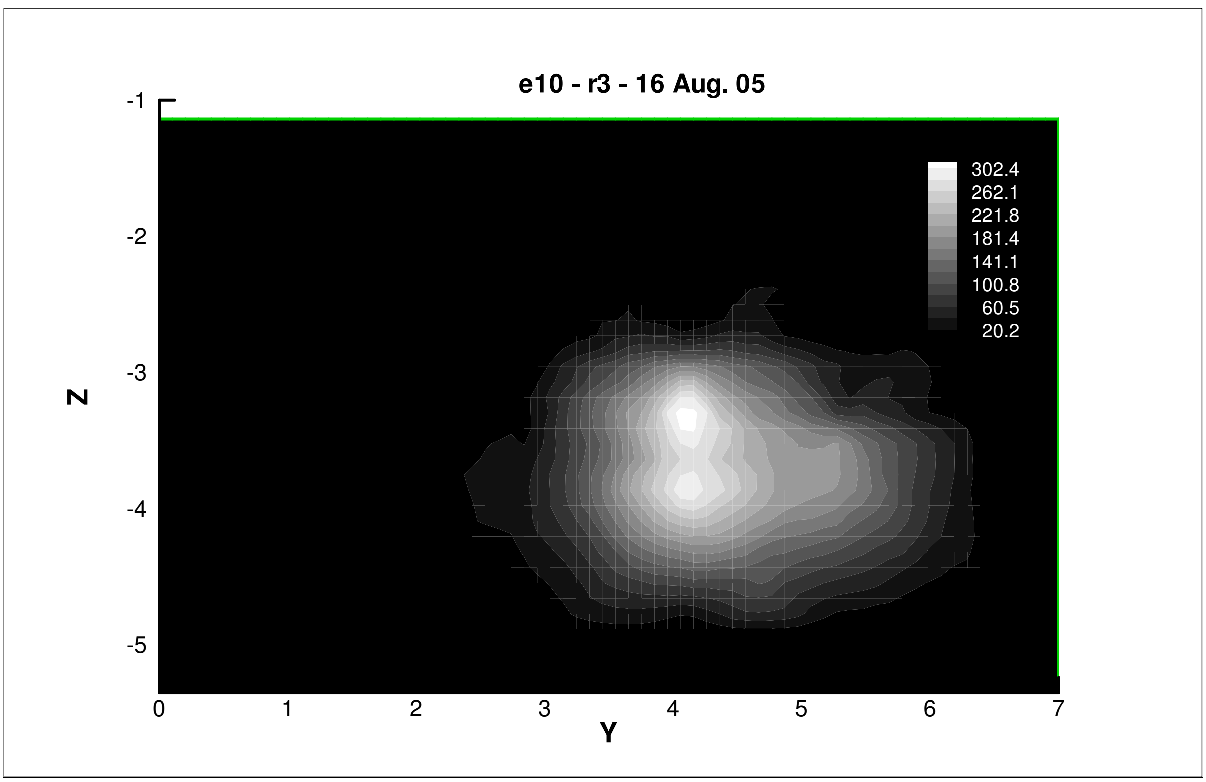

e10 - r3 - 16 Aug. 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
3832.1
3321.1
2810.2
2299.2
1788.3
1277.4
766.4
255.5

B. BTEX 2. E10 b. Row 3 4. Tri-Methyl Benzene (µg/l)

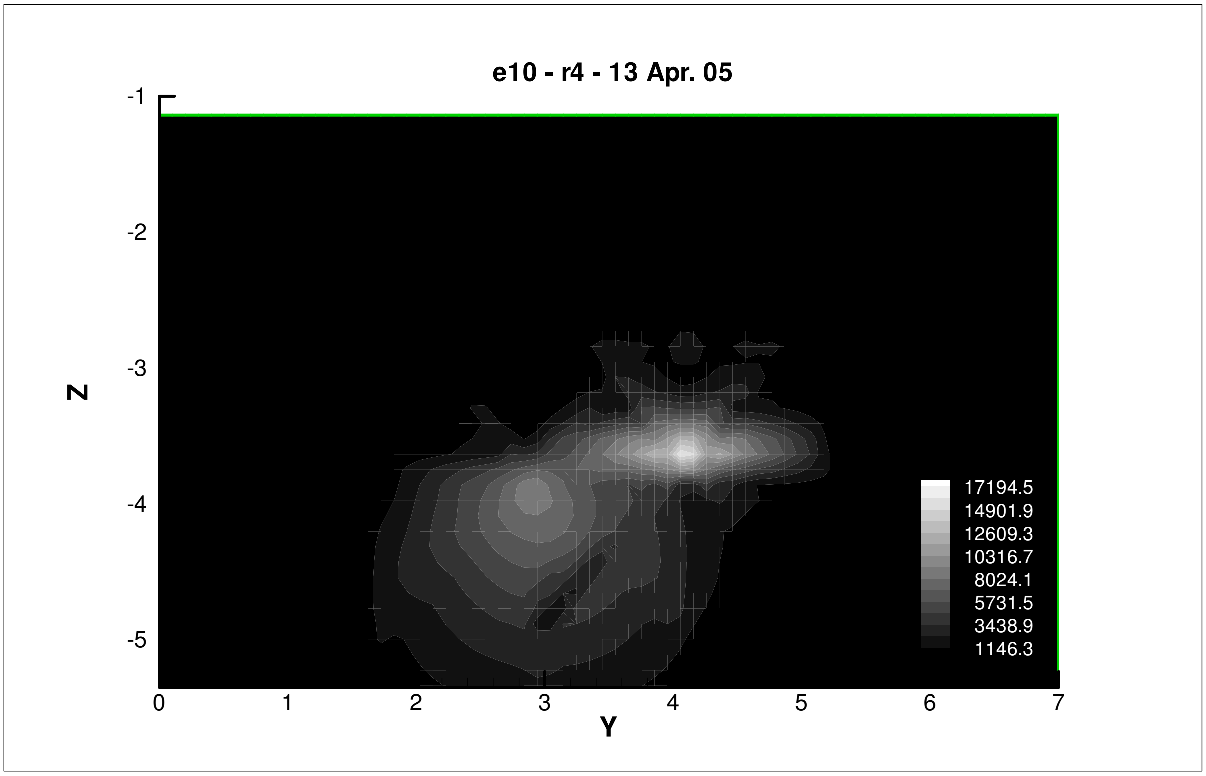


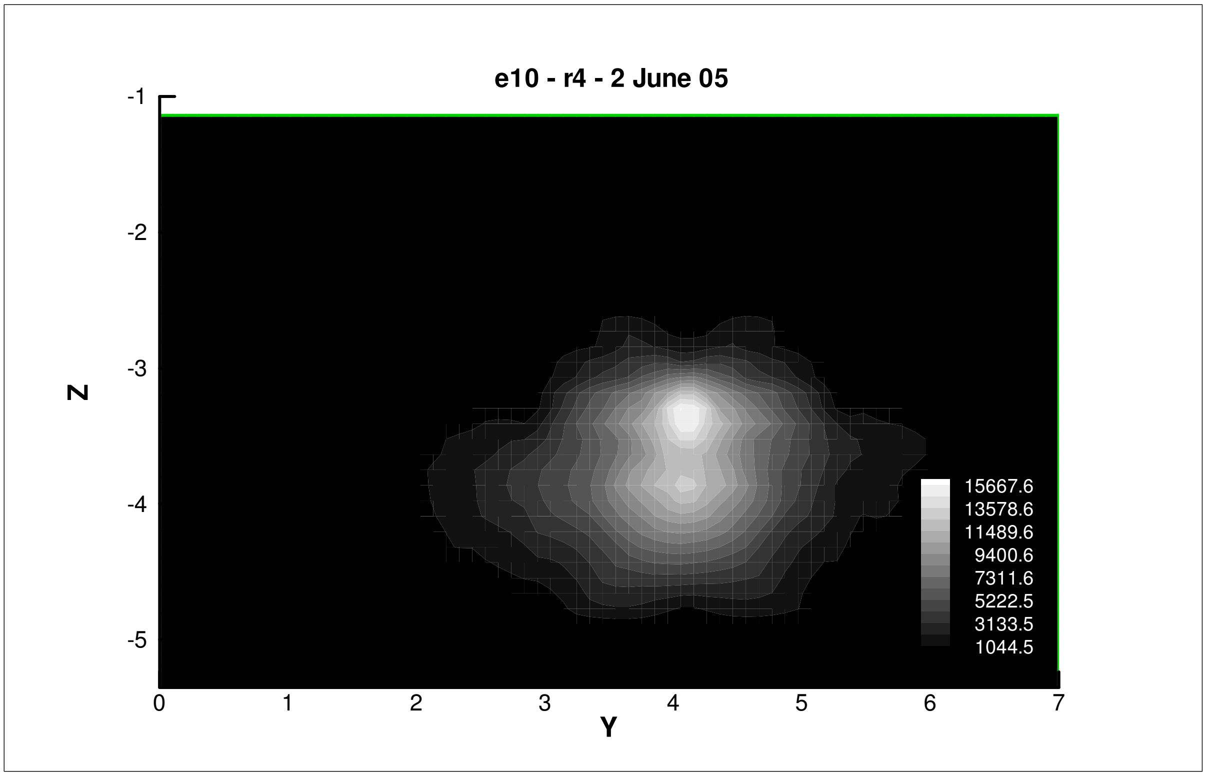


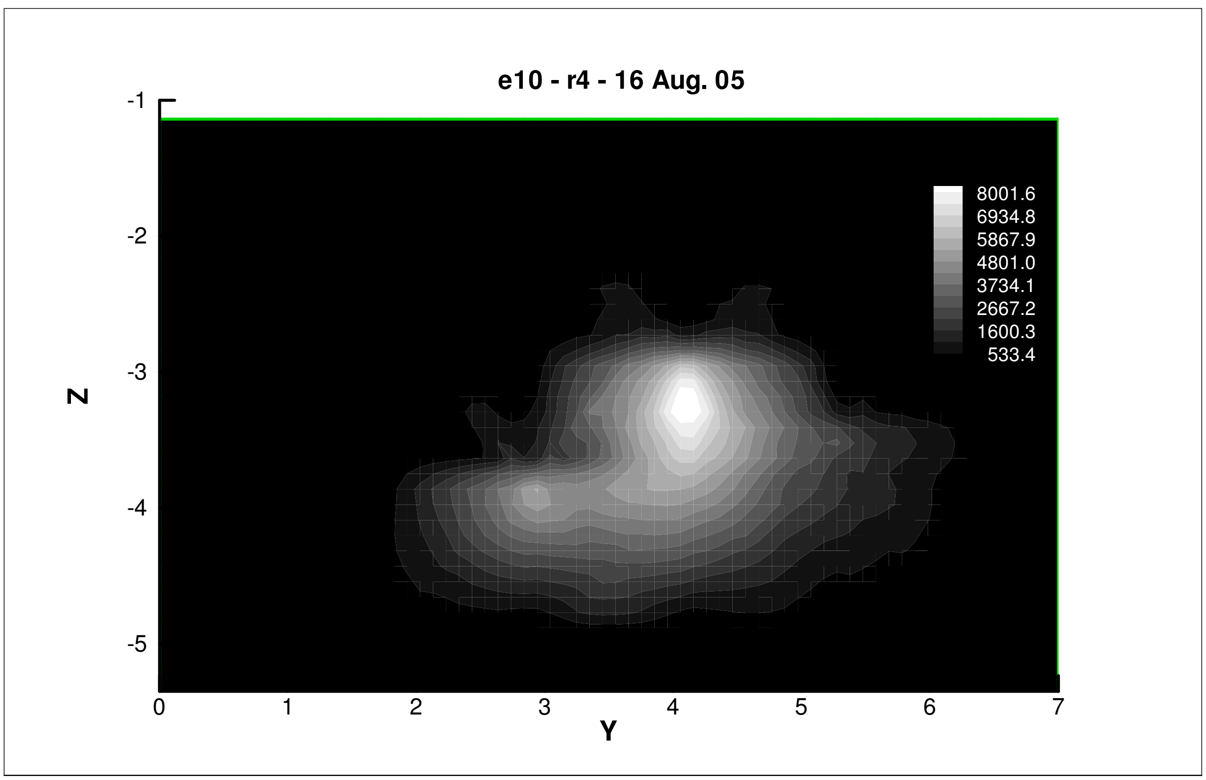

e10 - r3 - 6 June 05
-1
-2
-3
-4
-5
Z
0
1
2
3
4
5
6
7
Y
300.9
260.8
220.6
180.5
140.4
100.3
60.2
20.1


e10 - r3 - 16 Aug. 05
-1
-2
-3
-4
-5
Z
0
1
2
3
4
5
6
7
Y
302.4
262.1
221.8
181.4
141.1
100.8
60.5
20.2

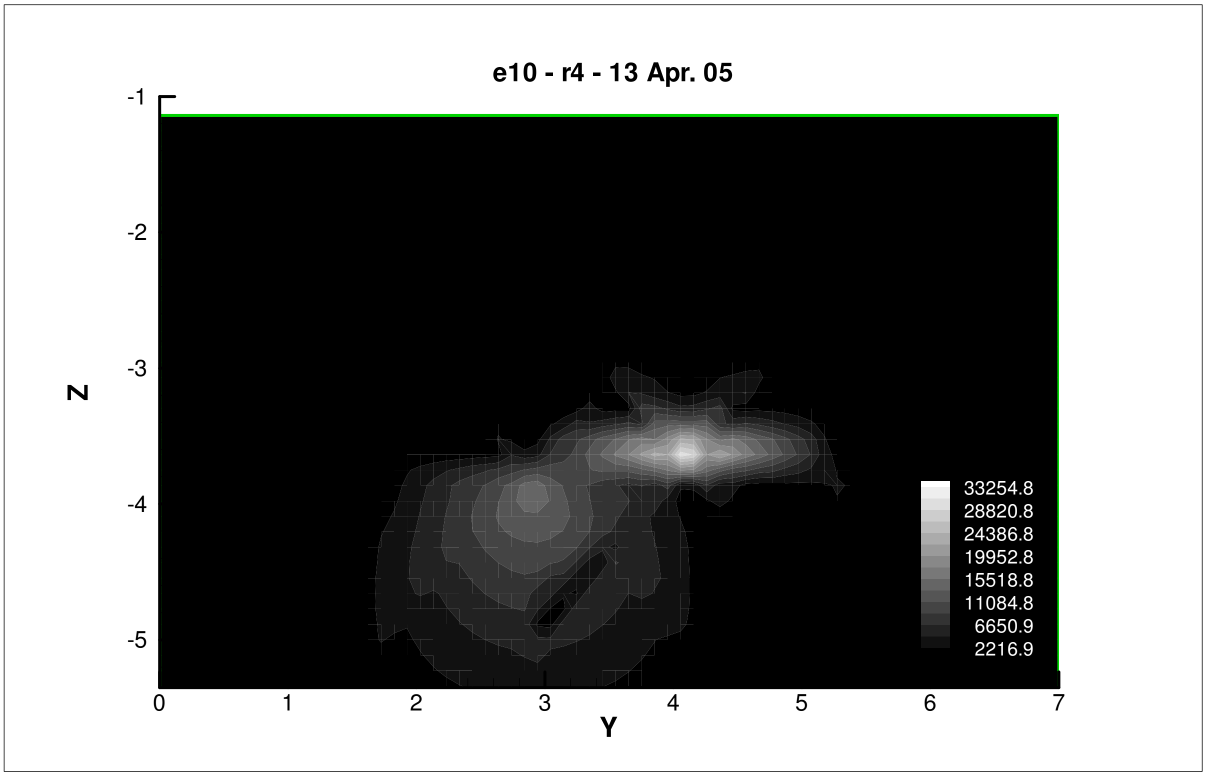
B. BTEX 2. E10 c. Row 4 1. Benzene (µg/l)

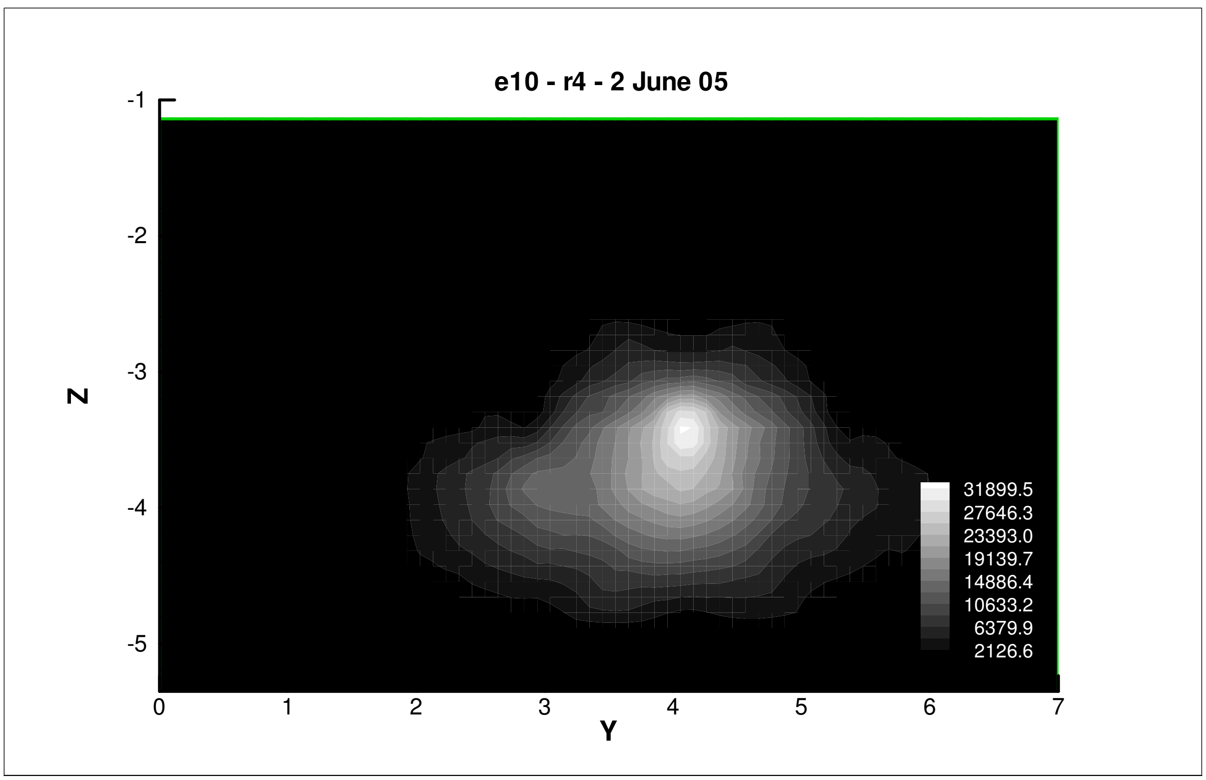


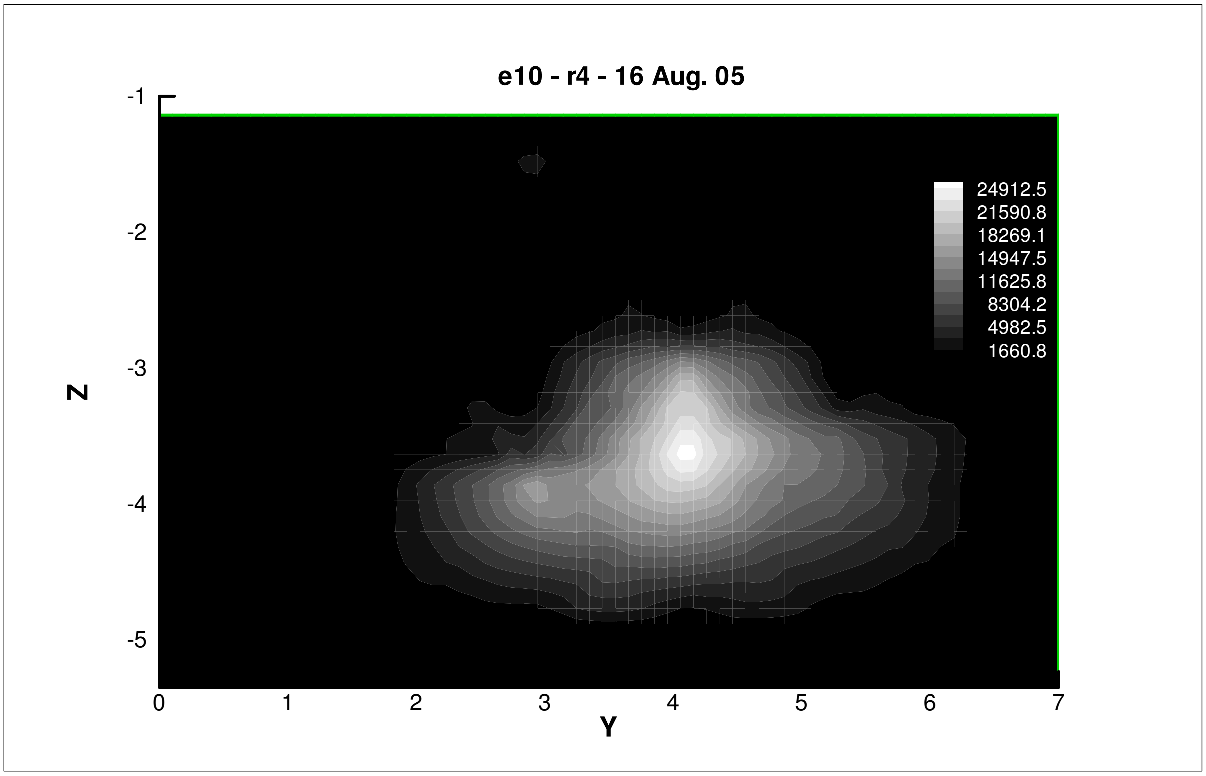

e10 - r4 - 2 June 05
-1
-2
-3
-4
-5
Z
0
1
2
3
4
5
6
7
Y
15667.6
13578.6
11489.6
9400.6
7311.6
5222.5
3133.5
1044.5


e10 - r4 - 16 Aug. 05
-1
-2
-3
-4
-5
Z
0
1
2
3
4
5
6
7
Y
8001.6
6934.8
5867.9
4801.0
3734.1
2667.2
1600.3
533.4

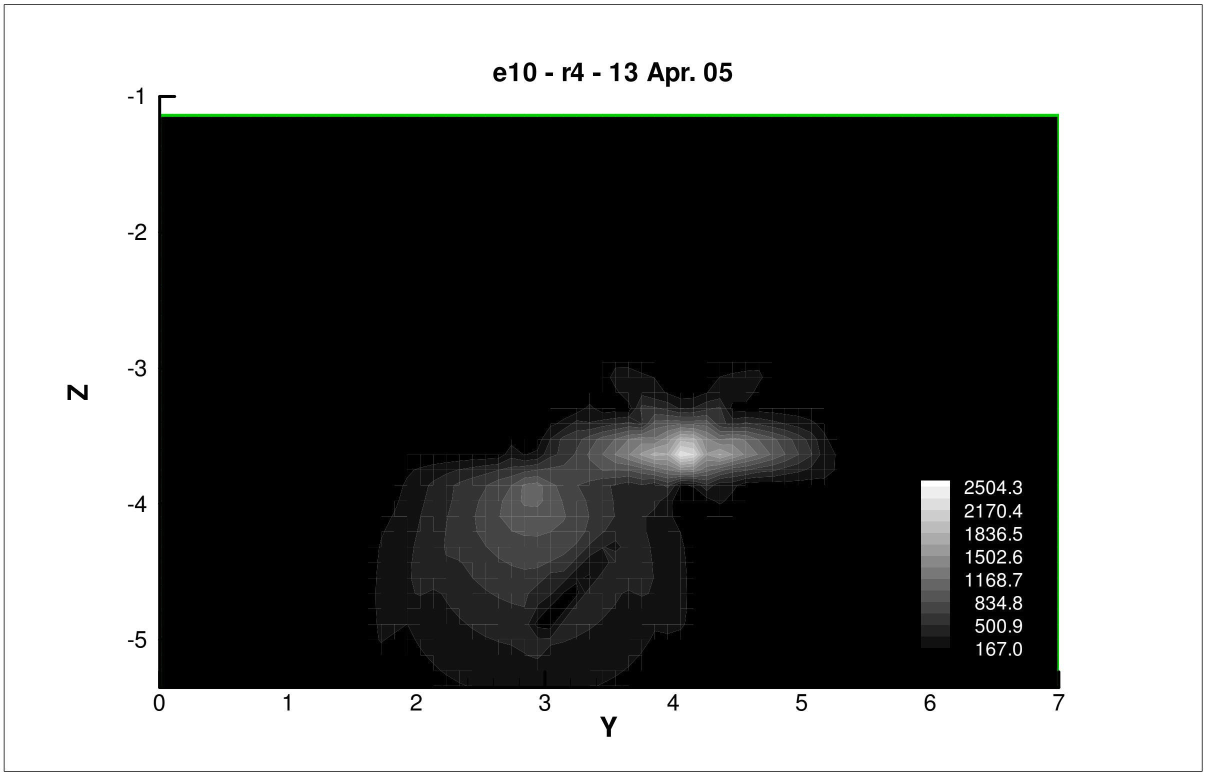
B. BTEX 2. E10 c. Row 4 2. Toluene (µg/l)

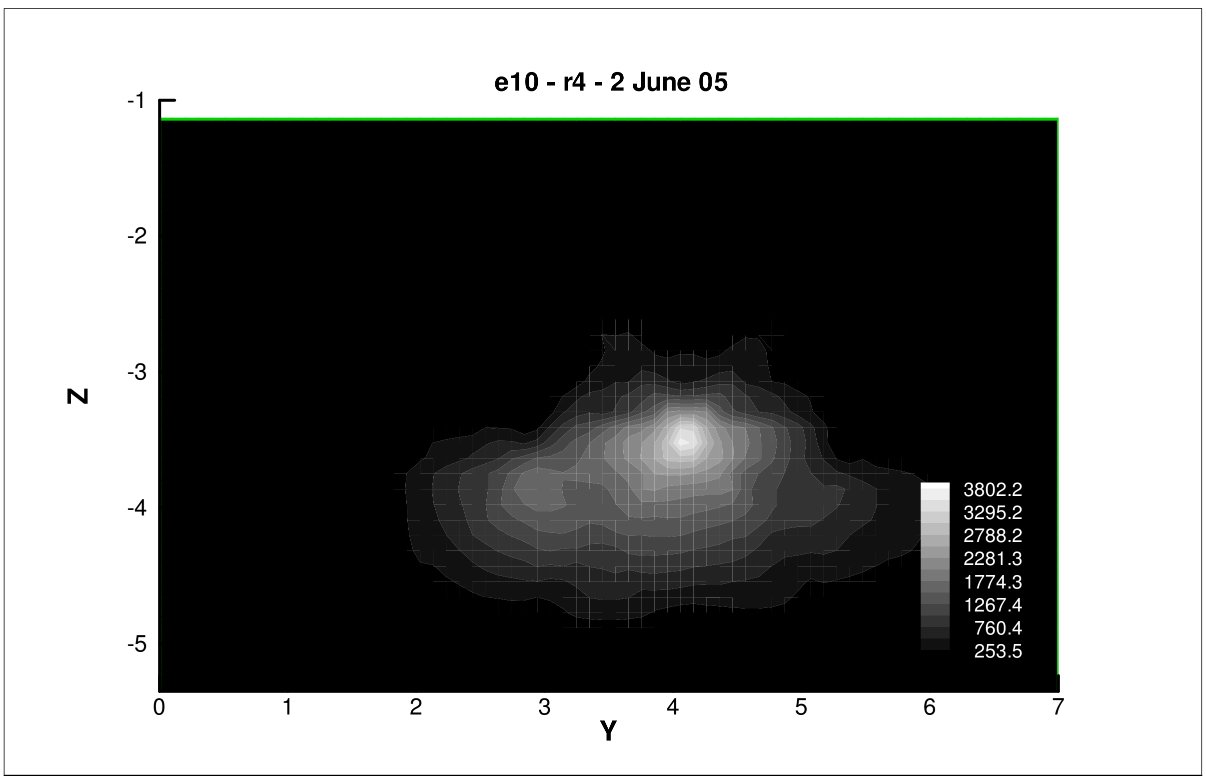


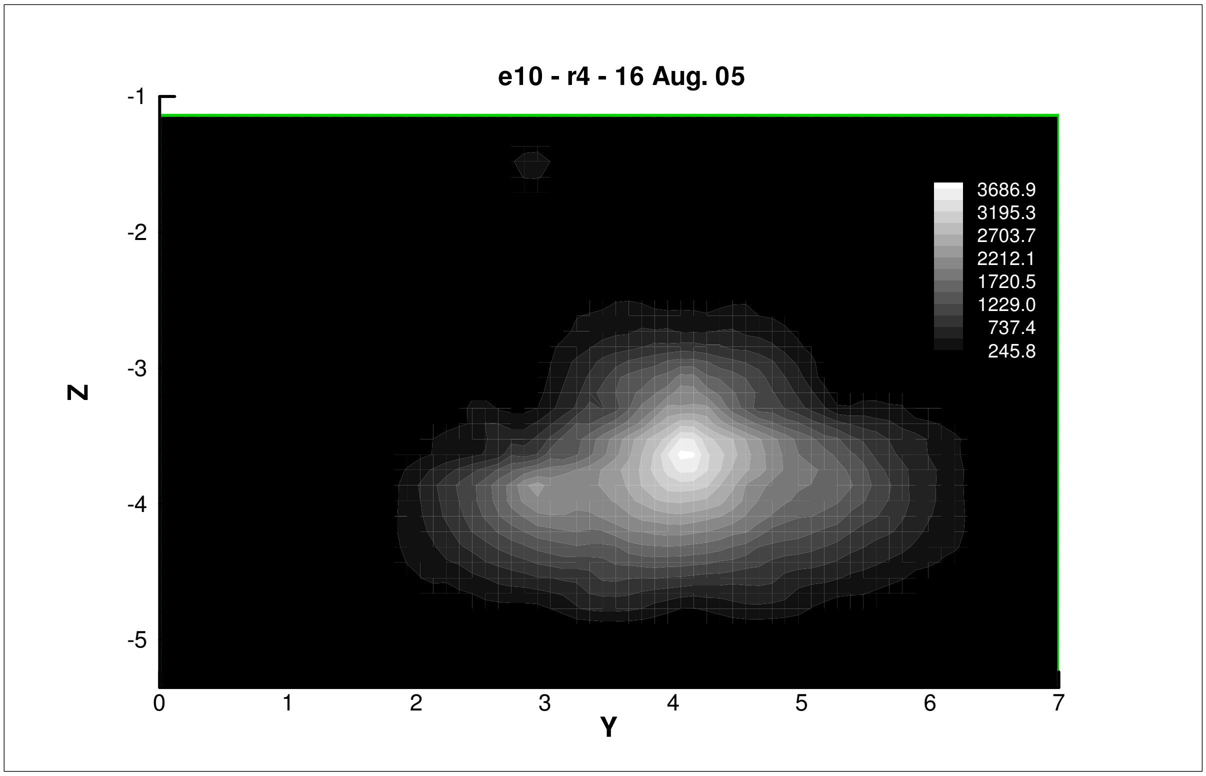




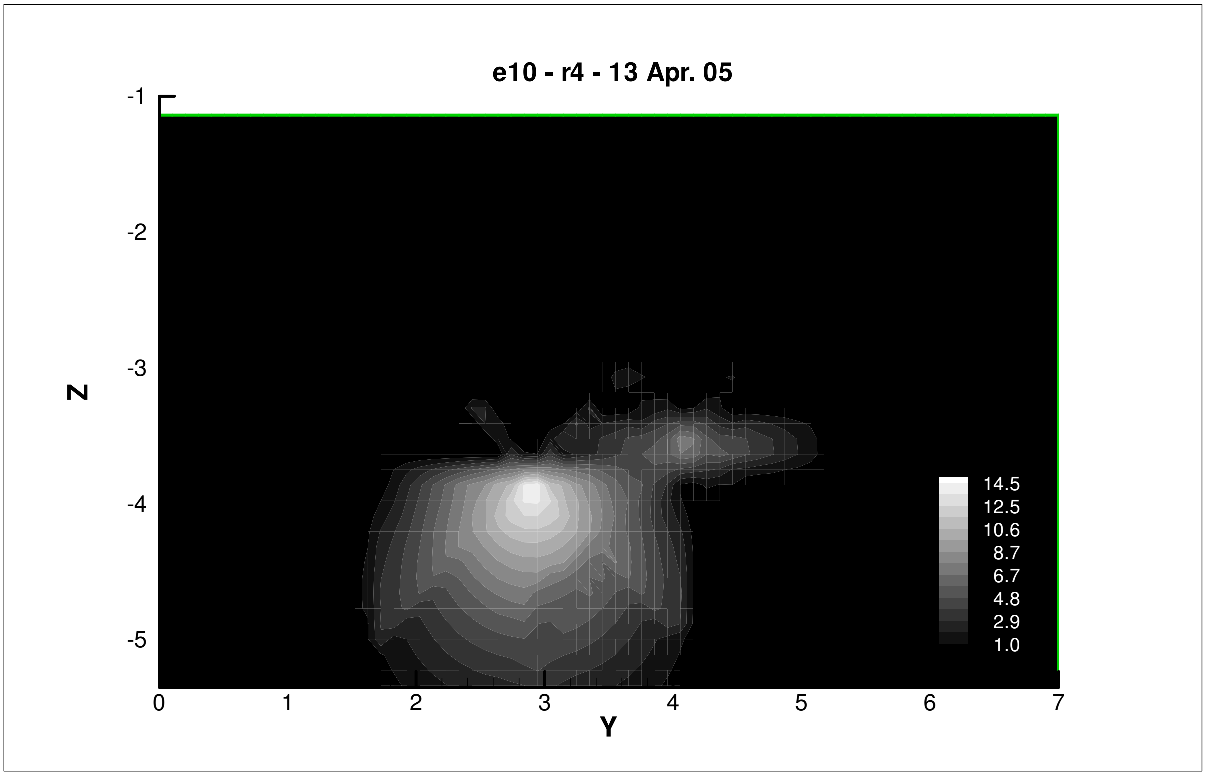
B. BTEX 2. E10 c. Row 4 3. O-Xylene (µg/l)

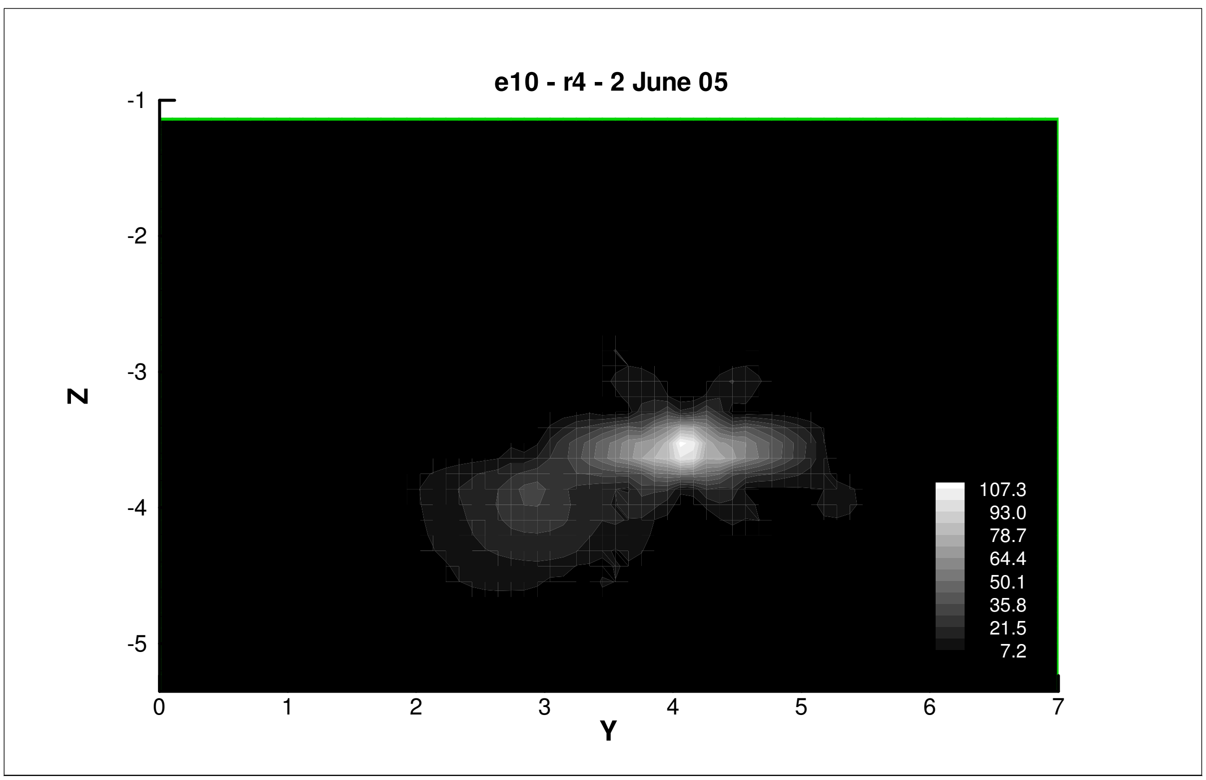

e10 - r4 - 13 Apr. 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
2504.3
2170.4
1836.5
1502.6
1168.7
834.8
500.9
167.0

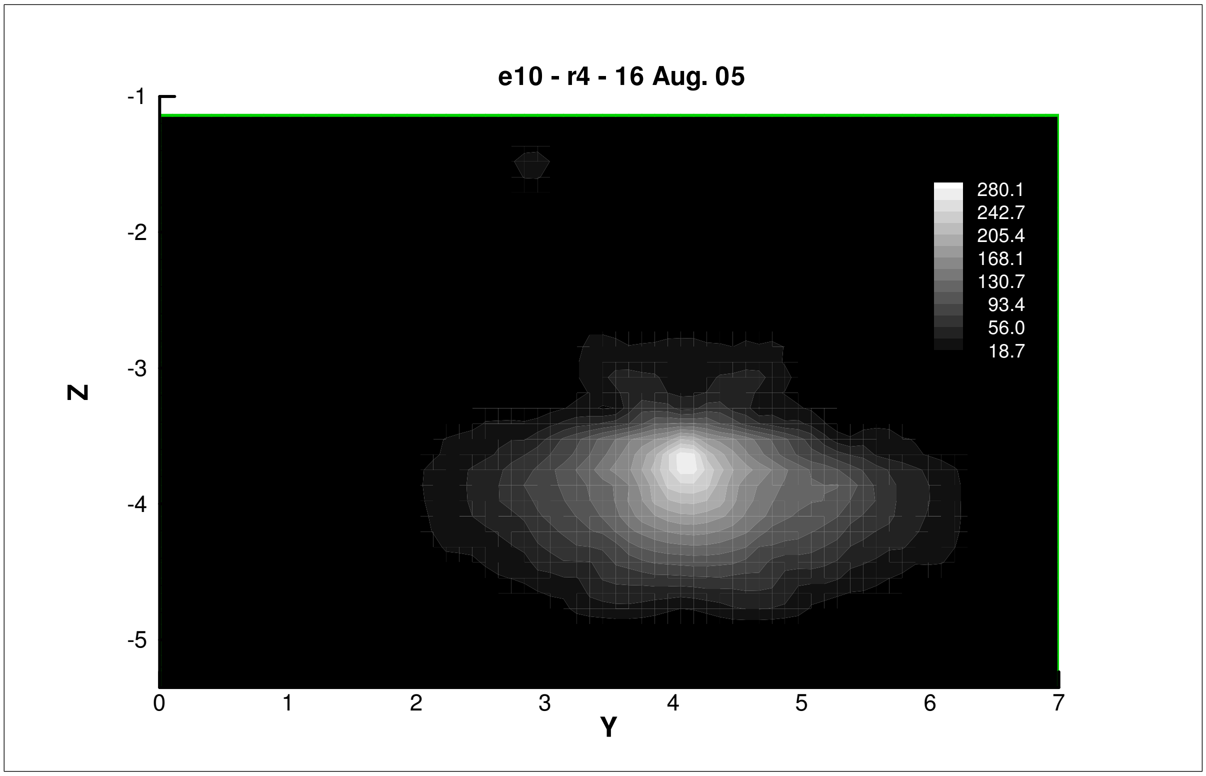

e10 - r4 - 2 June 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
3802.2
3295.2
2788.2
2281.3
1774.3
1267.4
760.4
253.5



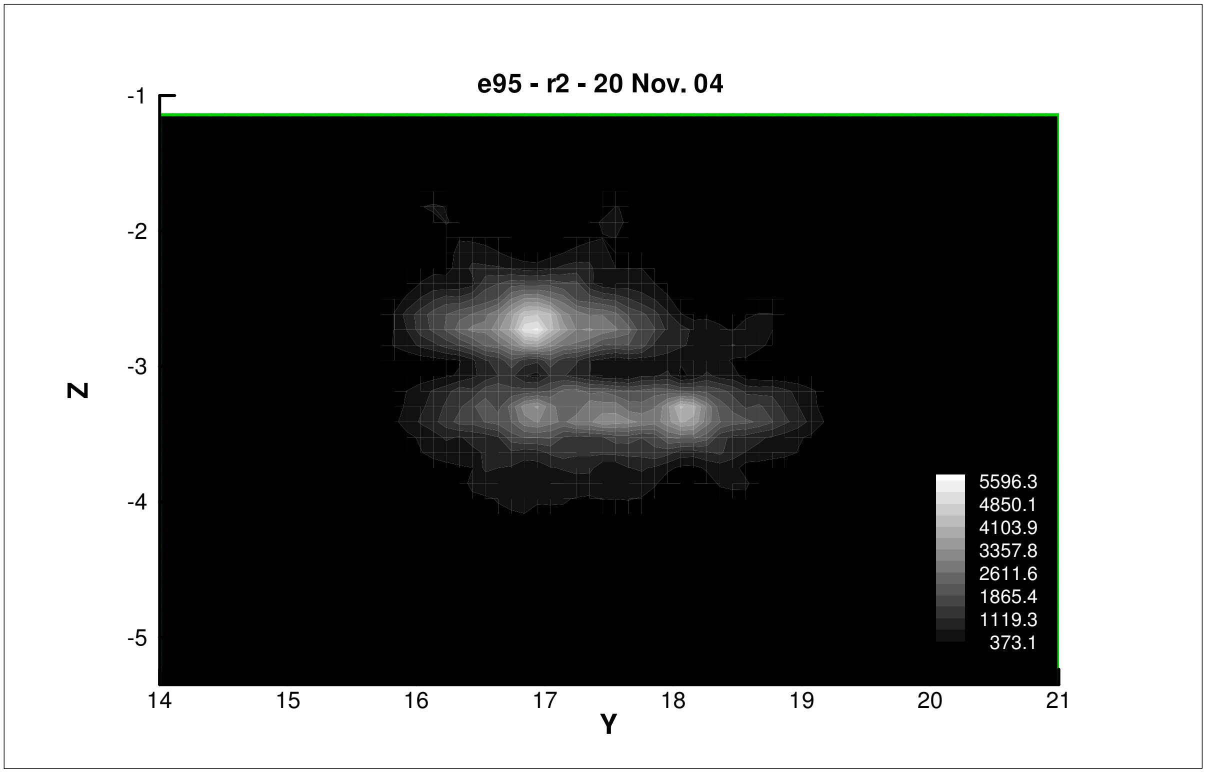
B. BTEX 2. E10 c. Row 4 4. Tri-Methyl Benzene (µg/l)

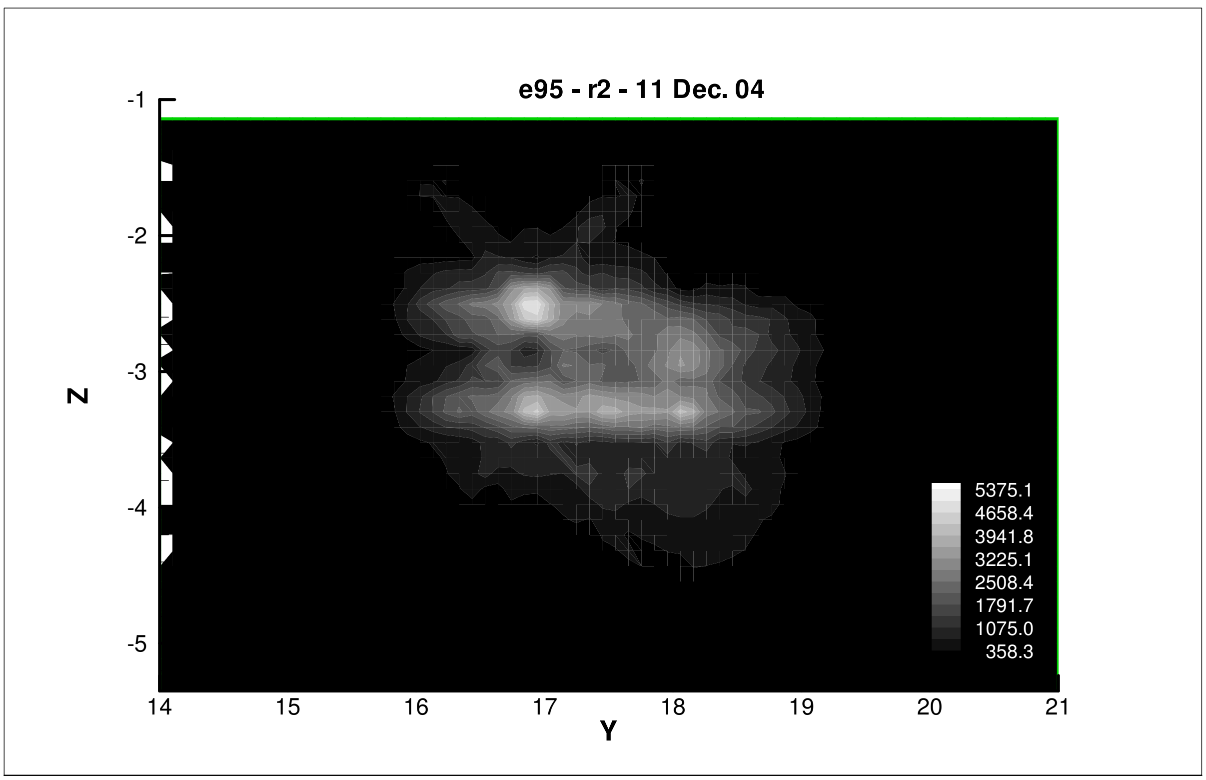

e10 - r4 - 13 Apr. 05
-1
-2
-3
-4
-5
Z
0
1
2
3
4
5
6
7
Y
14.5
12.5
10.6
8.7
6.7
4.8
2.9
1.0

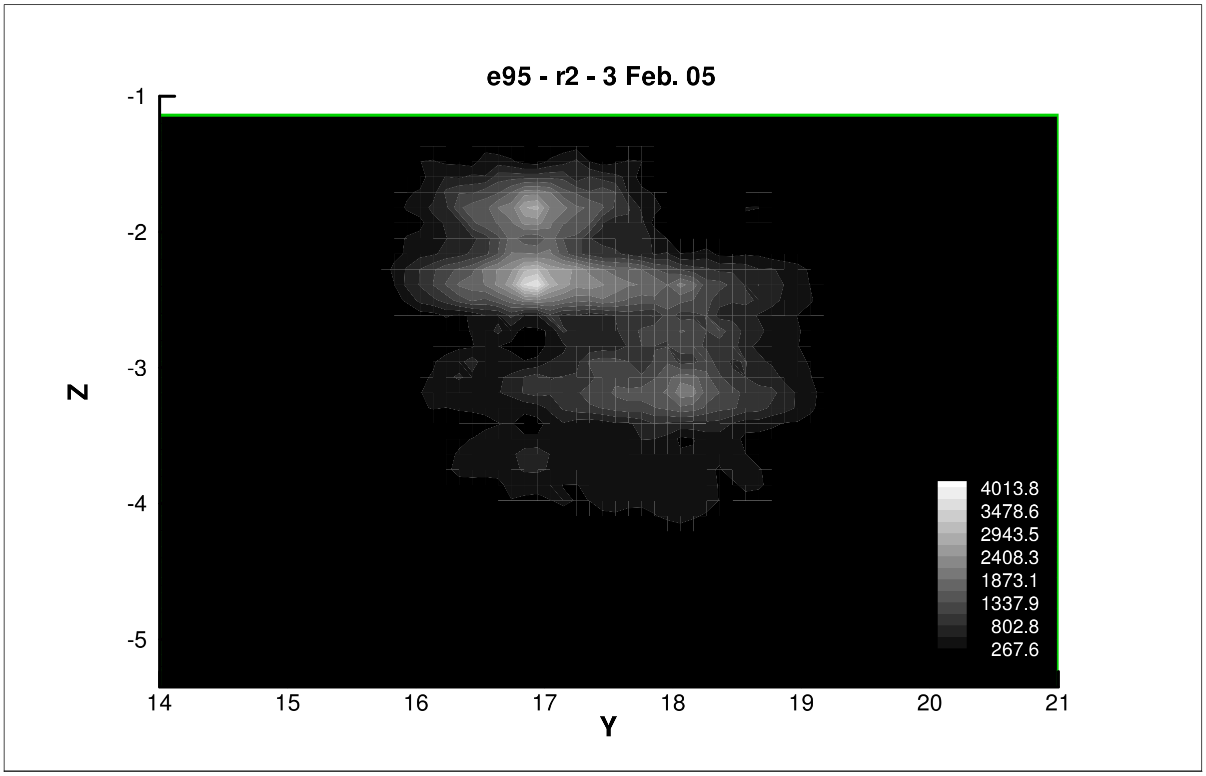

e10 - r4 - 2 June 05
-1
-2
-3
-4
-5
Z
0
1
2
3
4
5
6
7
Y
107.3
93.0
78.7
64.4
50.1
35.8
21.5
7.2

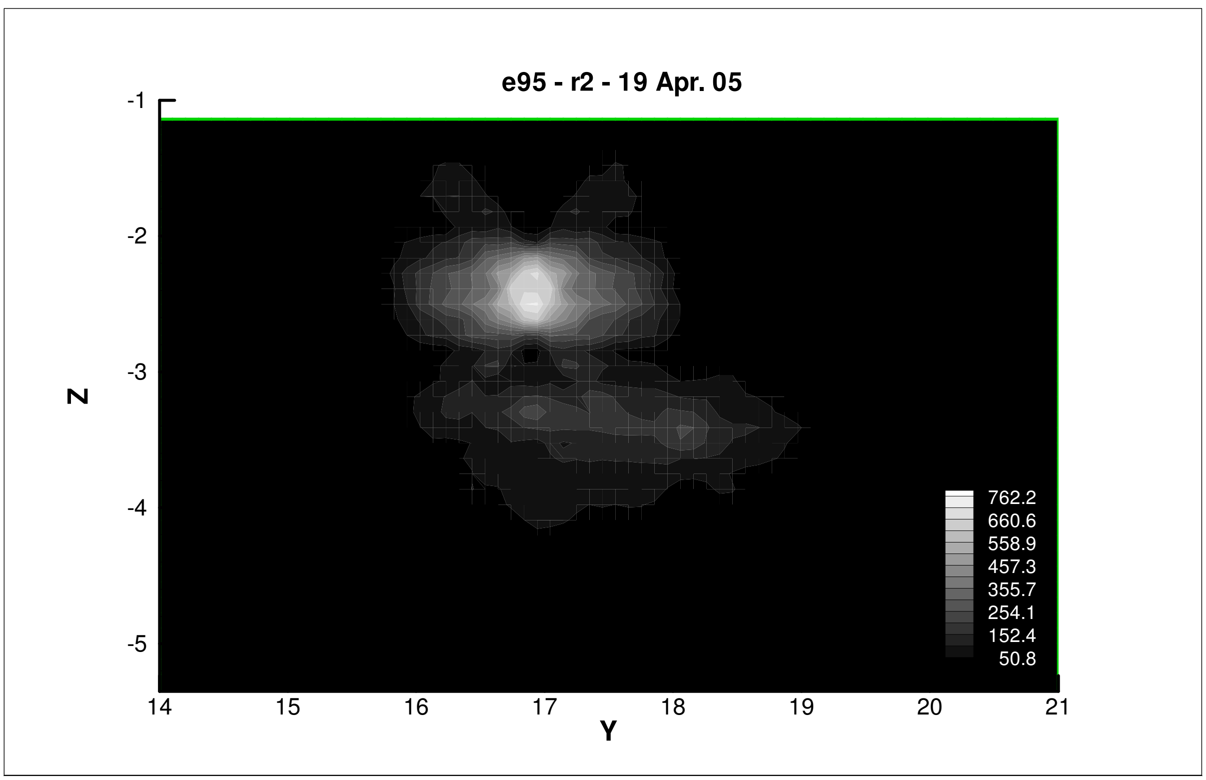


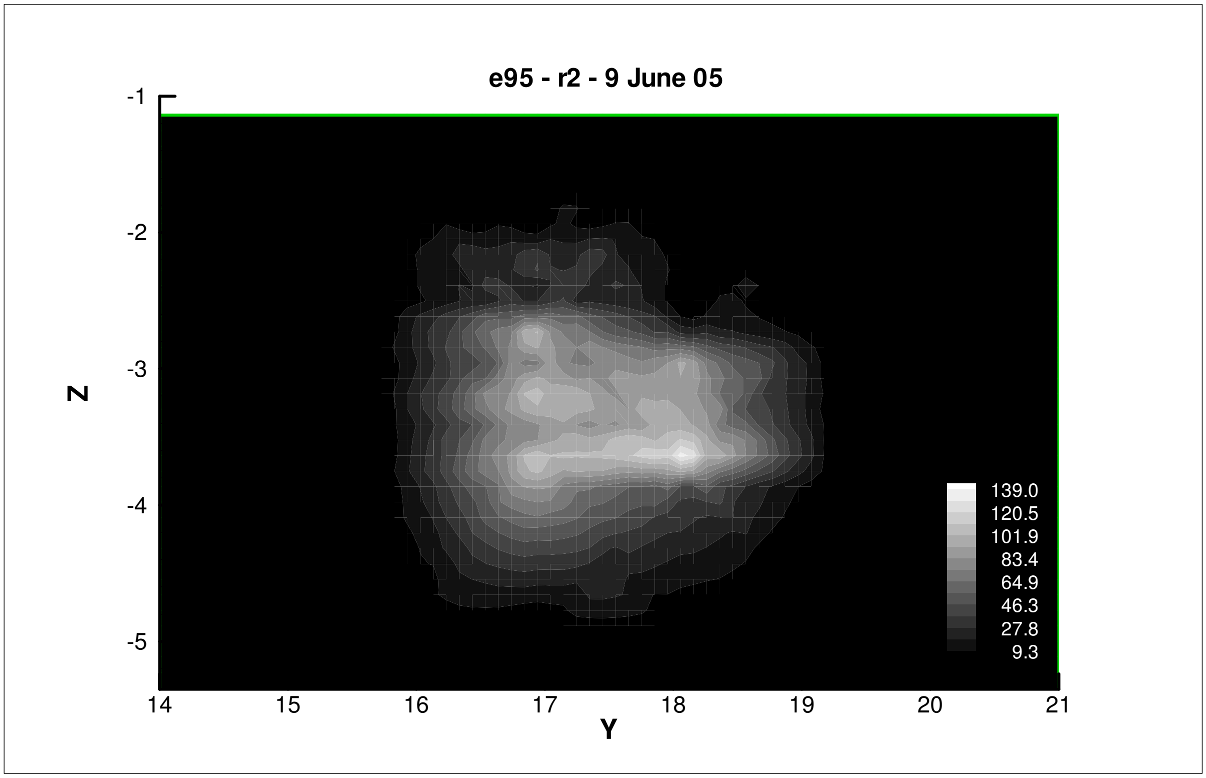
B. BTEX 3. E95 a. Row 2 1. Benzene (µg/l)


e95 - r2 - 20 Nov. 04
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
5596.3
4850.1
4103.9
3357.8
2611.6
1865.4
1119.3
373.1

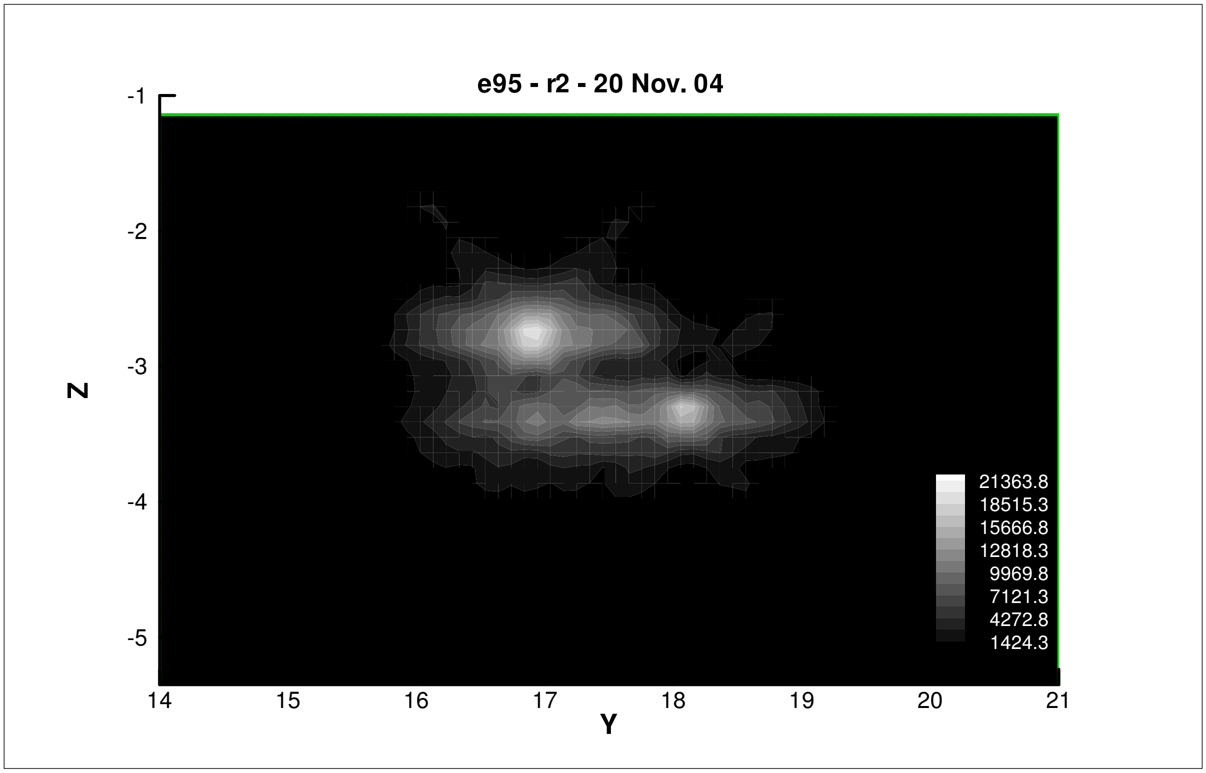

e95 - r2 - 11 Dec. 04
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
5375.1
4658.4
3941.8
3225.1
2508.4
1791.7
1075.0
358.3

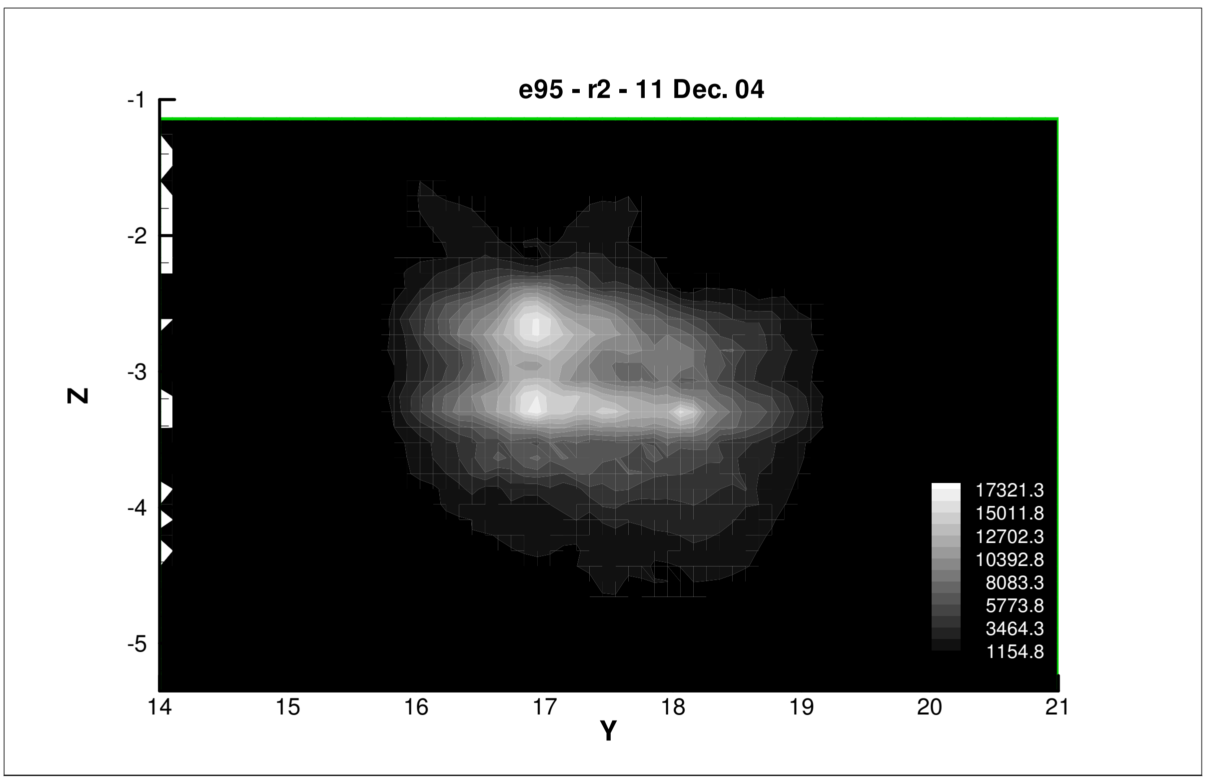

e95 - r2 - 3 Feb. 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
4013.8
3478.6
2943.5
2408.3
1873.1
1337.9
802.8
267.6

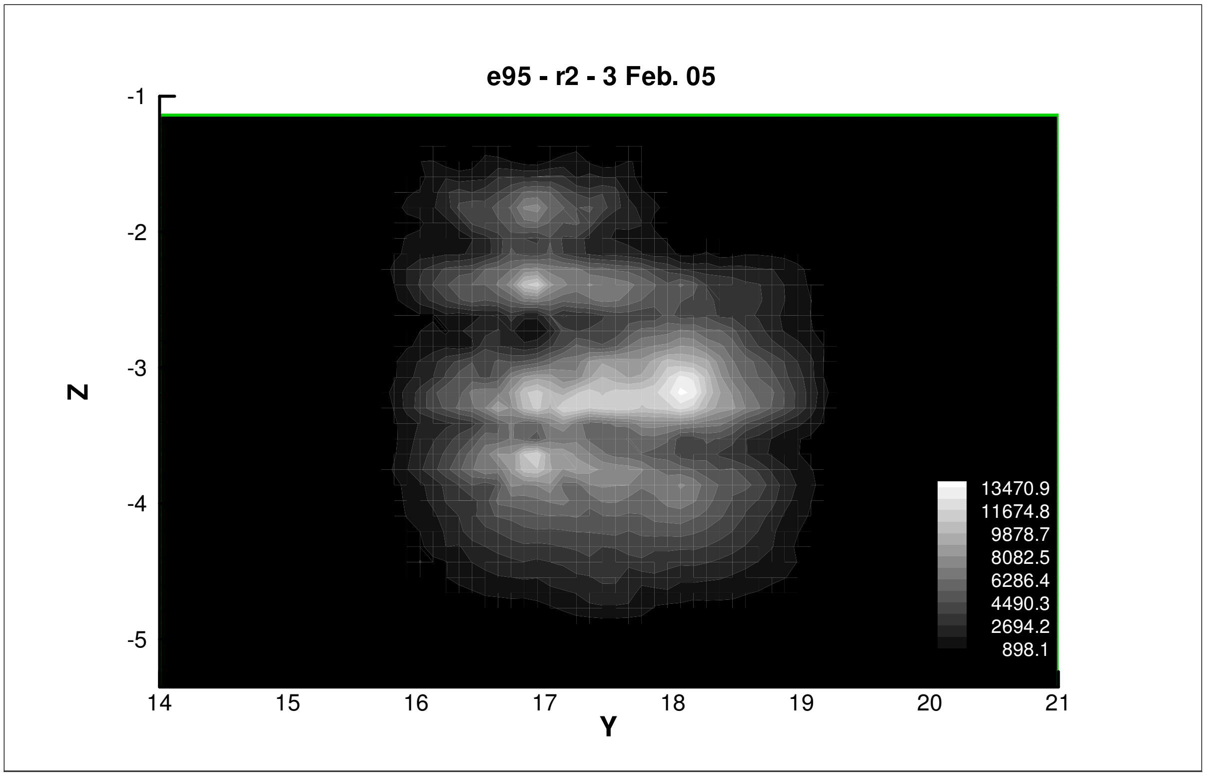

e95 - r2 - 19 Apr. 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
762.2
660.6
558.9
457.3
355.7
254.1
152.4
50.8

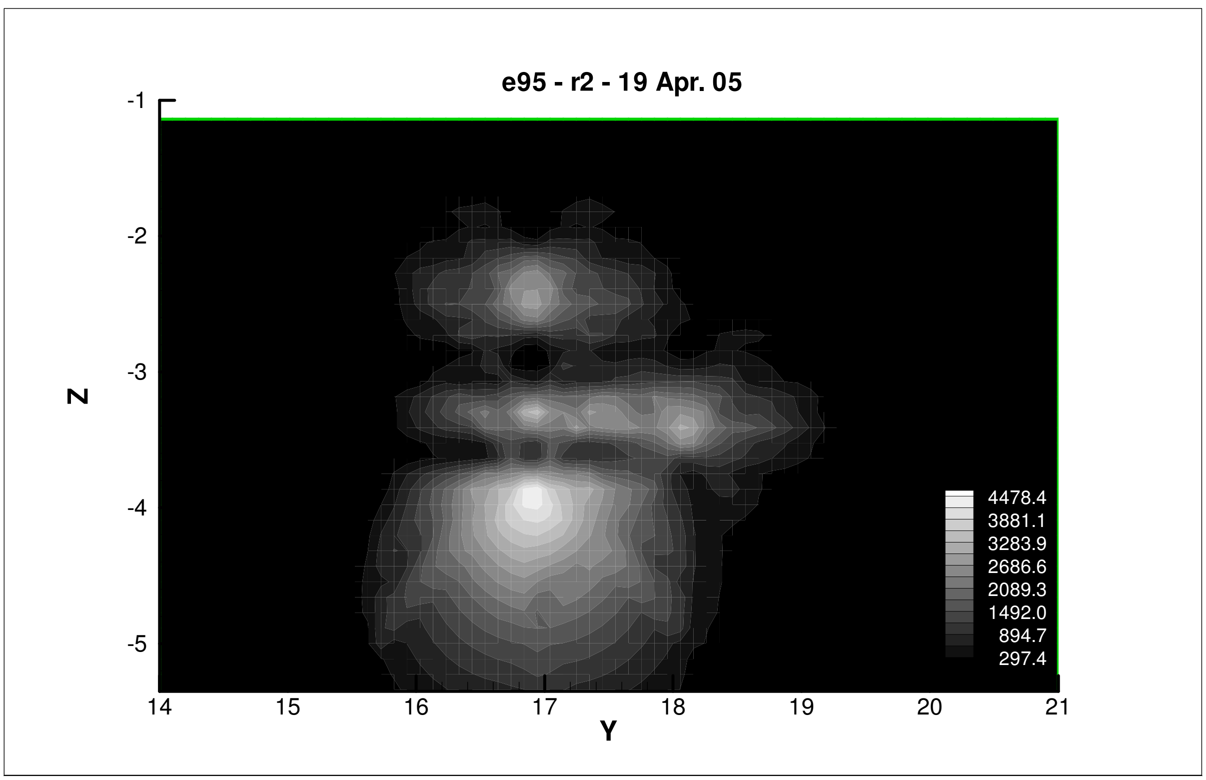


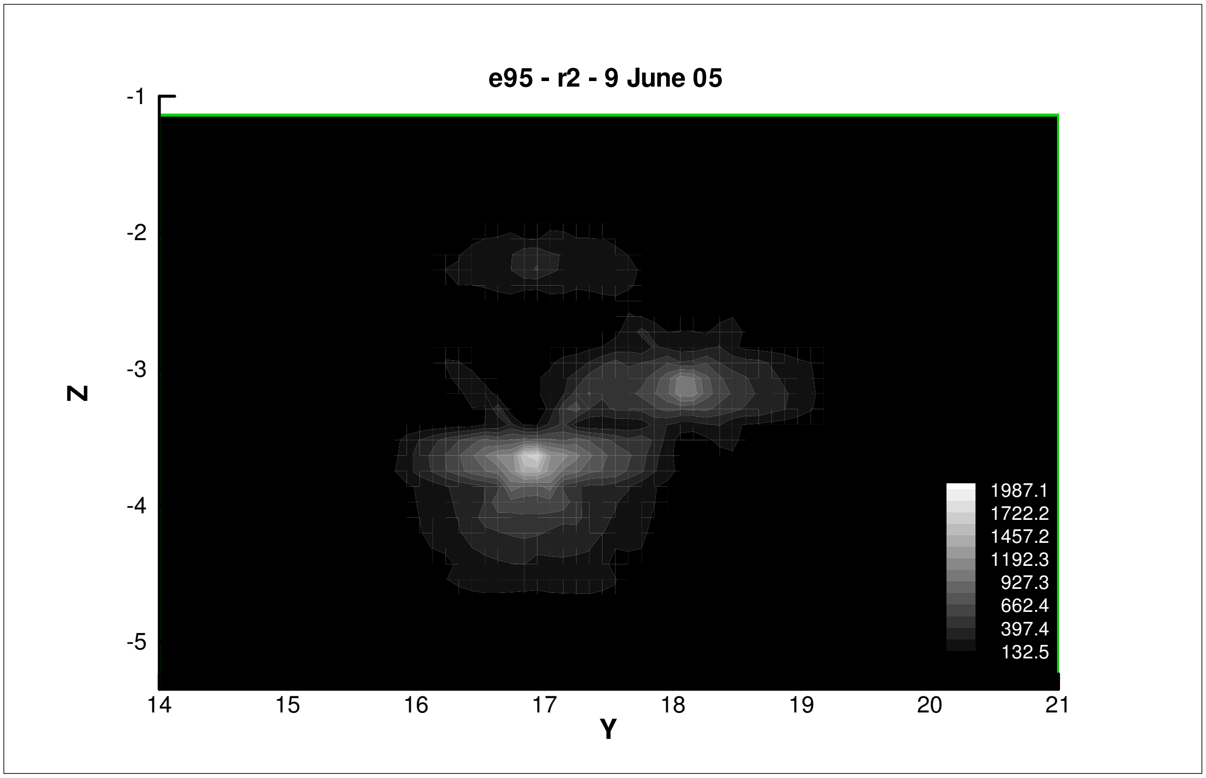
B. BTEX 3. E95 a. Row 2 2. Toluene (µg/l)


e95 - r2 - 20 Nov. 04
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
21363.8
18515.3
15666.8
12818.3
9969.8
7121.3
4272.8
1424.3

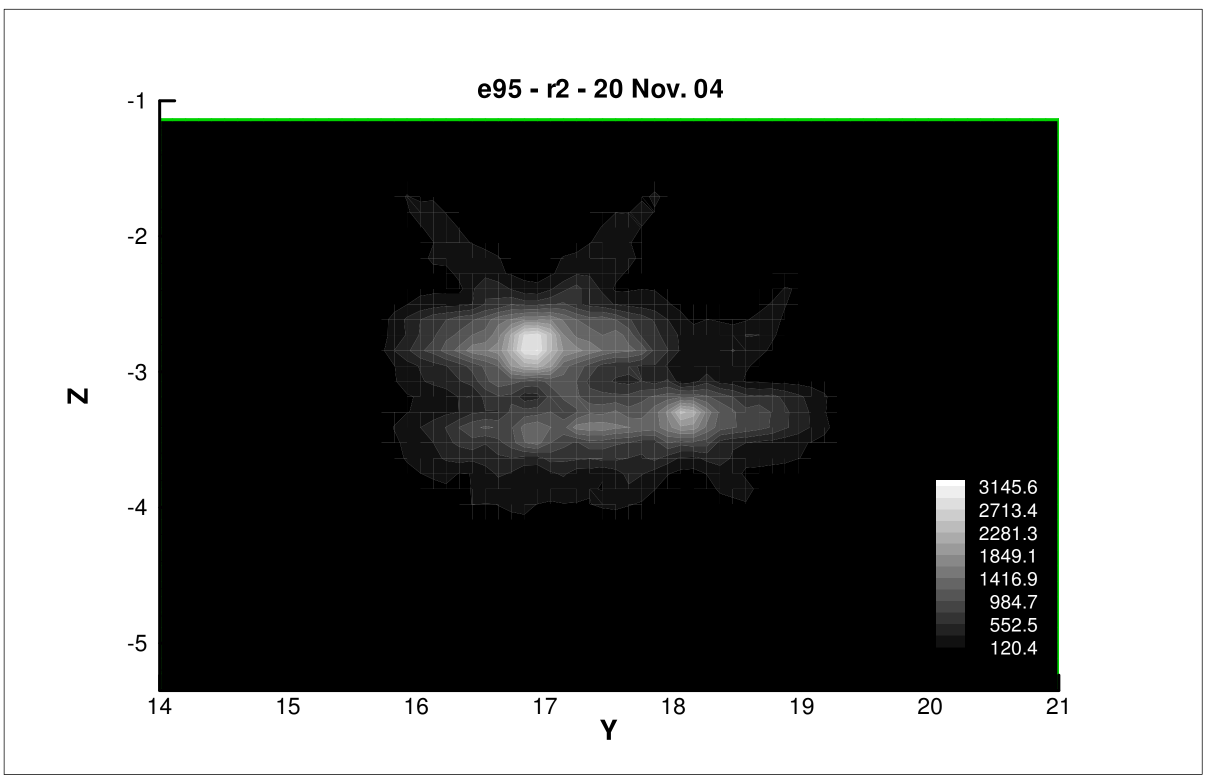

e95 - r2 - 11 Dec. 04
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
17321.3
15011.8
12702.3
10392.8
8083.3
5773.8
3464.3
1154.8

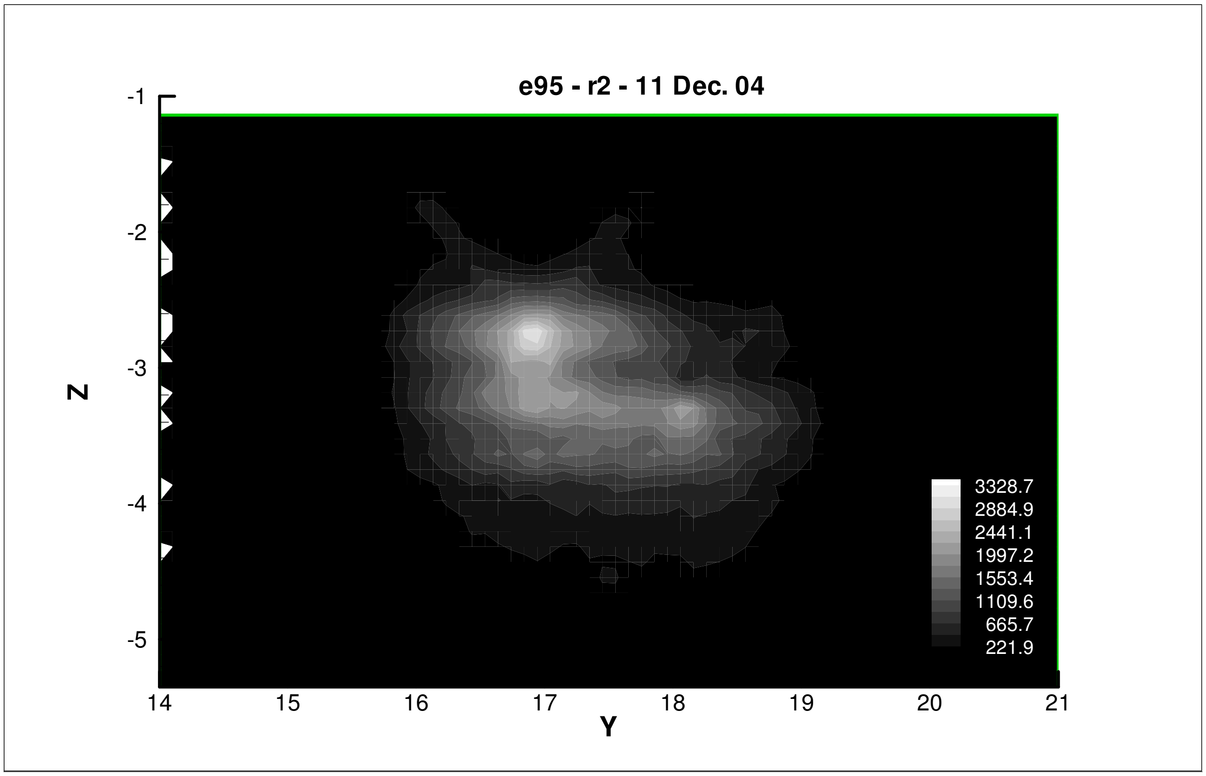

e95 - r2 - 3 Feb. 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
13470.9
11674.8
9878.7
8082.5
6286.4
4490.3
2694.2
898.1

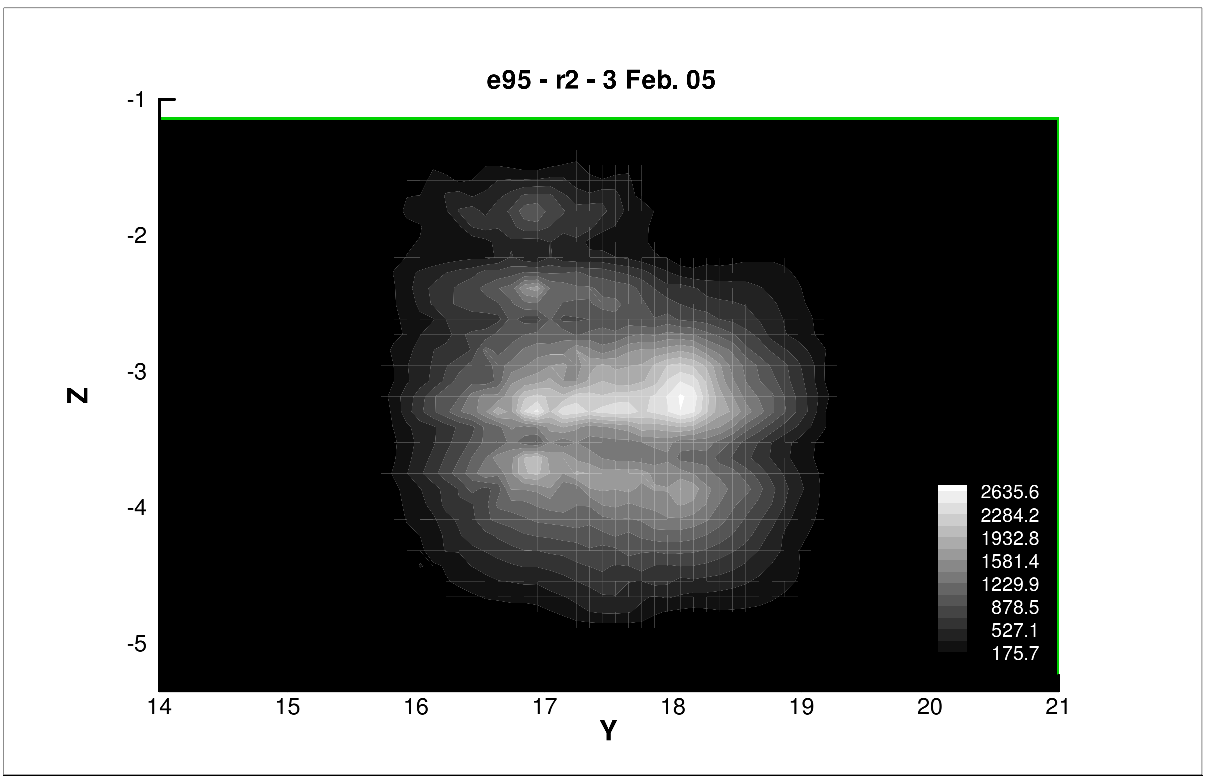

e95 - r2 - 19 Apr. 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
4478.4
3881.1
3283.9
2686.6
2089.3
1492.0
894.7
297.4

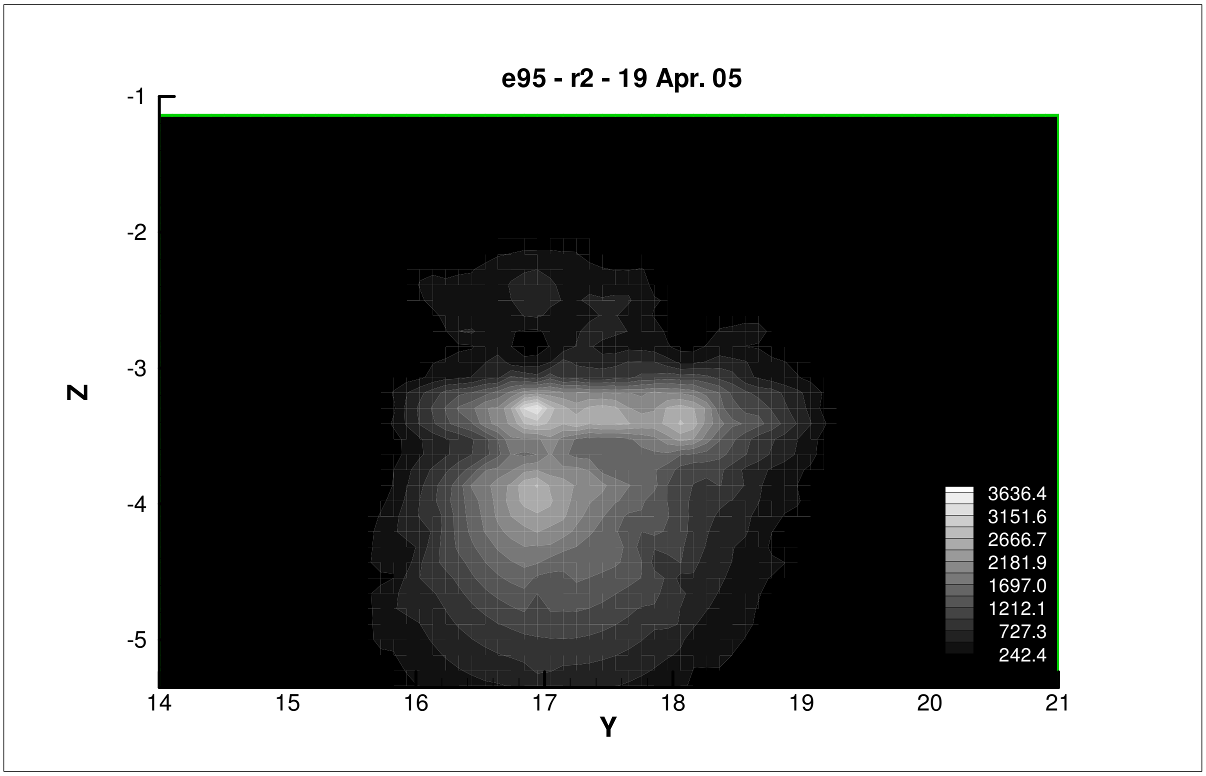


B. BTEX 3. E95 a. Row 2 3. O-Xylene (µg/l)

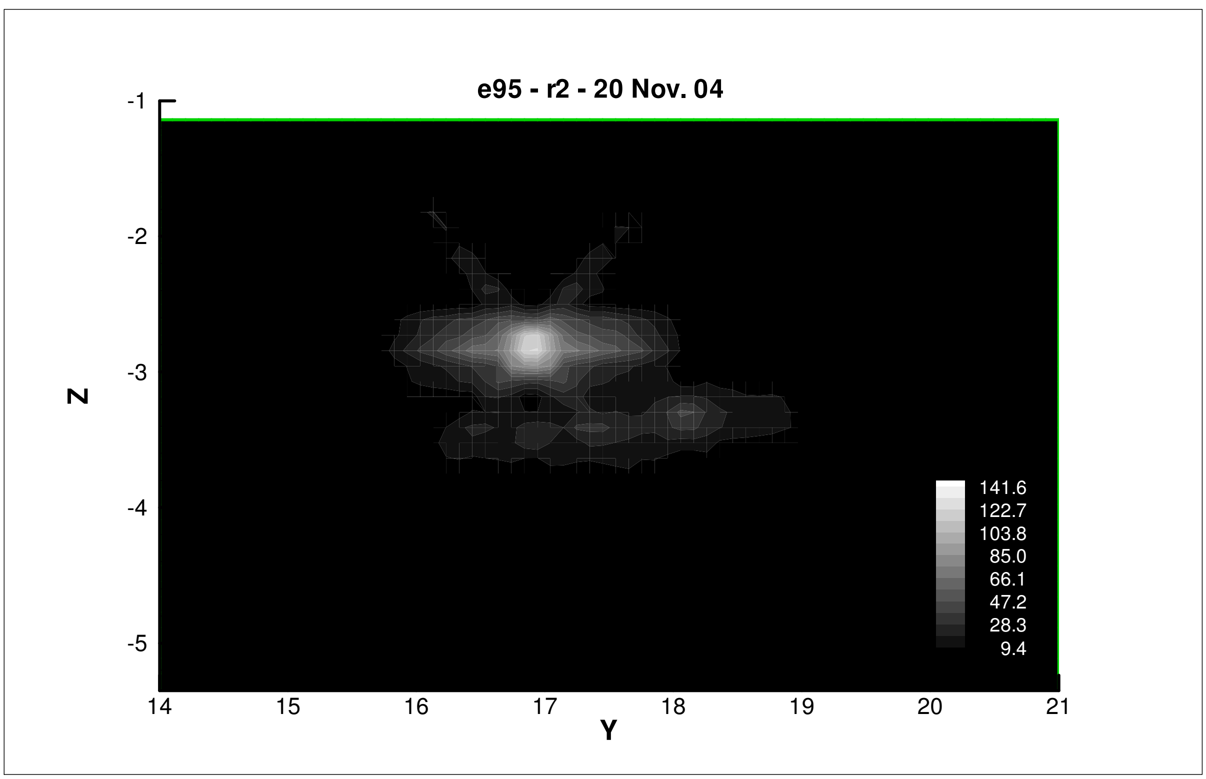


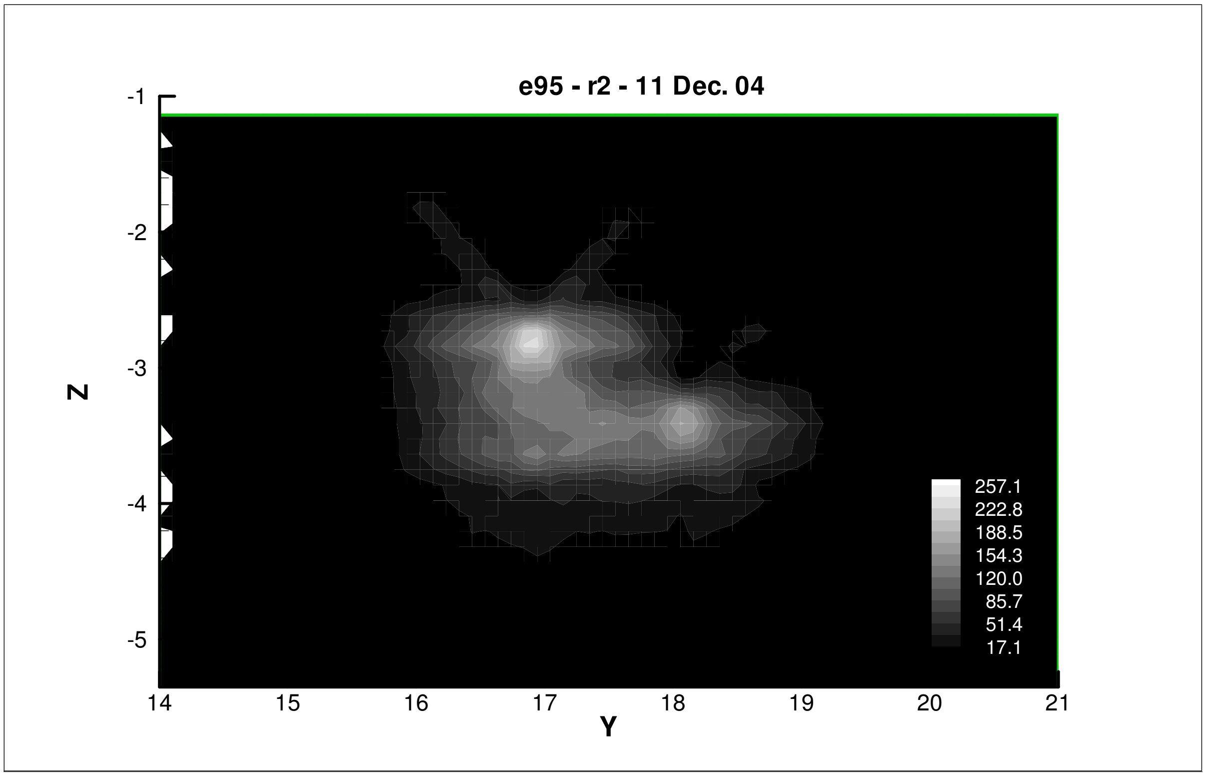

e95 - r2 - 11 Dec. 04
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
3328.7
2884.9
2441.1
1997.2
1553.4
1109.6
665.7
221.9

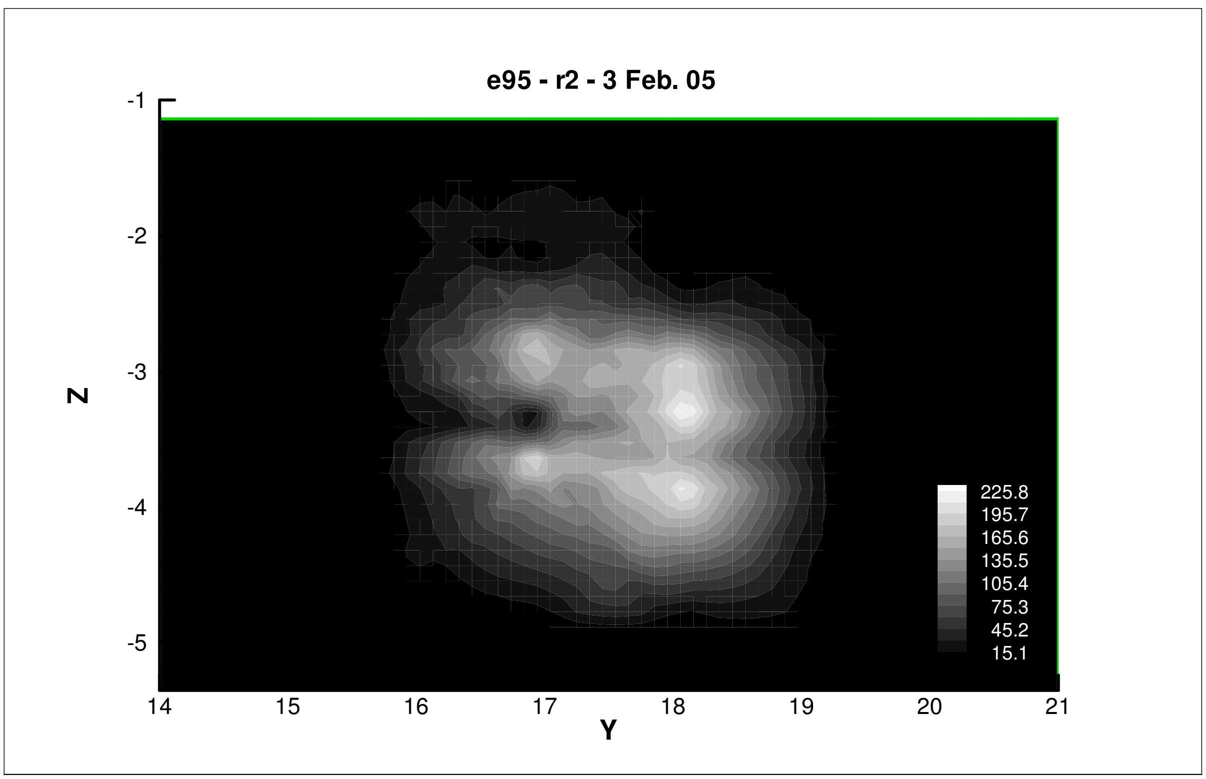

e95 - r2 - 3 Feb. 05
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
2635.6
2284.2
1932.8
1581.4
1229.9
878.5
527.1
175.7

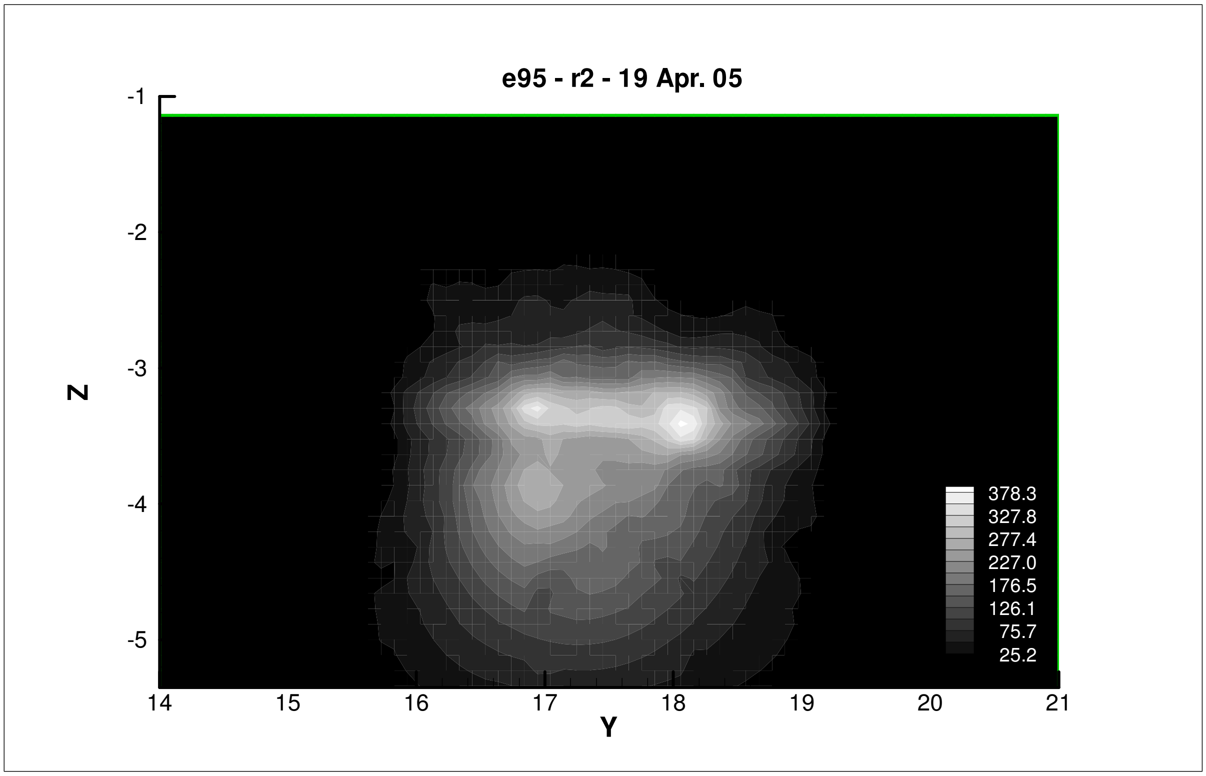


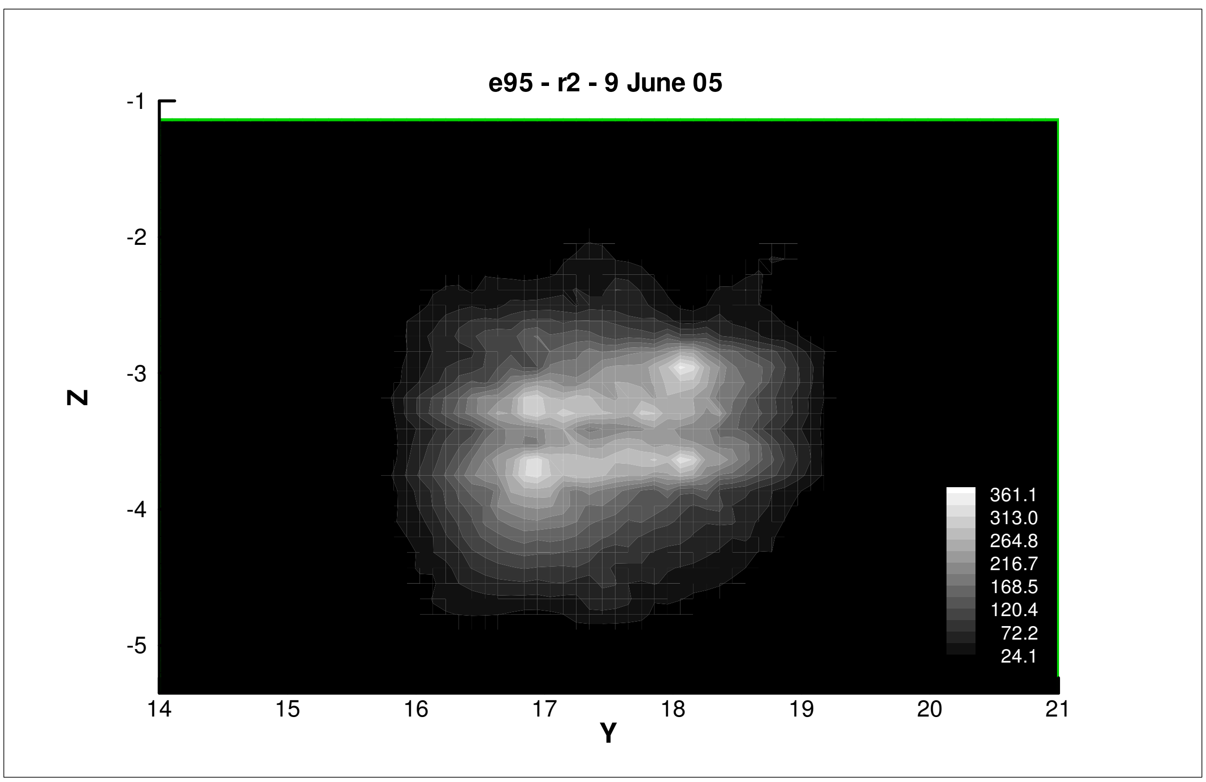
B. BTEX 3. E95 a. Row 2 4. Tri-Methyl Benzene (µg/l)



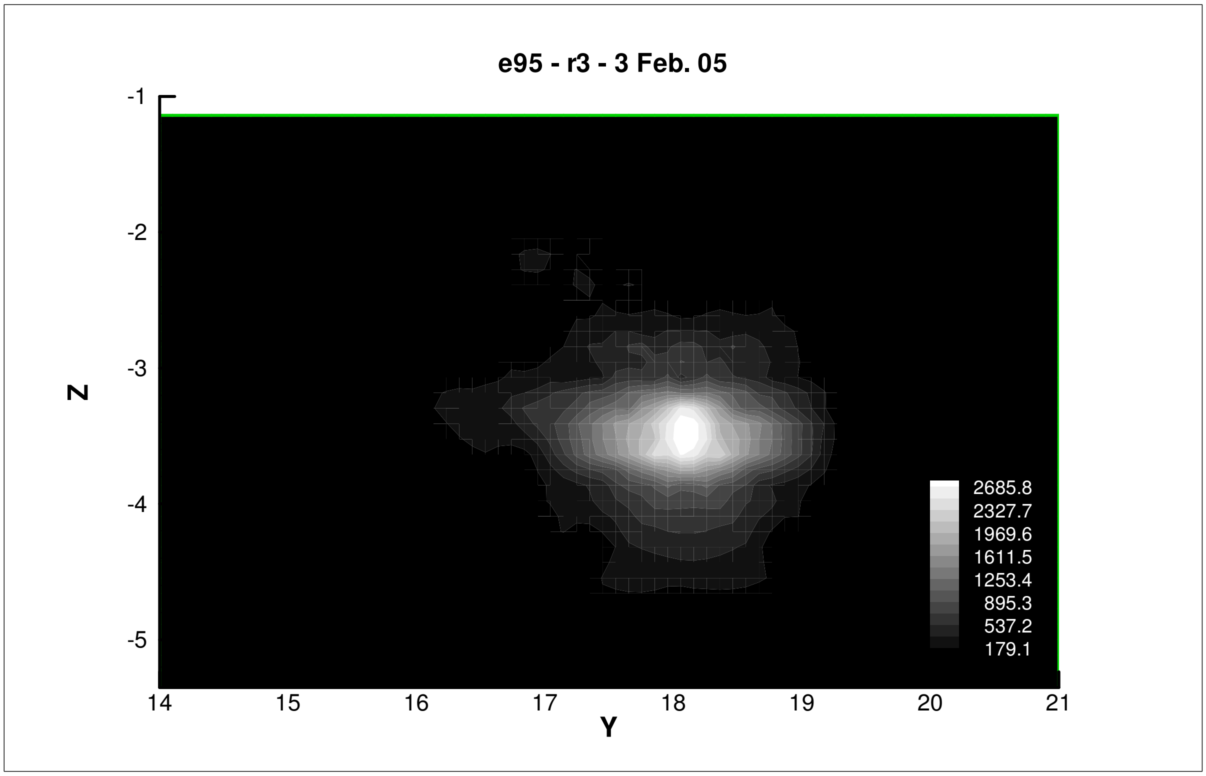

e95 - r2 - 11 Dec. 04
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
257.1
222.8
188.5
154.3
120.0
85.7
51.4
17.1

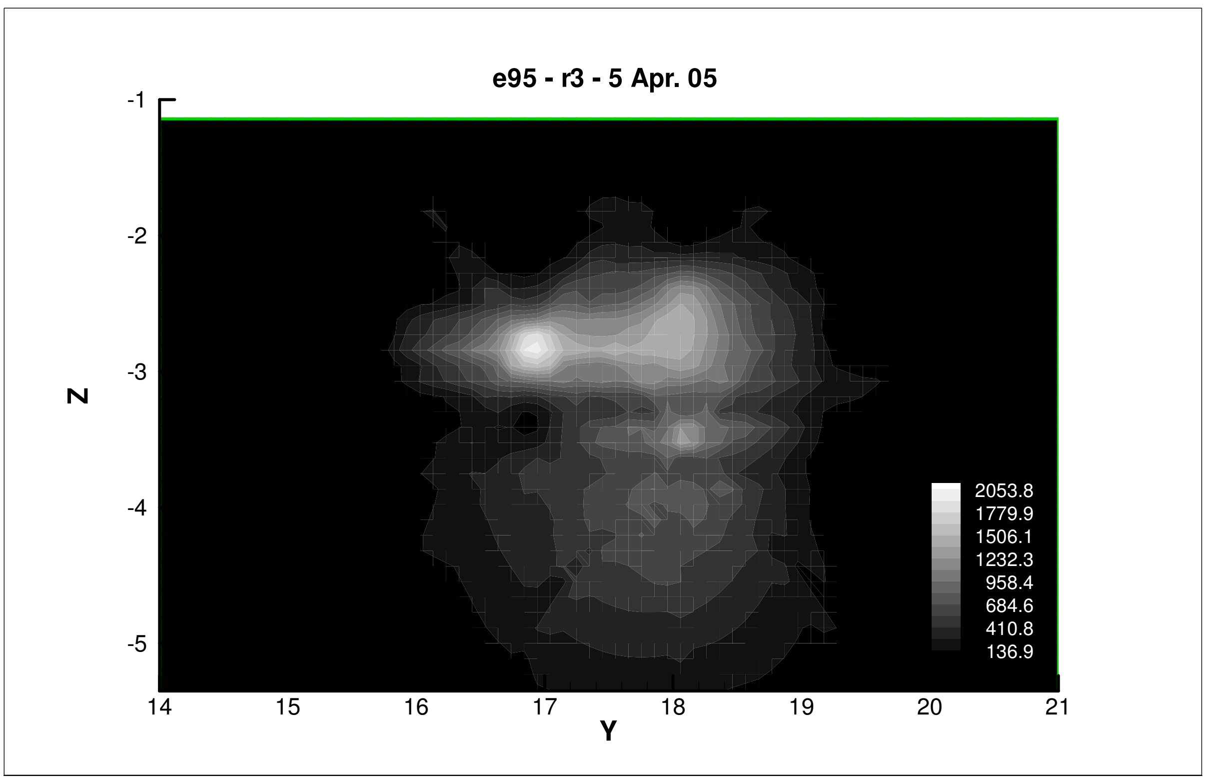

e95 - r2 - 3 Feb. 05
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
225.8
195.7
165.6
135.5
105.4
75.3
45.2
15.1

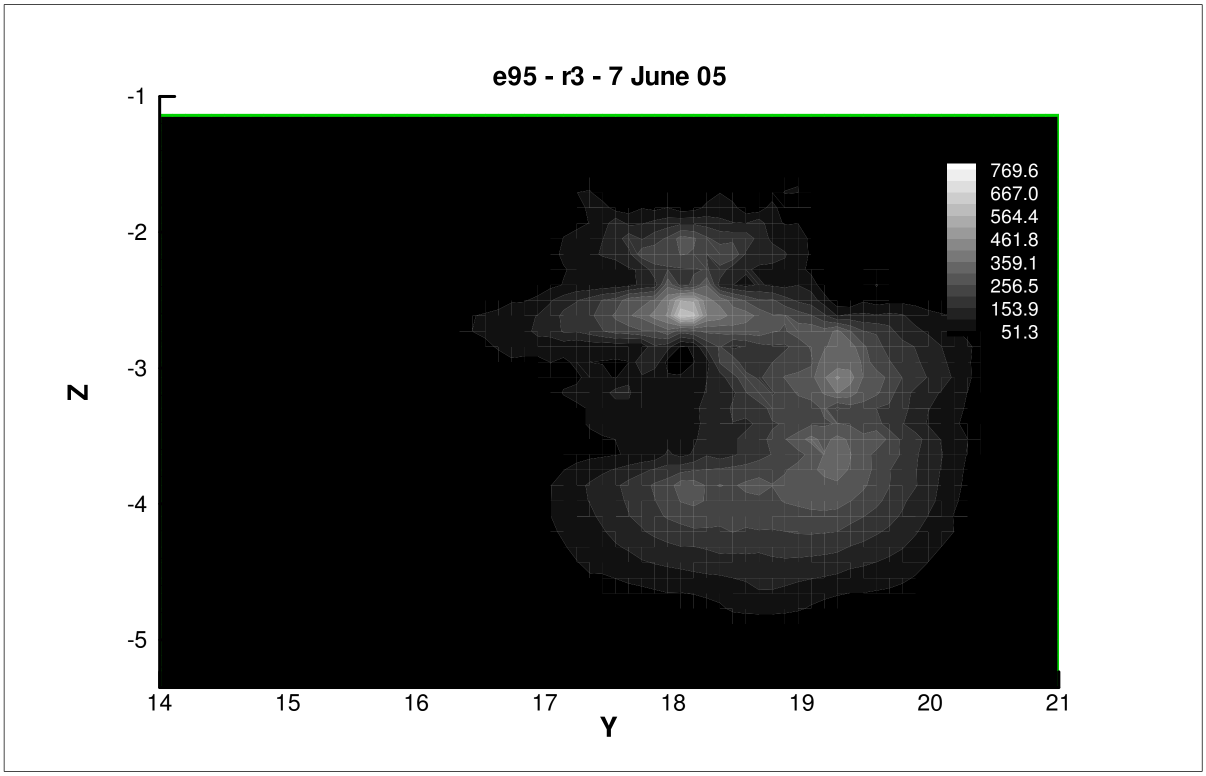


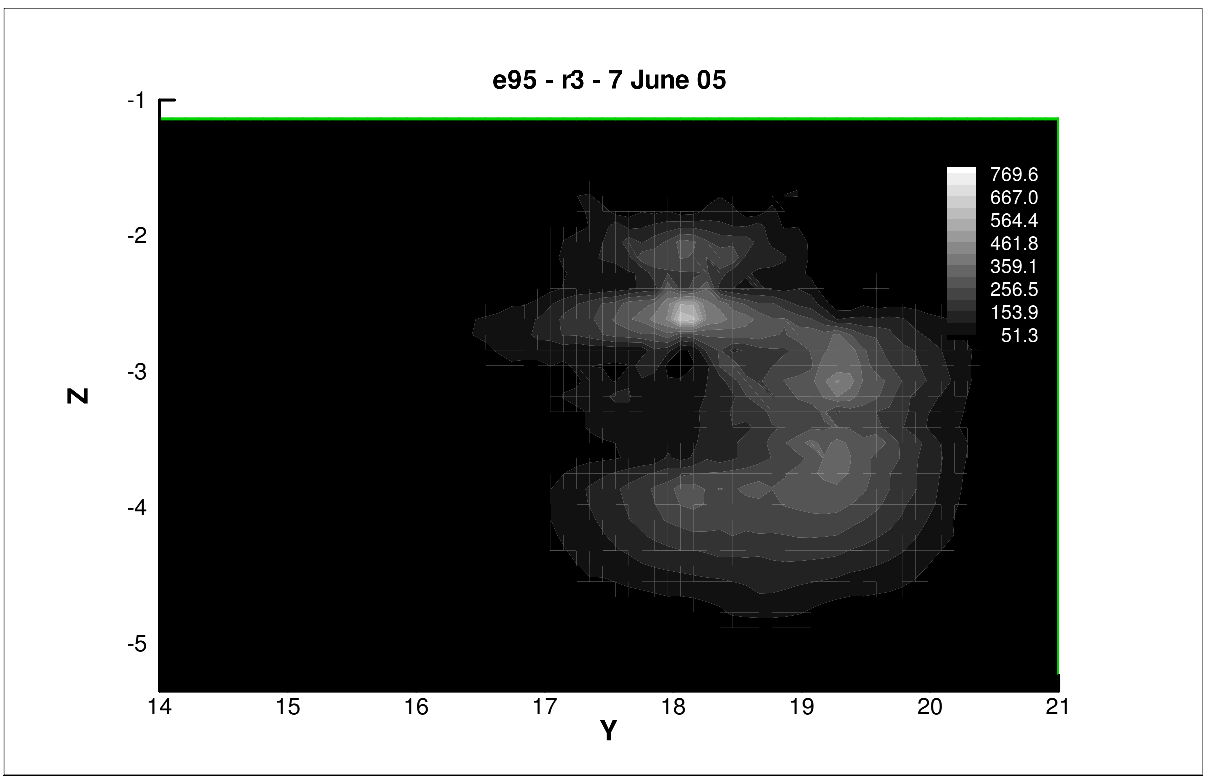


B. BTEX 3. E95 b. Row 3 1. Benzene (µg/l)

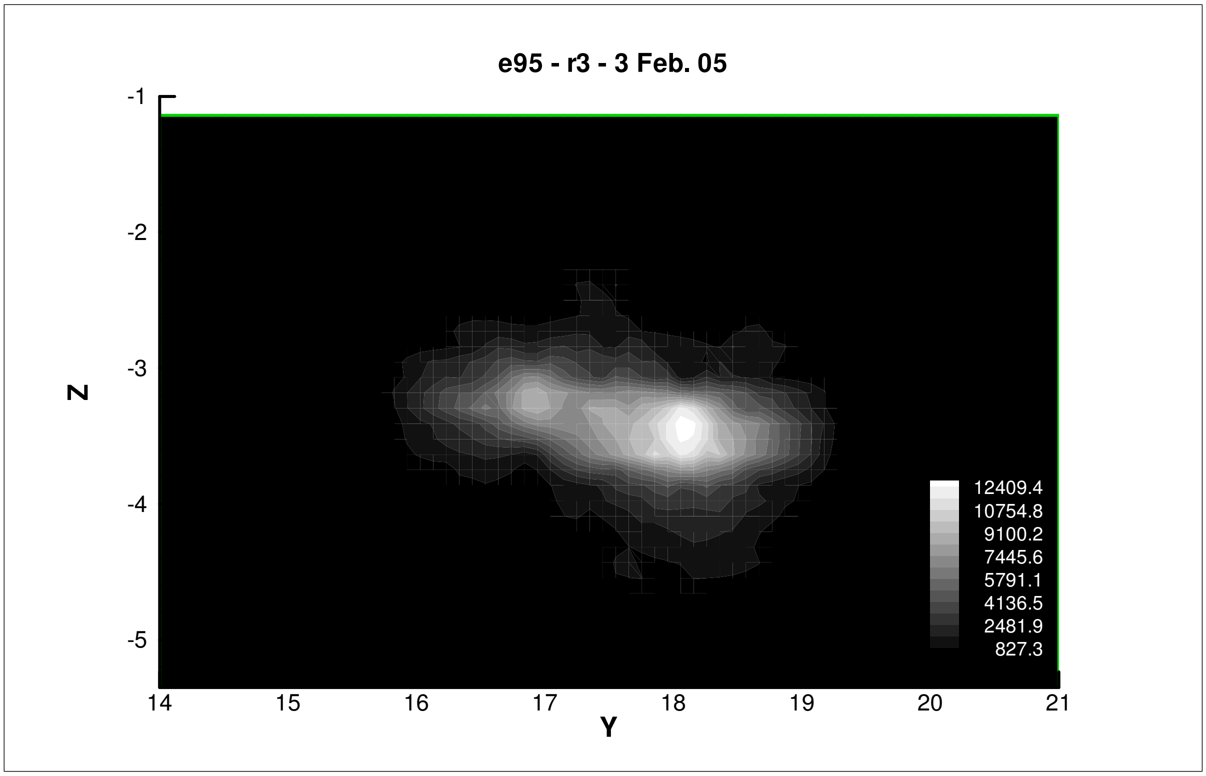

e95 - r3 - 3 Feb. 05
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
2685.8
2327.7
1969.6
1611.5
1253.4
895.3
537.2
179.1

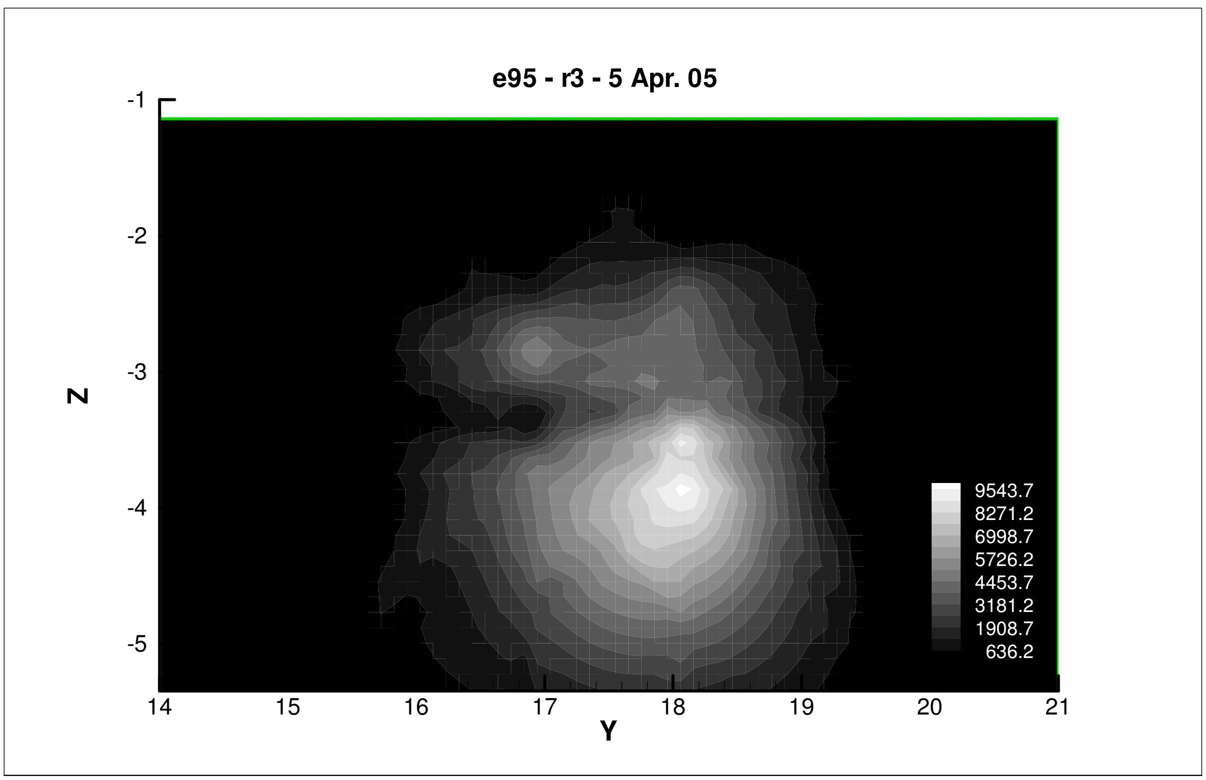

e95 - r3 - 5 Apr. 05
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
2053.8
1779.9
1506.1
1232.3
958.4
684.6
410.8
136.9

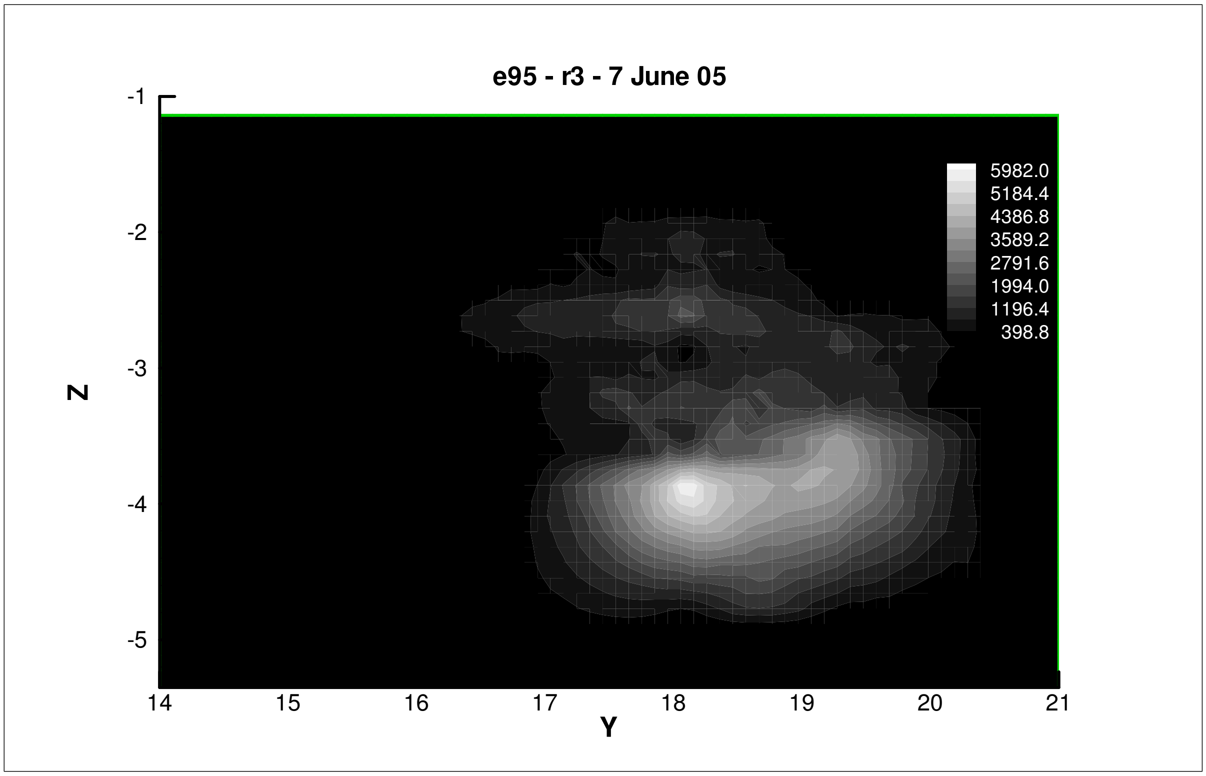


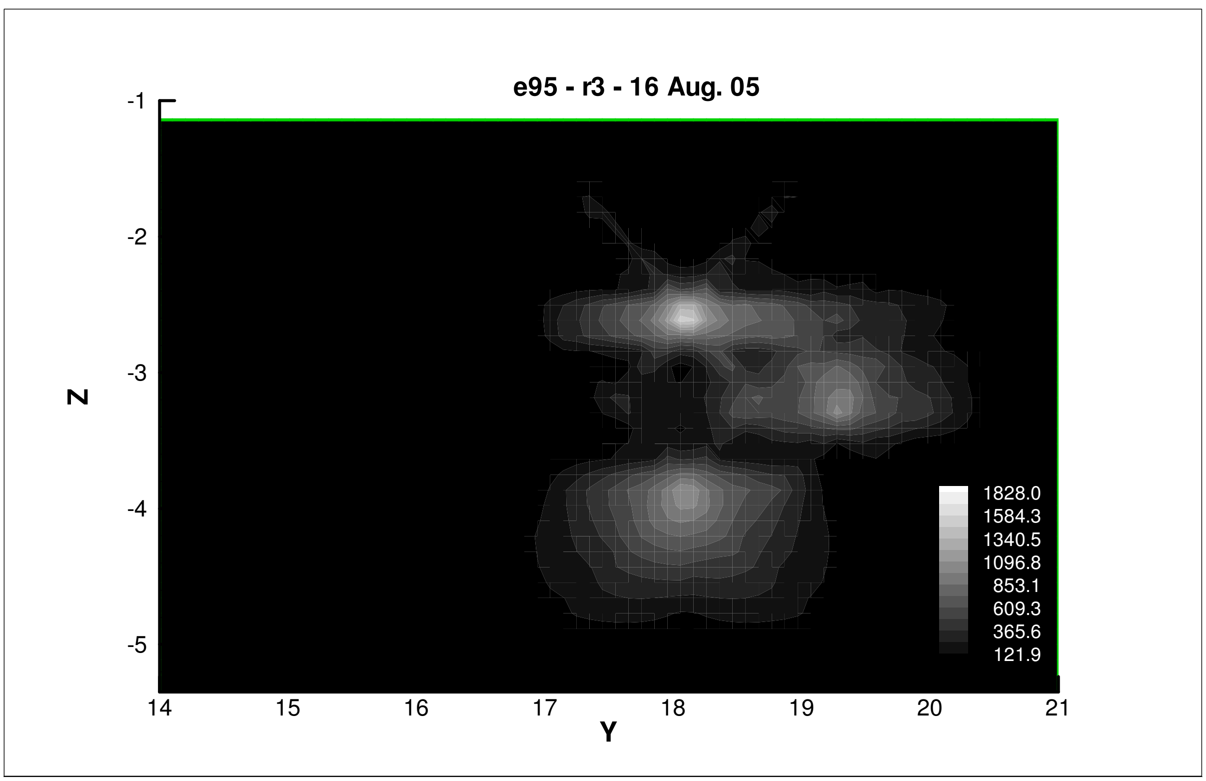


B. BTEX 3. E95 b. Row 3 2. Toluene (µg/l)

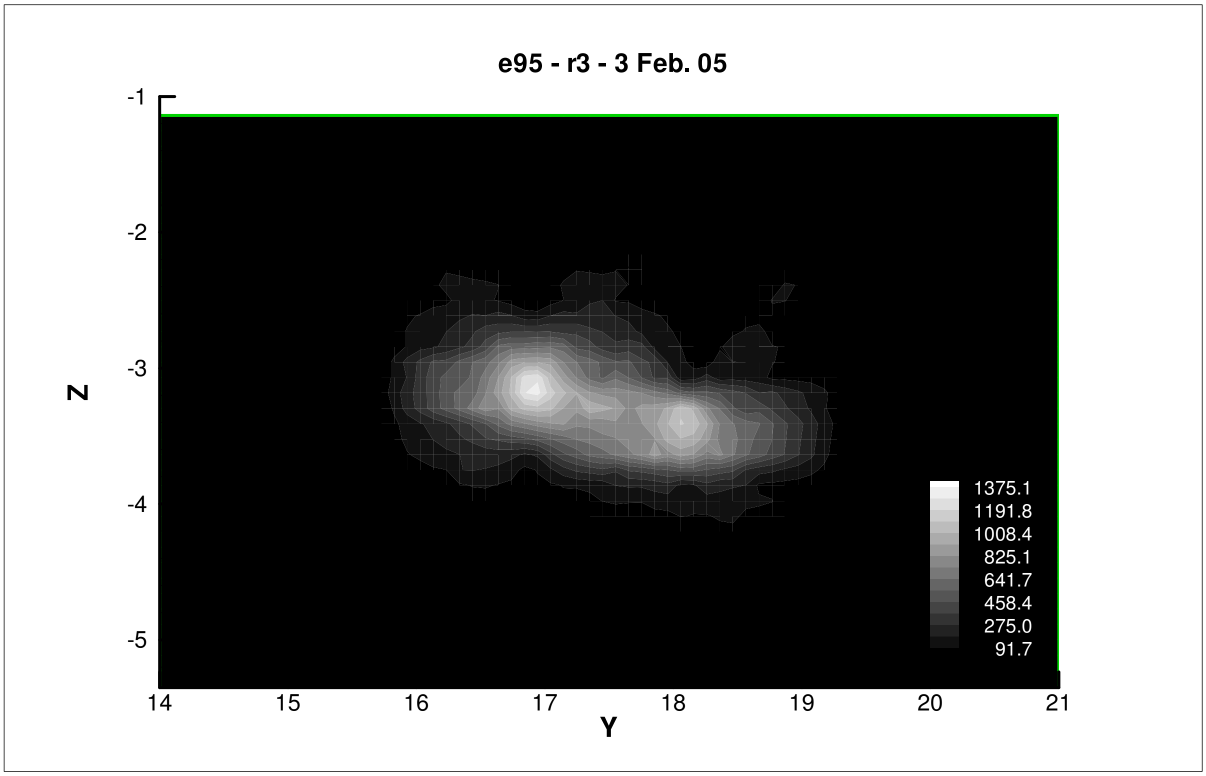

e95 - r3 - 3 Feb. 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
12409.4
10754.8
9100.2
7445.6
5791.1
4136.5
2481.9
827.3

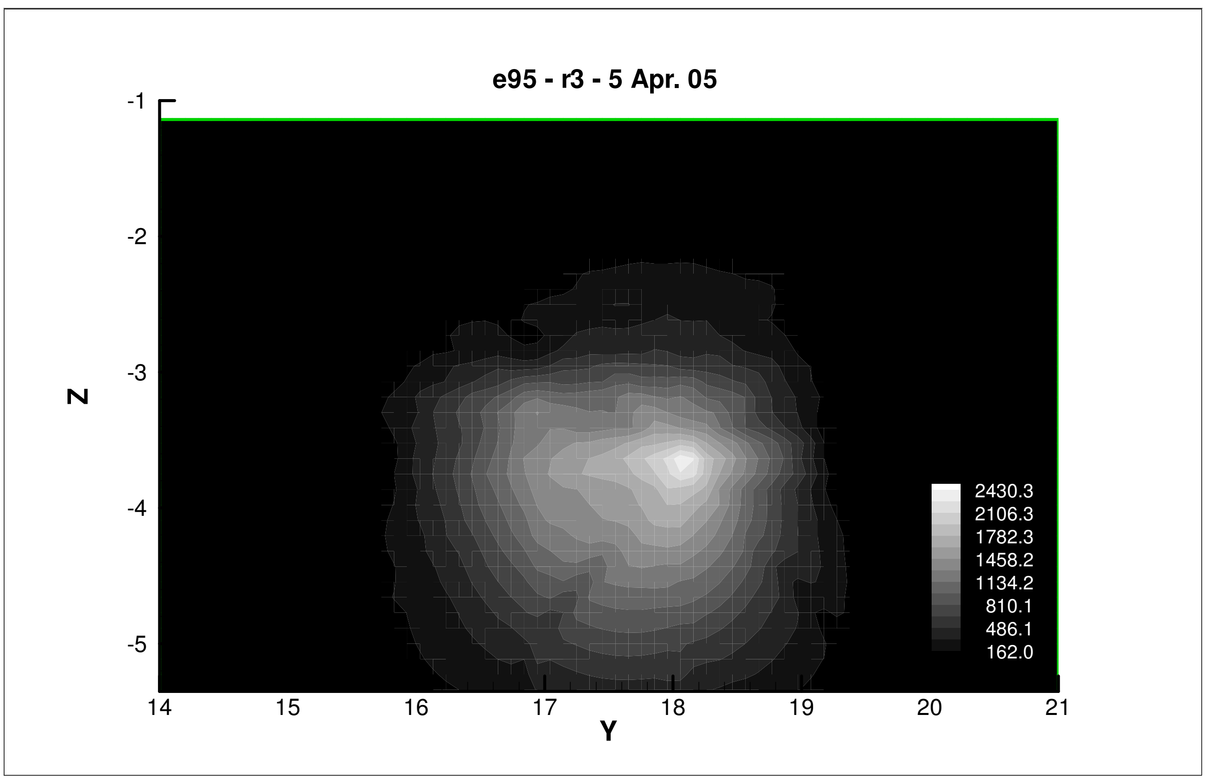

e95 - r3 - 5 Apr. 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
9543.7
8271.2
6998.7
5726.2
4453.7
3181.2
1908.7
636.2

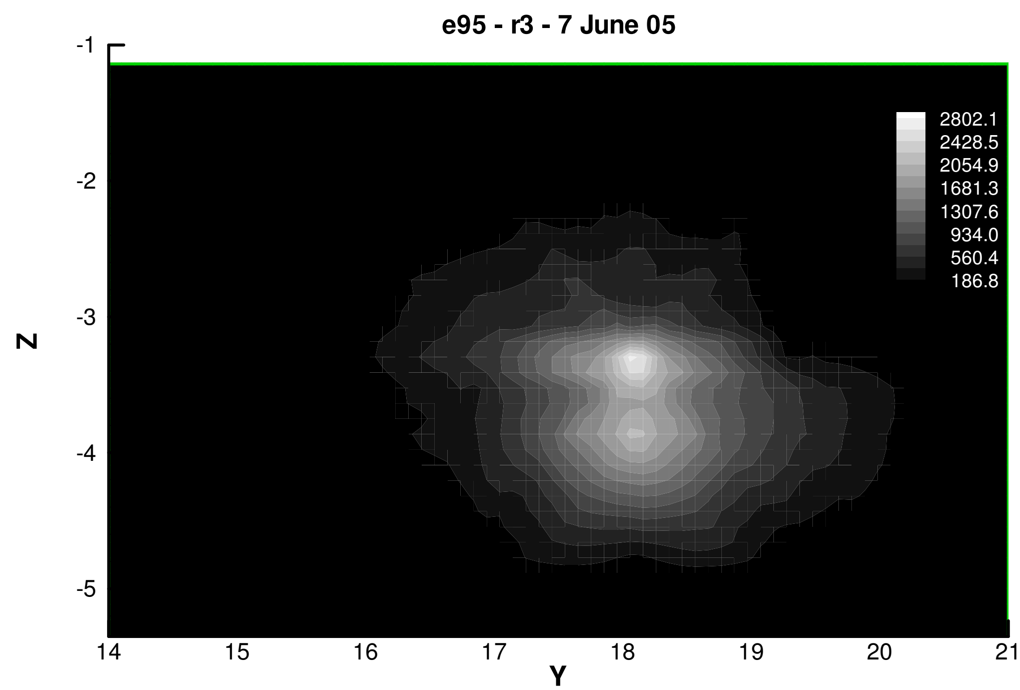

e95 - r3 - 7 June 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
5982.0
5184.4
4386.8
3589.2
2791.6
1994.0
1196.4
398.8

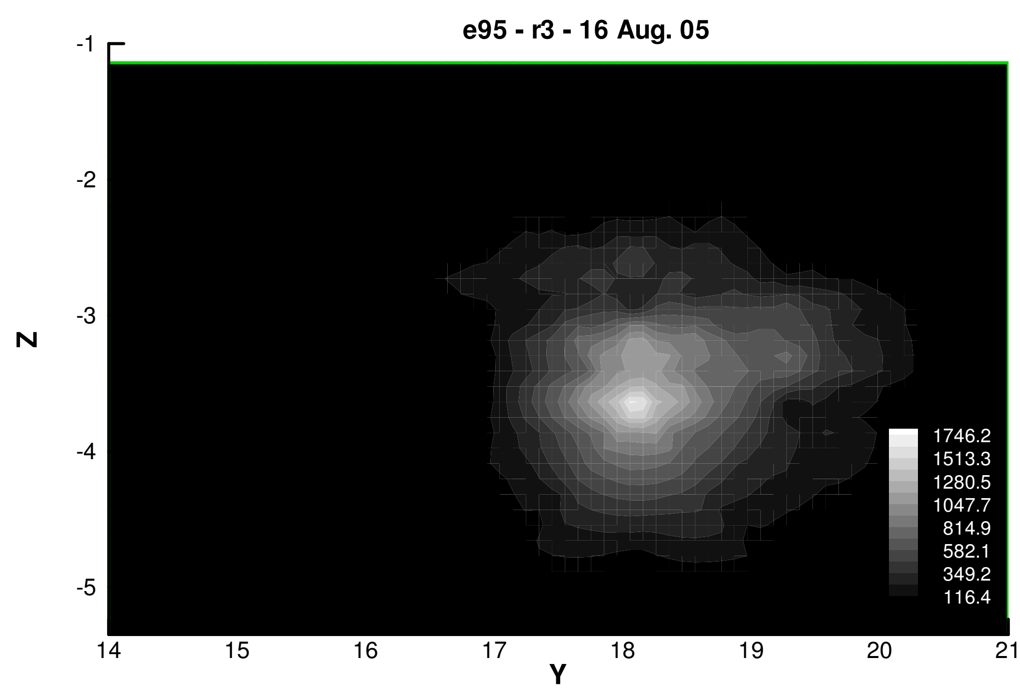

e95 - r3 - 16 Aug. 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
1828.0
1584.3
1340.5
1096.8
853.1
609.3
365.6
121.9

B. BTEX 3. E95 b. Row 3 3. O-Xylene (µg/l)

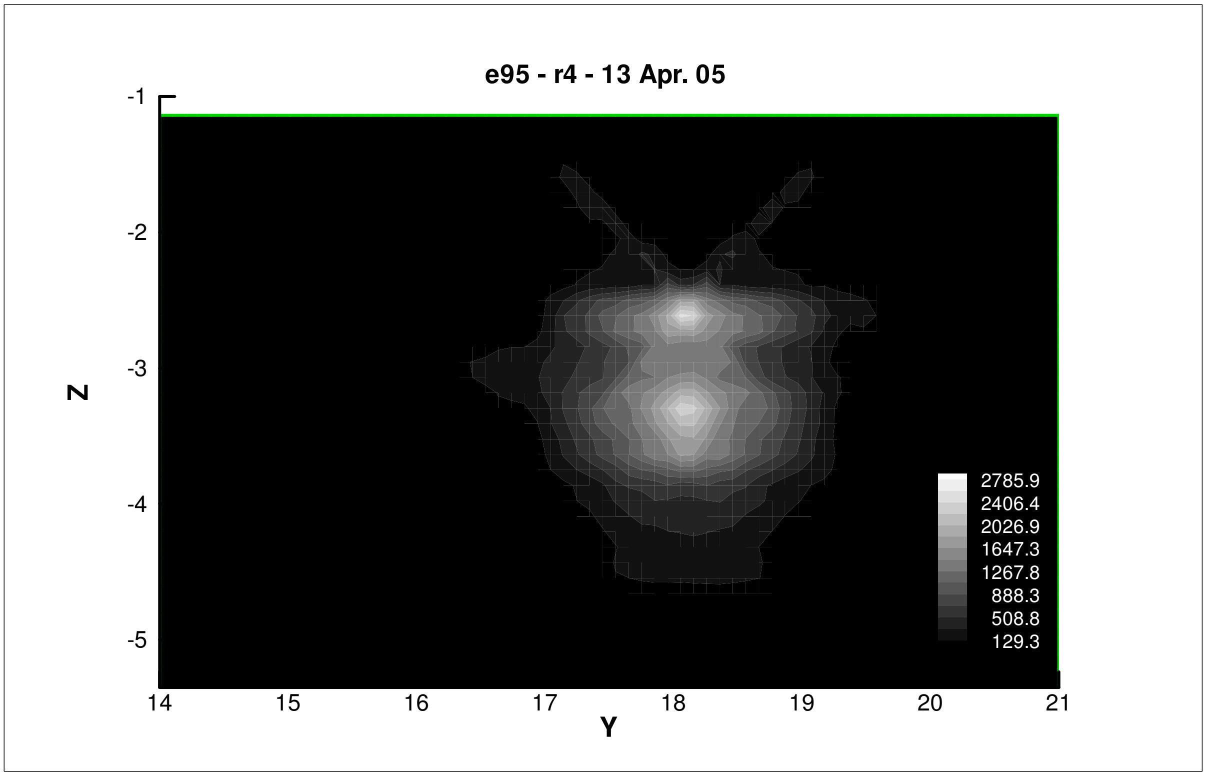


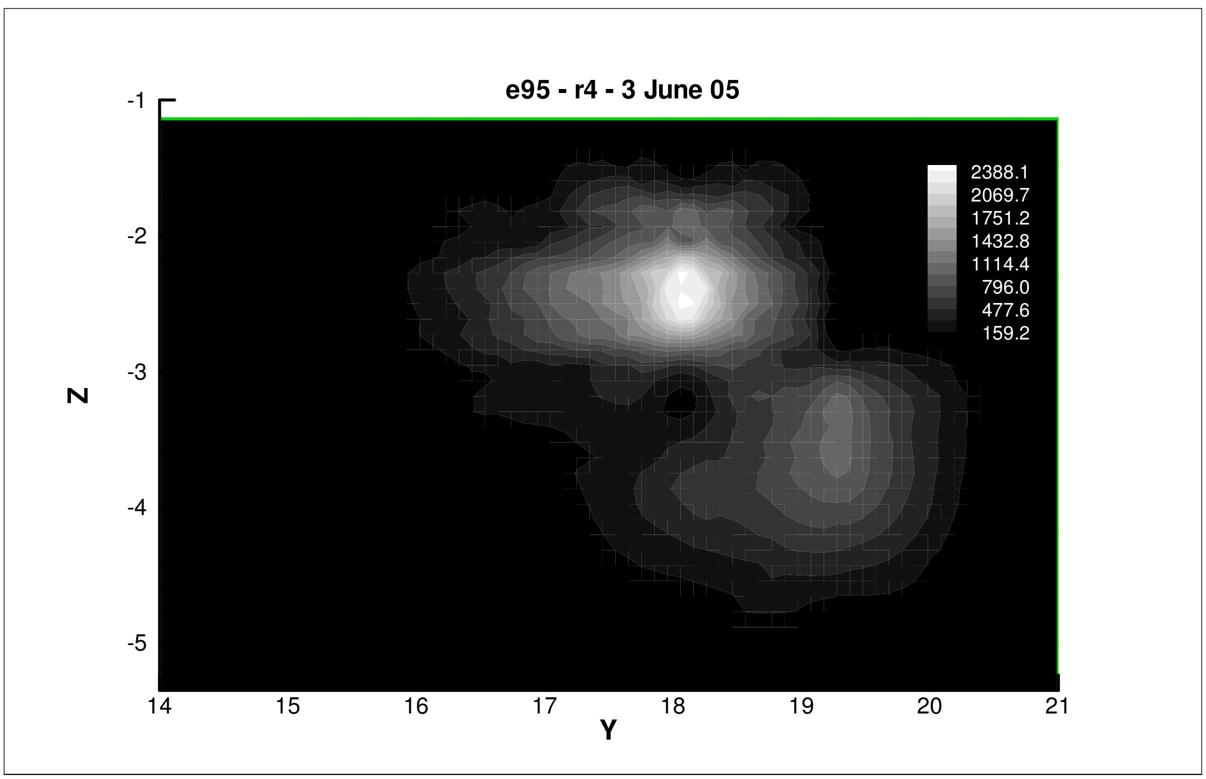


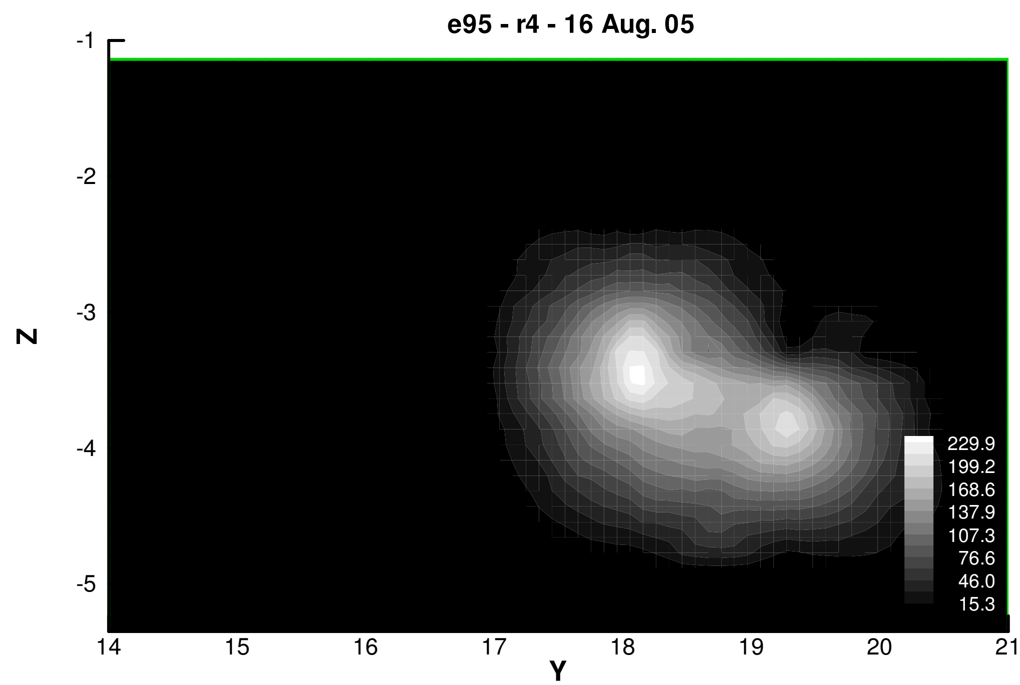




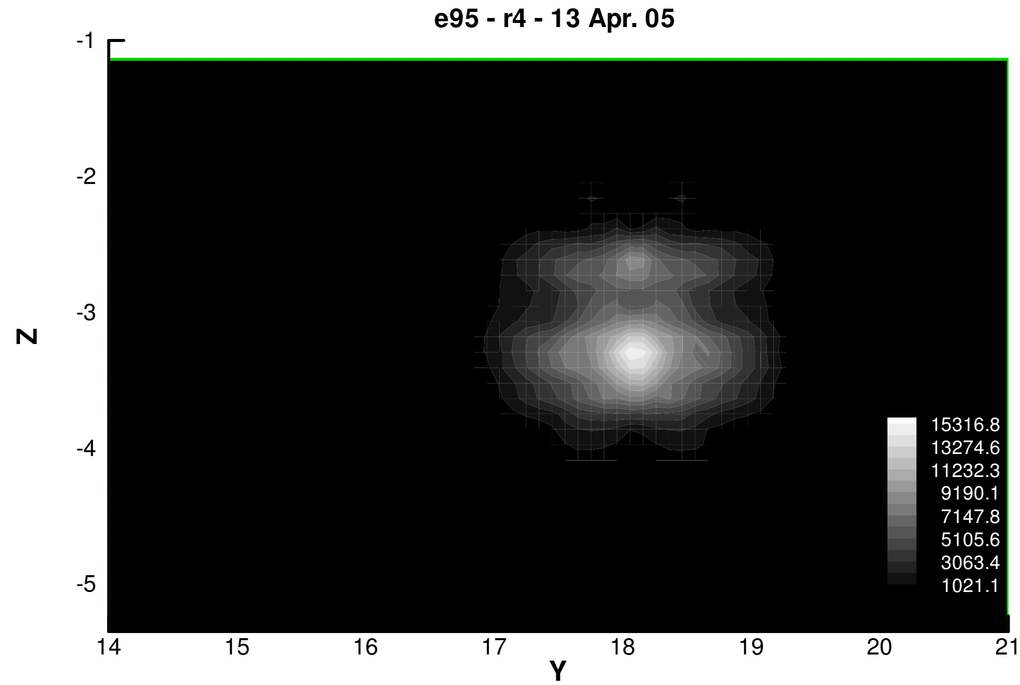
B. BTEX 3. E95 c. Row 4 1. Benzene (µg/l)

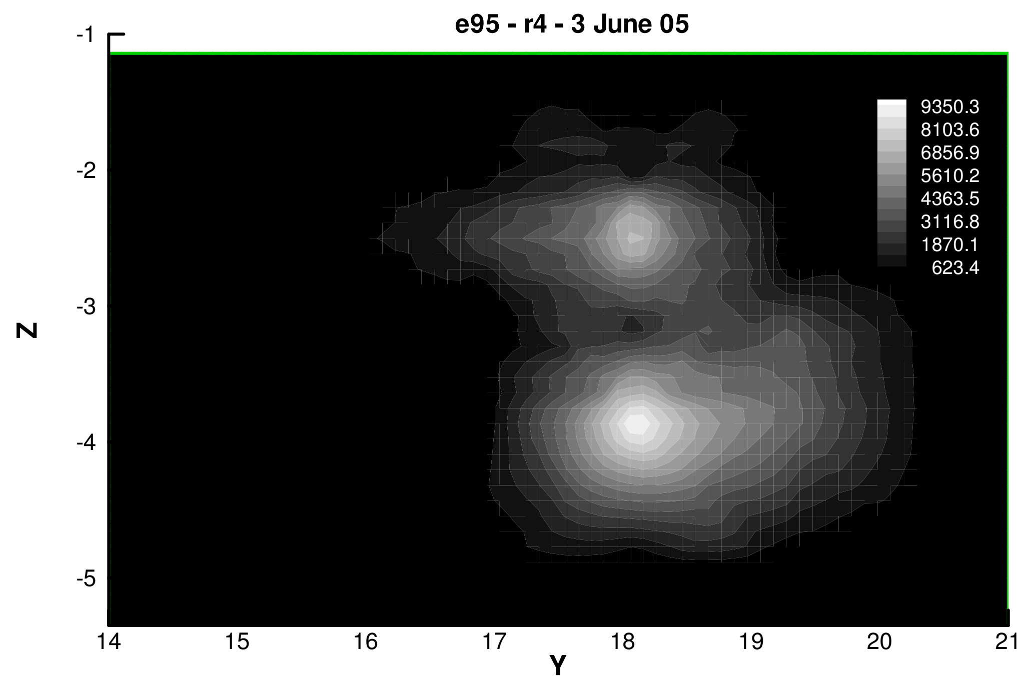

e95 - r4 - 13 Apr. 05
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
2785.9
2406.4
2026.9
1647.3
1267.8
888.3
508.8
129.3

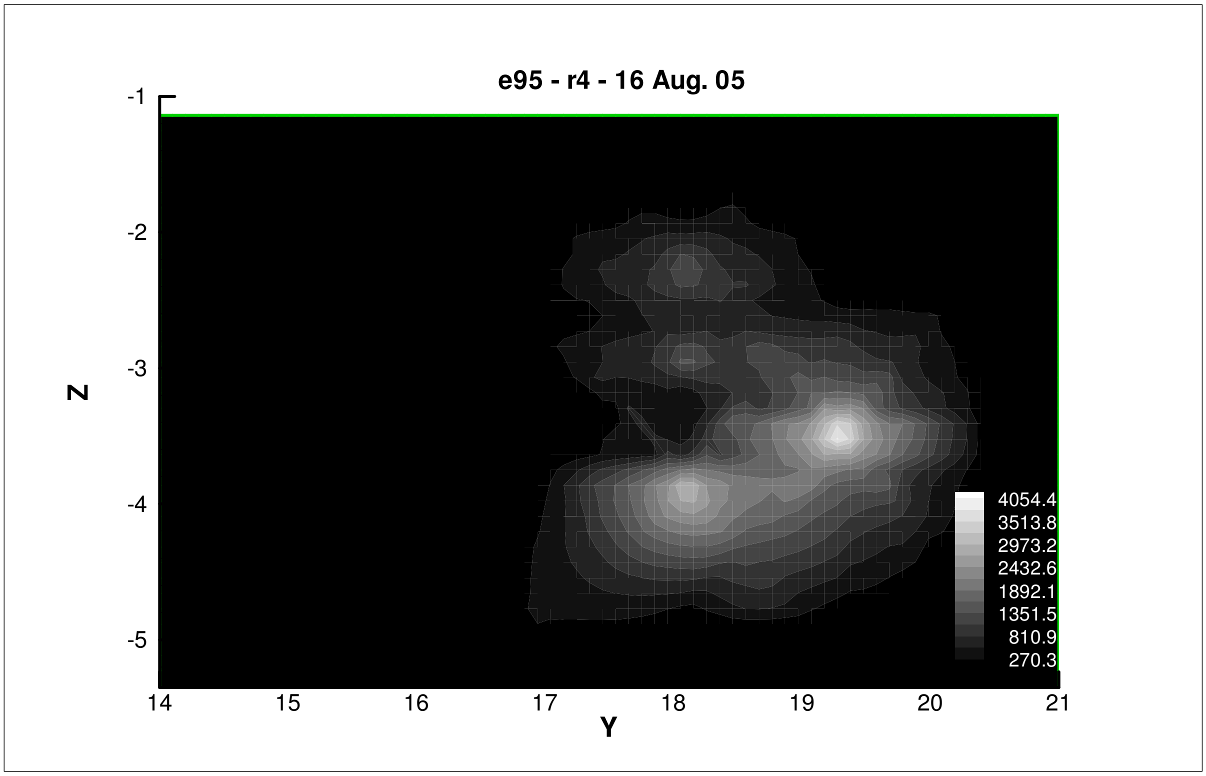

e95 - r4 - 3 June 05
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
2388.1
2069.7
1751.2
1432.8
1114.4
796.0
477.6
159.2



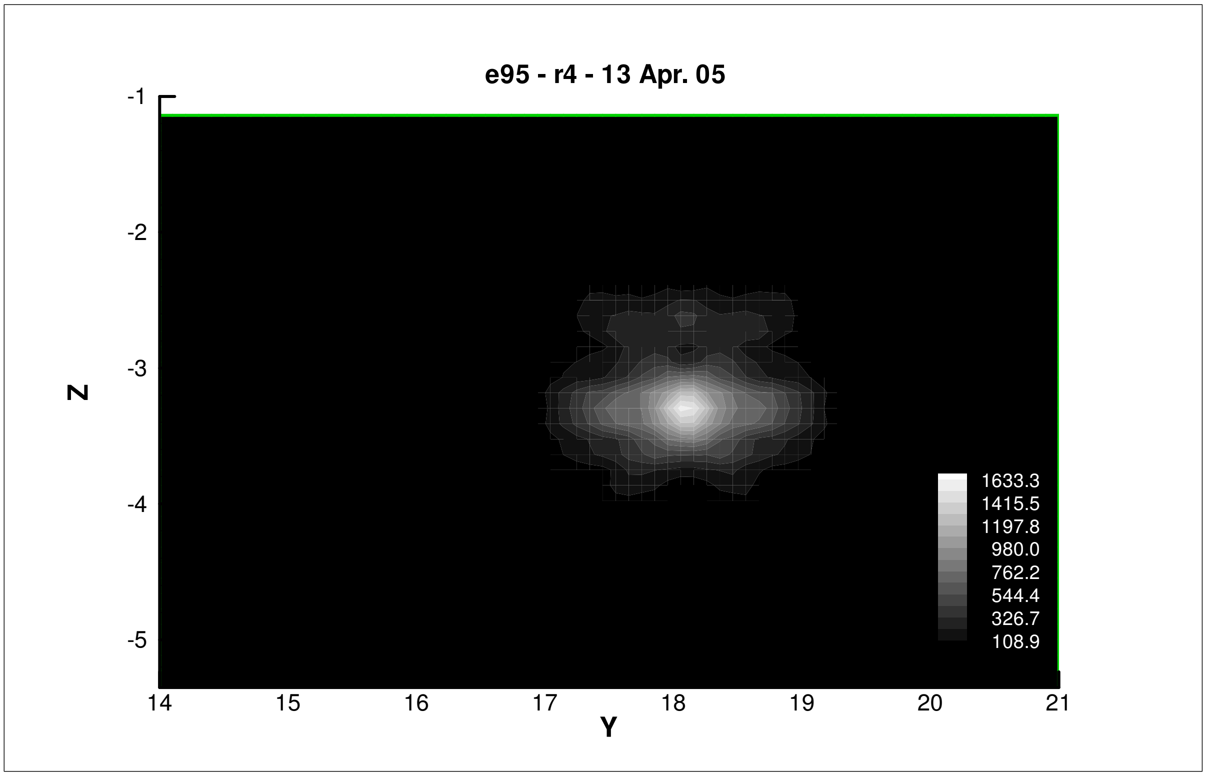
B. BTEX 3. E95 c. Row 4 2. Toluene (µg/l)

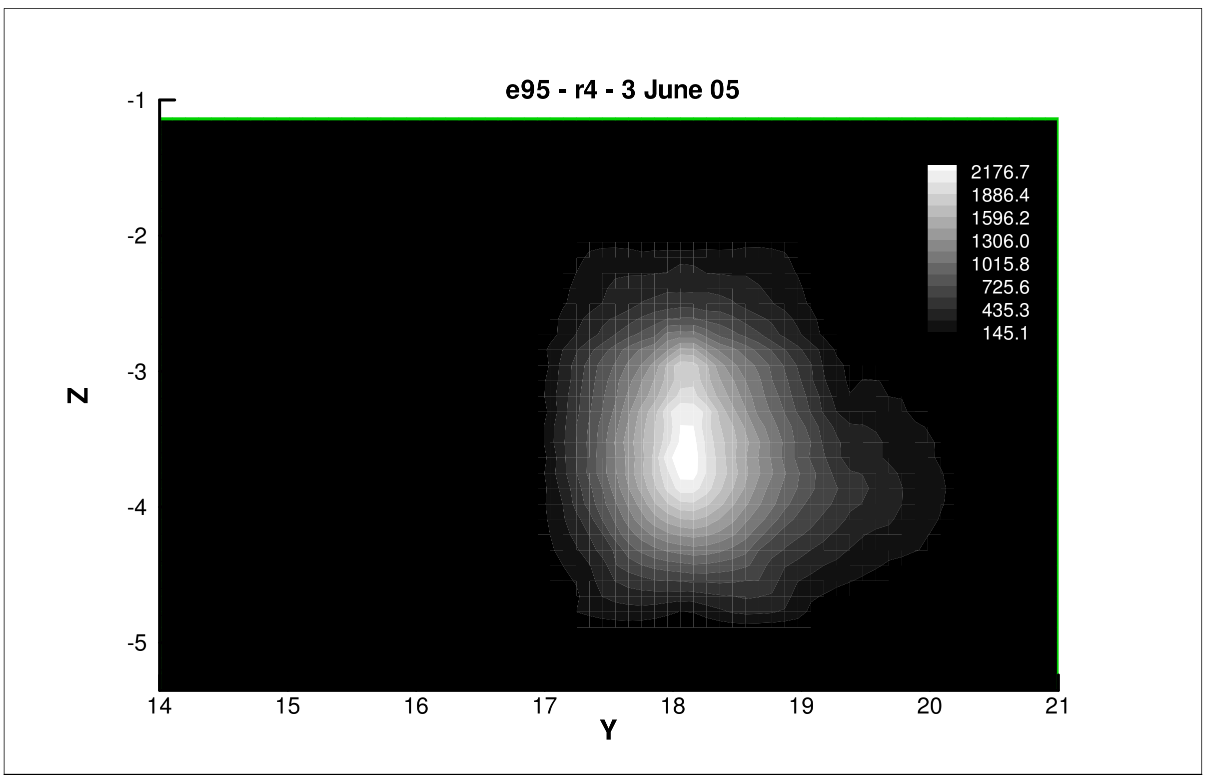

e95 - r4 - 13 Apr. 05
-1
-2
-3
-4
-5
Z
15316.8
13274.6
11232.3
9190.1
7147.8
5105.6
3063.4
1021.1
14
15
16
17
18
19
20
21
Y

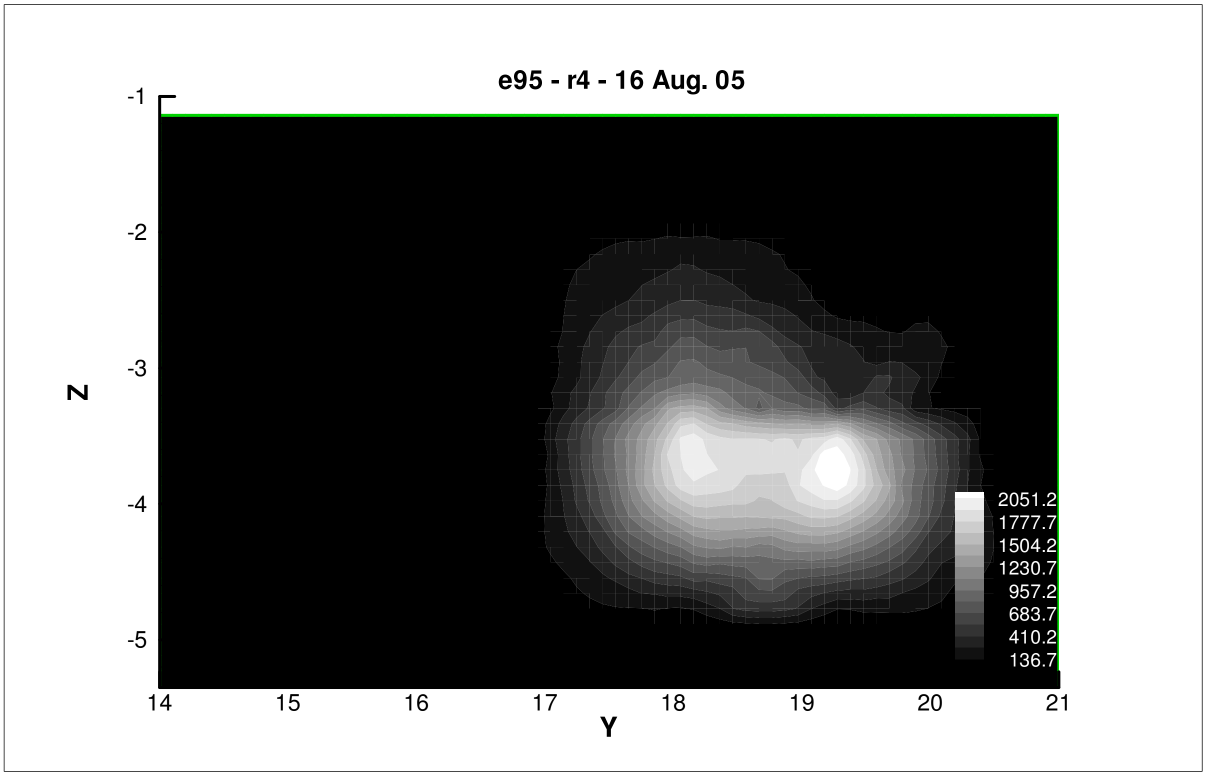

e95 - r4 - 3 June 05
-1
-2
-3
-4
-5
Z
9350.3
8103.6
6856.9
5610.2
4363.5
3116.8
1870.1
623.4
14
15
16
17
18
19
20
21
Y



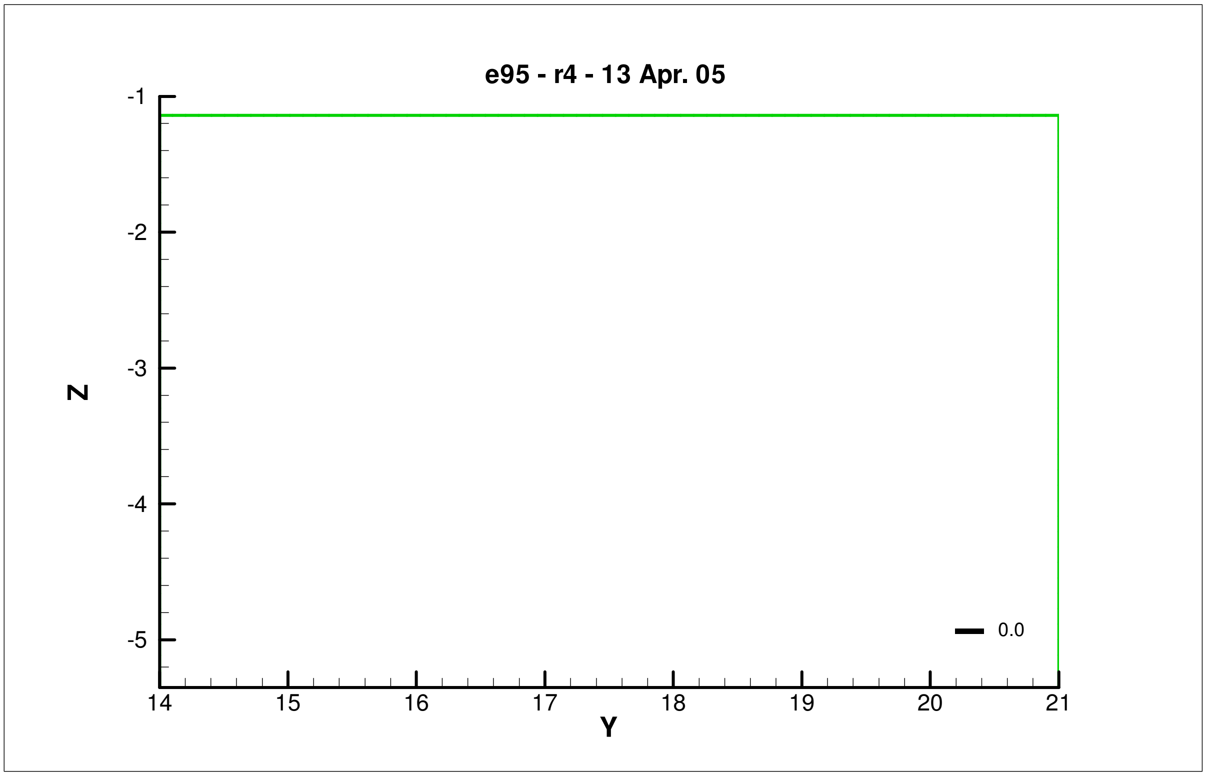
B. BTEX 3. E95 c. Row 4 3. O-Xylene (µg/l)

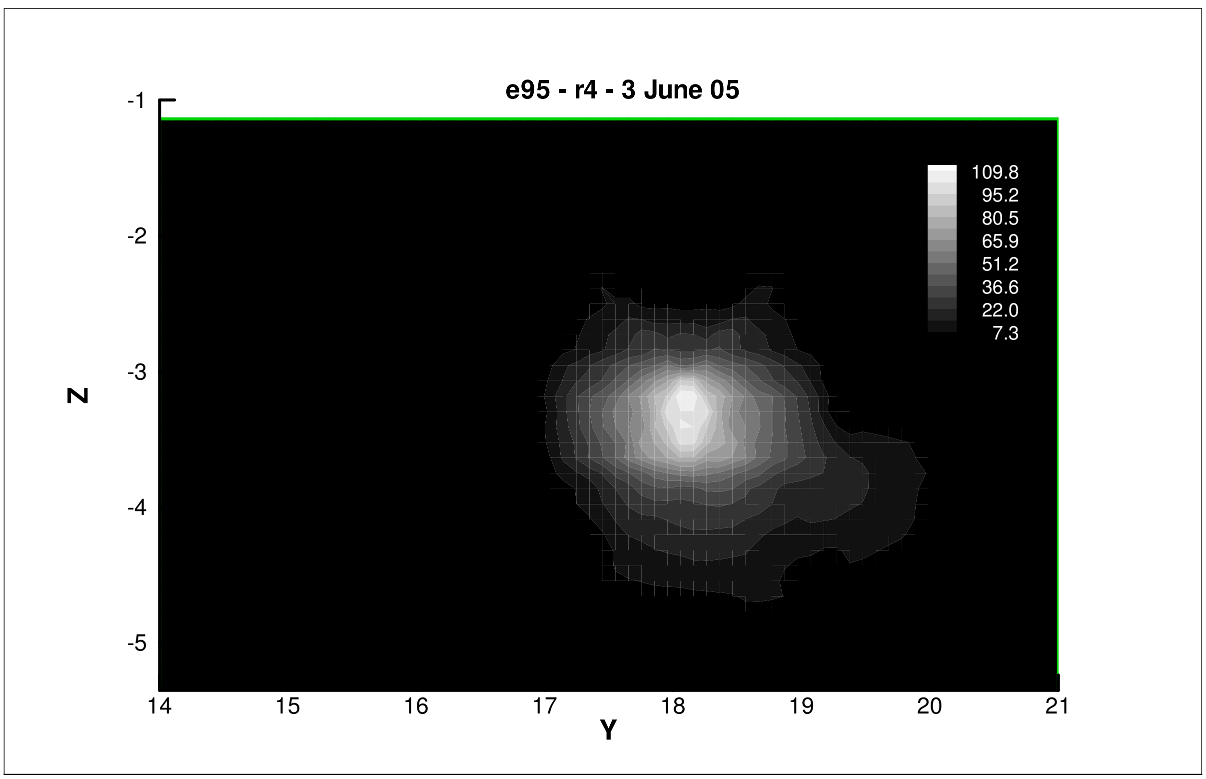

e95 - r4 - 13 Apr. 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
1633.3
1415.5
1197.8
980.0
762.2
544.4
326.7
108.9

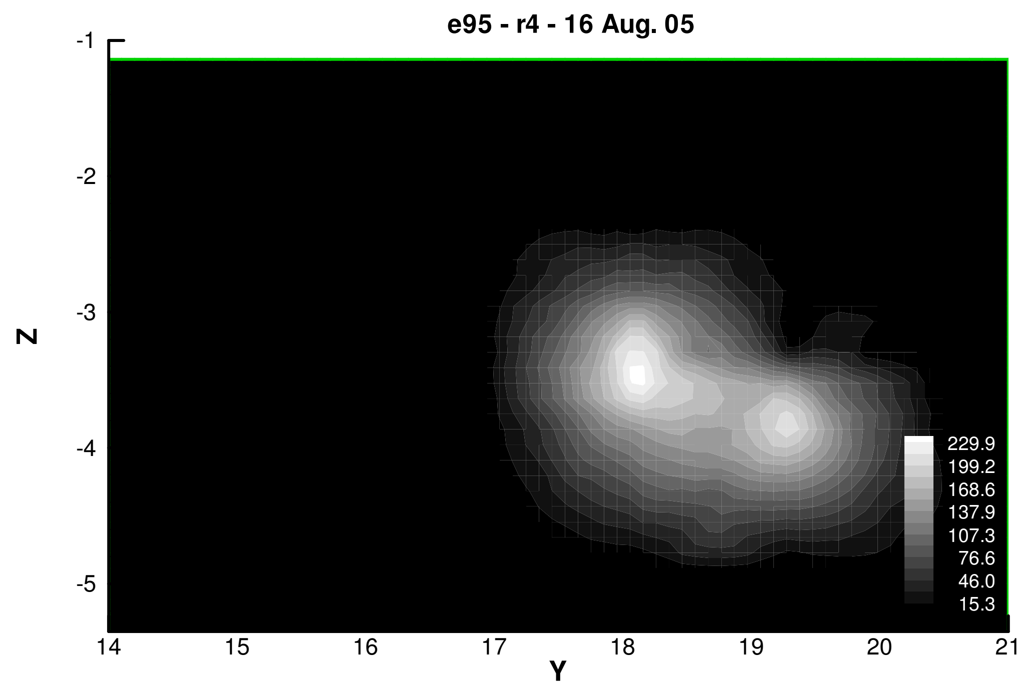

e95 - r4 - 3 June 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
2176.7
1886.4
1596.2
1306.0
1015.8
725.6
435.3
145.1



B. BTEX 3. E95 c. Row 4 4. Tri-Methyl Benzene (μg/l)


e95 - r4 - 13 Apr. 05
-1
-2
-3
-4
-5
Z
0.0
14
15
16
17
18
19
20
21
Y

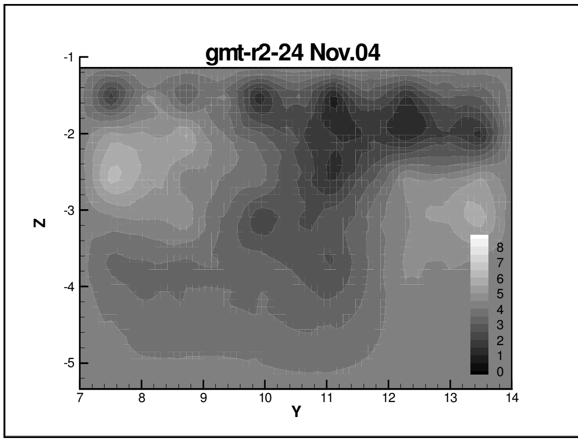

e95 - r4 - 3 June 05
-1
-2
-3
-4
-5
Z
109.8
95.2
80.5
65.9
51.2
36.6
22.0
7.3
14
15
16
17
18
19
20
21
Y

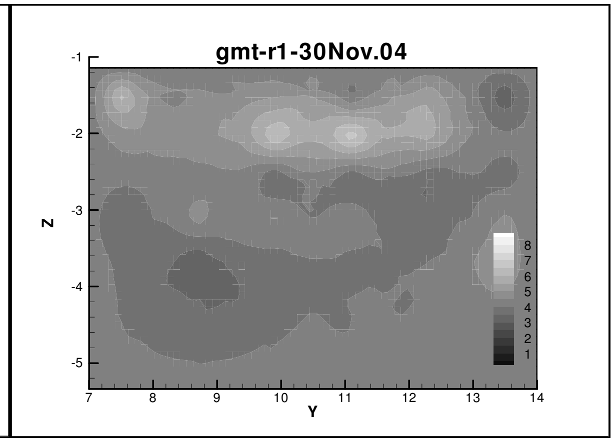

e95 - r4 - 16 Aug. 05
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
229.9
199.2
168.6
137.9
107.3
76.6
46.0
15.3

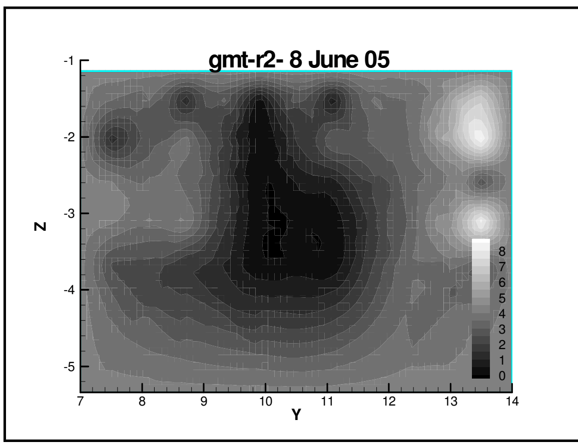
Appendix 2 (Cross Sections)

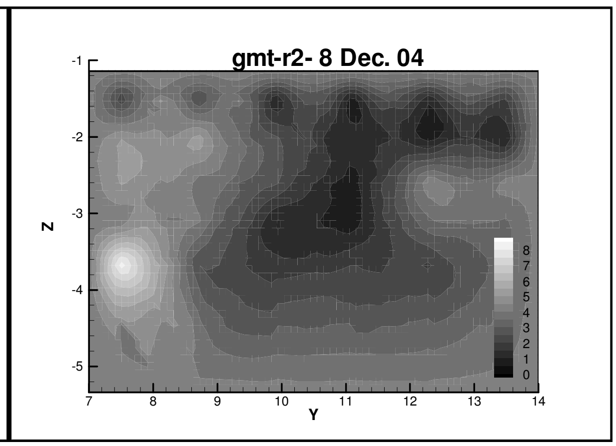
C. Dissolved Oxygen

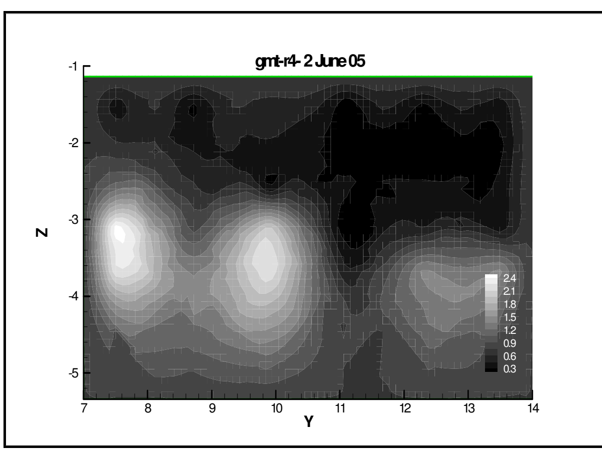
1. GMT

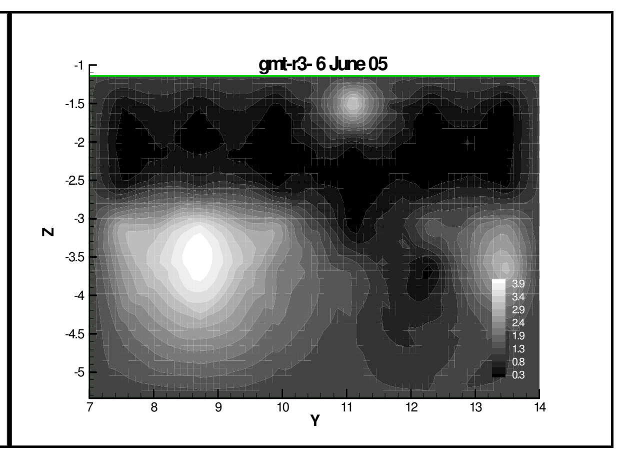




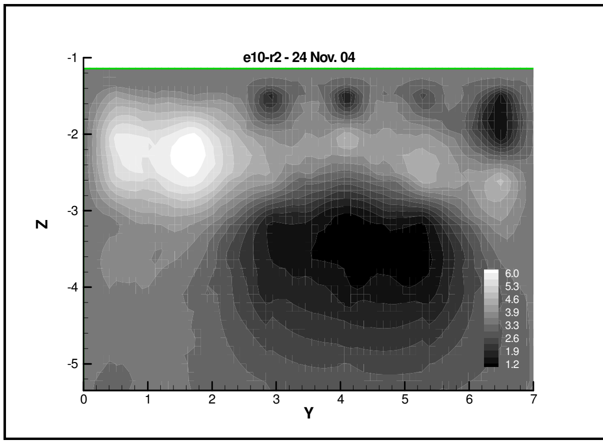


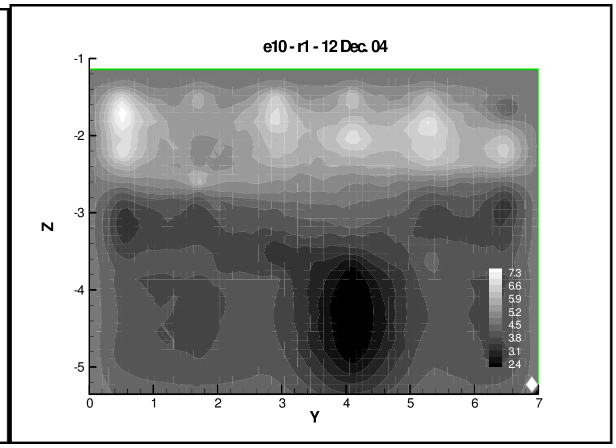


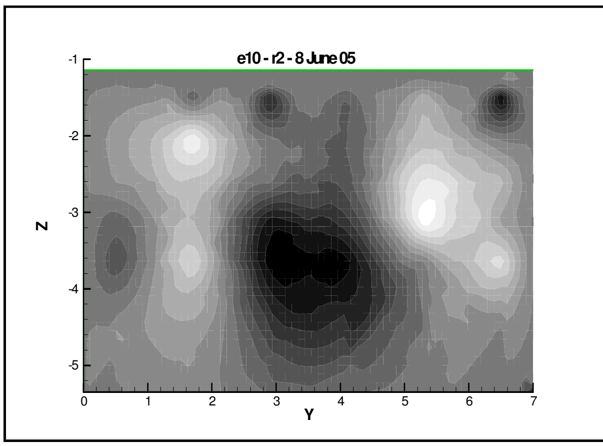


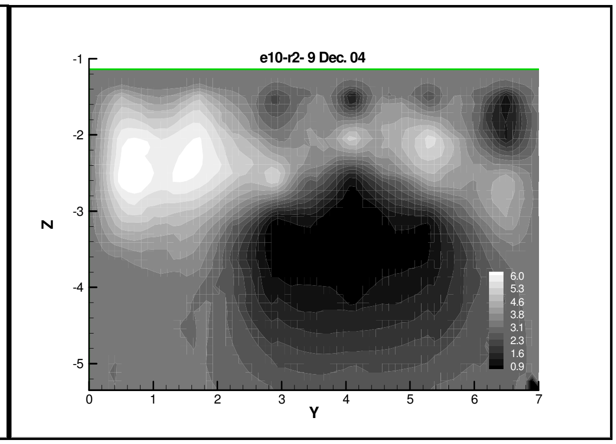


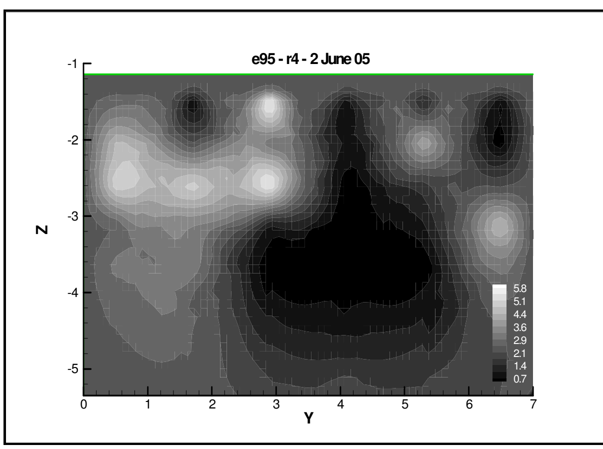
2. E10

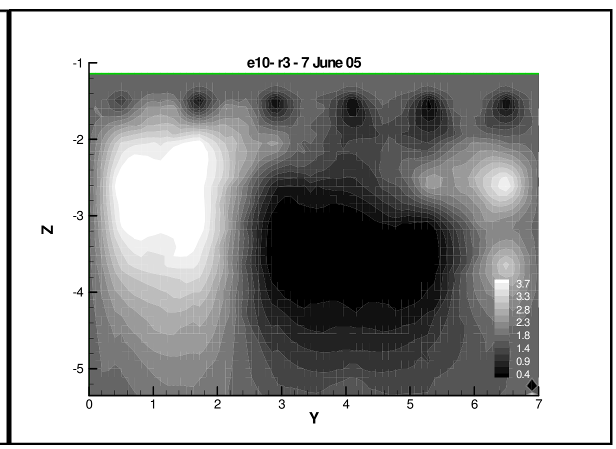

e10-r2 - 24 Nov. 04
Z
Y
-1
-2
-3
-4
-5
0 1 2 3 4 5 6 7
6.0 5.3 4.6 3.9 3.3 2.6 1.9 1.2


e10 - r1 - 12 Dec. 04
Z
Y
-1
-2
-3
-4
-5
0 1 2 3 4 5 6 7
7.3 6.6 5.9 5.2 4.5 3.8 3.1 2.4


e10 - r2 - 8 June 05
Z
Y
-1
-2
-3
-4
-5
0 1 2 3 4 5 6 7

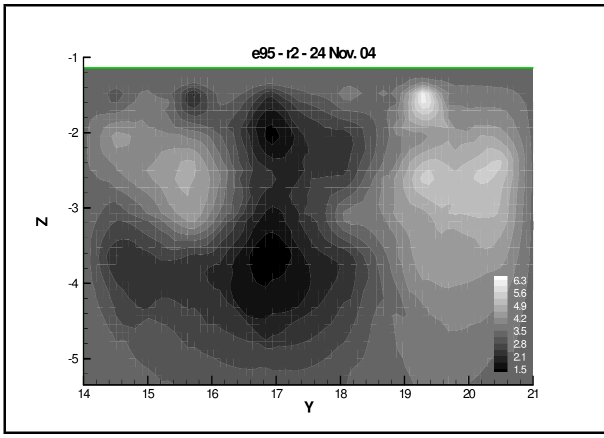

e10-r2- 9 Dec. 04
Z
Y
-1
-2
-3
-4
-5
0 1 2 3 4 5 6 7
6.0 5.3 4.6 3.8 3.1 2.3 1.6 0.9

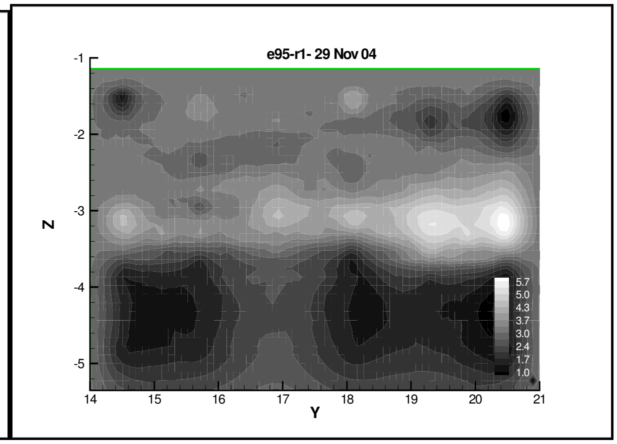

e95 - r4 - 2 June 05
Z
Y
-1
-2
-3
-4
-5
0 1 2 3 4 5 6 7
5.8 5.1 4.4 3.6 2.9 2.1 1.4 0.7

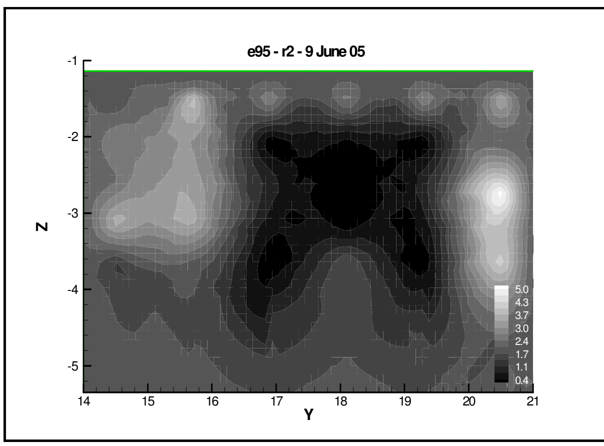

e10- r3 - 7 June 05
Z
Y
-1
-2
-3
-4
-5
0 1 2 3 4 5 6 7
3.7 3.3 2.8 2.3 1.8 1.4 0.9 0.4

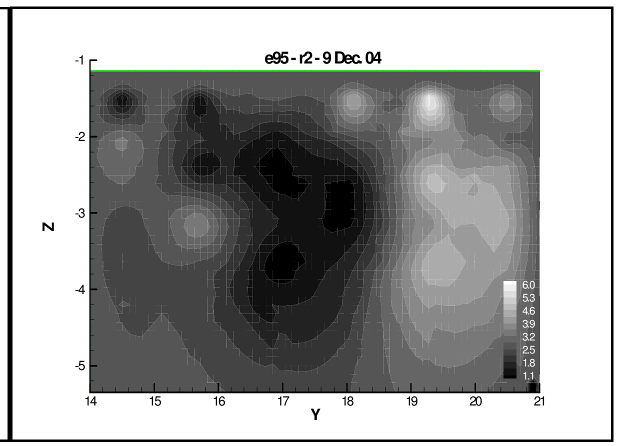
C. Dissolved Oxygen

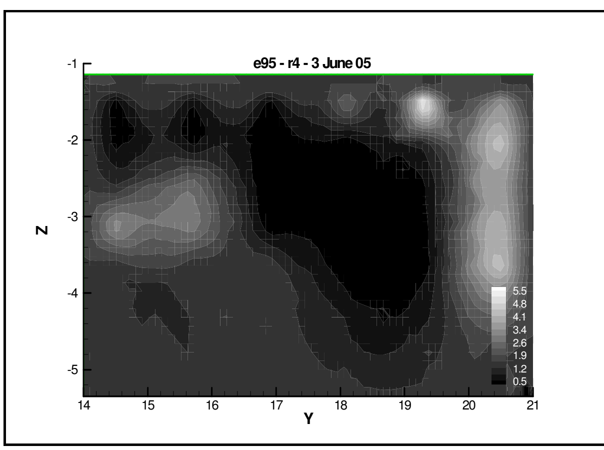
3. E95

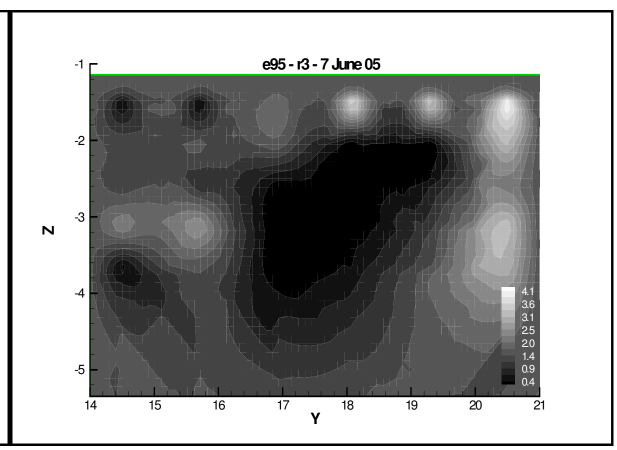








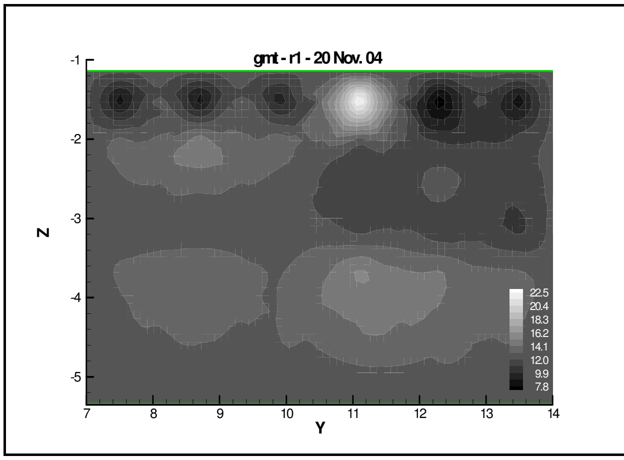


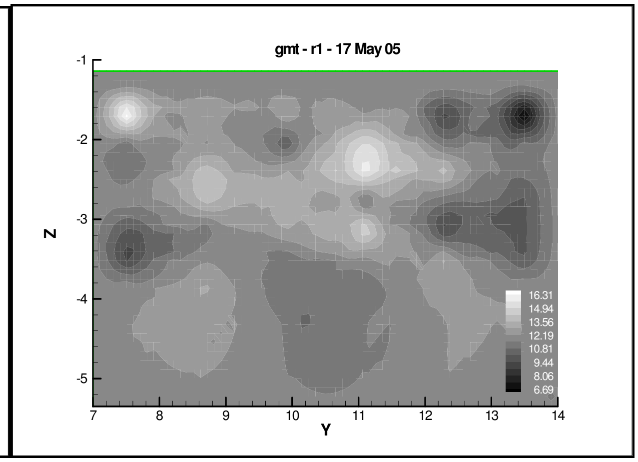


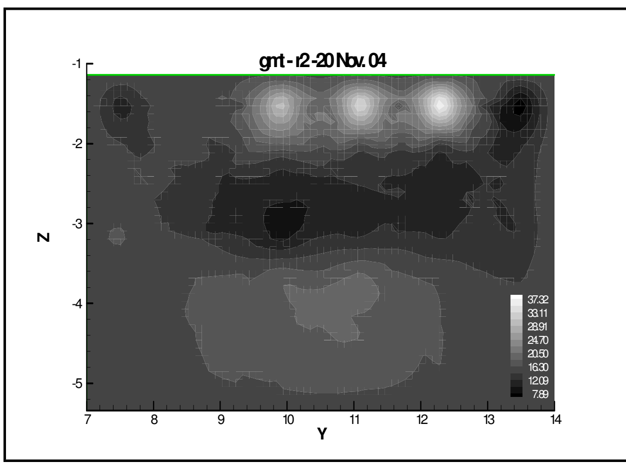
Appendix 2 (Cross Sections)

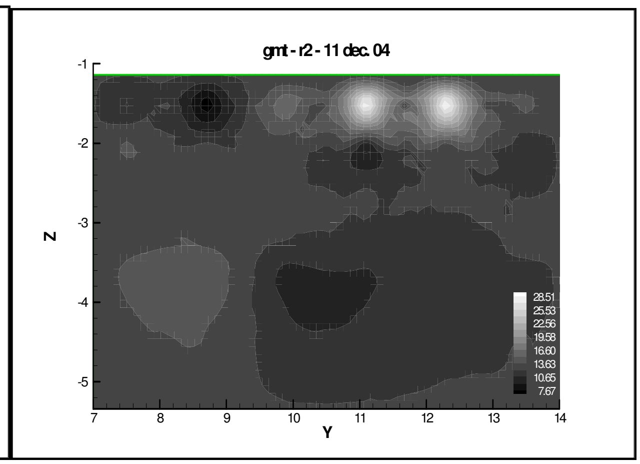
D. Inorganics

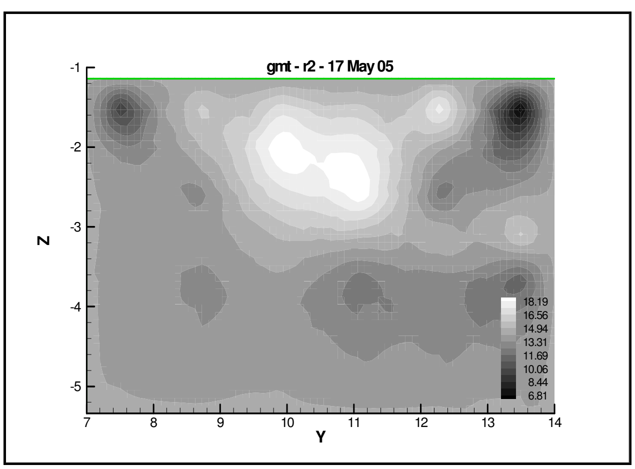
1. GMT A. Sulphate a. Row 1

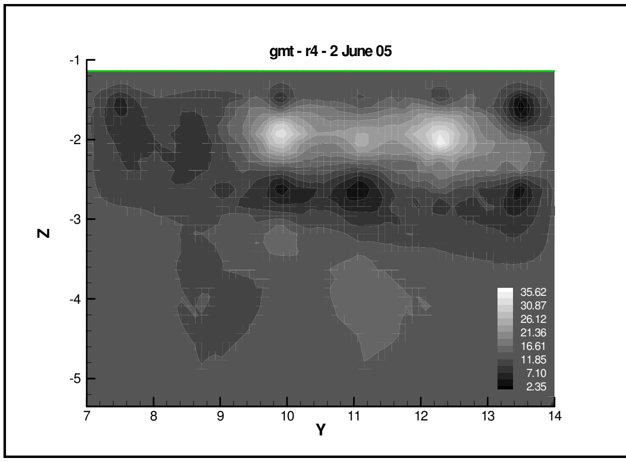


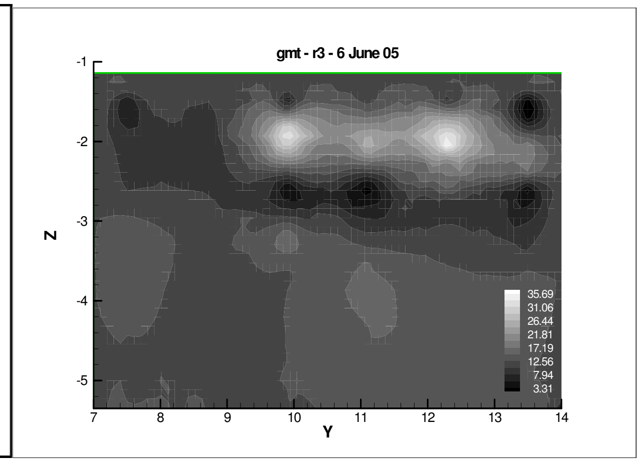




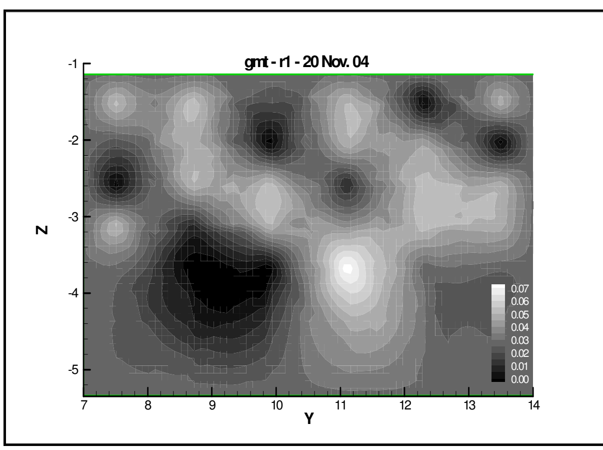


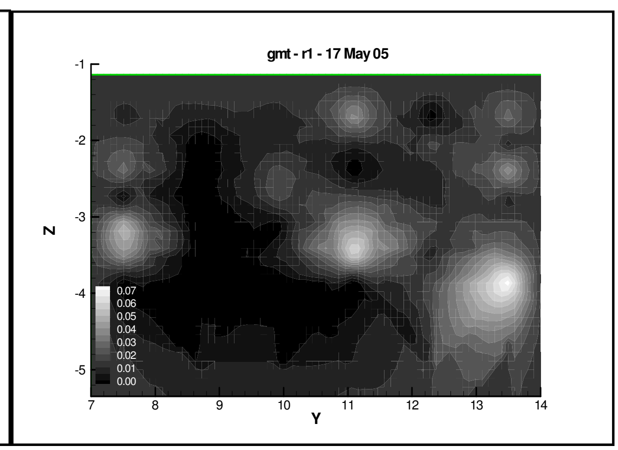


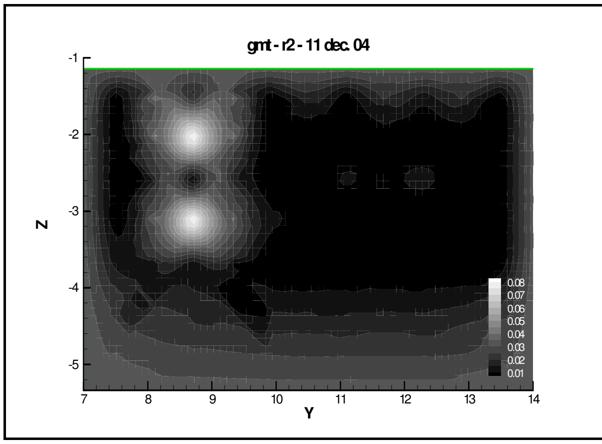


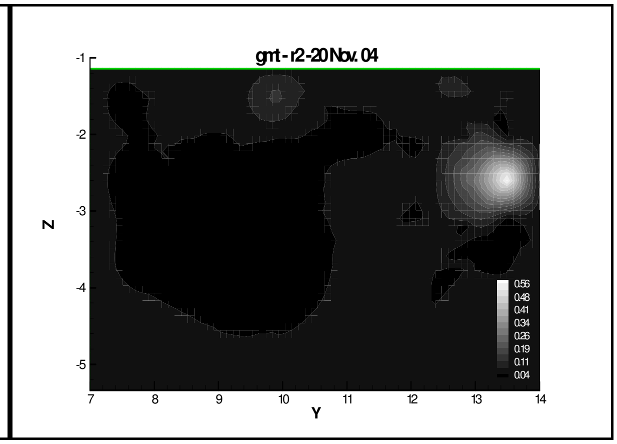


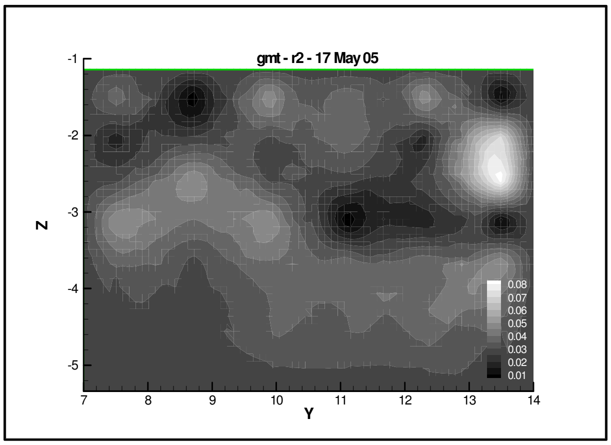
2. GMT B. Bivalent Iron a. Row 1



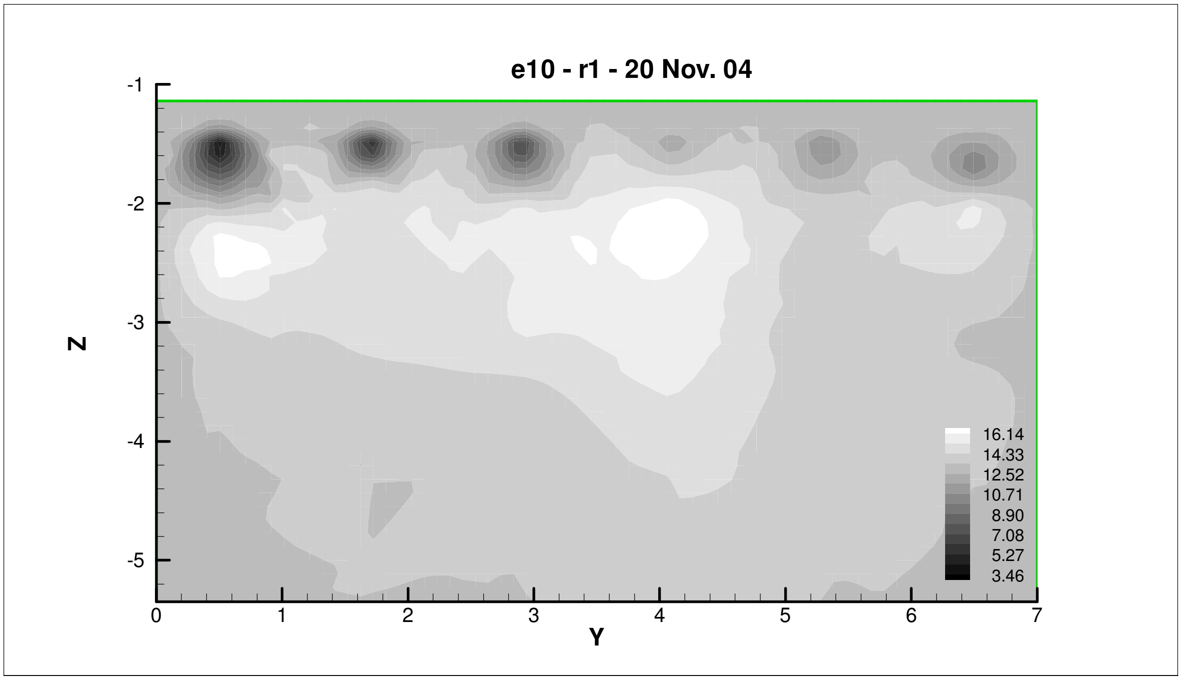


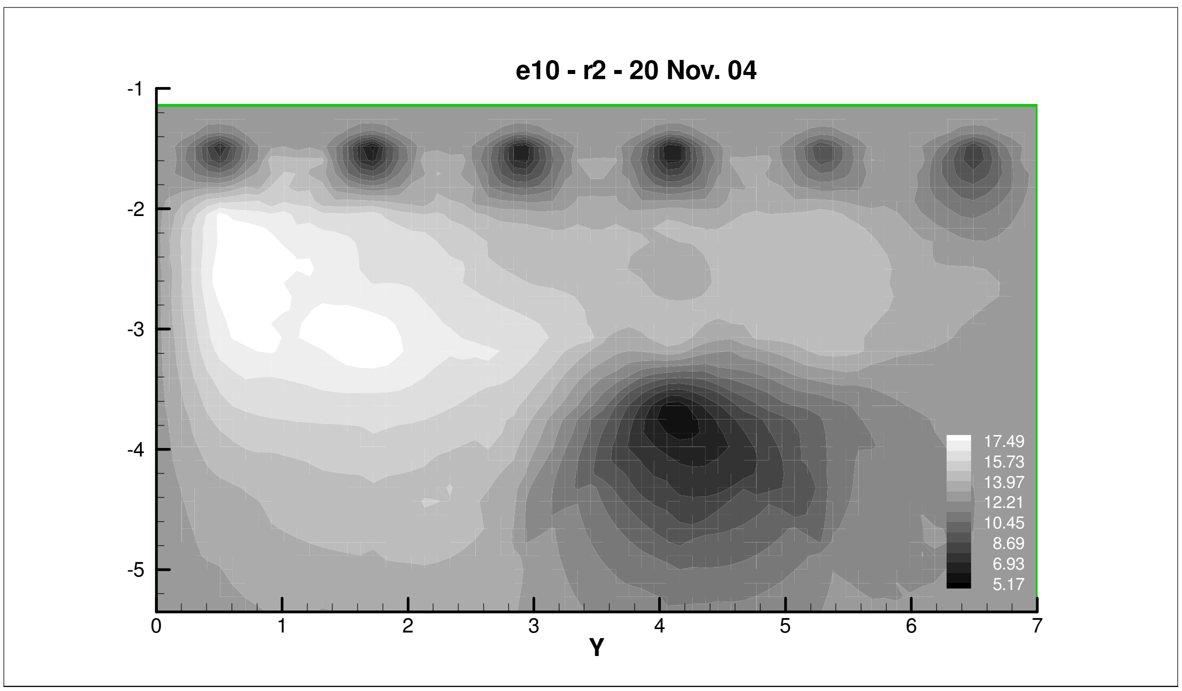


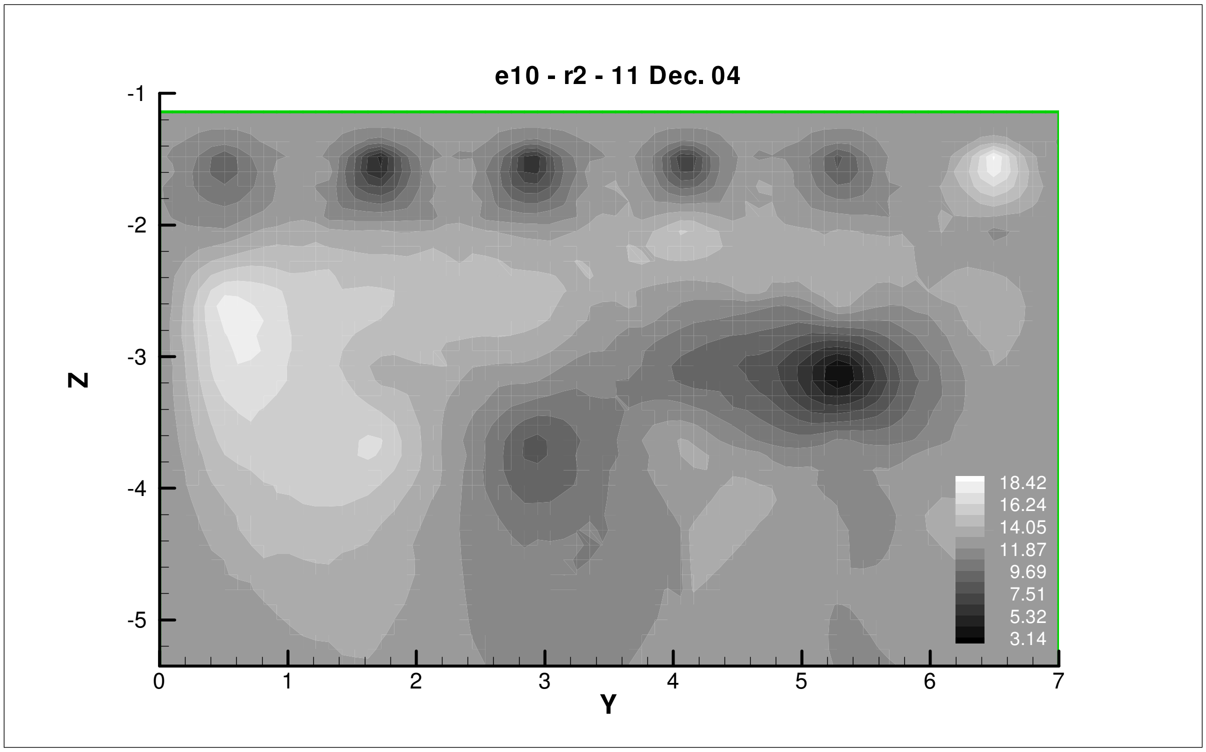


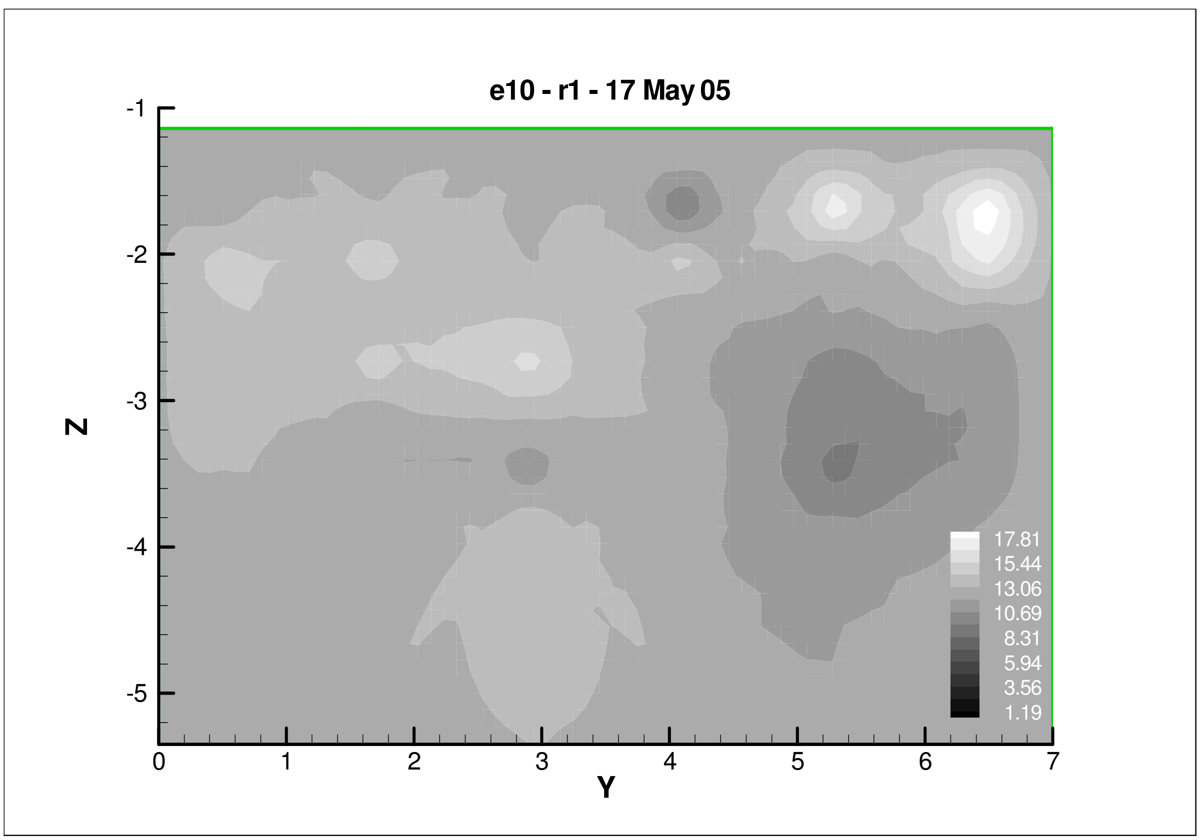


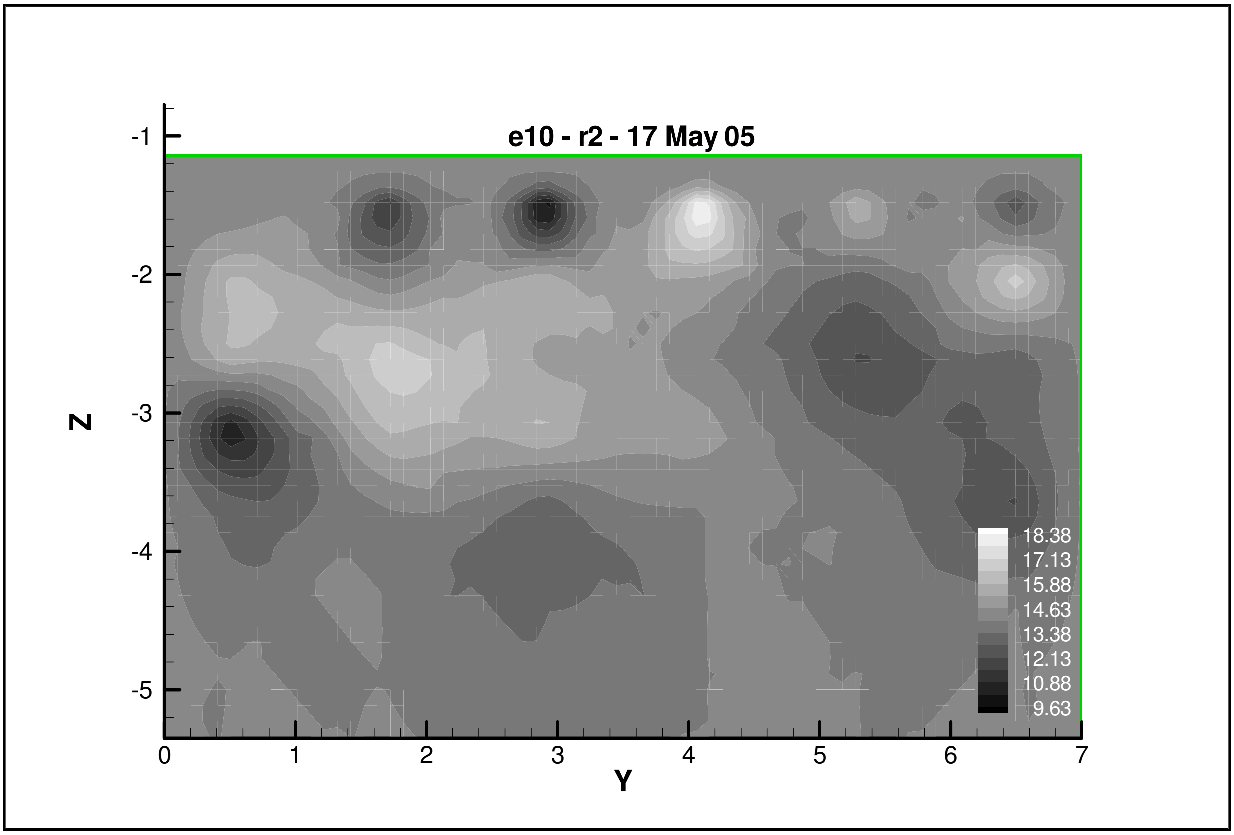
2. E10 A. Sulphate a. Row 1

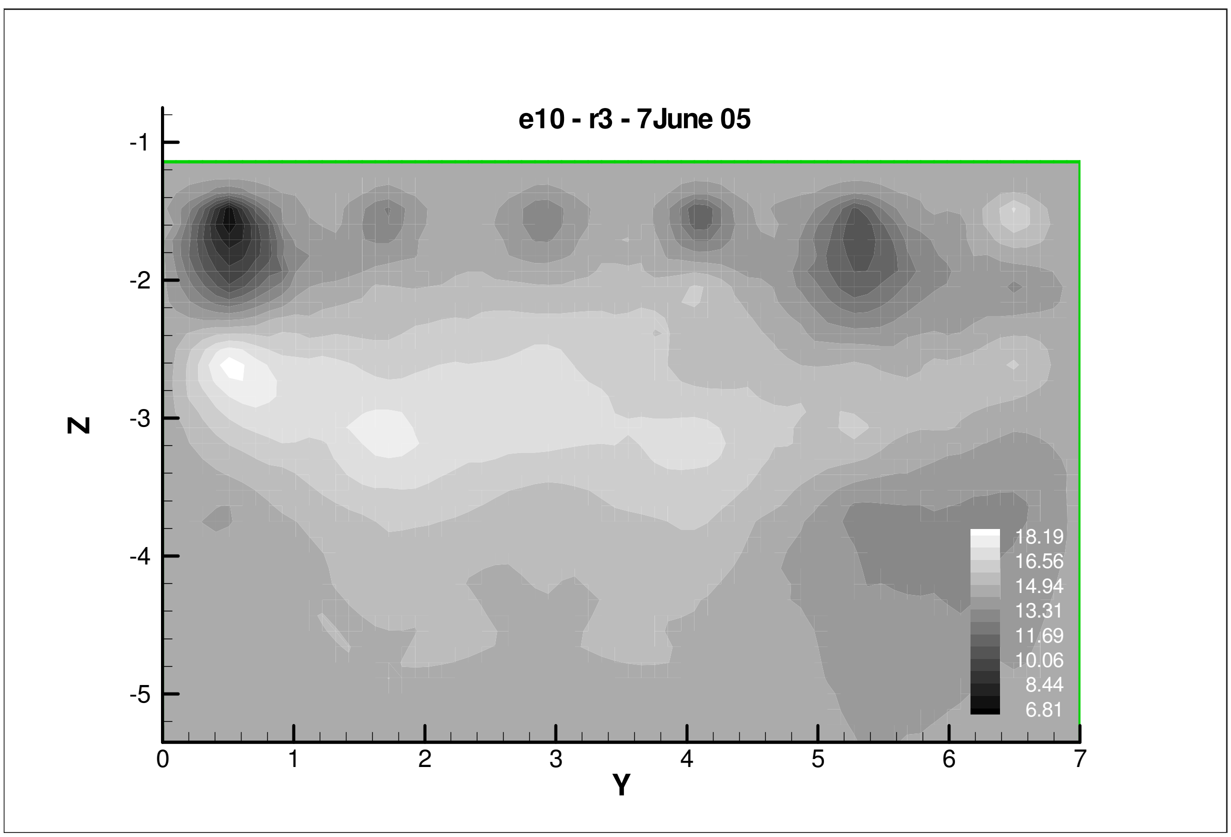

e10 - r1 - 20 Nov. 04
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
16.14
14.33
12.52
10.71
8.90
7.08
5.27
3.46

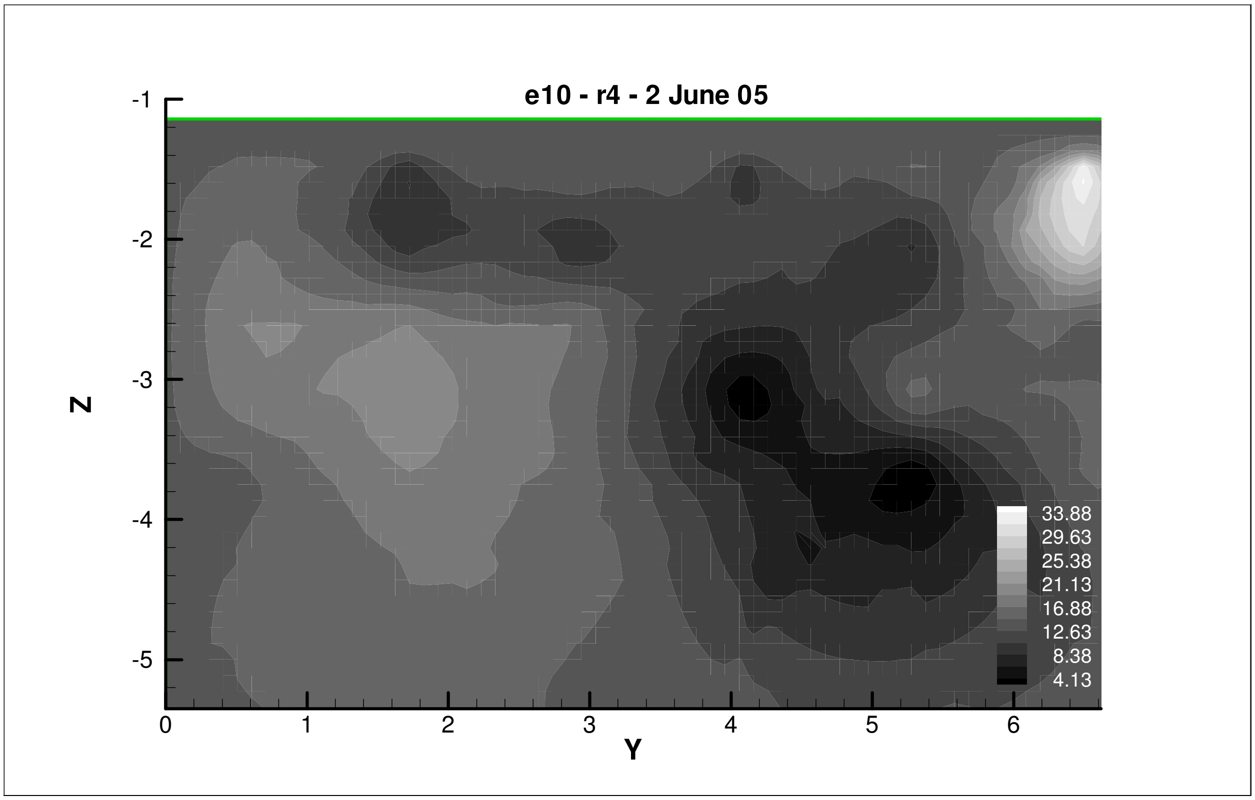

e10 - r2 - 20 Nov. 04
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
17.49
15.73
13.97
12.21
10.45
8.69
6.93
5.17


e10 - r2 - 11 Dec. 04
Z
Y
18.42
16.24
14.05
11.87
9.69
7.51
5.32
3.14


e10 - r1 - 17 May 05
Z
Y
17.81
15.44
13.06
10.69
8.31
5.94
3.56
1.19

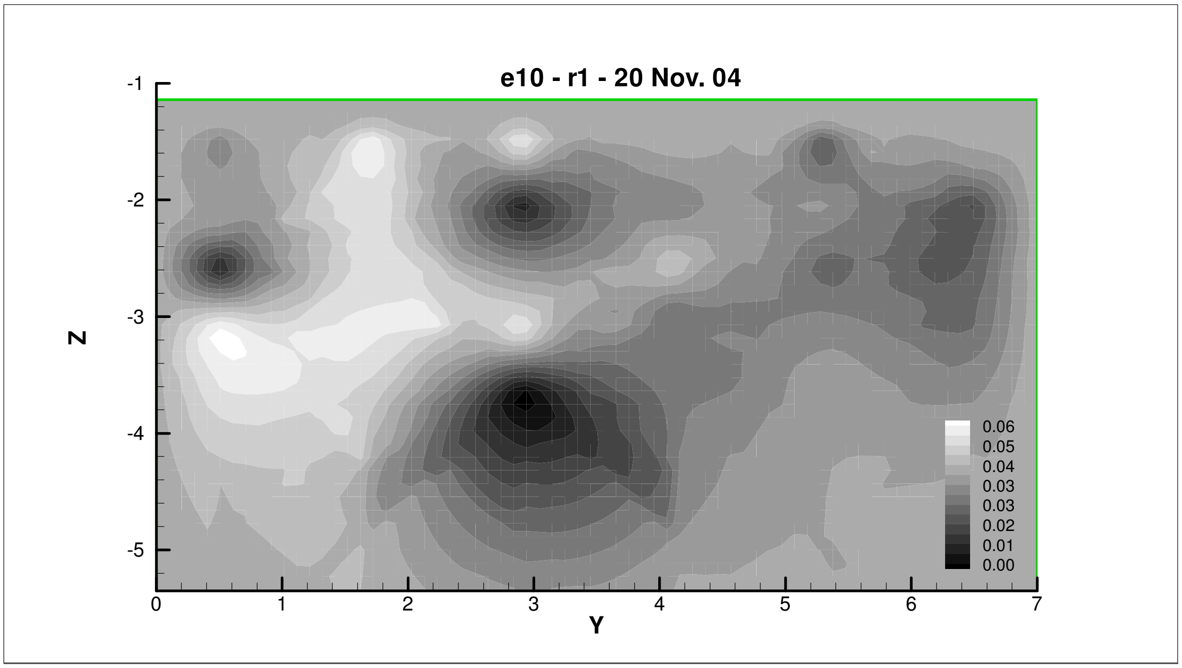

e10 - r2 - 17 May 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
18.38
17.13
15.88
14.63
13.38
12.13
10.88
9.63

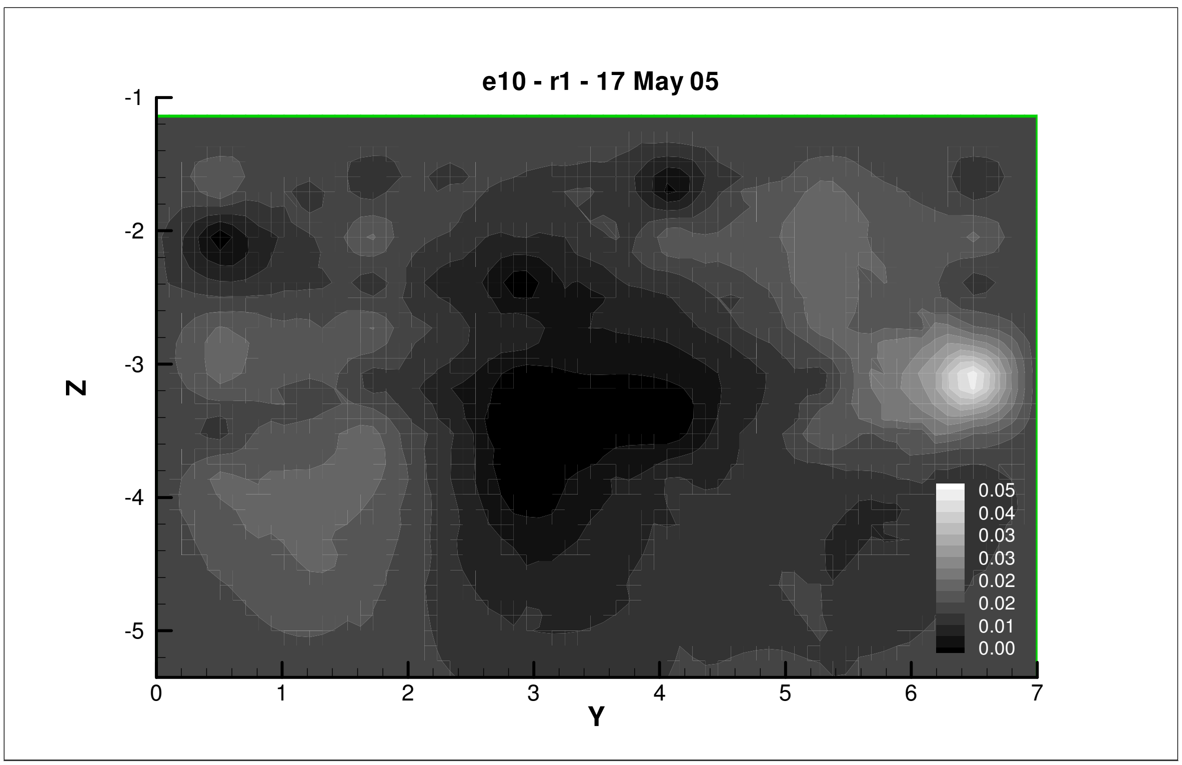

e10 - r3 - 7June 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
18.19
16.56
14.94
13.31
11.69
10.06
8.44
6.81

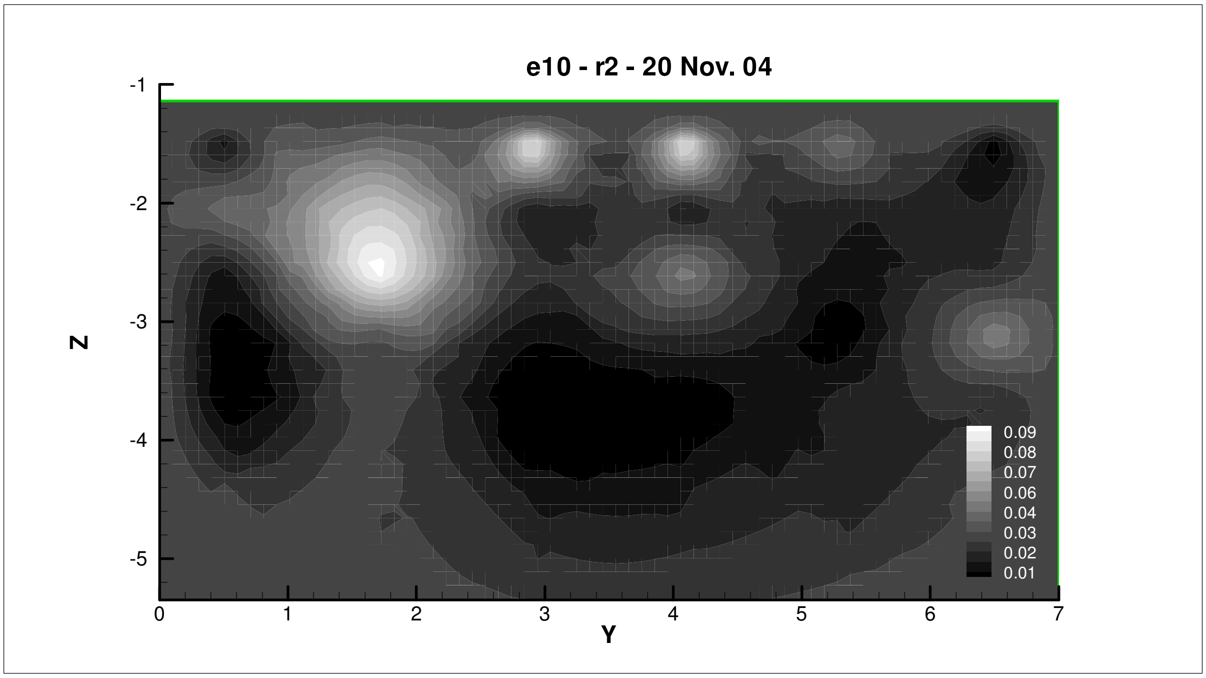


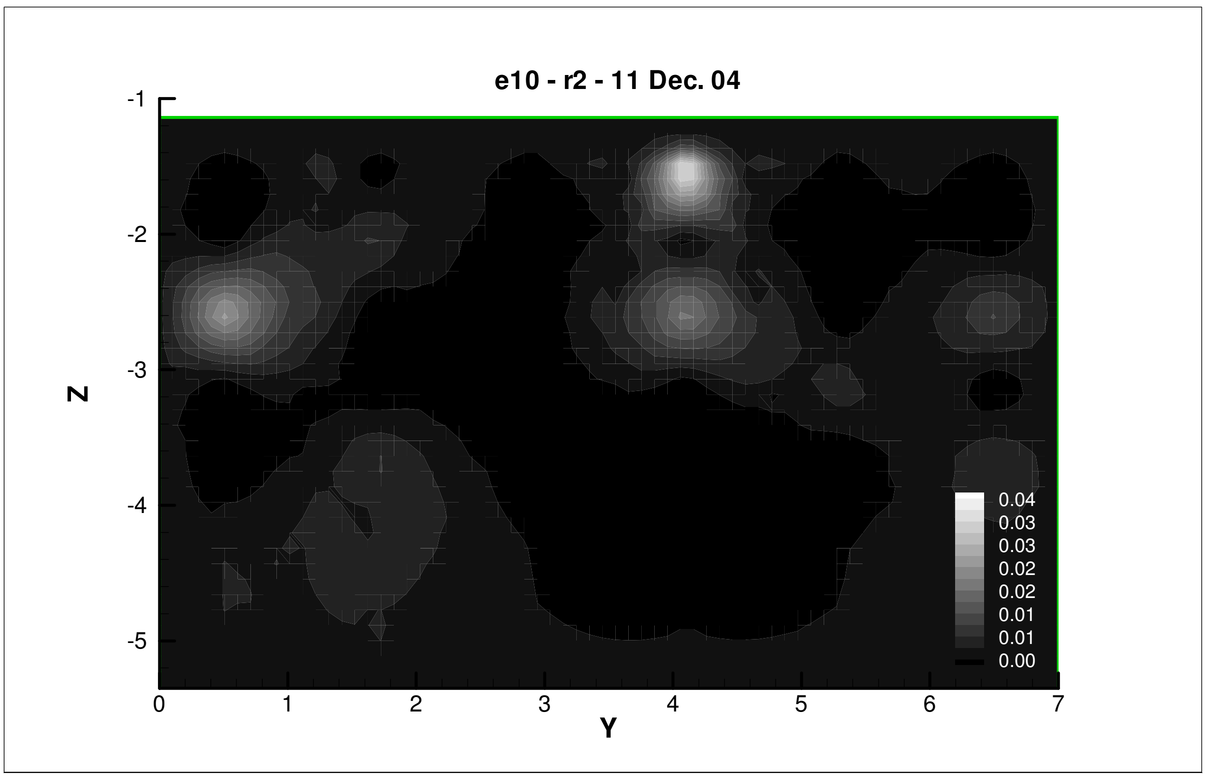
D. Inorganics

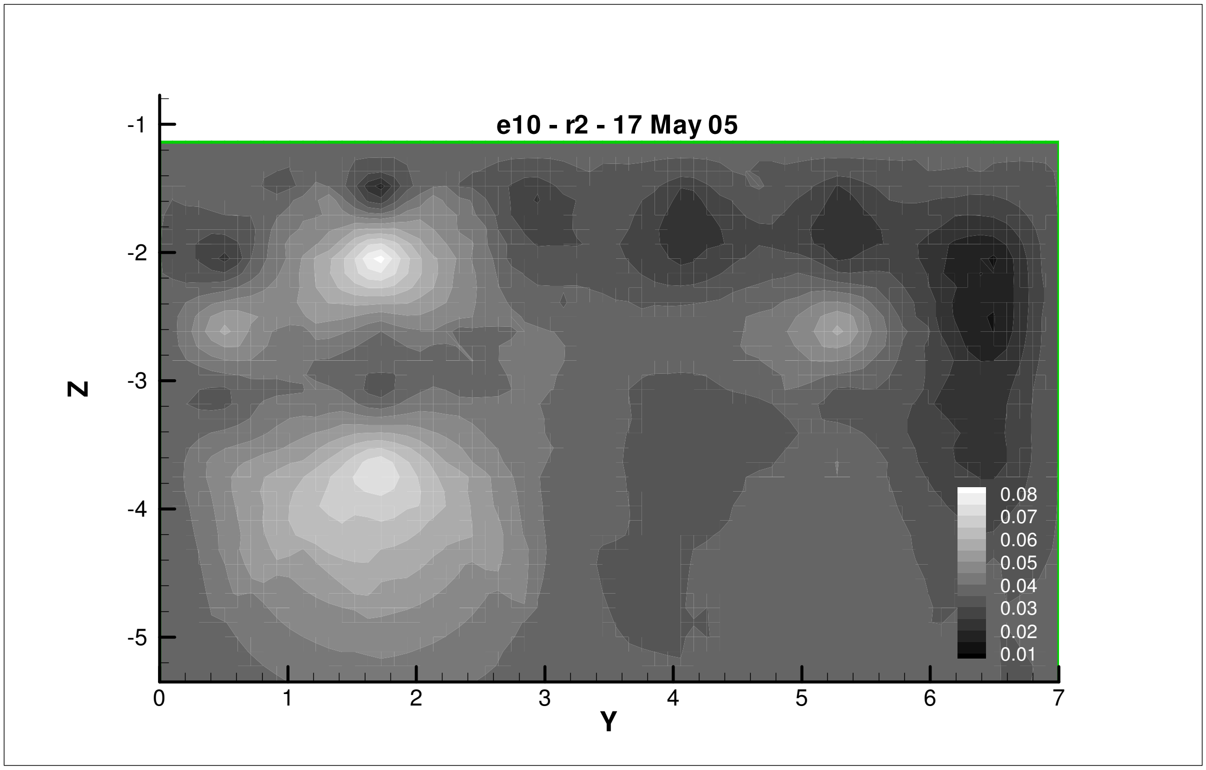
3. E10 B. Bivalent Iron

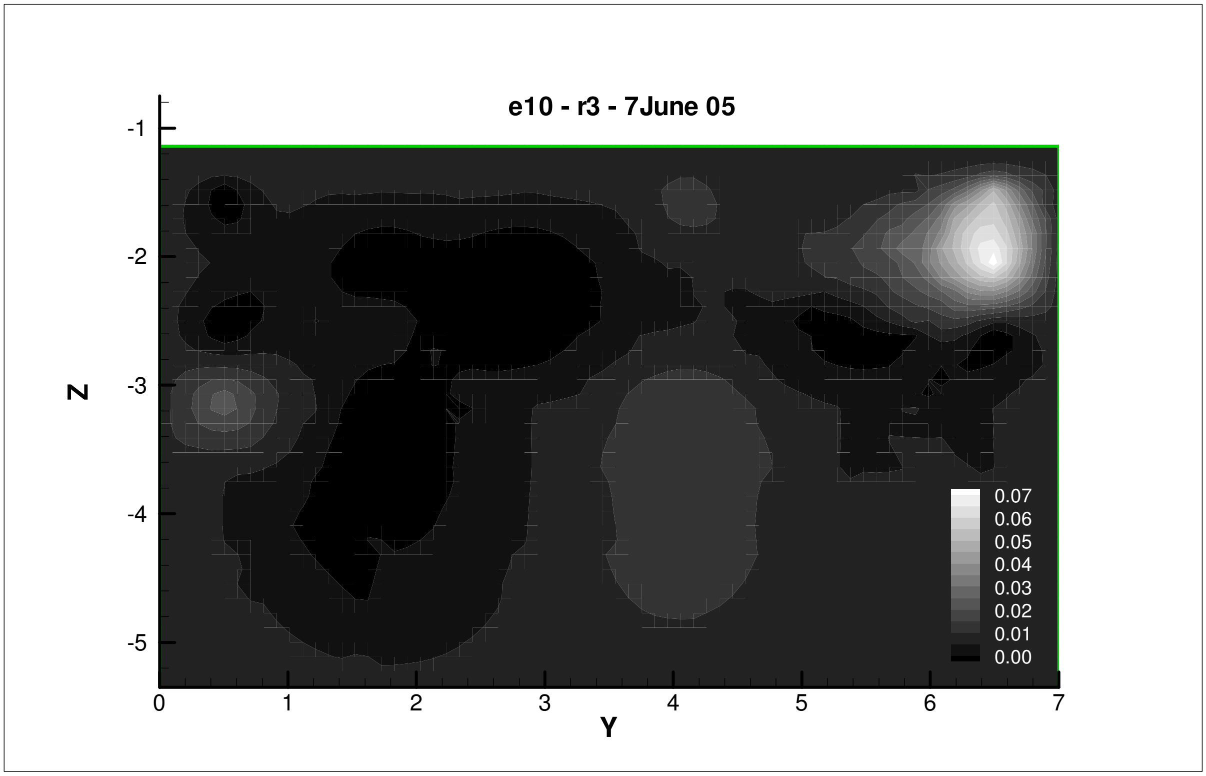

e10 - r1 - 20 Nov. 04
Z
-1
-2
-3
-4
-5
Y
0
1
2
3
4
5
6
7
0.06
0.05
0.04
0.03
0.03
0.02
0.01
0.00

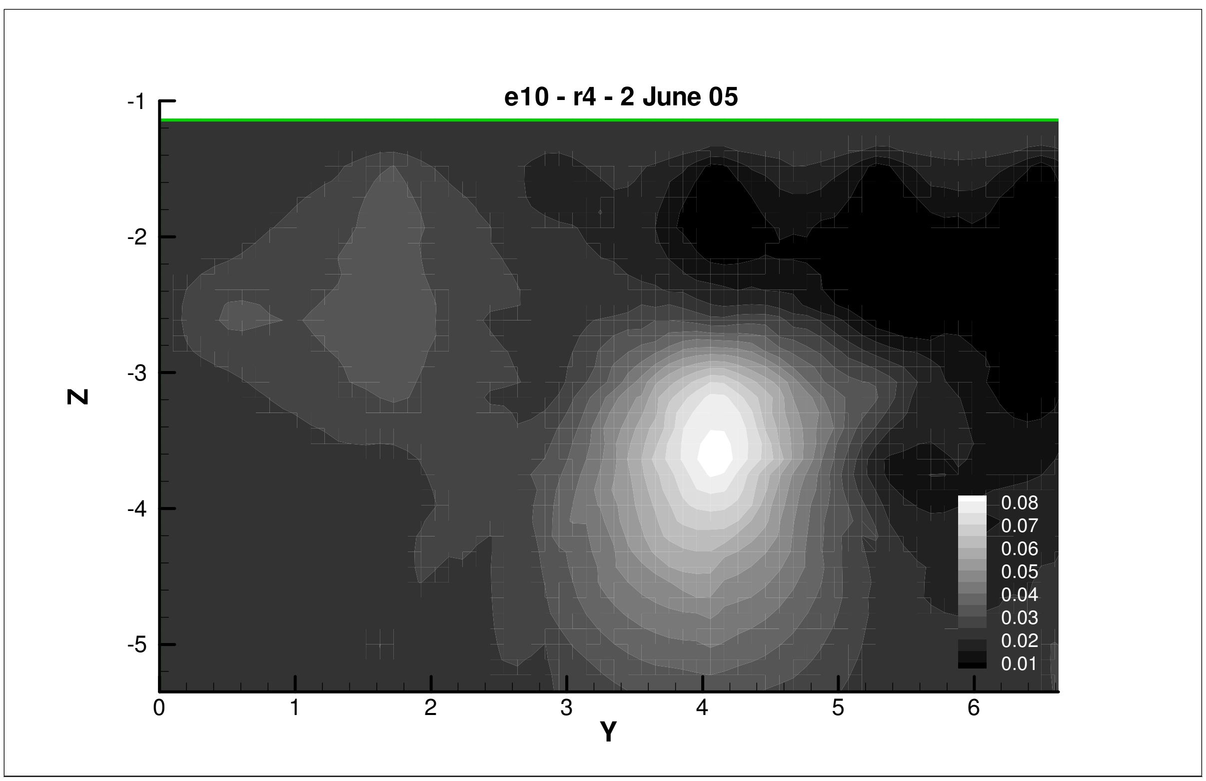

e10 - r1 - 17 May 05
Z
-1
-2
-3
-4
-5
Y
0
1
2
3
4
5
6
7
0.05
0.04
0.03
0.03
0.02
0.02
0.01
0.00


e10 - r2 - 20 Nov. 04
Z
-1
-2
-3
-4
-5
Y
0
1
2
3
4
5
6
7
0.09
0.08
0.07
0.06
0.04
0.03
0.02
0.01


e10 - r2 - 11 Dec. 04
Z
-1
-2
-3
-4
-5
Y
0
1
2
3
4
5
6
7
0.04
0.03
0.03
0.02
0.02
0.01
0.01
0.00

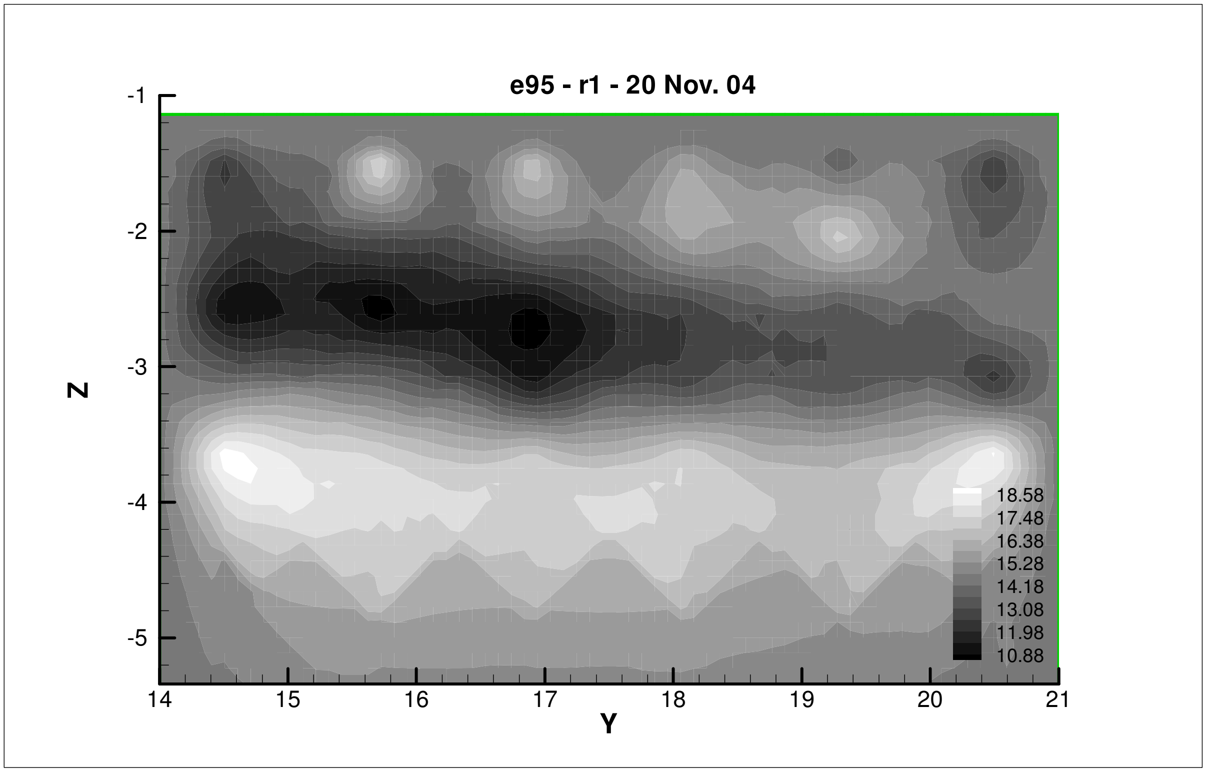

e10 - r2 - 17 May 05
Z
-1
-2
-3
-4
-5
Y
0
1
2
3
4
5
6
7
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01

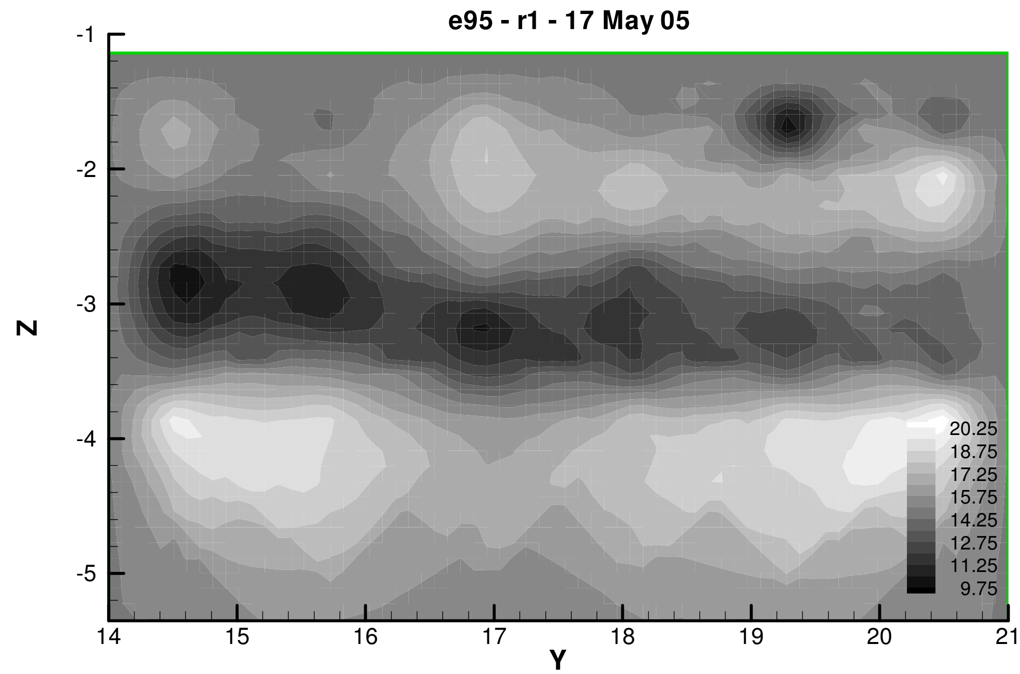

e10 - r3 - 7June 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00


e10 - r4 - 2 June 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01

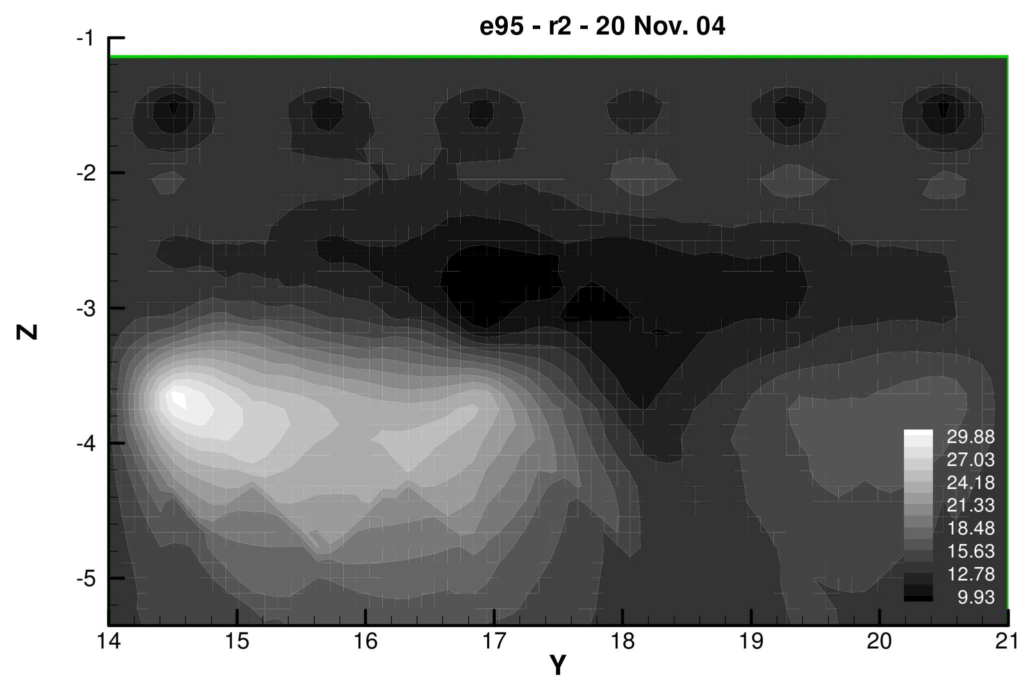
D. Inorganics

3. E95 A. Sulphate

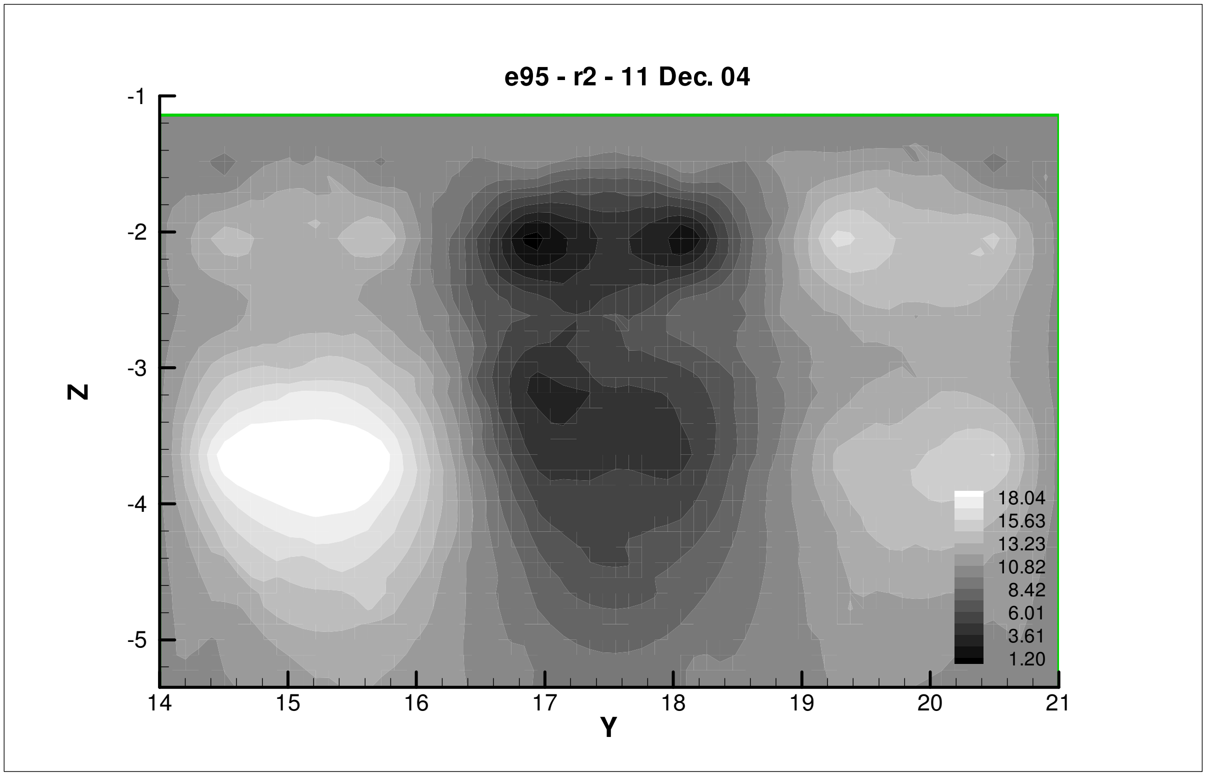


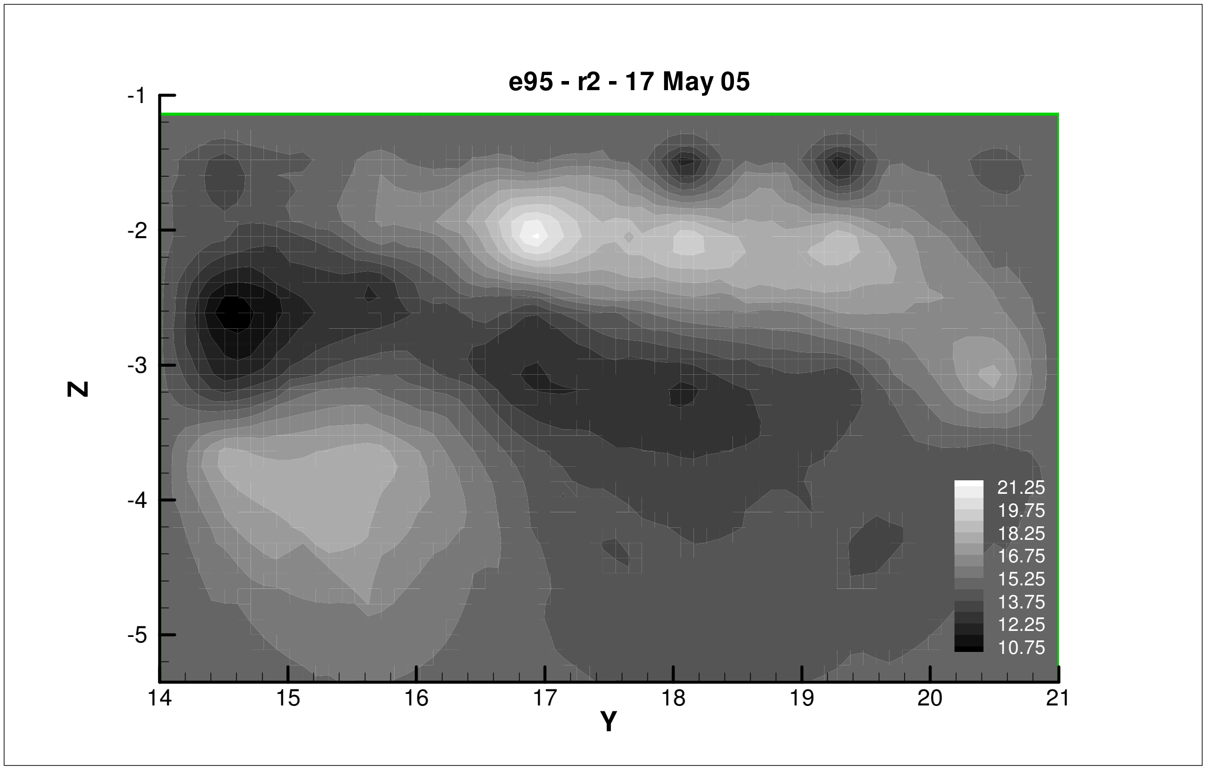


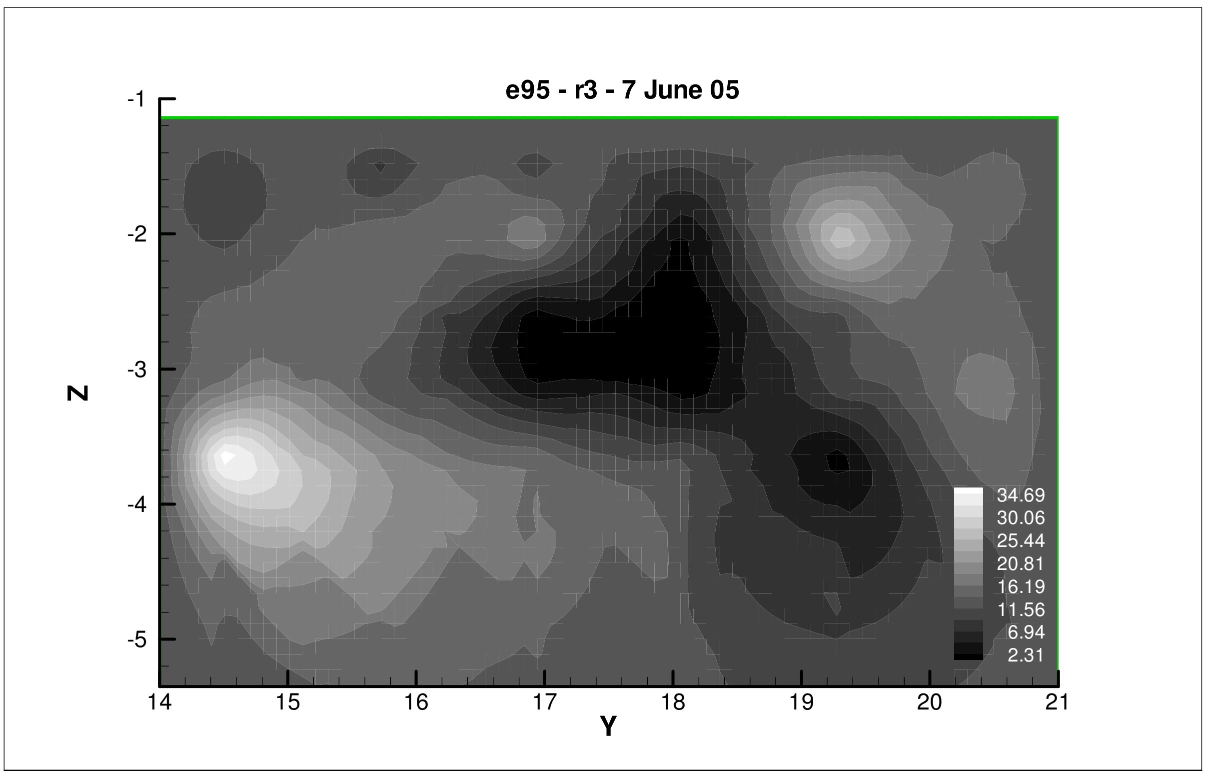
e95 - r1 - 17 May 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
20.25
18.75
17.25
15.75
14.25
12.75
11.25
9.75

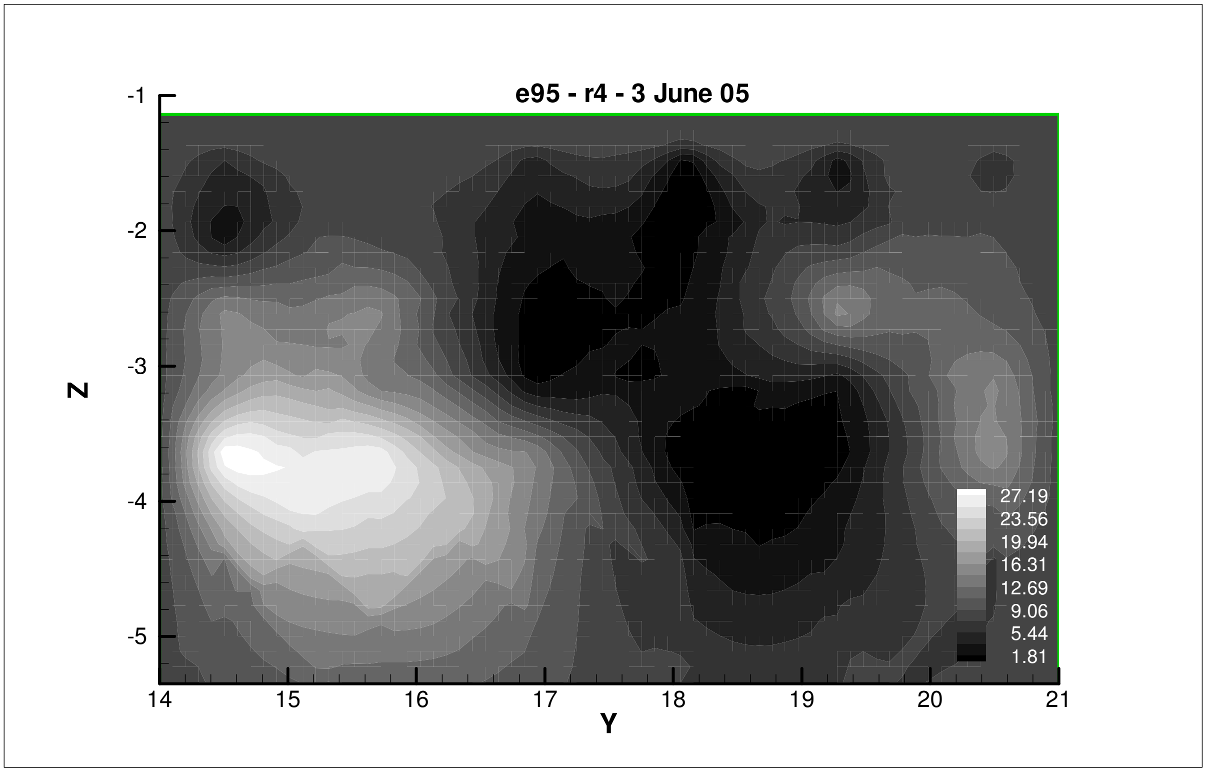


e95 - r2 - 20 Nov. 04
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
29.88
27.03
24.18
21.33
18.48
15.63
12.78
9.93

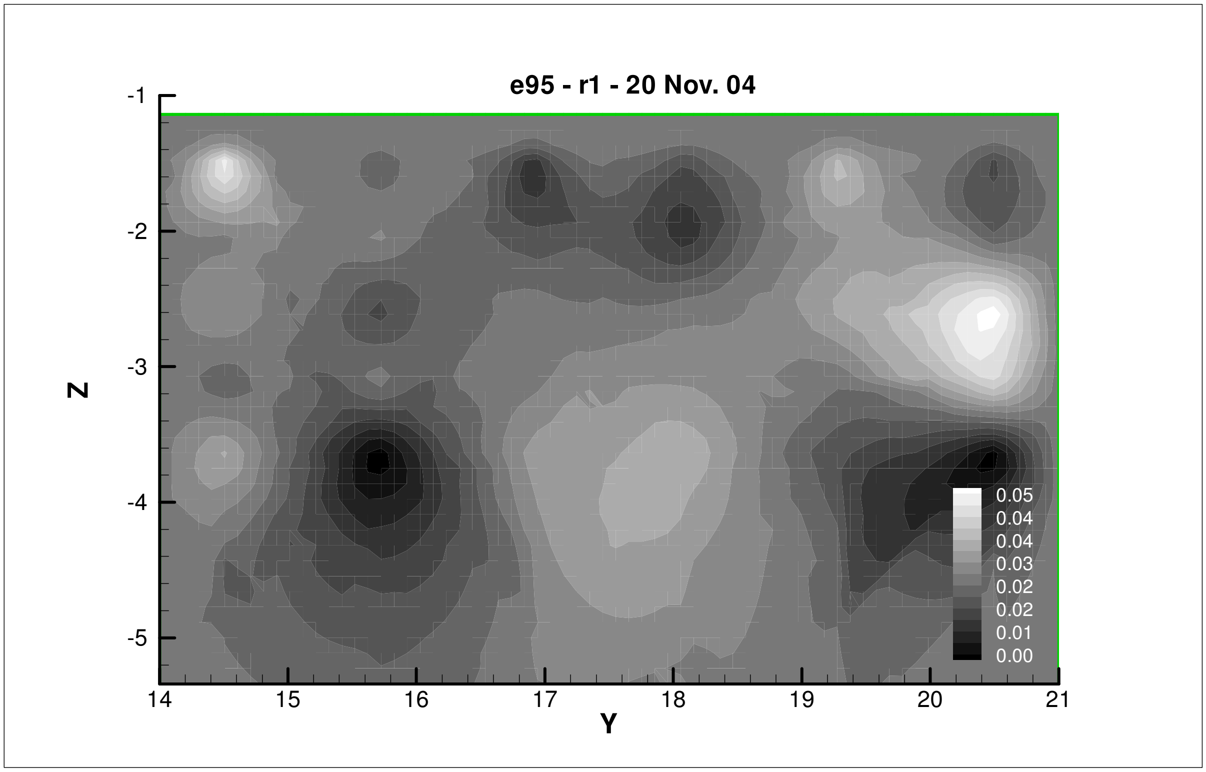

e95 - r2 - 11 Dec. 04
Z
-1
-2
-3
-4
-5
Y
14
15
16
17
18
19
20
21
18.04
15.63
13.23
10.82
8.42
6.01
3.61
1.20

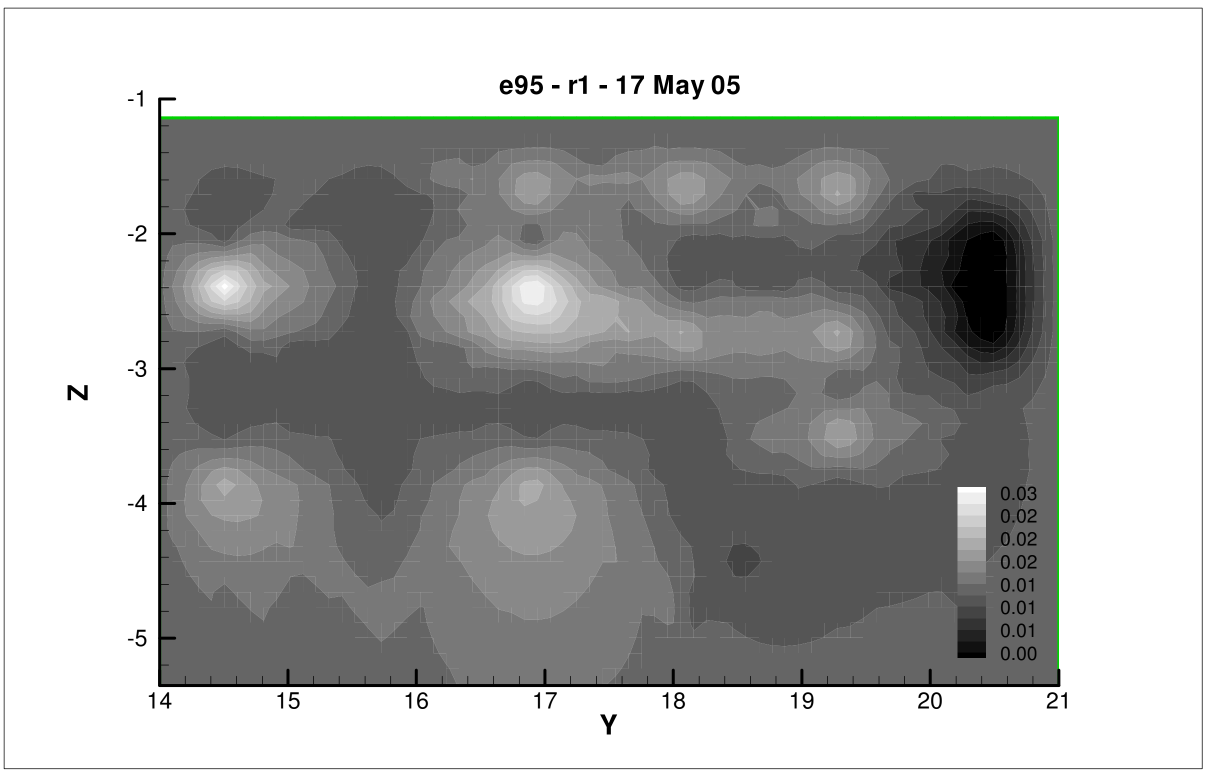

e95 - r2 - 17 May 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
21.25
19.75
18.25
16.75
15.25
13.75
12.25
10.75

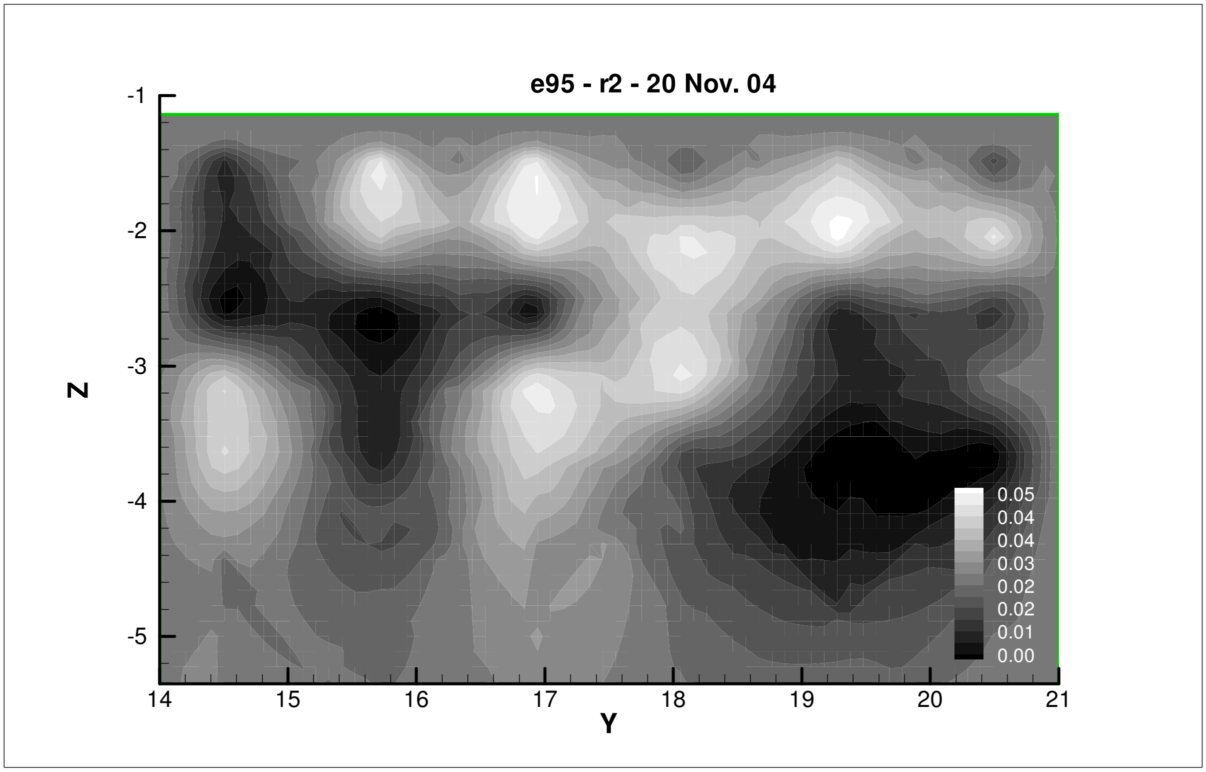

e95 - r3 - 7 June 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
34.69
30.06
25.44
20.81
16.19
11.56
6.94
2.31

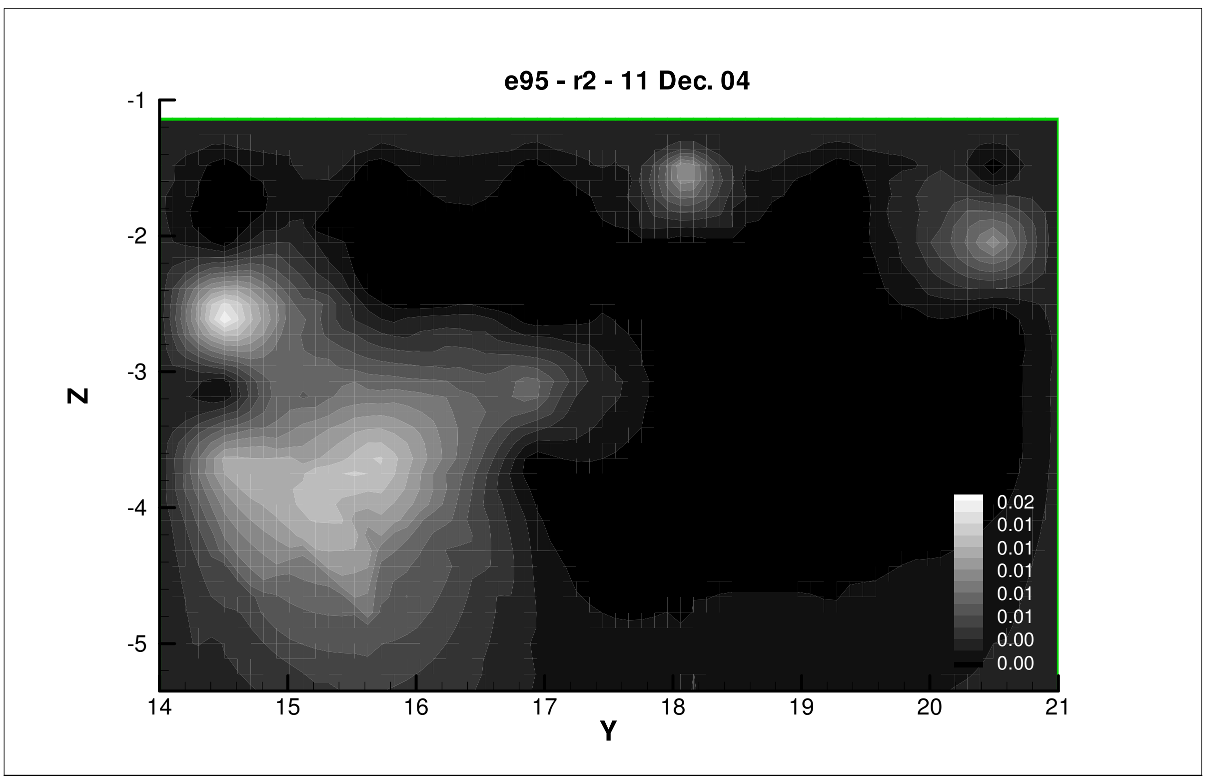


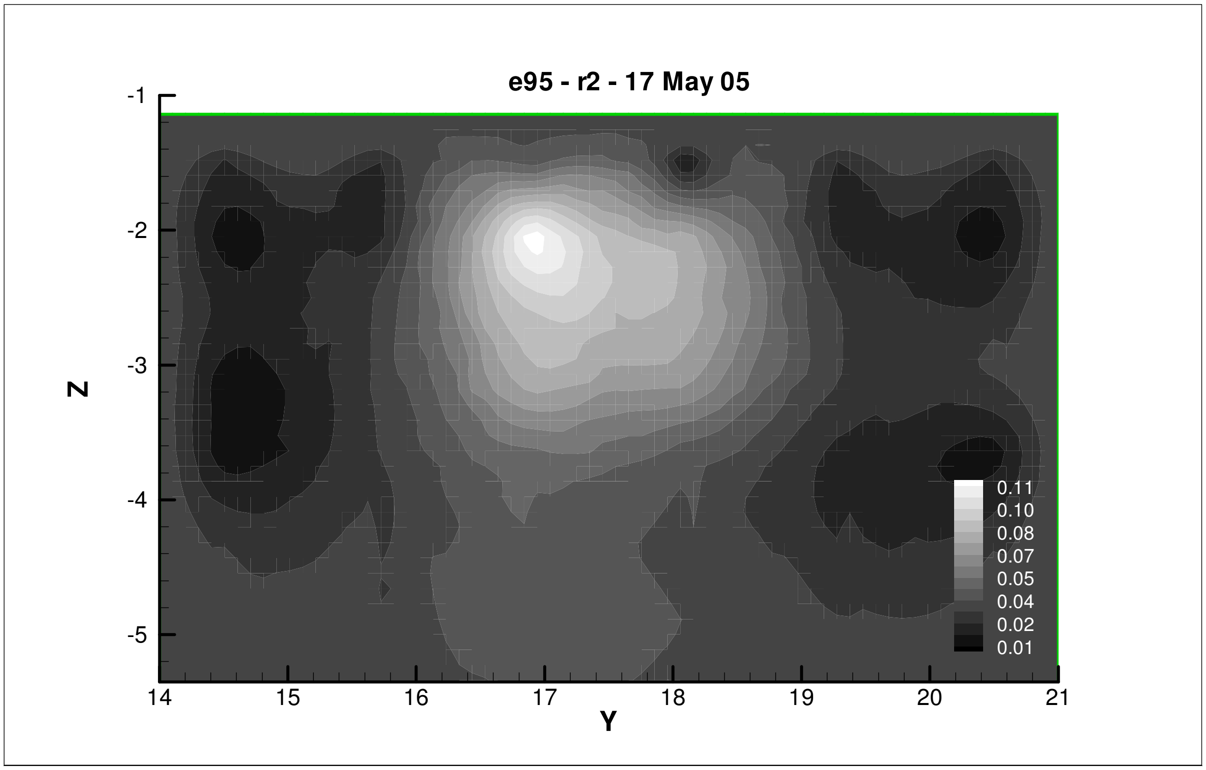
D. Inorganics 3. E95 B. Bivalent Iron

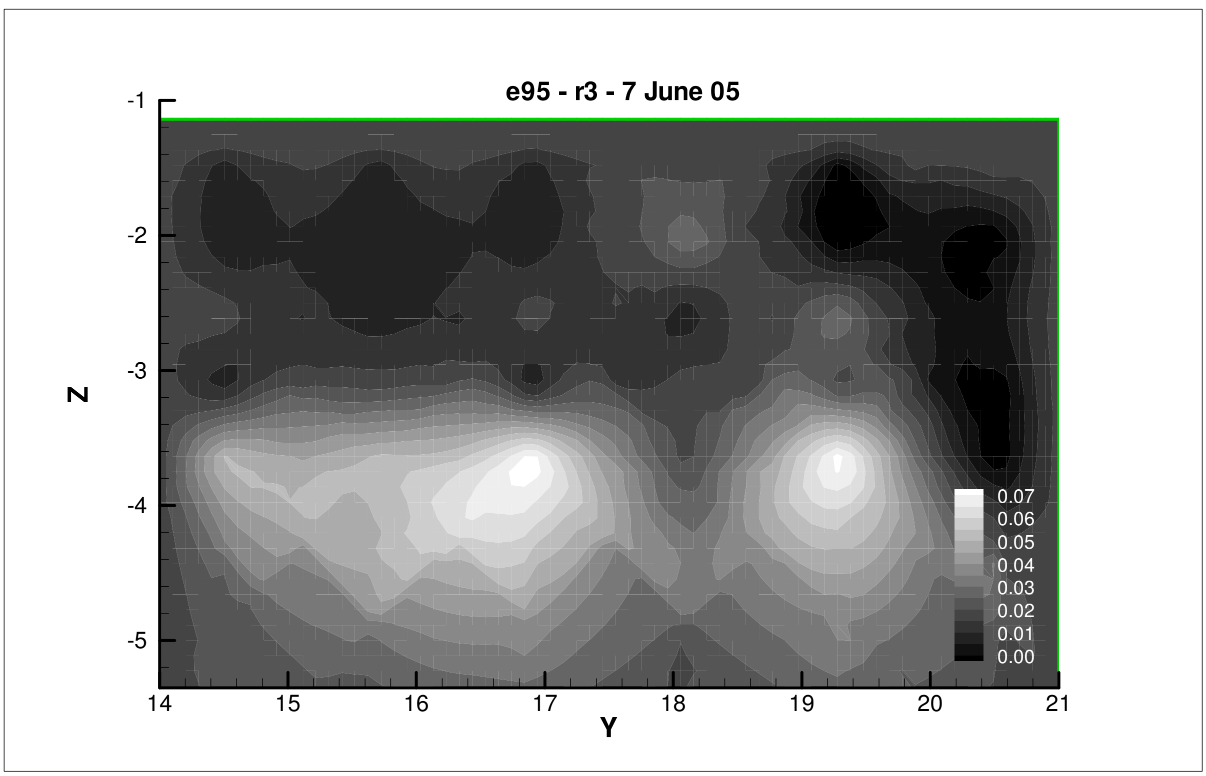

e95 - r1 - 20 Nov. 04
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
0.05
0.04
0.04
0.03
0.02
0.02
0.01
0.00

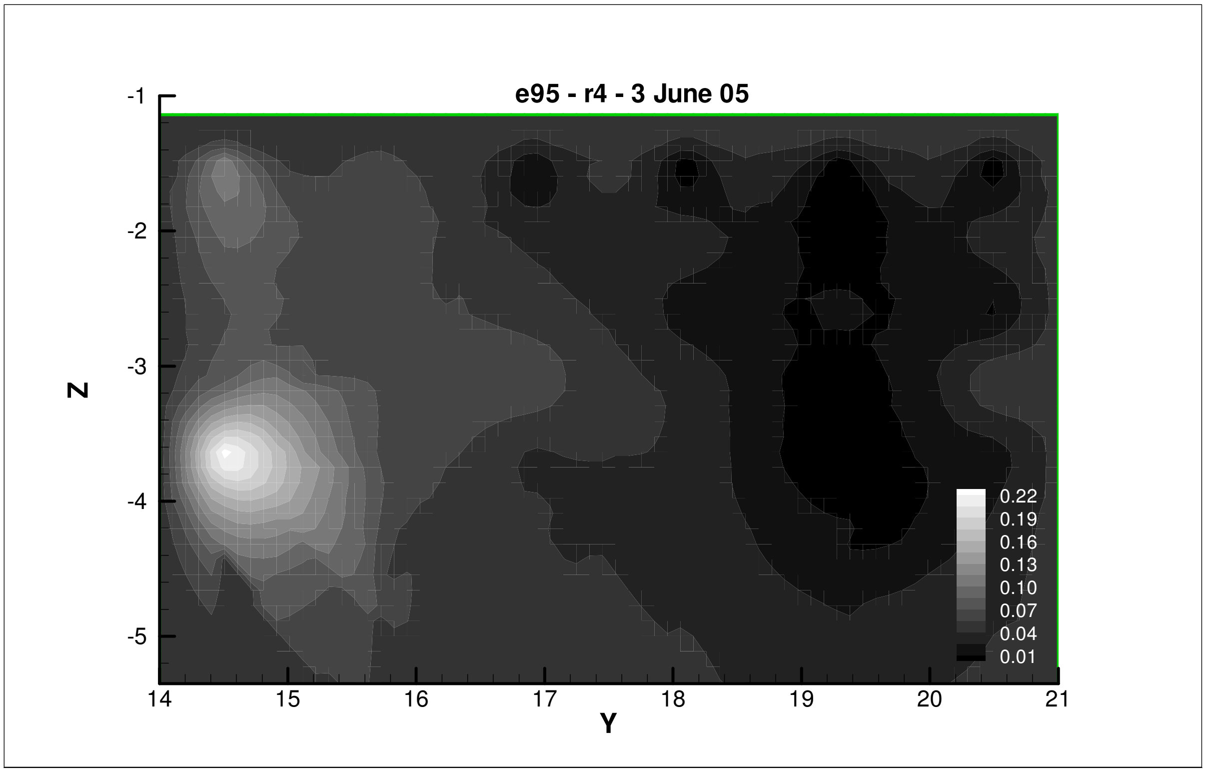

e95 - r1 - 17 May 05
-1
-2
-3
-4
-5
Z
14
15
16
17
18
19
20
21
Y
0.03
0.02
0.02
0.02
0.01
0.01
0.01
0.00


e95 - r2 - 20 Nov. 04
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
0.05
0.04
0.04
0.03
0.02
0.02
0.01
0.00


e95 - r2 - 11 Dec. 04
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
0.02
0.01
0.01
0.01
0.01
0.01
0.00
0.00


e95 - r2 - 17 May 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
0.11
0.10
0.08
0.07
0.05
0.04
0.02
0.01

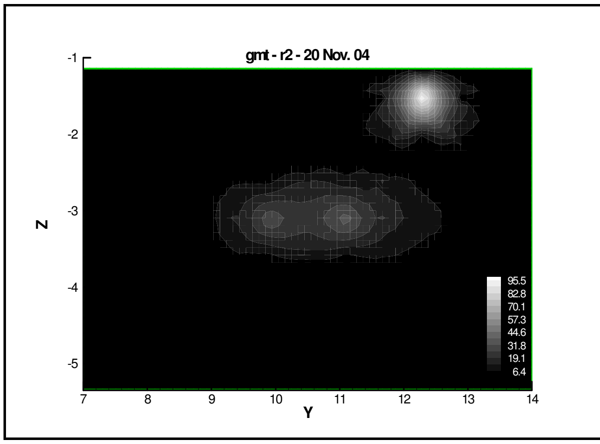

e95 - r3 - 7 June 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00

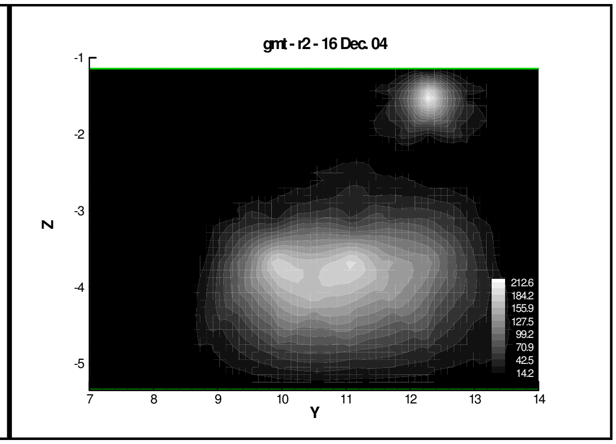

e95 - r4 - 3 June 05
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
0.22
0.19
0.16
0.13
0.10
0.07
0.04
0.01

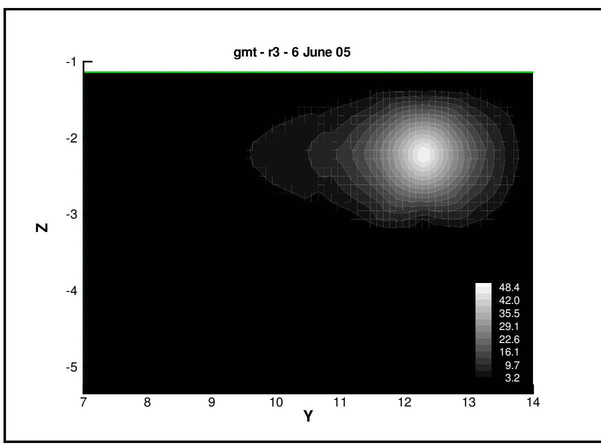
Appendix 2 (Cross Sections)

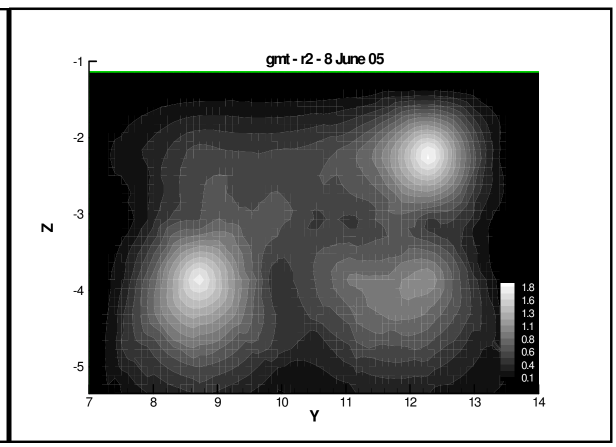
E. Methane

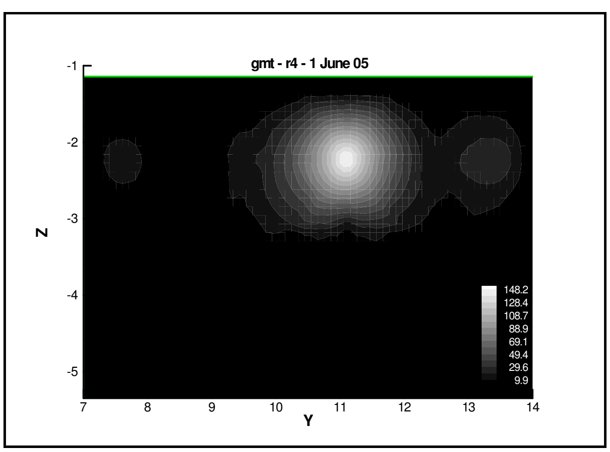
1. GMT



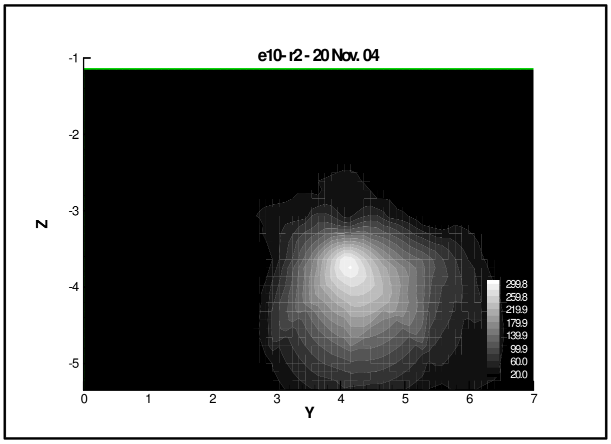


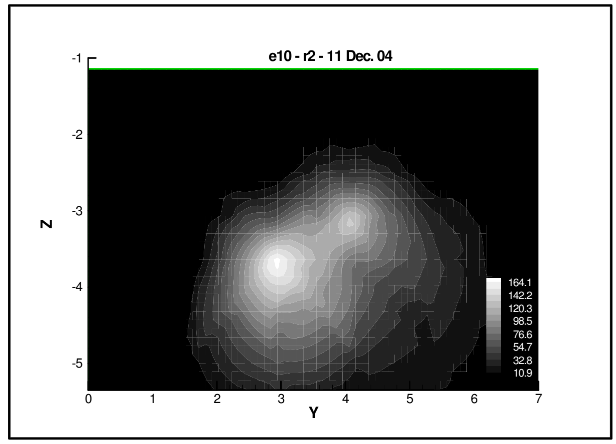






2. E10


e10- r2 - 20 Nov. 04
Z
Y
299.8
259.8
219.9
179.9
139.9
99.9
60.0
20.0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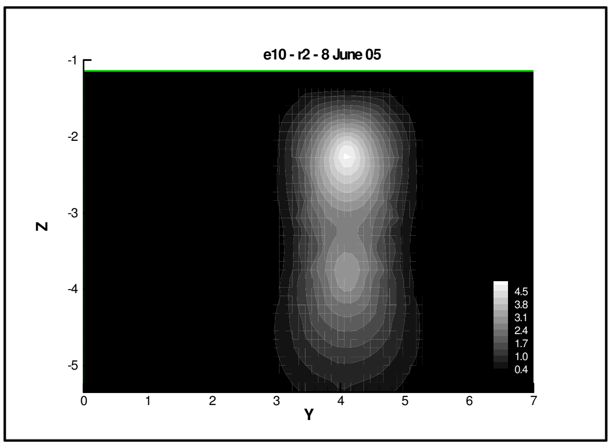
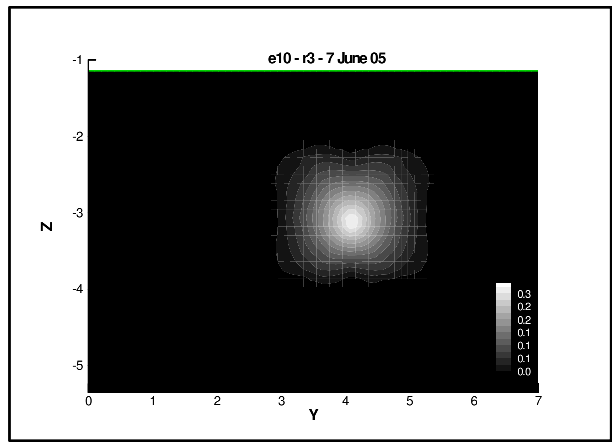
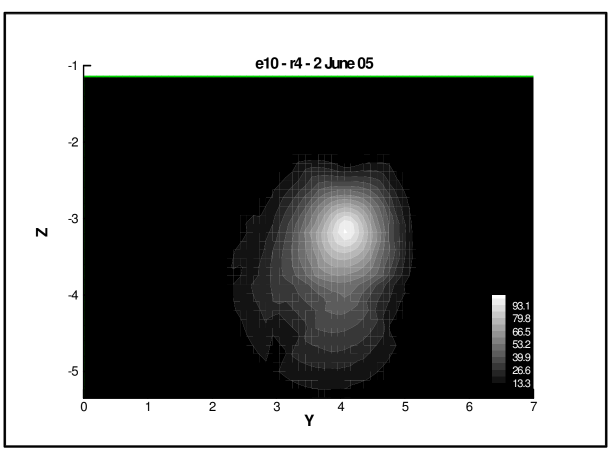
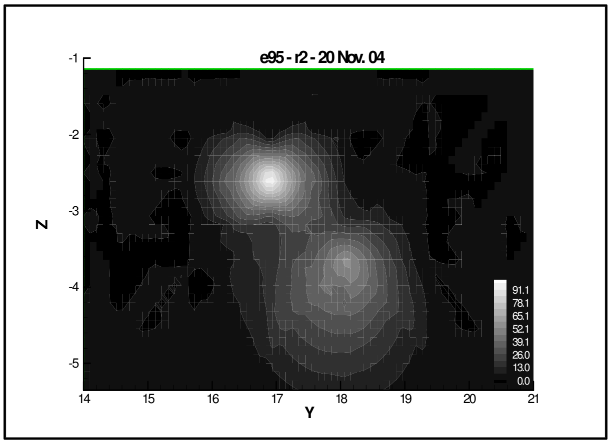
Z
Y
164.1
142.2
120.3
98.5
76.6
54.7
32.8
10.9

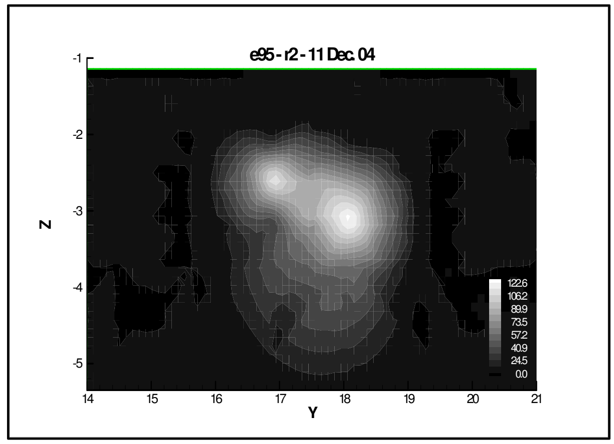

e10 - r2 - 8 June 05
Z
Y
4.5
3.8
3.1
2.4
1.7
1.0
0.4

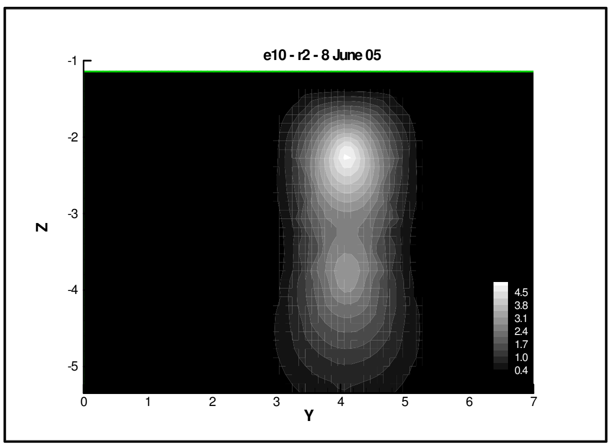

e10 - r3 - 7 June 05
Z
Y
0.3
0.2
0.2
0.1
0.1
0.1
0.0

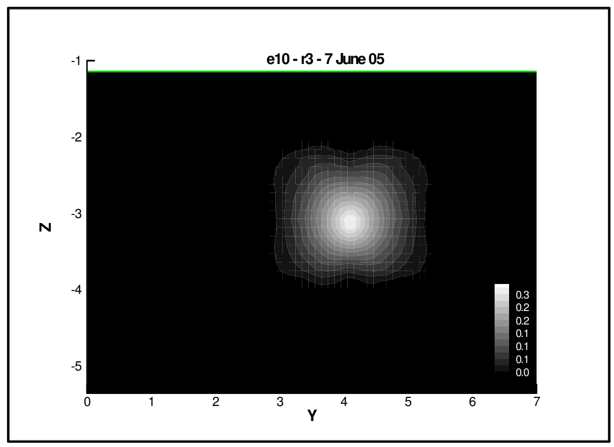

e10 - r4 - 2 June 05
Z
Y
93.1
79.8
66.5
53.2
39.9
26.6
13.3

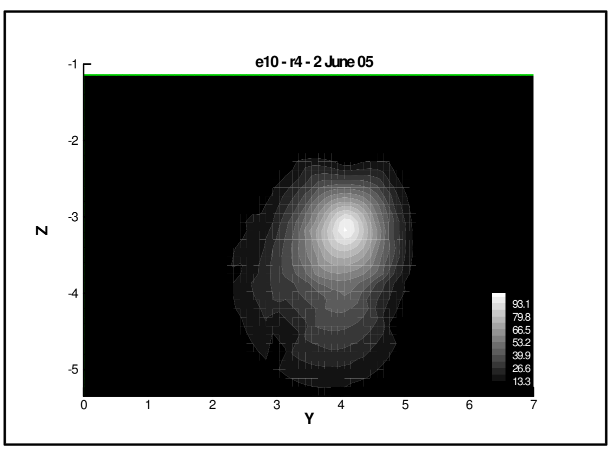
3. E95


e95 - r2 - 20 Nov. 04
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
91.1
78.1
65.1
52.1
39.1
26.0
13.0
0.0


e95 - r2 - 11 Dec. 04
Z
Y
-1
-2
-3
-4
-5
14
15
16
17
18
19
20
21
122.6
106.2
89.9
73.5
57.2
40.9
24.5
0.0


e10 - r2 - 8 June 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
4.5
3.8
3.1
2.4
1.7
1.0
0.4

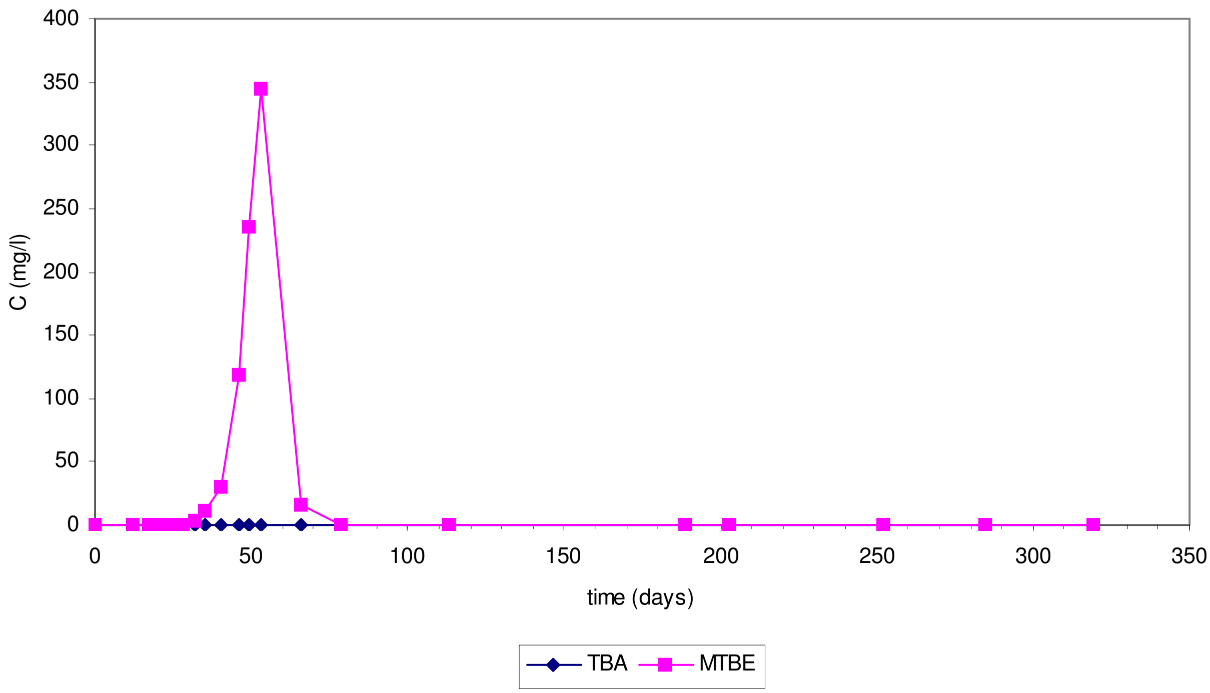

e10 - r3 - 7 June 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
0.3
0.2
0.2
0.1
0.1
0.1
0.0

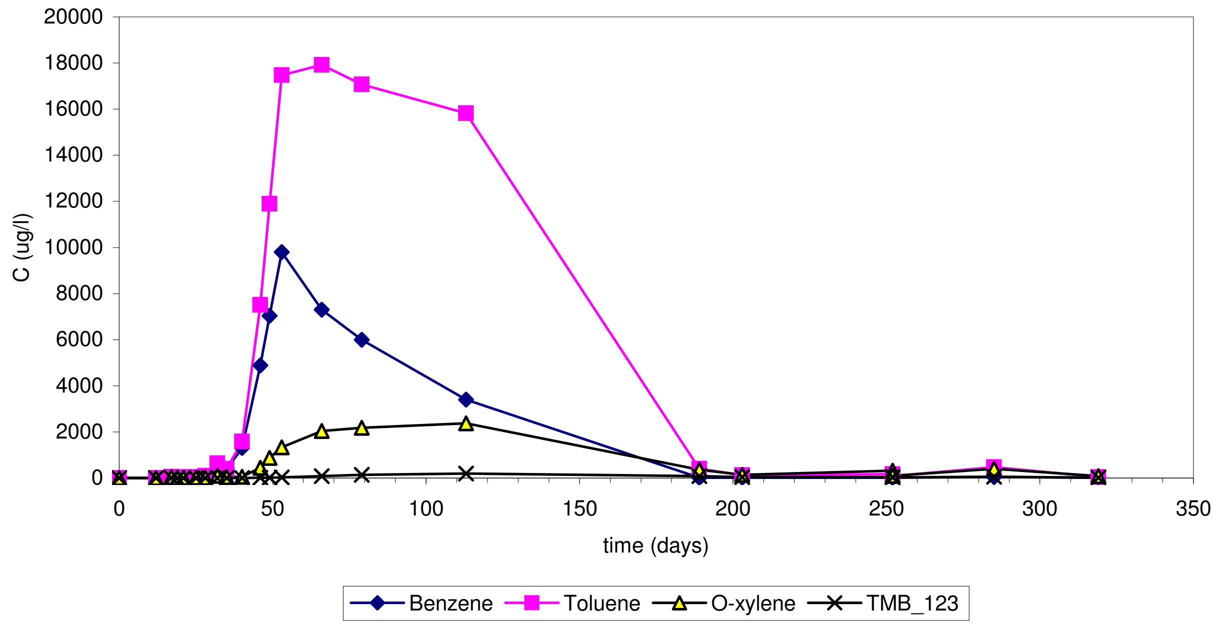

e10 - r4 - 2 June 05
Z
Y
-1
-2
-3
-4
-5
0
1
2
3
4
5
6
7
93.1
79.8
66.5
53.2
39.9
26.6
13.3

Appendix 3 - Breakthrough Curves

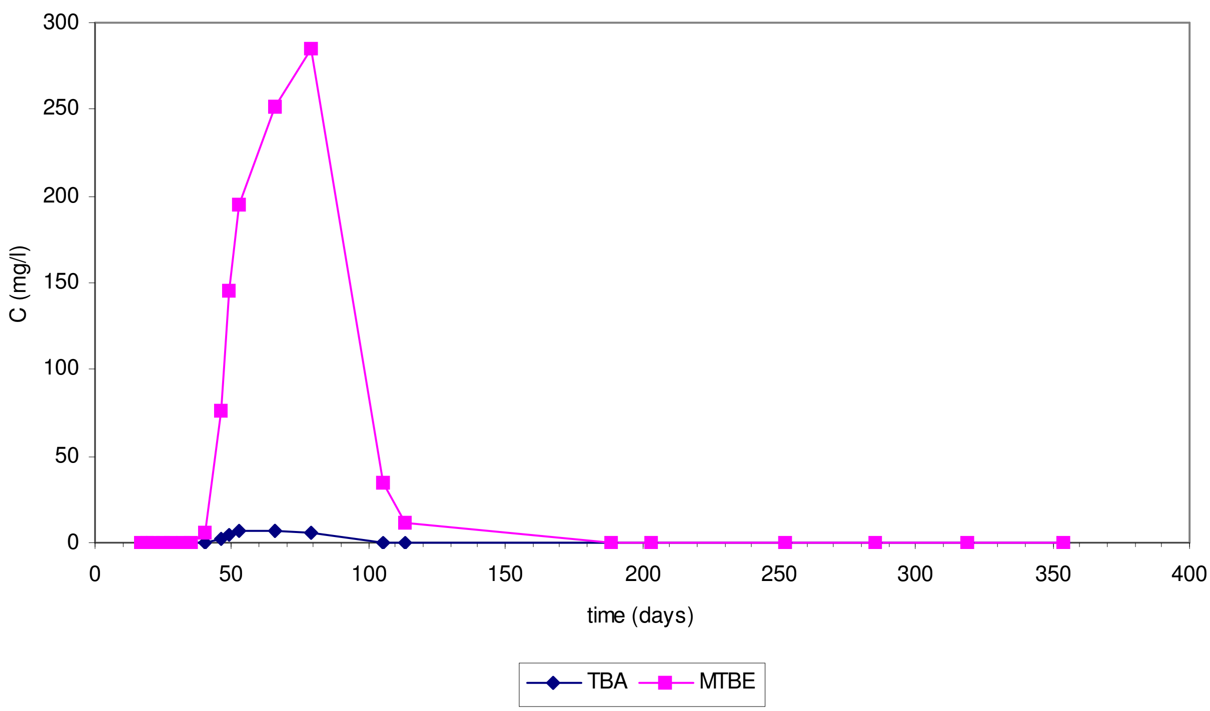
A.GMT a. Row 2

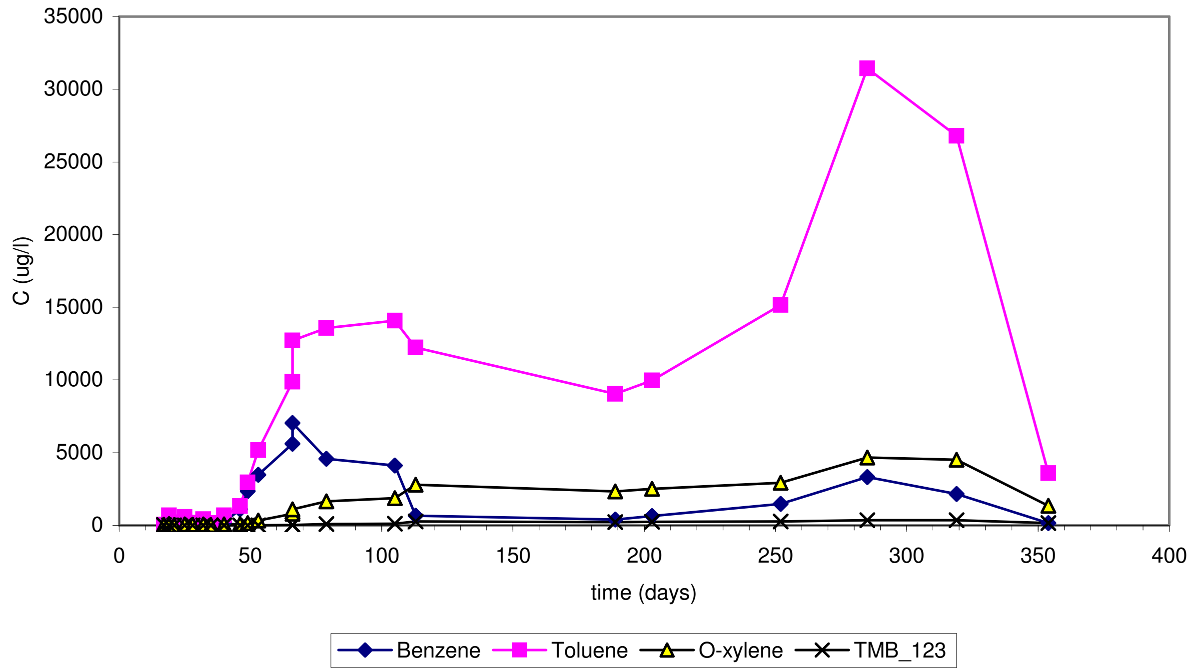
R2-3-6



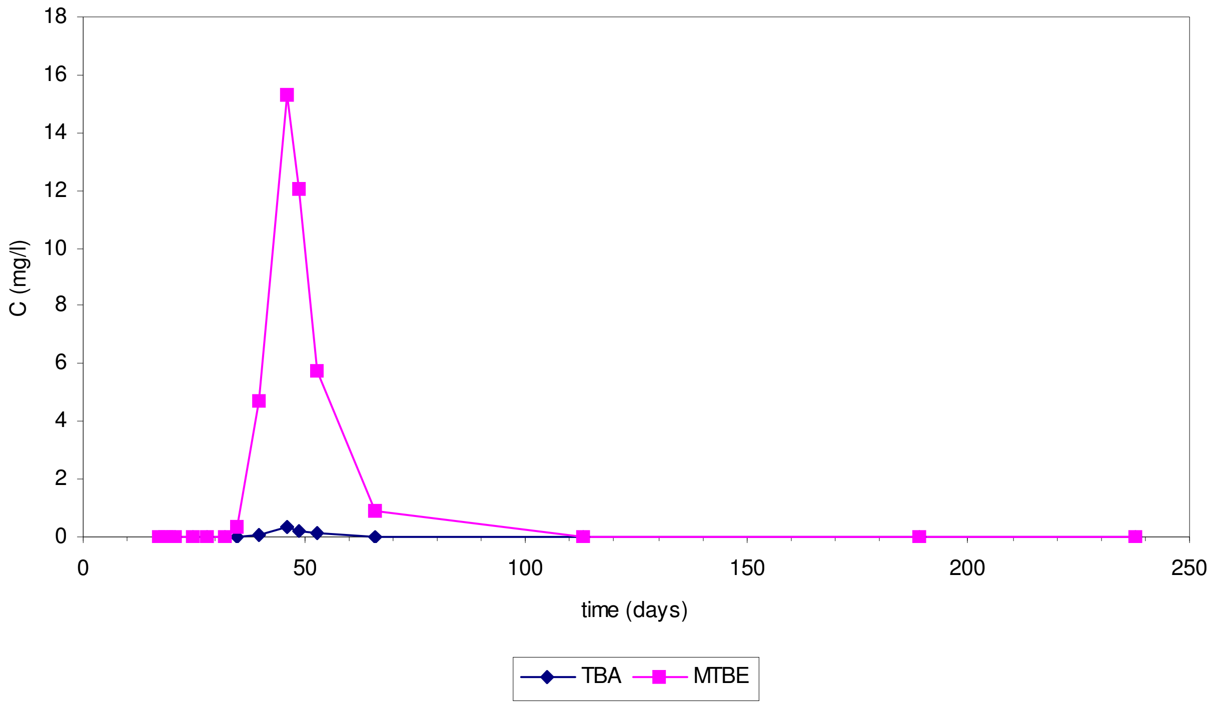

20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
C (ug/l)
0
50
100
150
200
250
300
350
time (days)
Benzene
Toluene
O-xylene
TMB_123

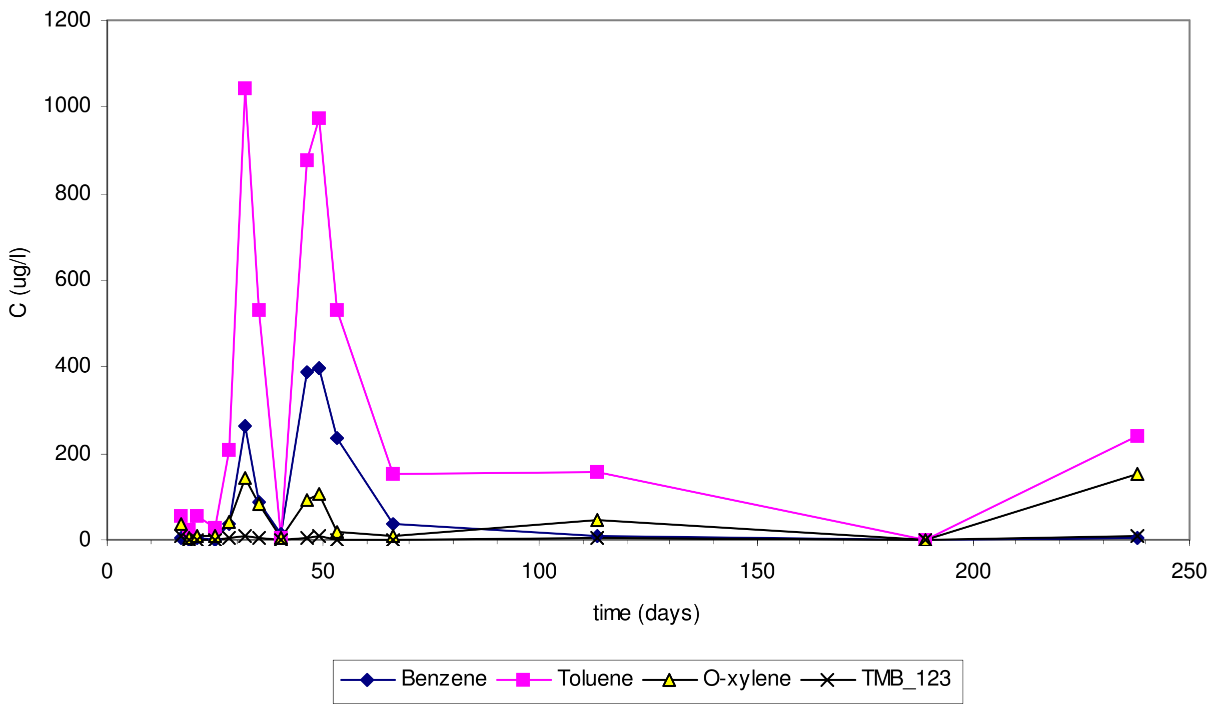
R2-4-11


300
250
200
150
100
50
0
C (mg/l)
0
50
100
150
200
250
300
350
400
time (days)
TBA
MTBE

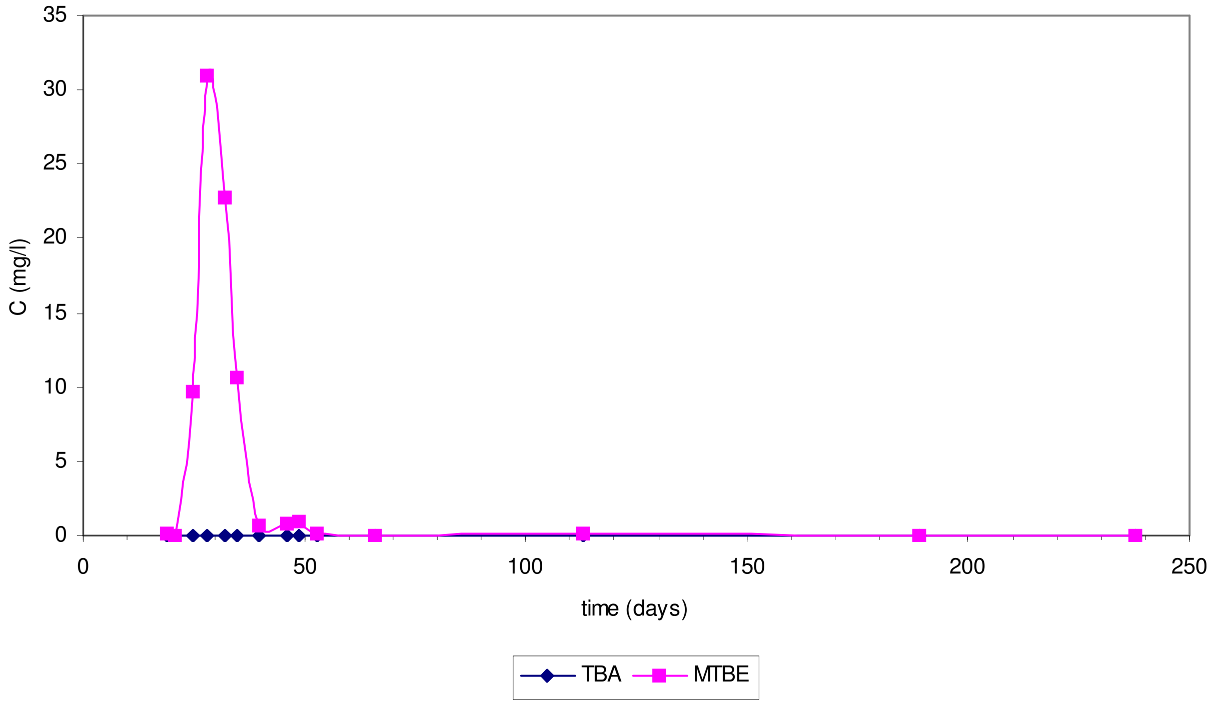

35000
30000
25000
20000
15000
10000
5000
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

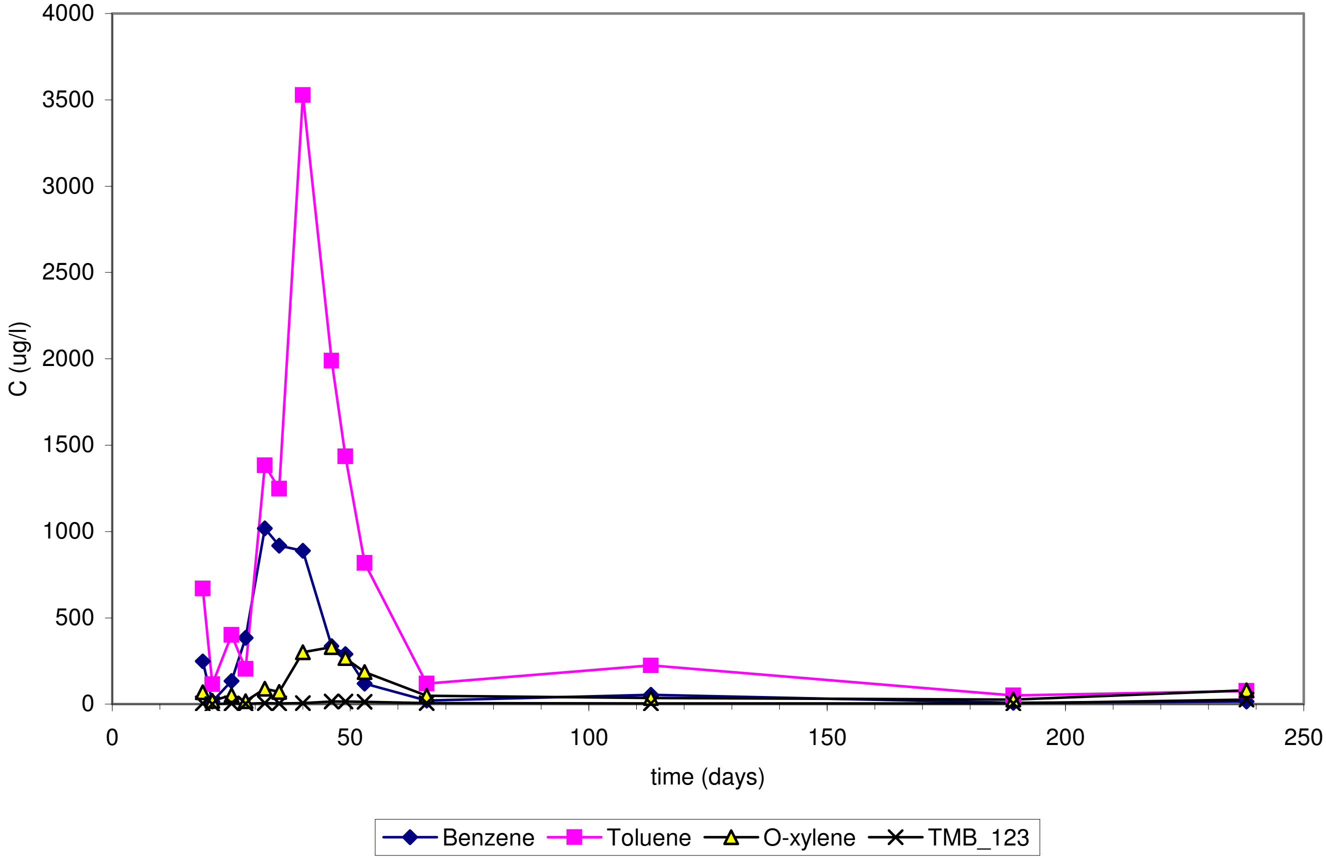
R2-2-10


C (mg/l)
time (days)
TBA
MTBE

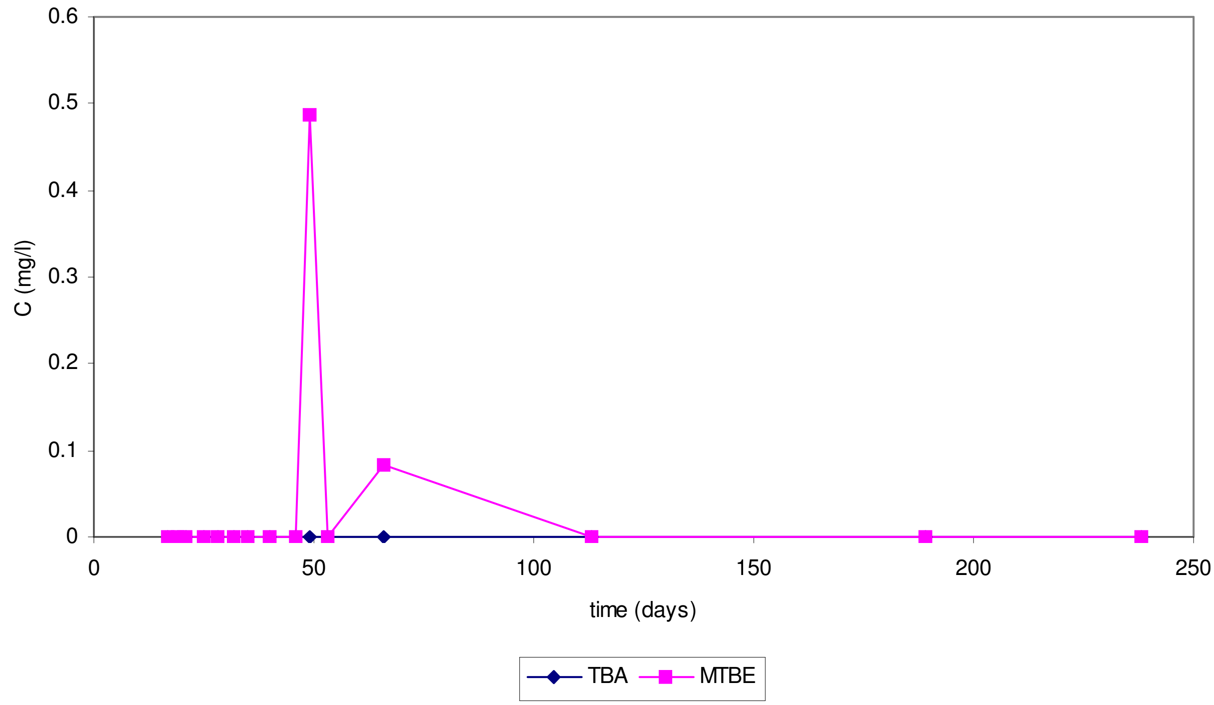

C (ug/l)
time (days)
Benzene
Toluene
O-xylene
TMB_123

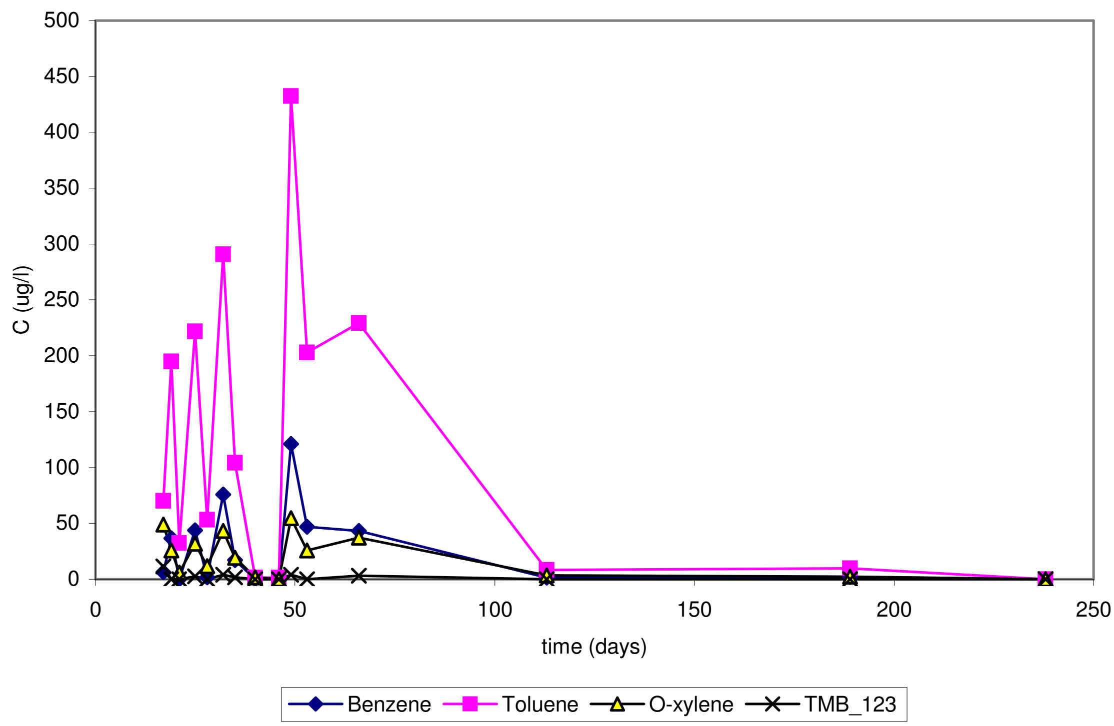
R2-4-3



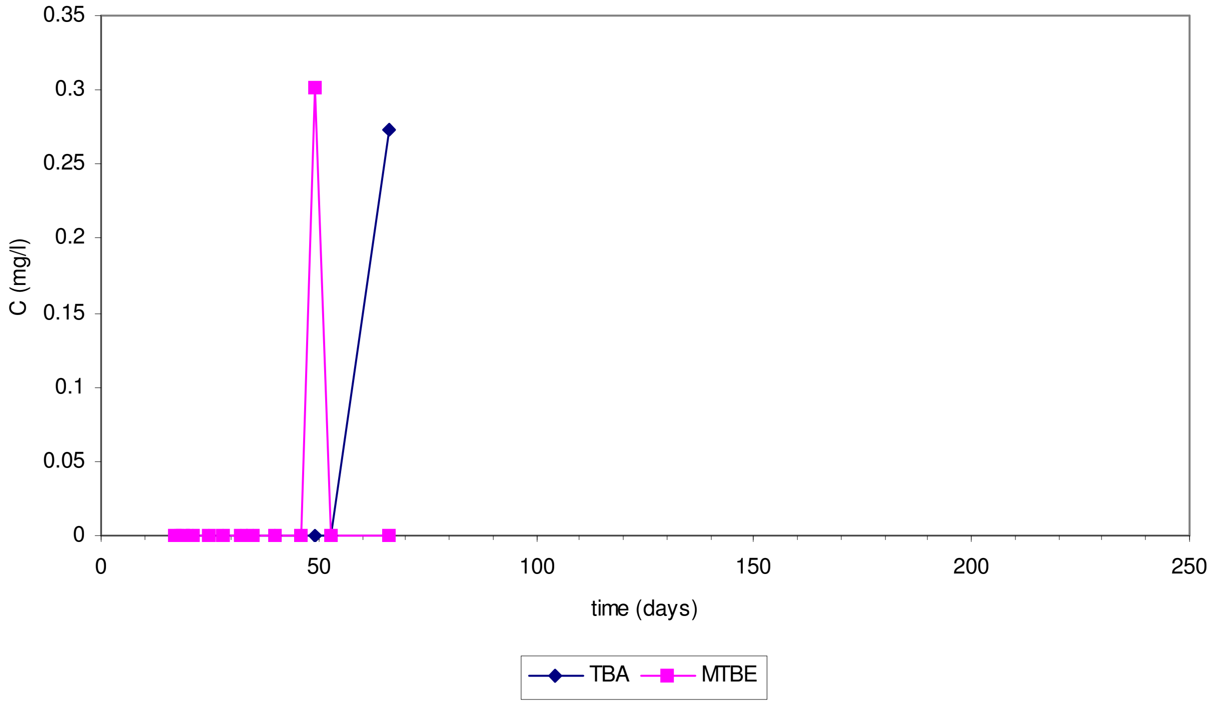

4000
3500
3000
2500
2000
1500
1000
500
0
C (ug/l)
0
50
100
150
200
250
time (days)
Benzene
Toluene
O-xylene
TMB_123

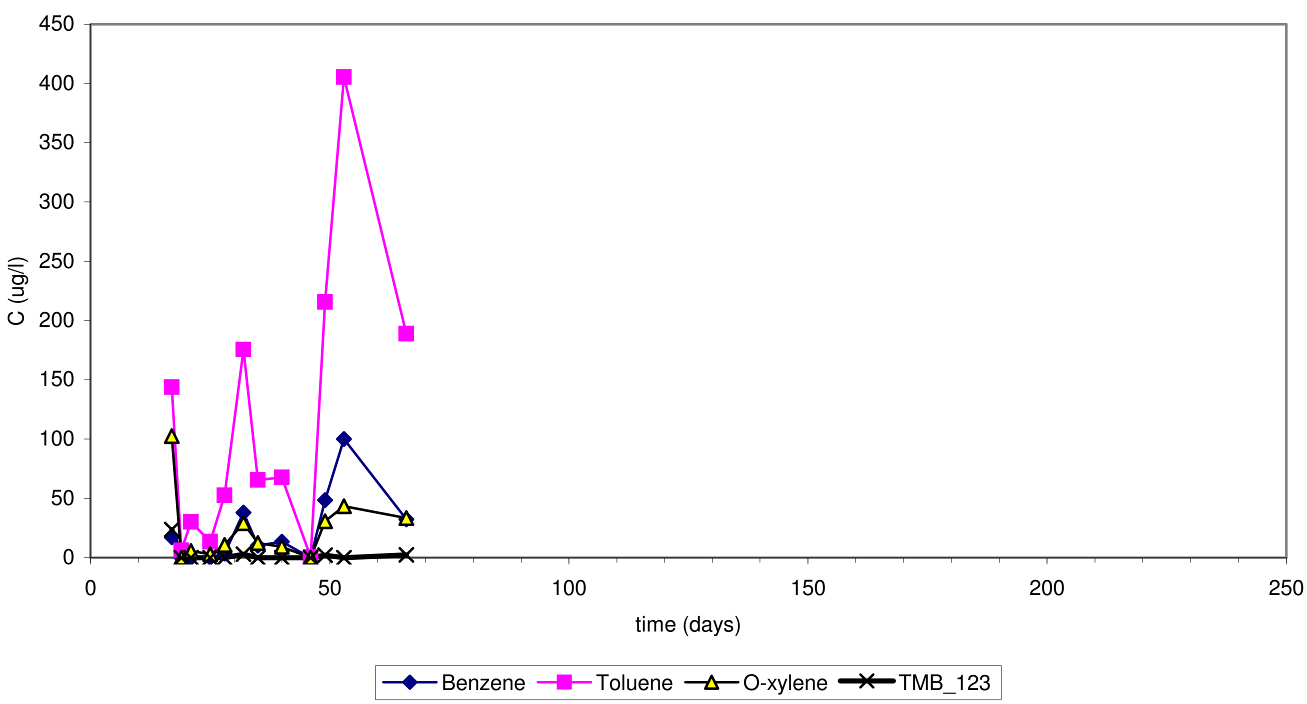
R2-5-10


0.6
0.5
0.4
0.3
0.2
0.1
0
C (mg/l)
0
50
100
150
200
250
time (days)
TBA
MTBE

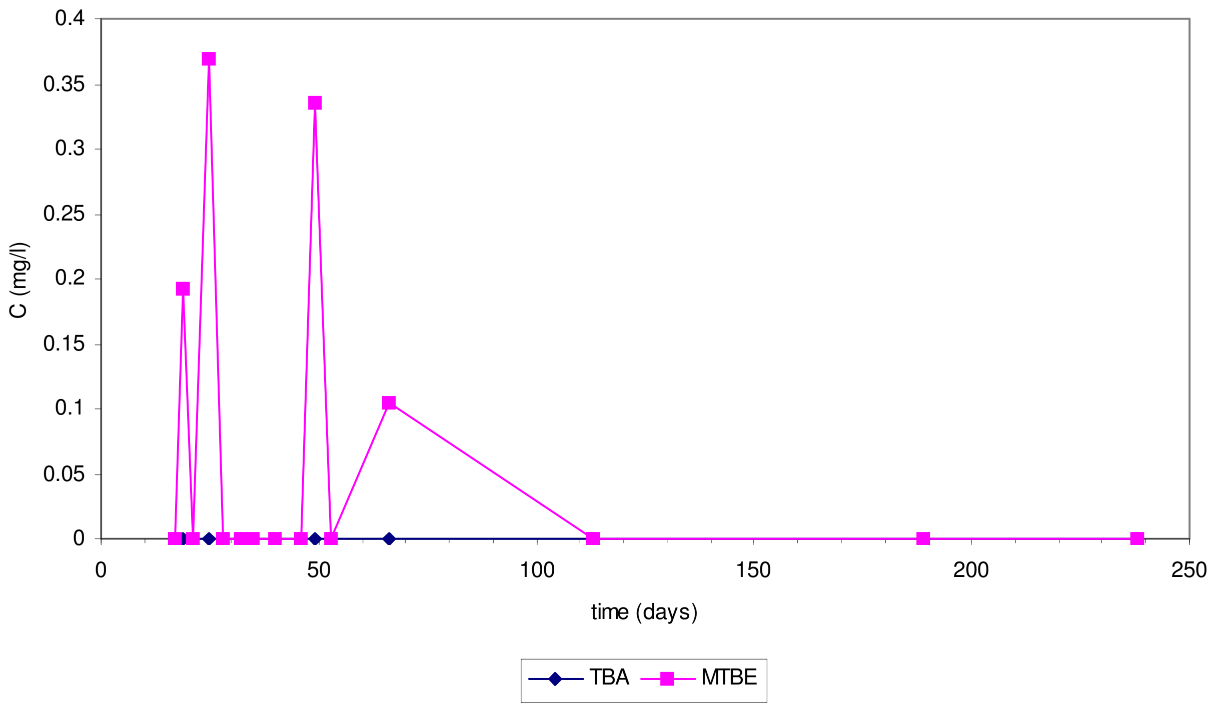

500
450
400
350
300
250
200
150
100
50
0
C (ug/l)
0
50
100
150
200
250
time (days)
Benzene
Toluene
O-xylene
TMB_123

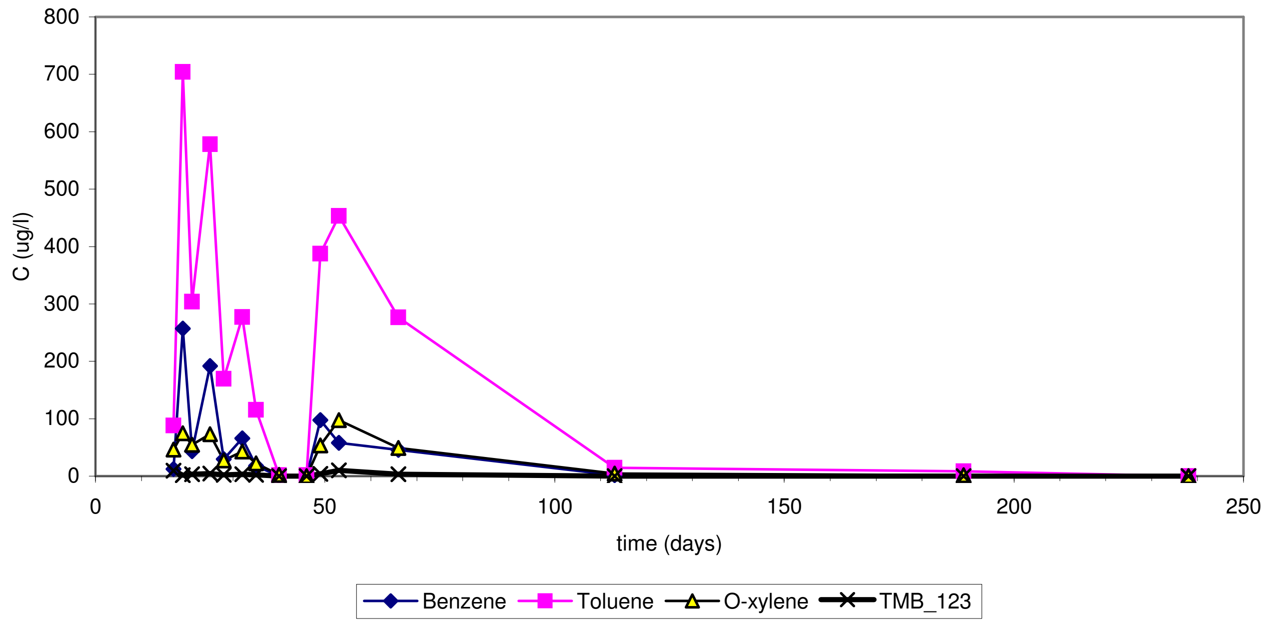
R2-6-8


0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
C (mg/l)
0
50
100
150
200
250
time (days)
TBA
MTBE


450
400
350
300
250
200
150
100
50
0
C (ug/l)
0
50
100
150
200
250
time (days)
Benzene
Toluene
O-xylene
TMB_123

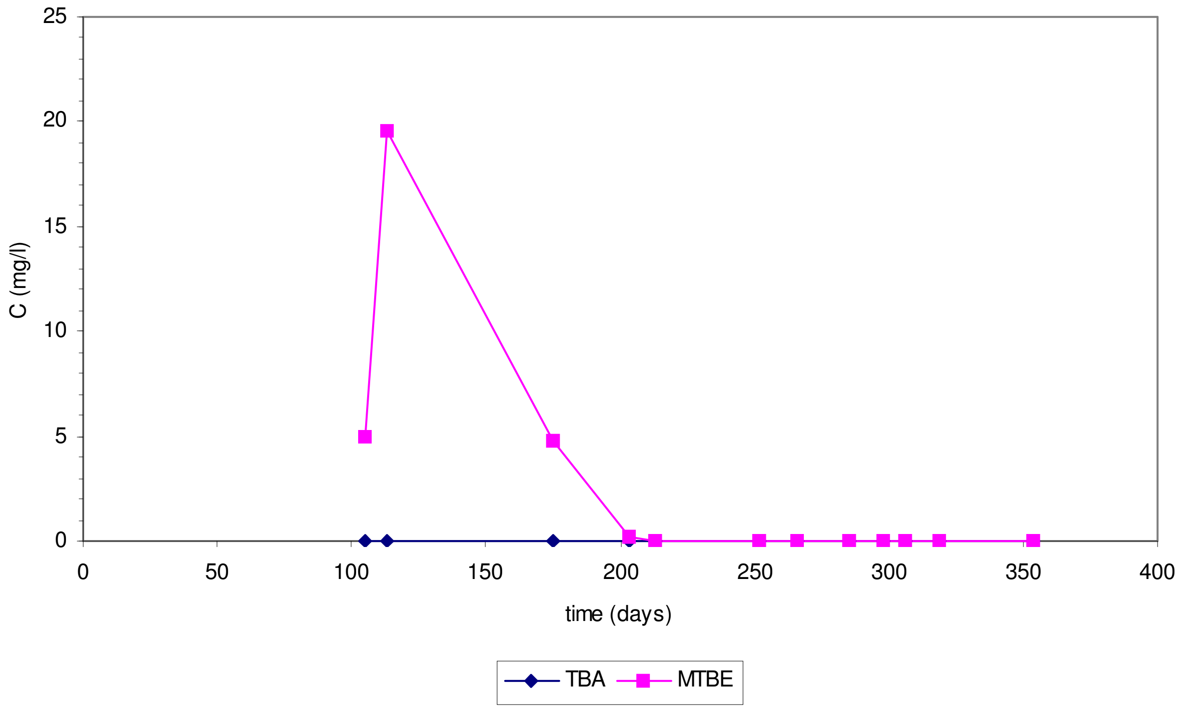
R2-5-14


0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
C (mg/l)
0
50
100
150
200
250
time (days)
TBA
MTBE

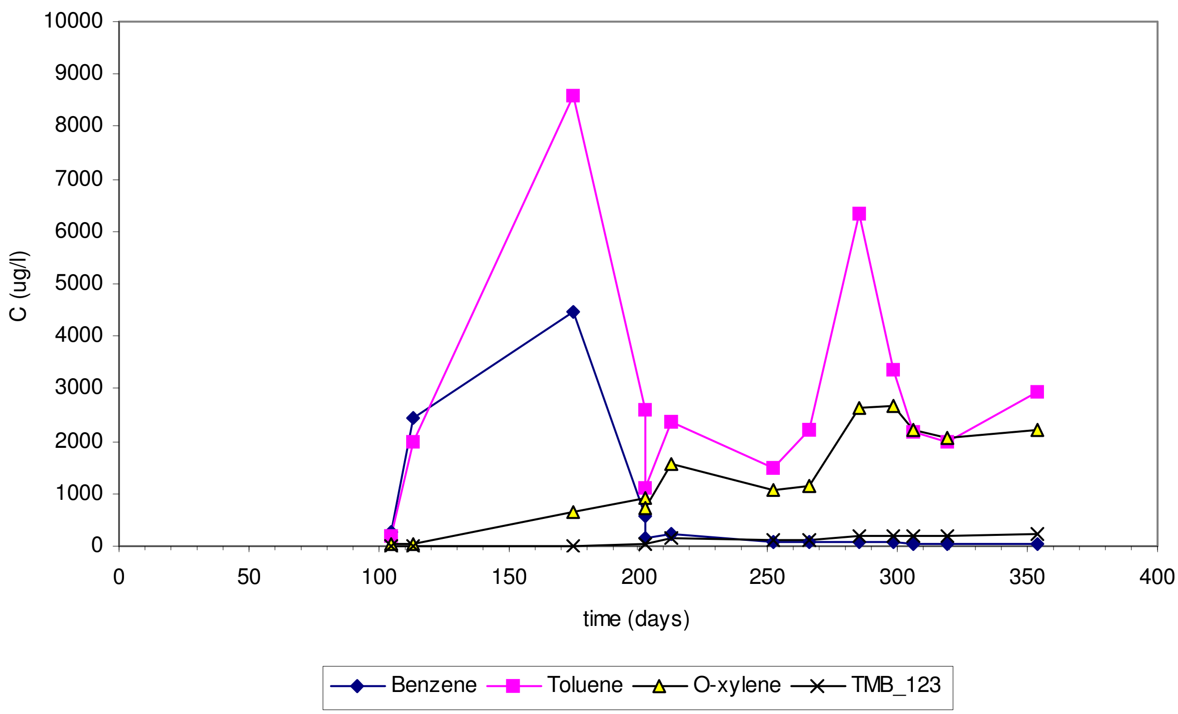


A.GMT b. Row 3

R3-3-6

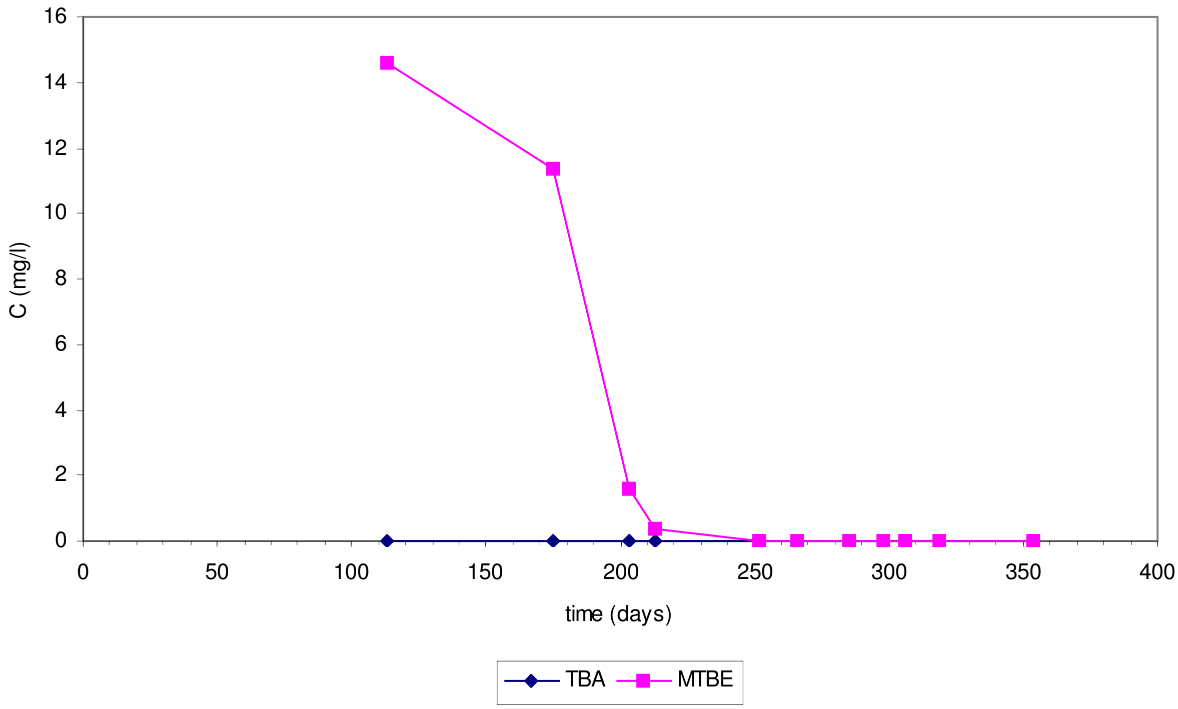


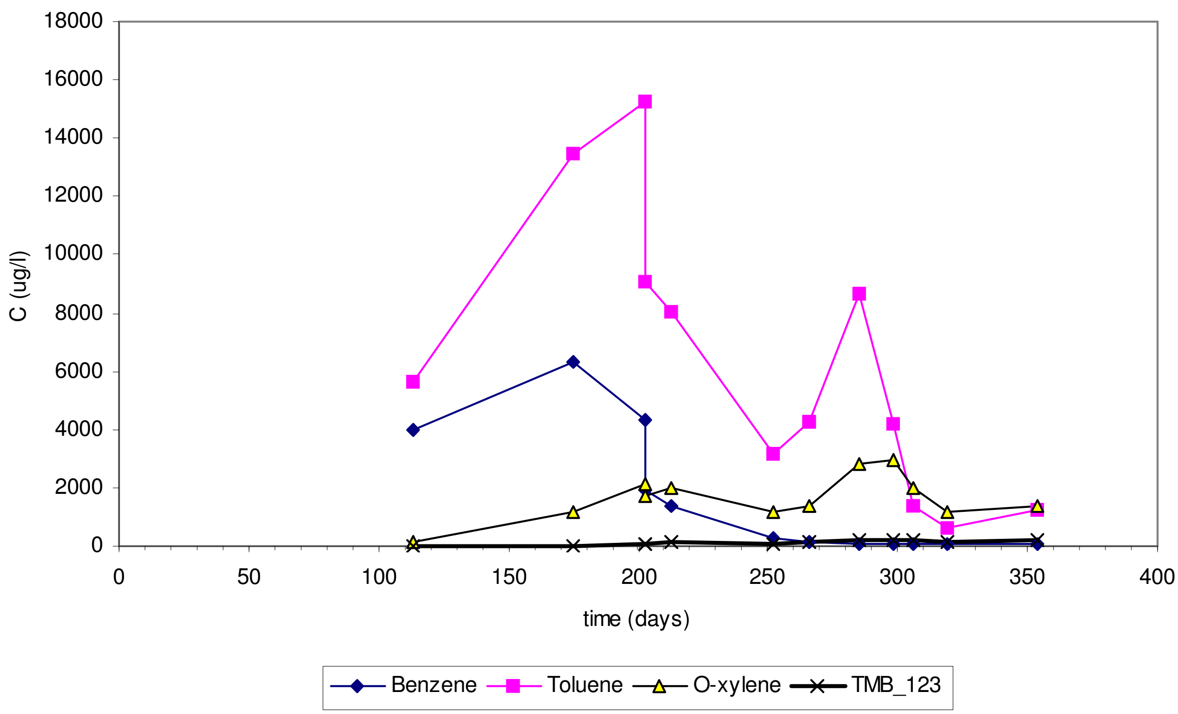
25
20
15
10
5
0
C (mg/l)
0
50
100
150
200
250
300
350
400
time (days)
TBA
MTBE



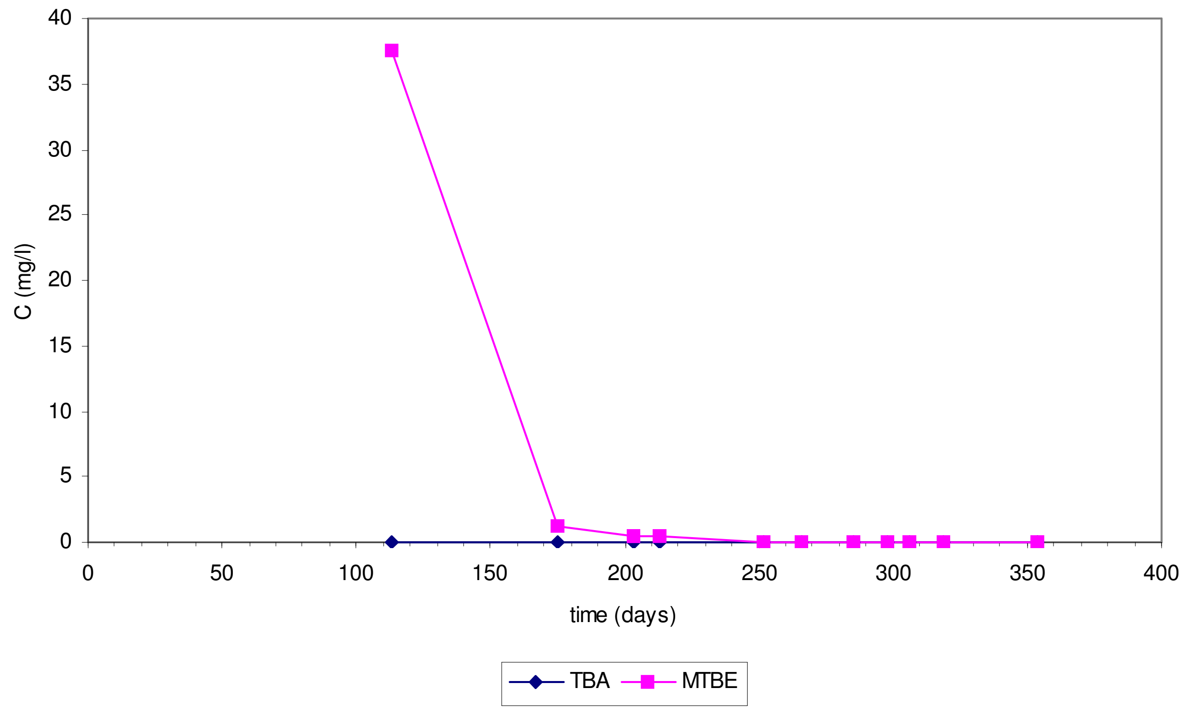
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

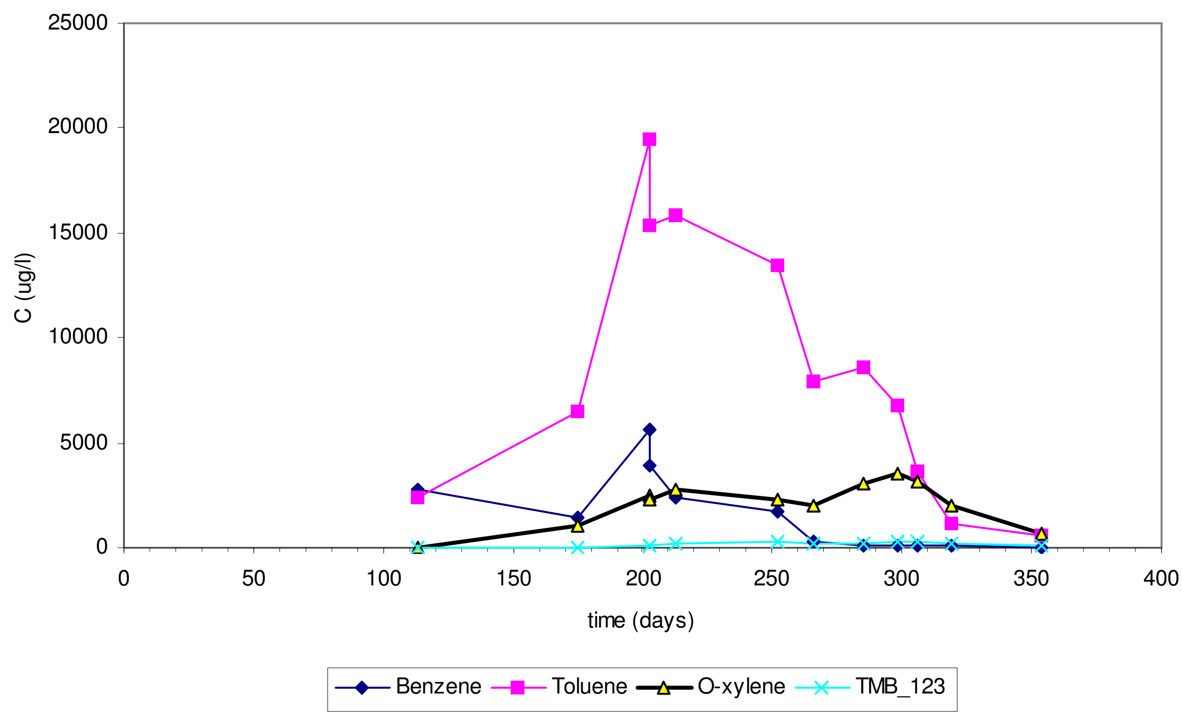
R3-3-7


C (mg/l)
16
14
12
10
8
6
4
2
0
0
50
100
150
200
250
300
350
400
time (days)
TBA
MTBE


C (ug/l)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

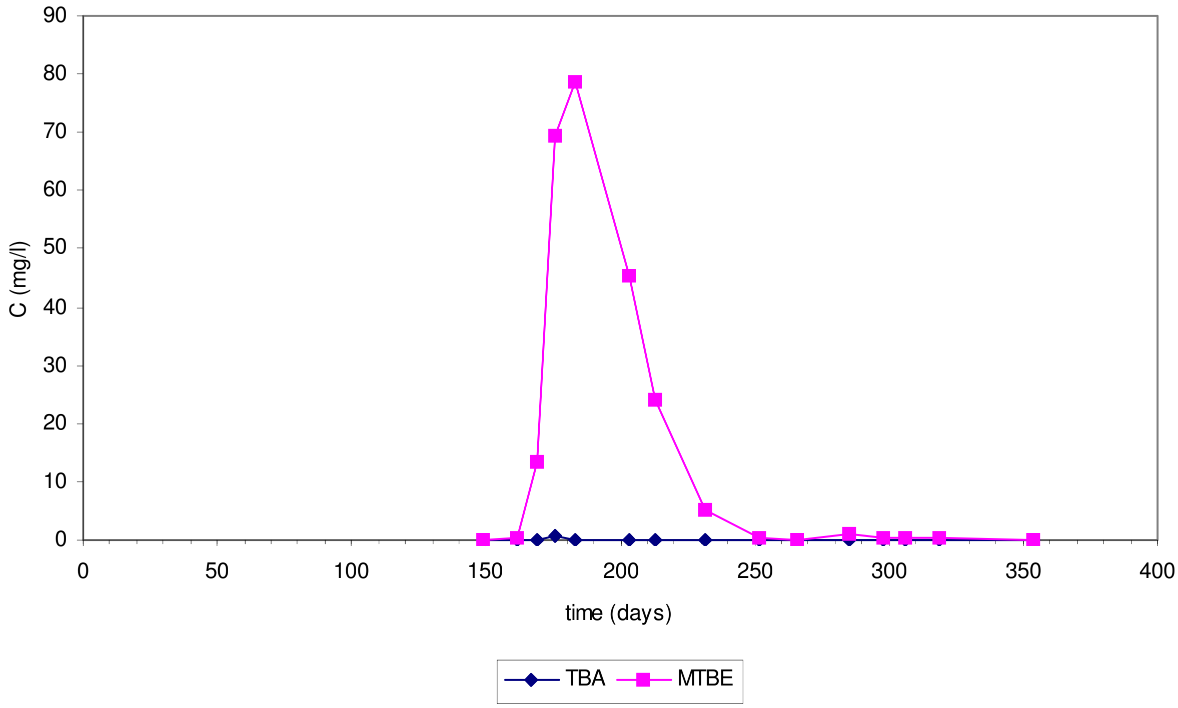
R3-3-8

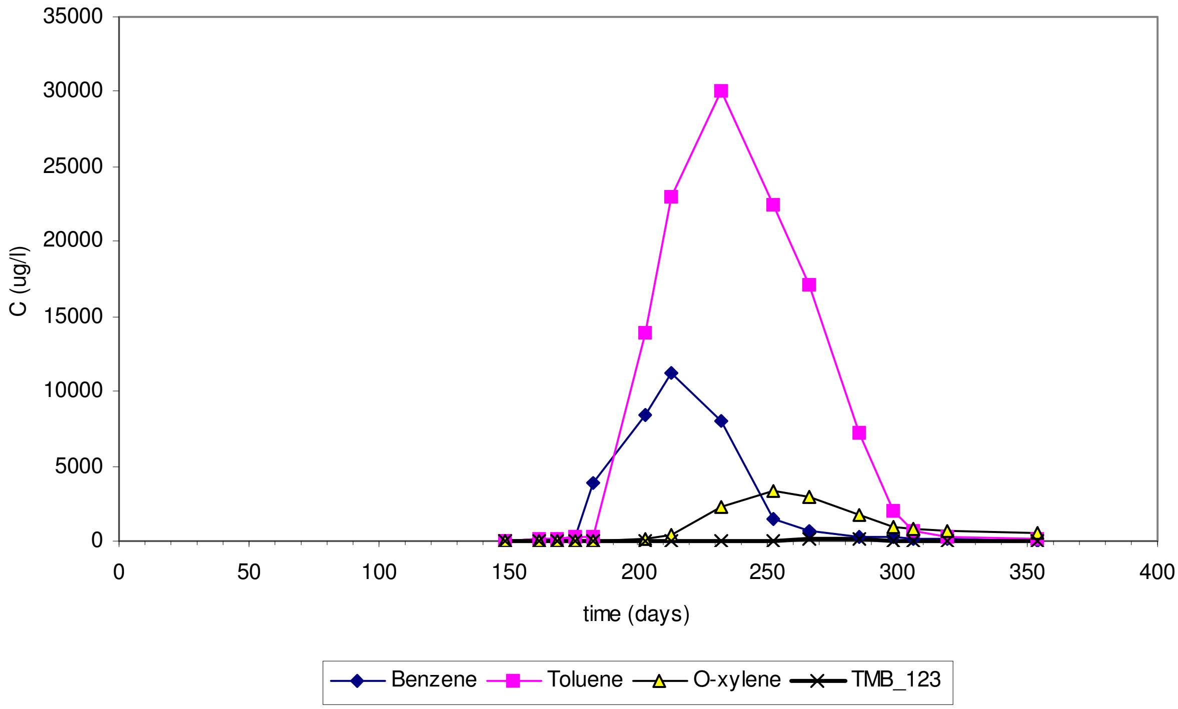

40
35
30
25
20
15
10
5
0
C (mg/l)
0
50
100
150
200
250
300
350
400
time (days)
TBA
MTBE


25000
20000
15000
10000
5000
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

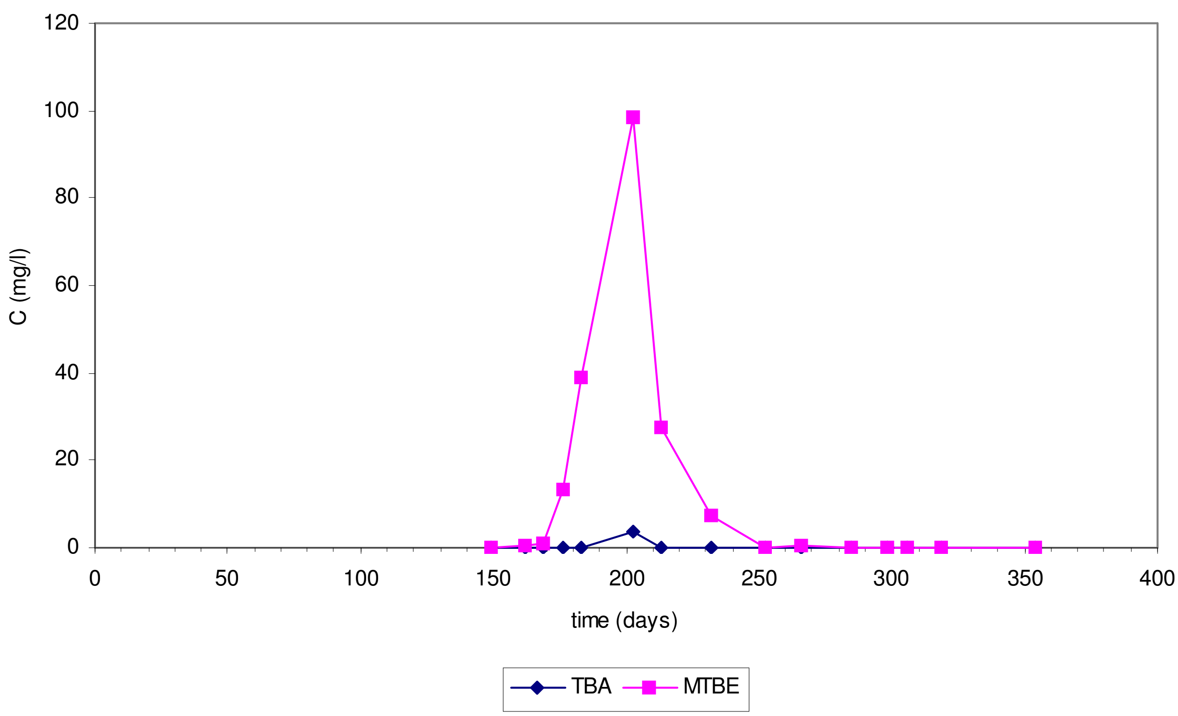
A.GMT c. Row 4

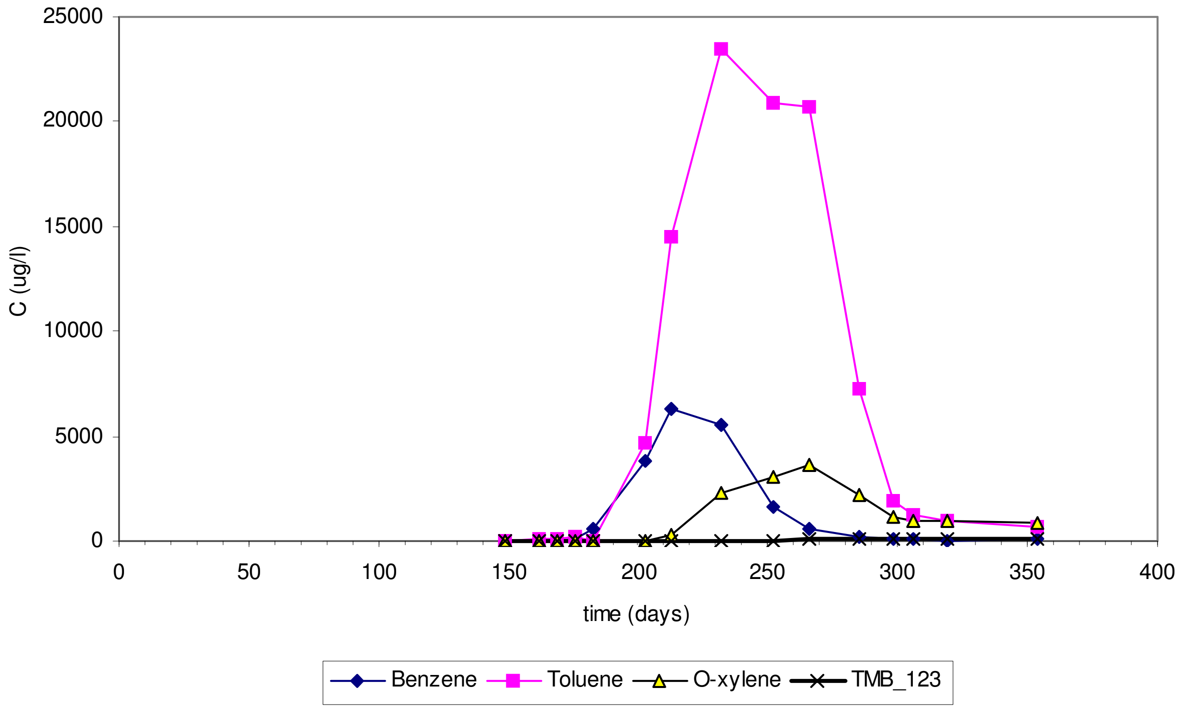
R4-3-11



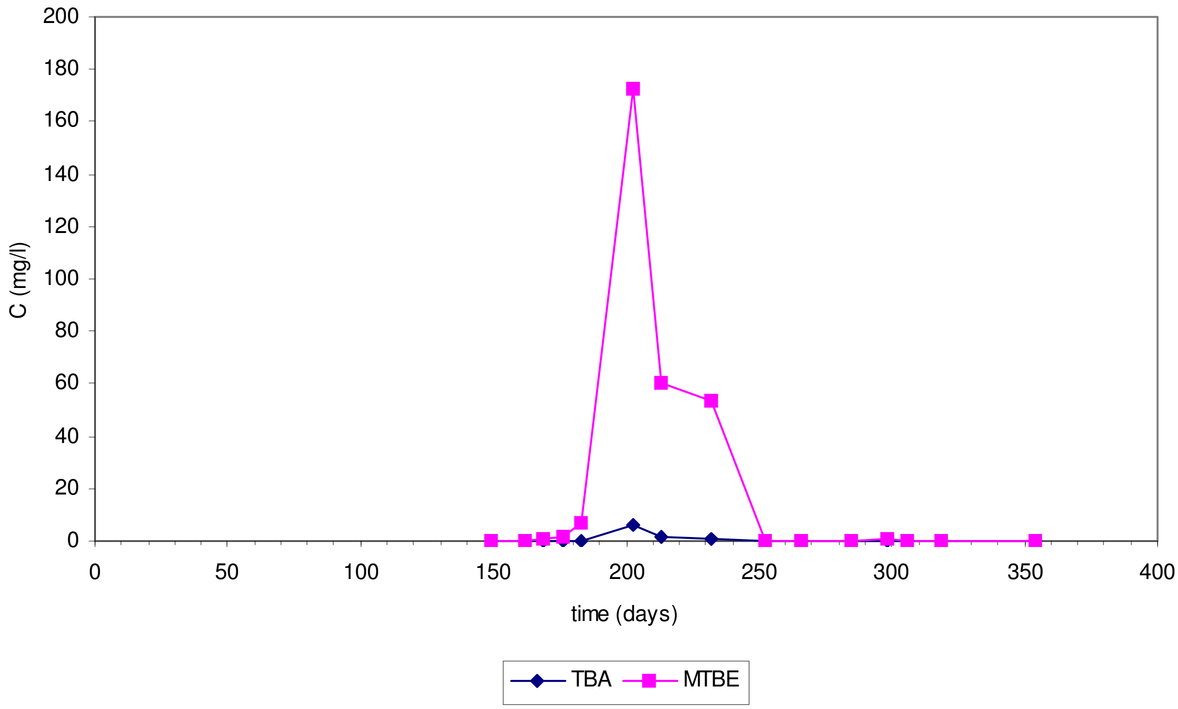

35000
30000
25000
20000
15000
10000
5000
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

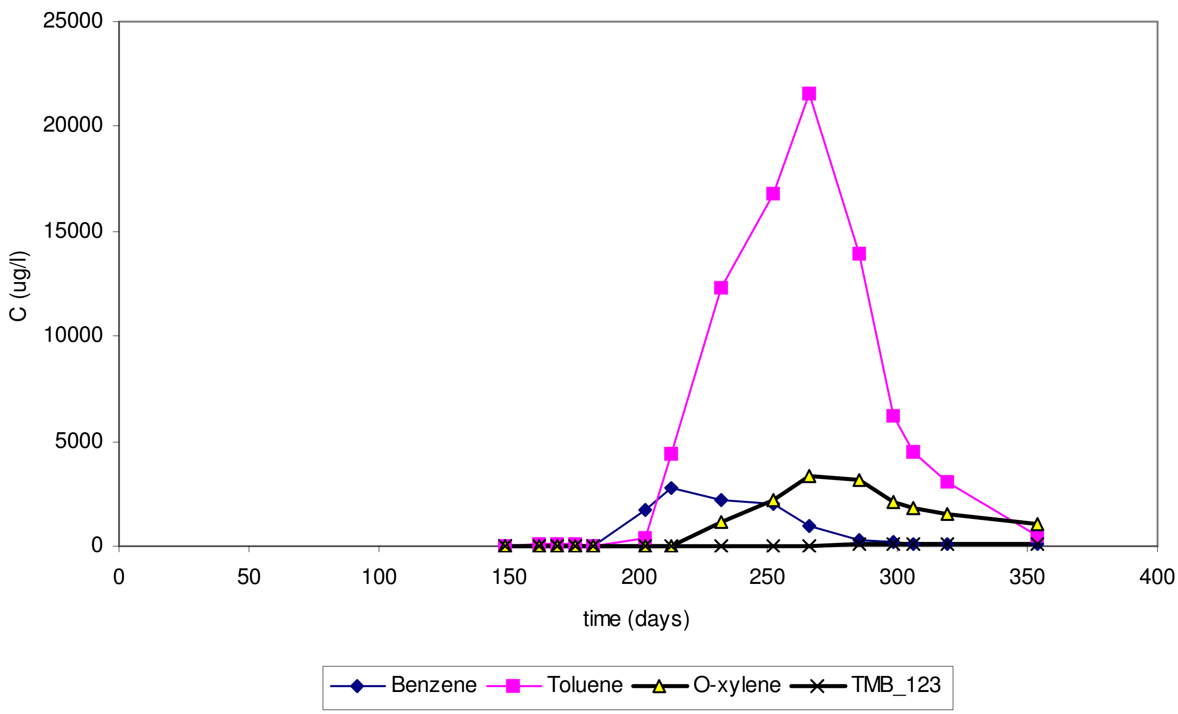
R4-3-12


120
100
80
60
40
20
0
C (mg/l)
0
50
100
150
200
250
300
350
400
time (days)
TBA
MTBE


25000
20000
15000
10000
5000
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

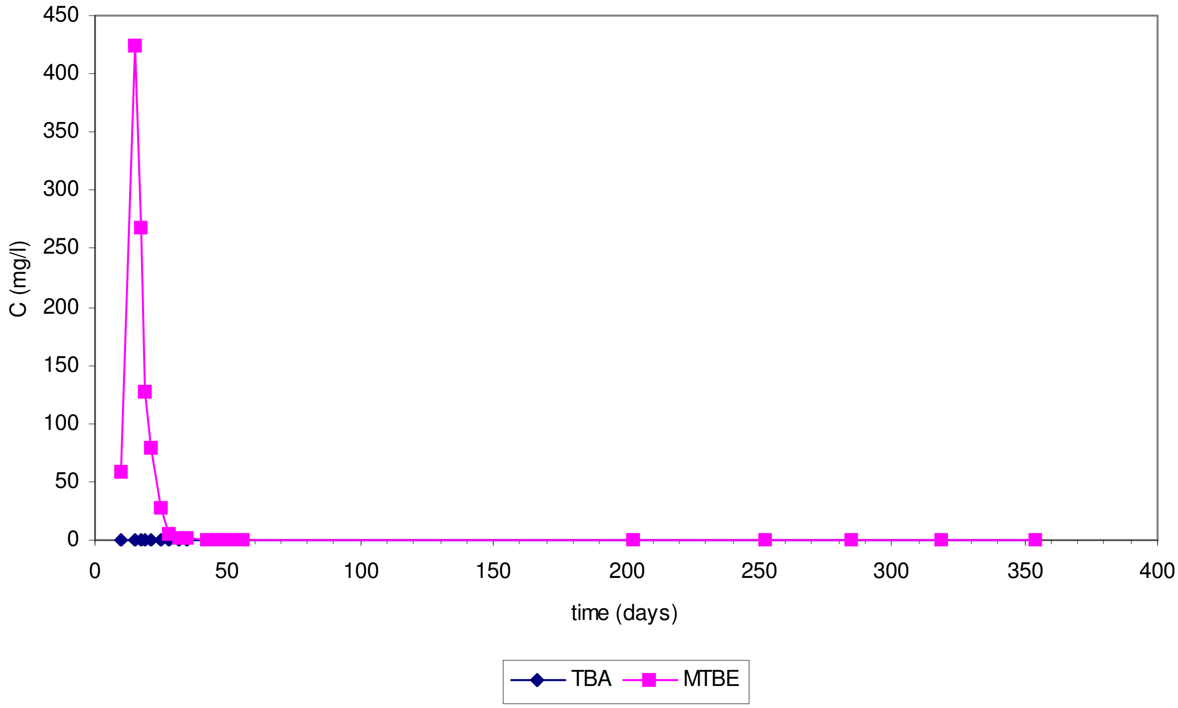
R4-3-13

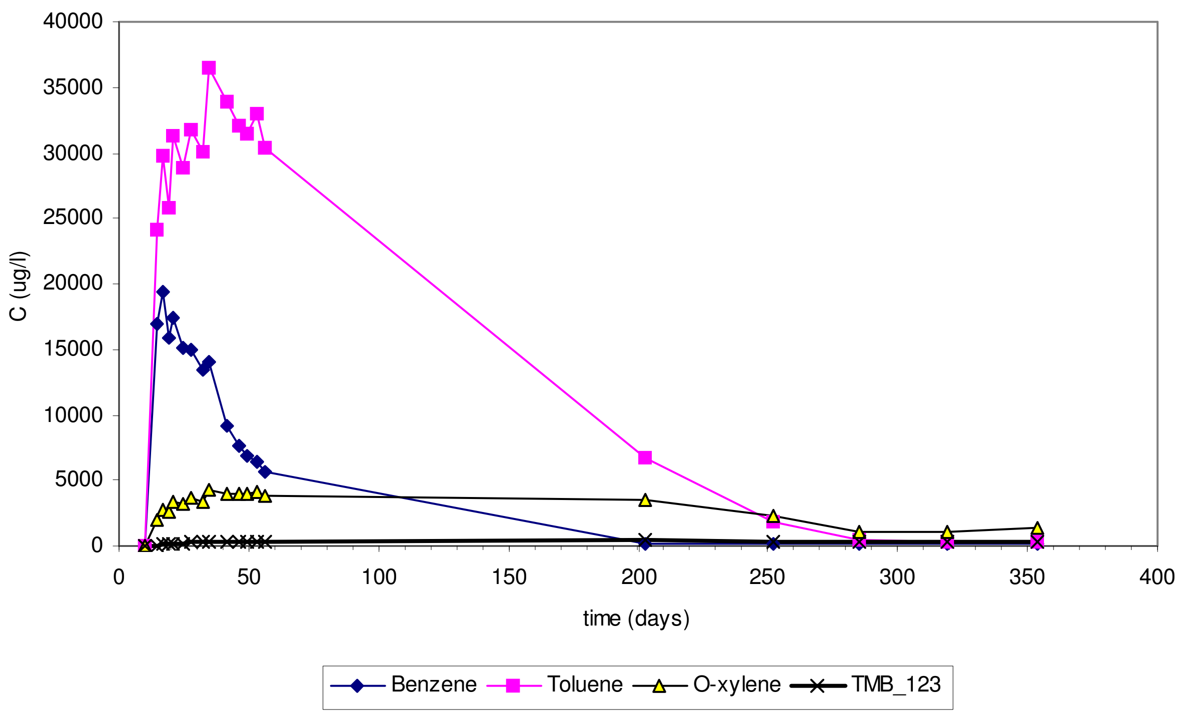

C (mg/l)
200
180
160
140
120
100
80
60
40
20
0
0
50
100
150
200
250
300
350
400
time (days)
TBA
MTBE


C (ug/l)
25000
20000
15000
10000
5000
0
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

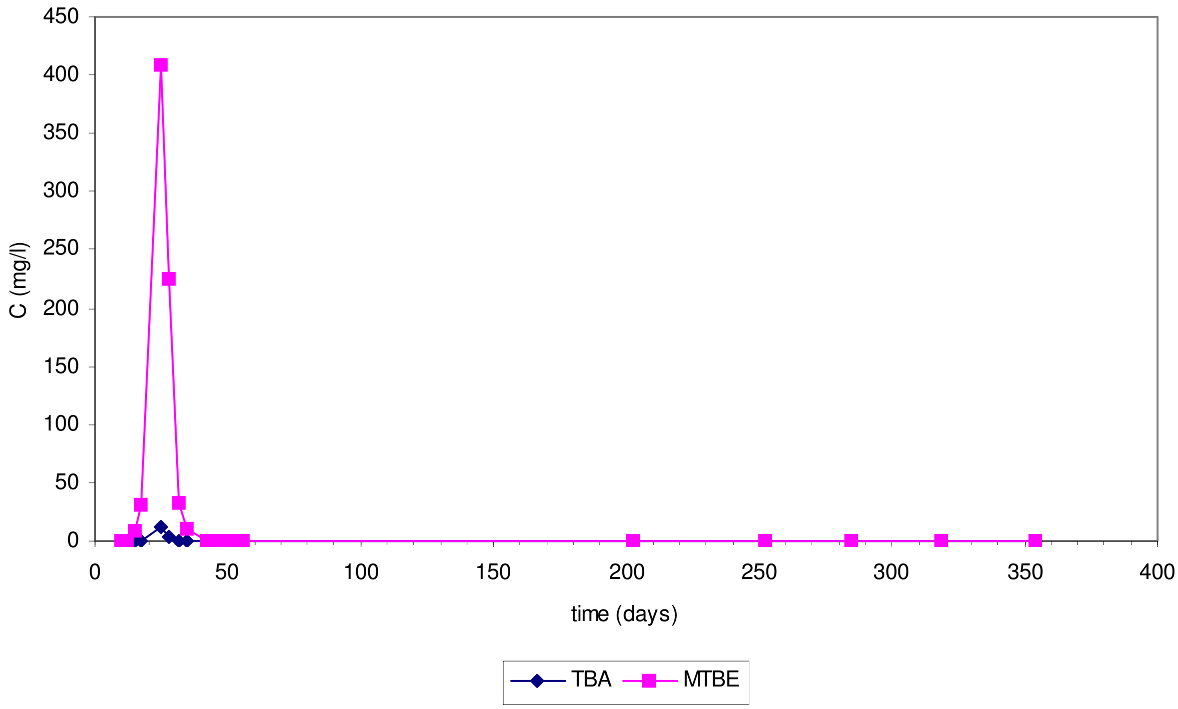
A.GMT M Wells

M2-5

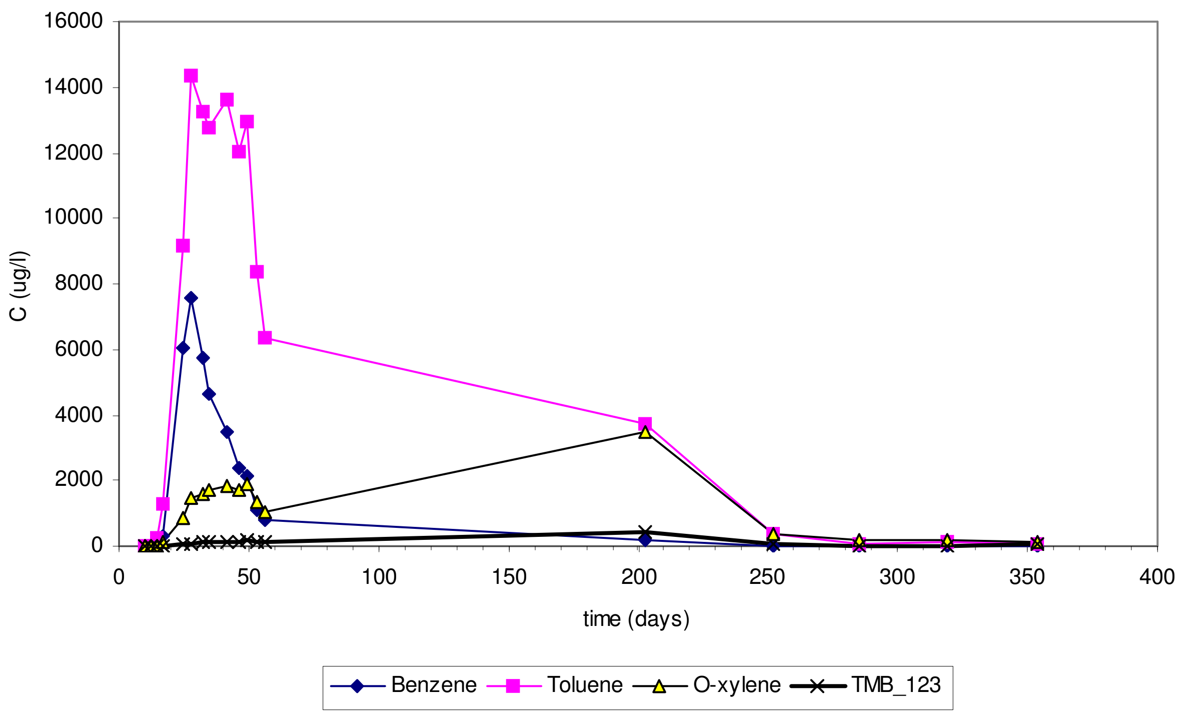




M2-6



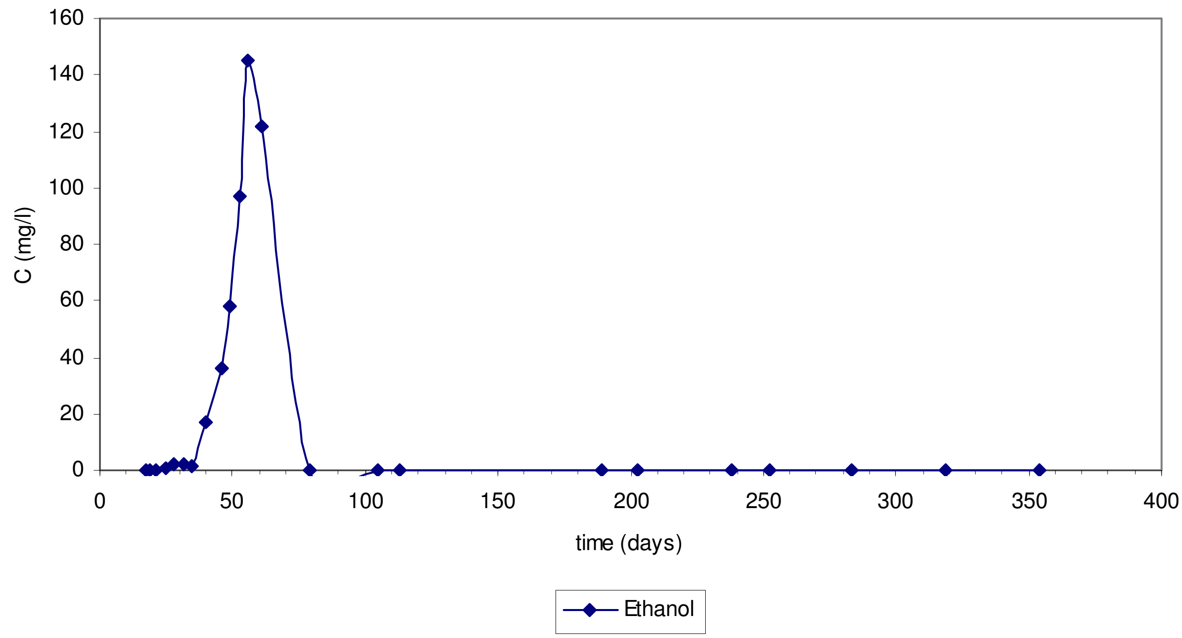
C (mg/l)
0
50
100
150
200
250
300
350
400
450
0
50
100
150
200
250
300
350
400
time (days)
TBA
MTBE

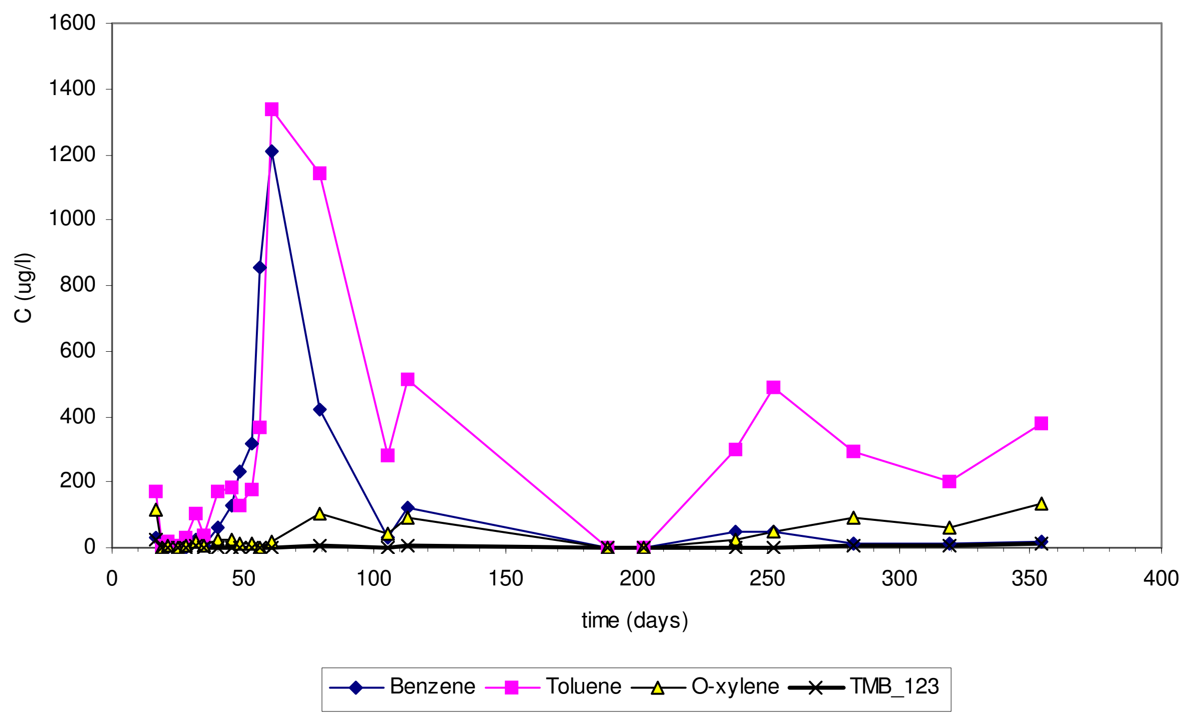


C (ug/l)
0
2000
4000
6000
8000
10000
12000
14000
16000
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

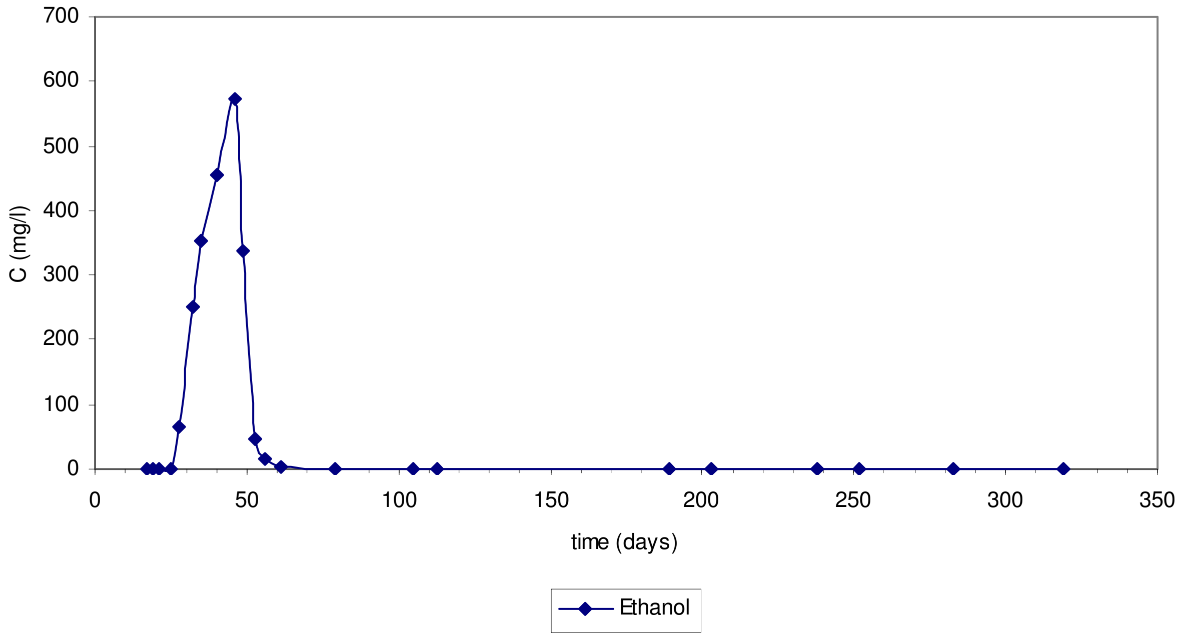
B.E10 a. Row 2

R2-2-10

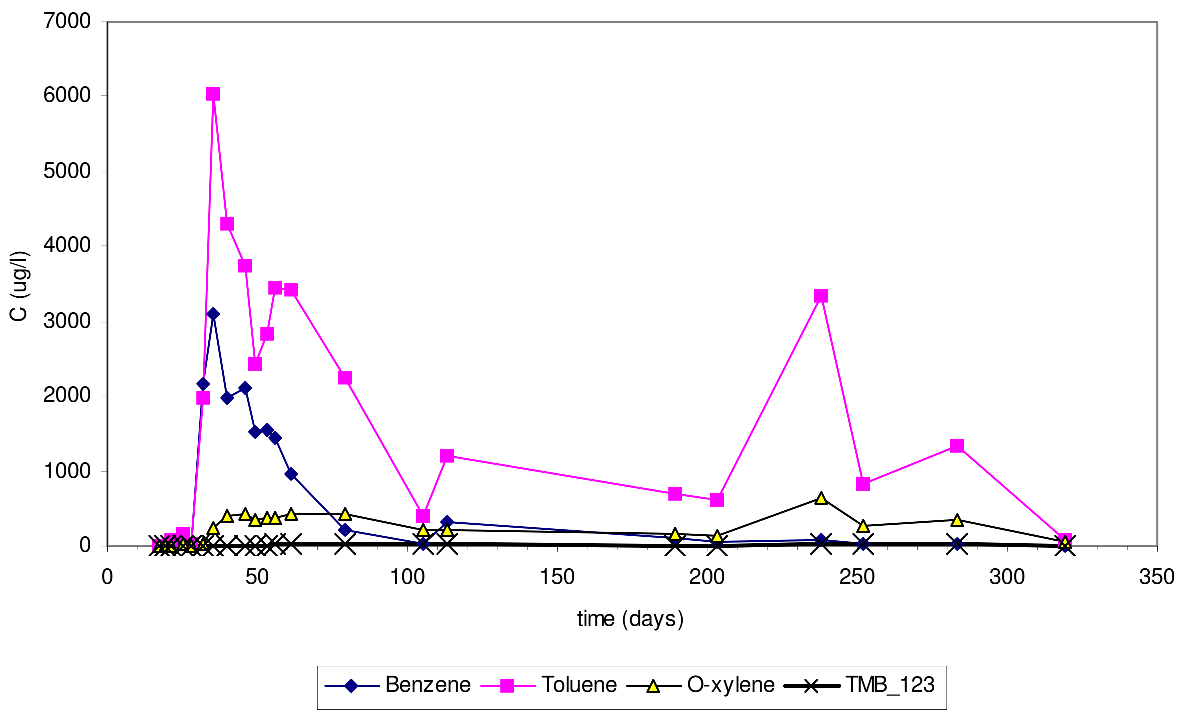

160
140
120
100
80
60
40
20
0
C (mg/l)
0
50
100
150
200
250
300
350
400
time (days)
Ethanol


1600
1400
1200
1000
800
600
400
200
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

R2-4-11

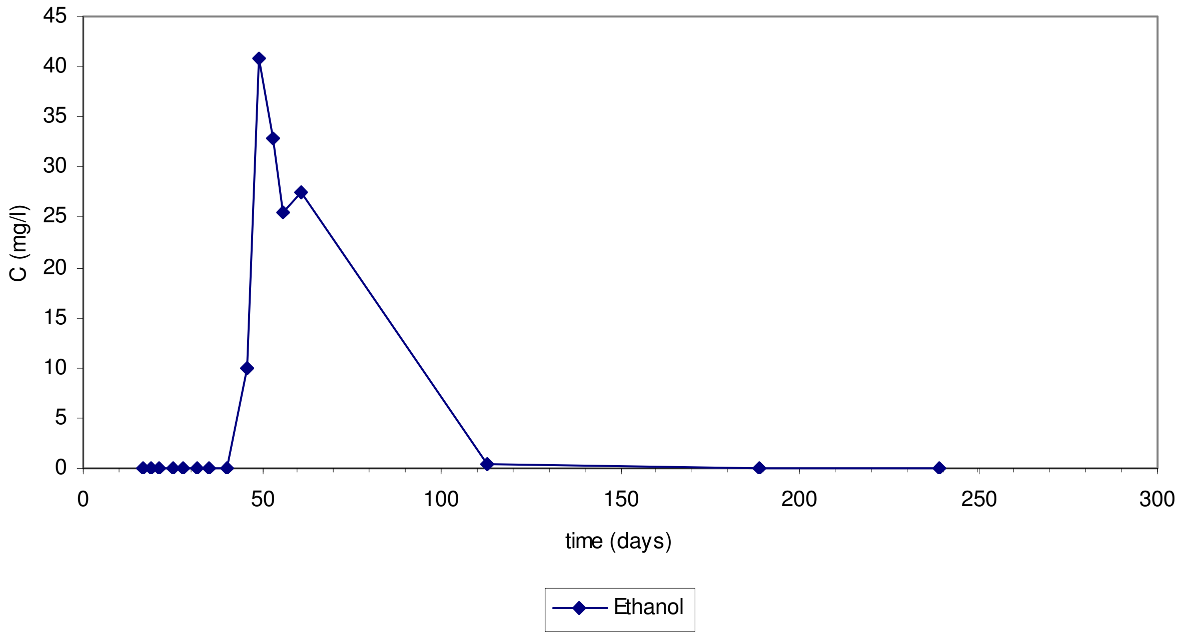


700
600
500
400
300
200
100
0
C (mg/l)
0
50
100
150
200
250
300
350
time (days)
Ethanol

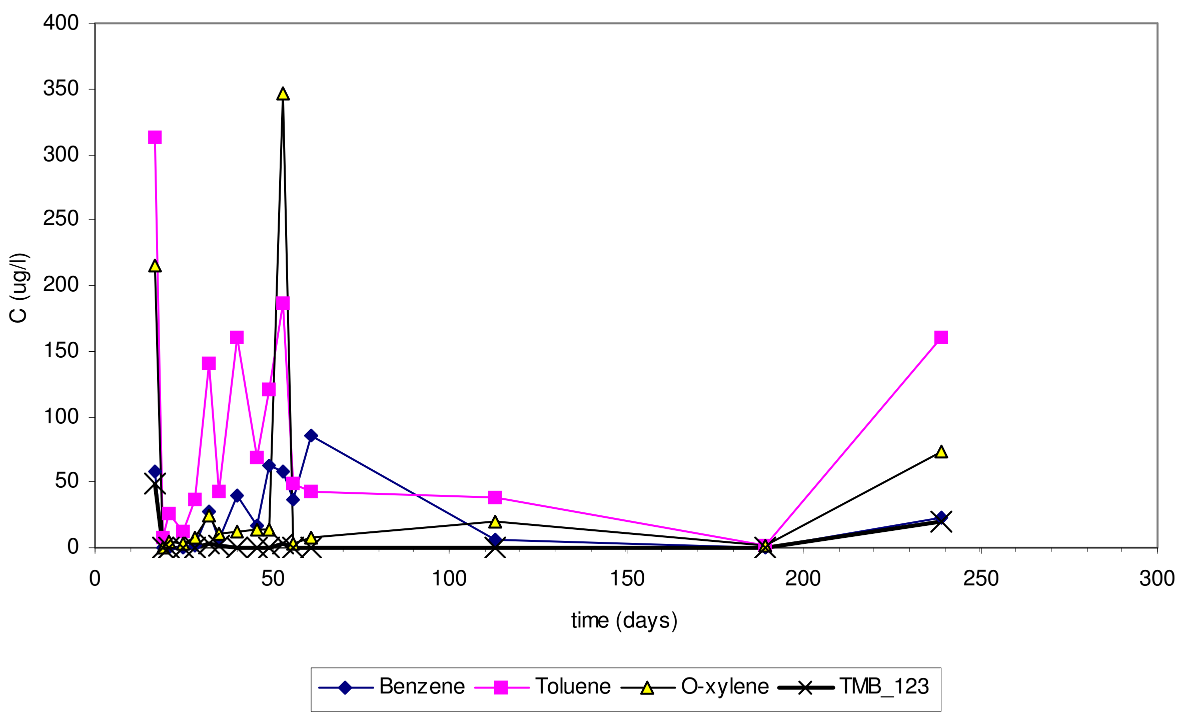


7000
6000
5000
4000
3000
2000
1000
0
C (ug/l)
0
50
100
150
200
250
300
350
time (days)
Benzene
Toluene
O-xylene
TMB_123

R2-3-6

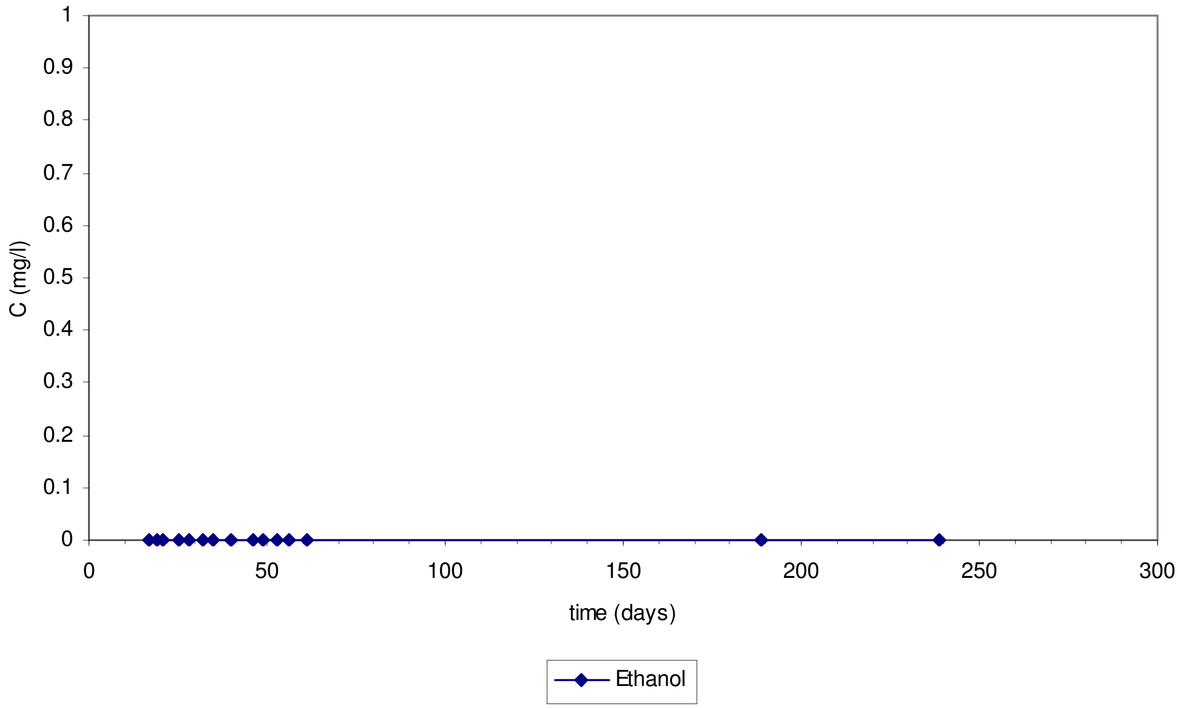


C (mg/l)
45
40
35
30
25
20
15
10
5
0
0
50
100
150
200
250
300
time (days)
Ethanol

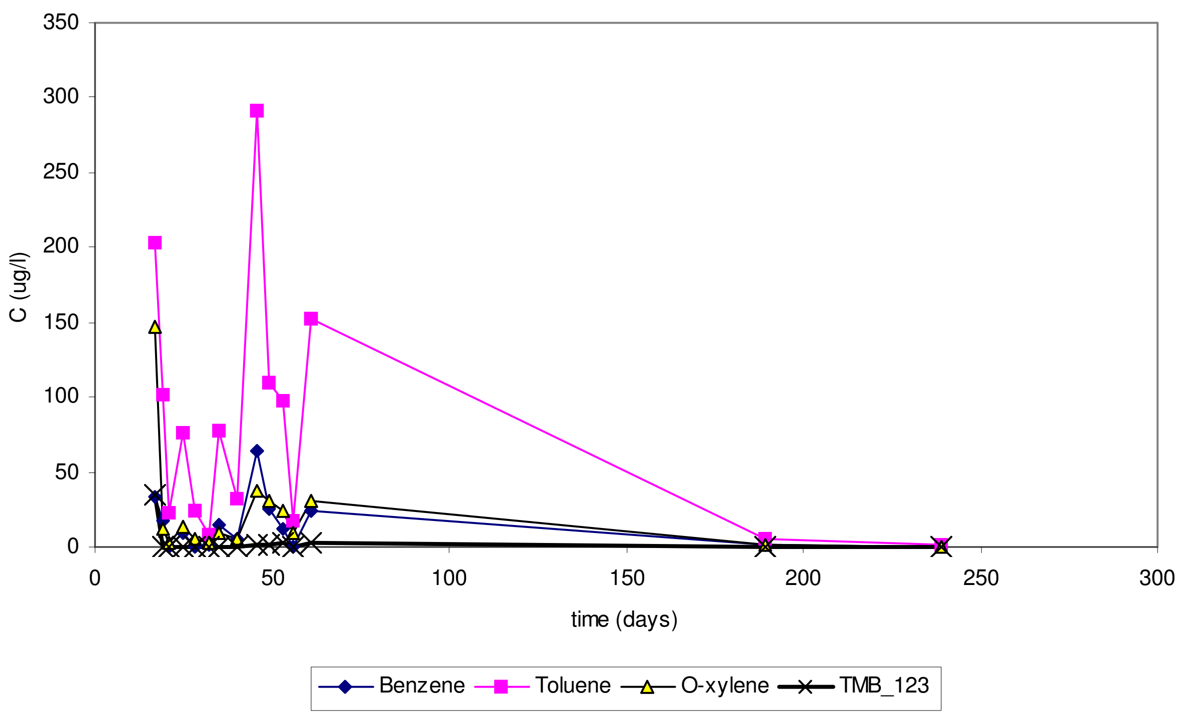


C (ug/l)
400
350
300
250
200
150
100
50
0
0
50
100
150
200
250
300
time (days)
Benzene
Toluene
O-xylene
TMB_123

R2-5-14

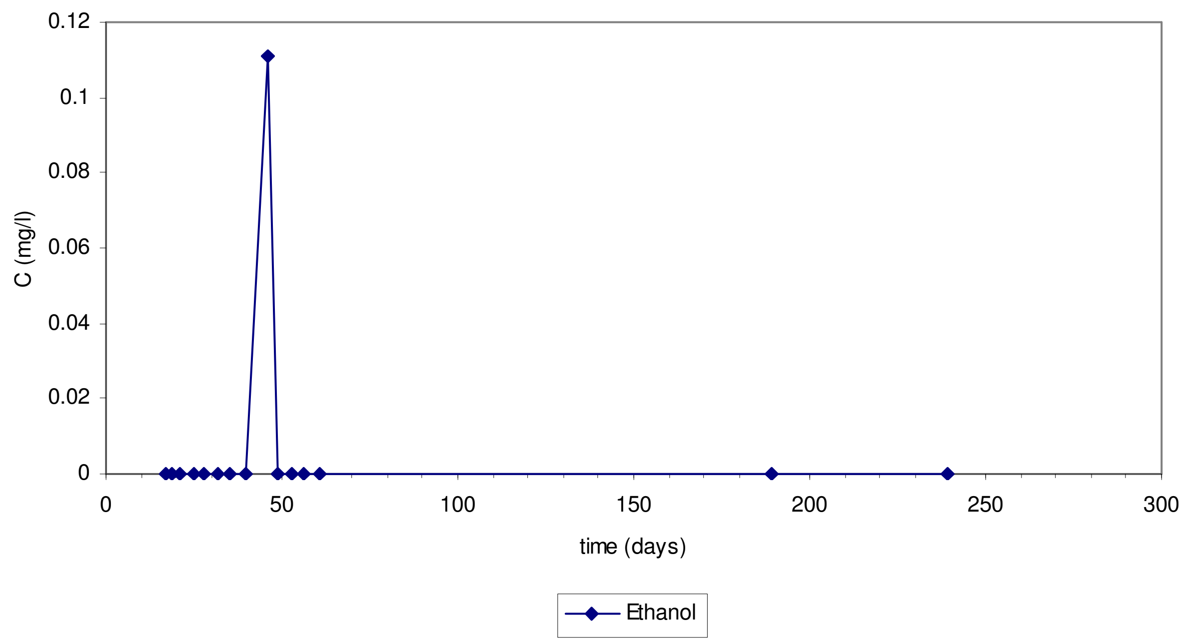


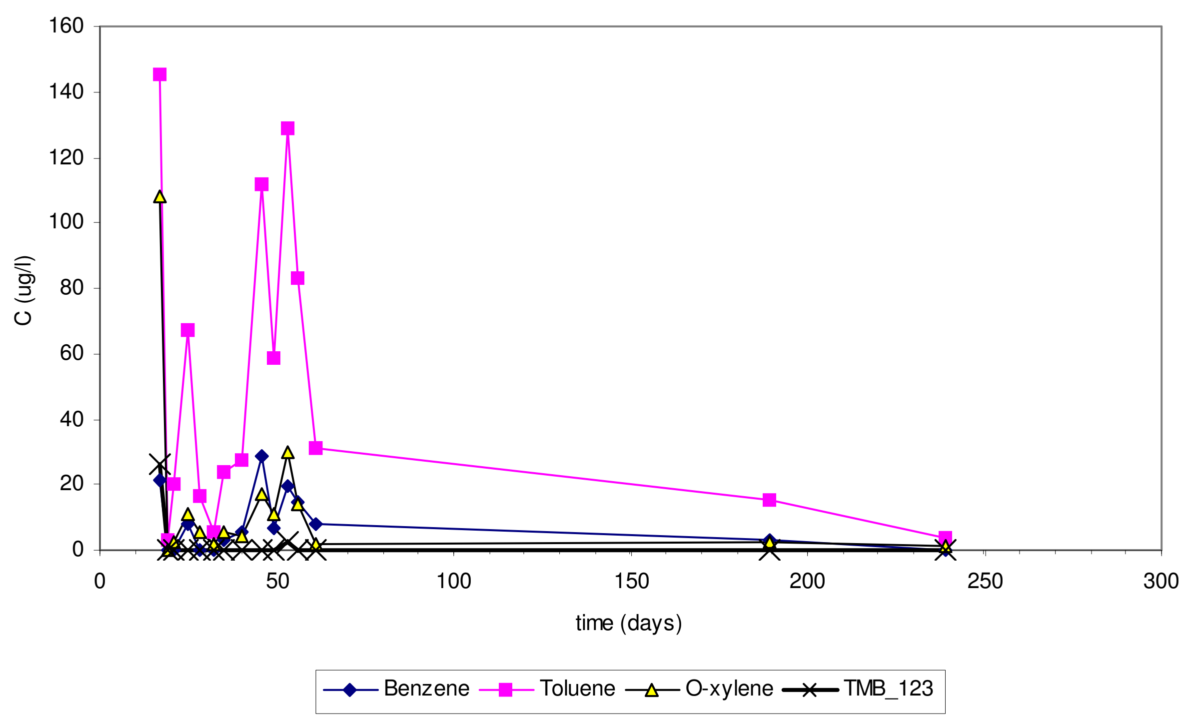
C (mg/l)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
50
100
150
200
250
300
time (days)
Ethanol



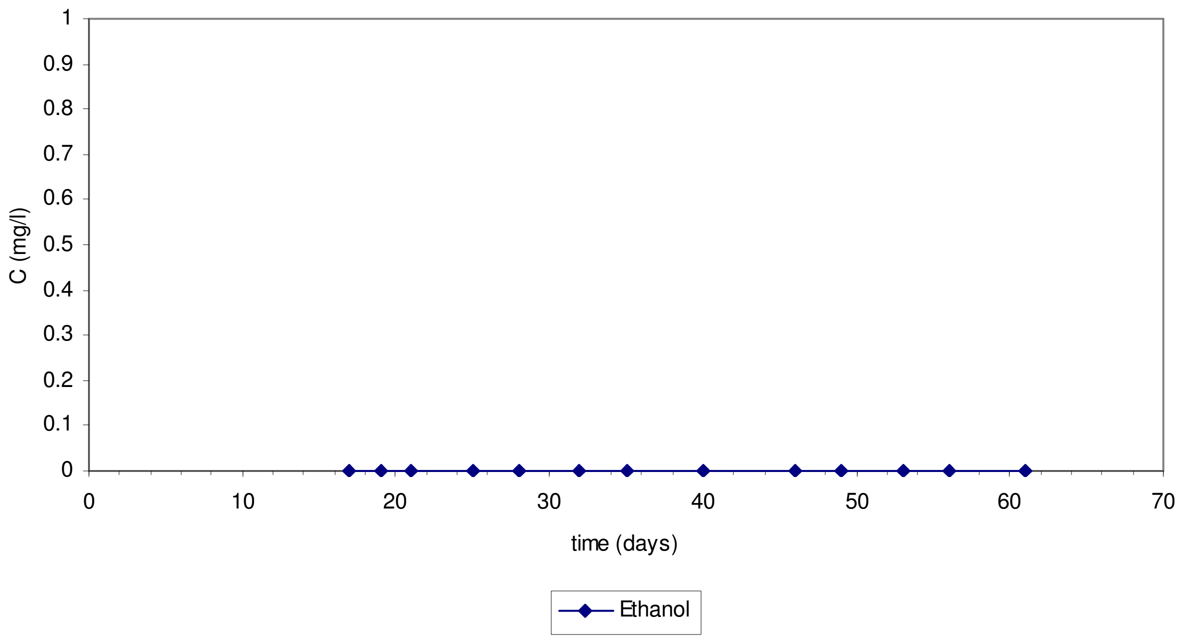
C (ug/l)
0
50
100
150
200
250
300
350
0
50
100
150
200
250
300
time (days)
Benzene
Toluene
O-xylene
TMB_123

R2-4-3

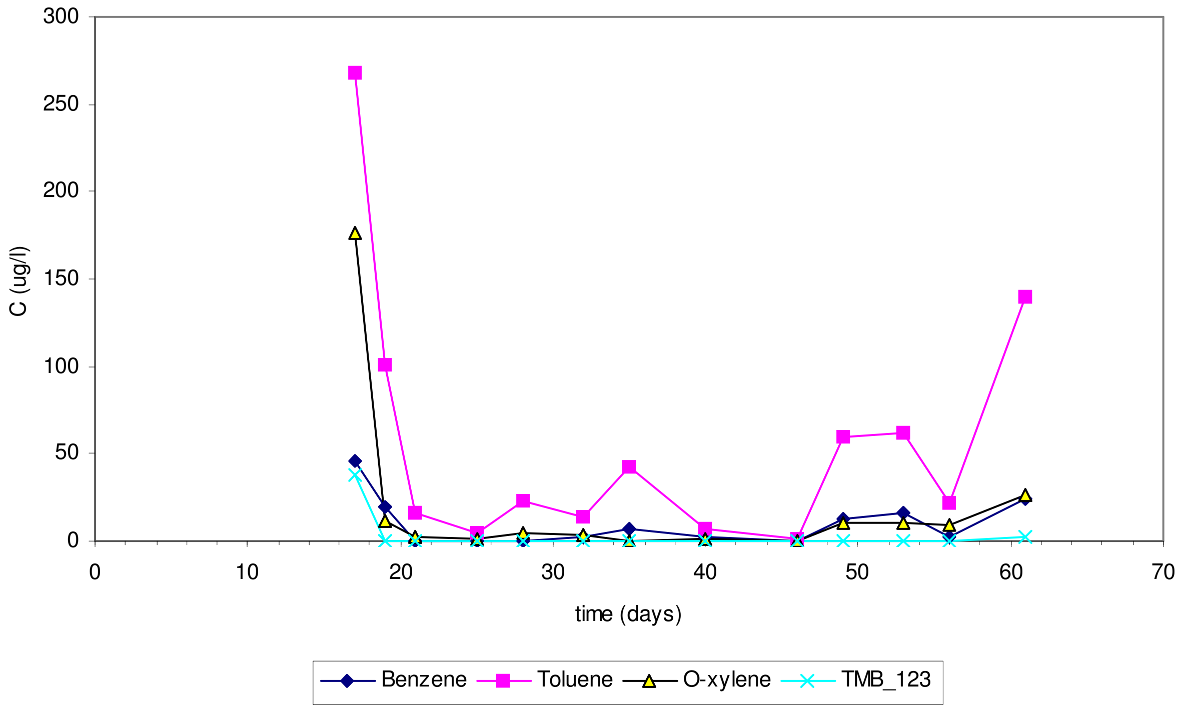

0.12
0.1
0.08
0.06
0.04
0.02
0
C (mg/l)
0
50
100
150
200
250
300
time (days)
Ethanol


160
140
120
100
80
60
40
20
0
C (ug/l)
0
50
100
150
200
250
300
time (days)
Benzene
Toluene
O-xylene
TMB_123

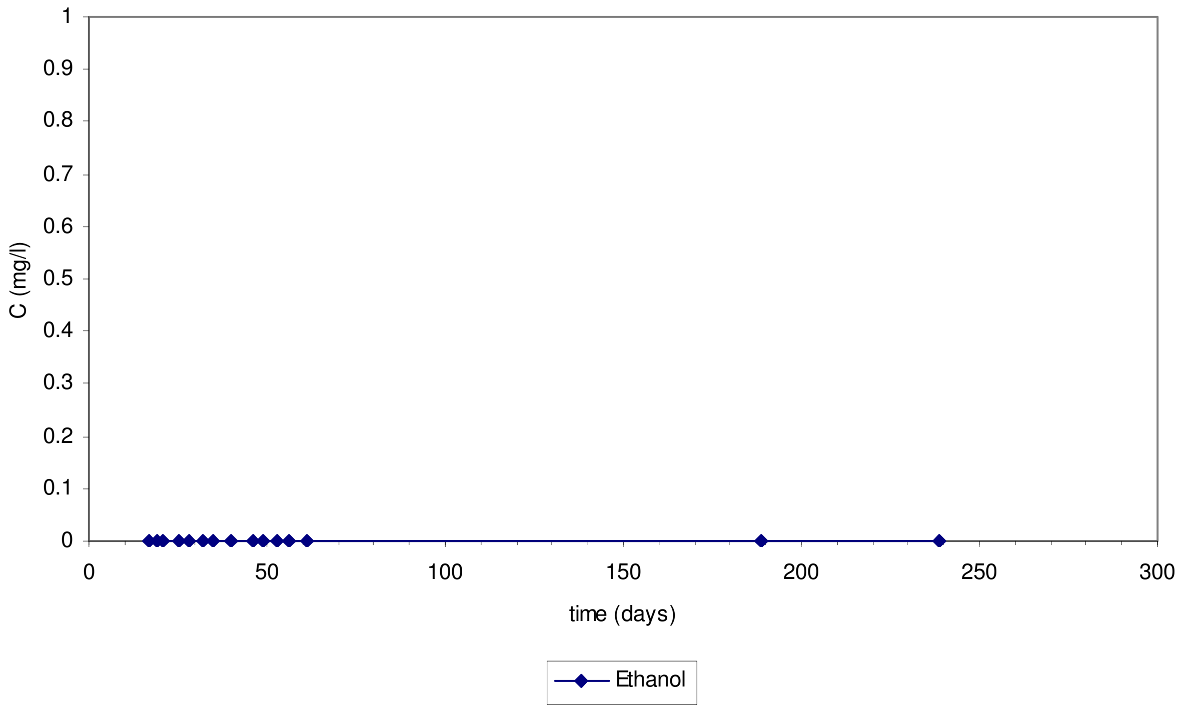
R2-6-8

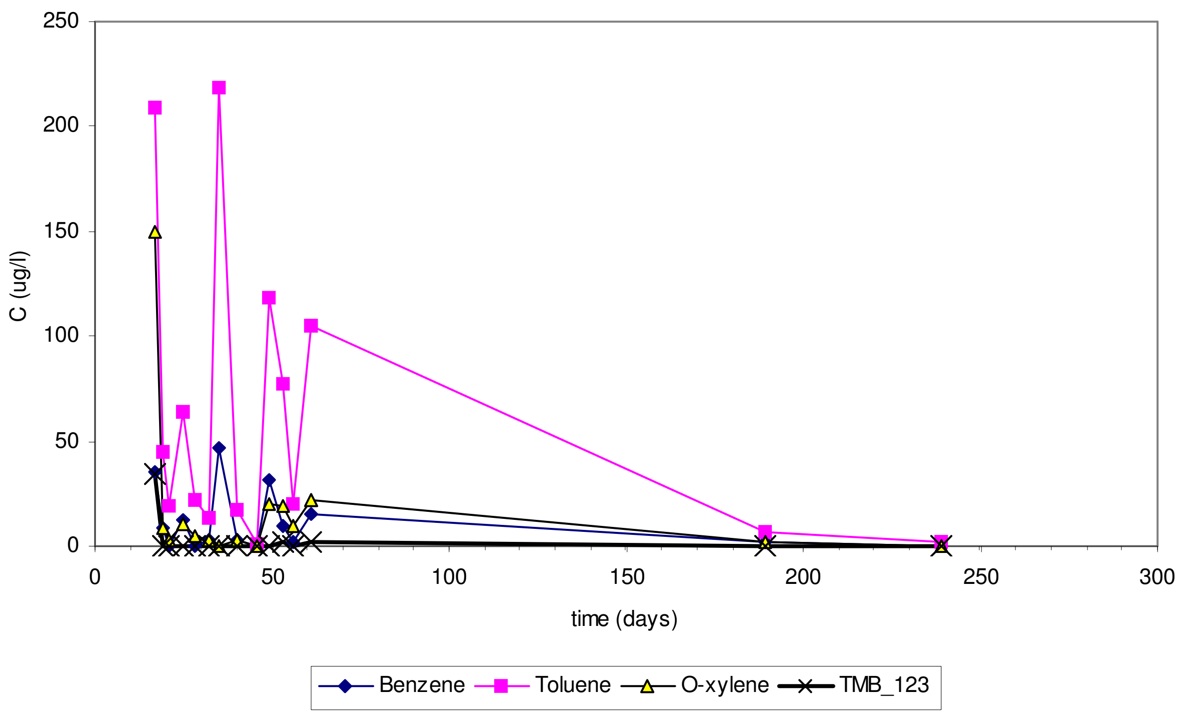


1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
C (mg/l)
0
10
20
30
40
50
60
70
time (days)
Ethanol


300
250
200
150
100
50
0
C (ug/l)
0
10
20
30
40
50
60
70
time (days)
Benzene
Toluene
O-xylene
TMB_123

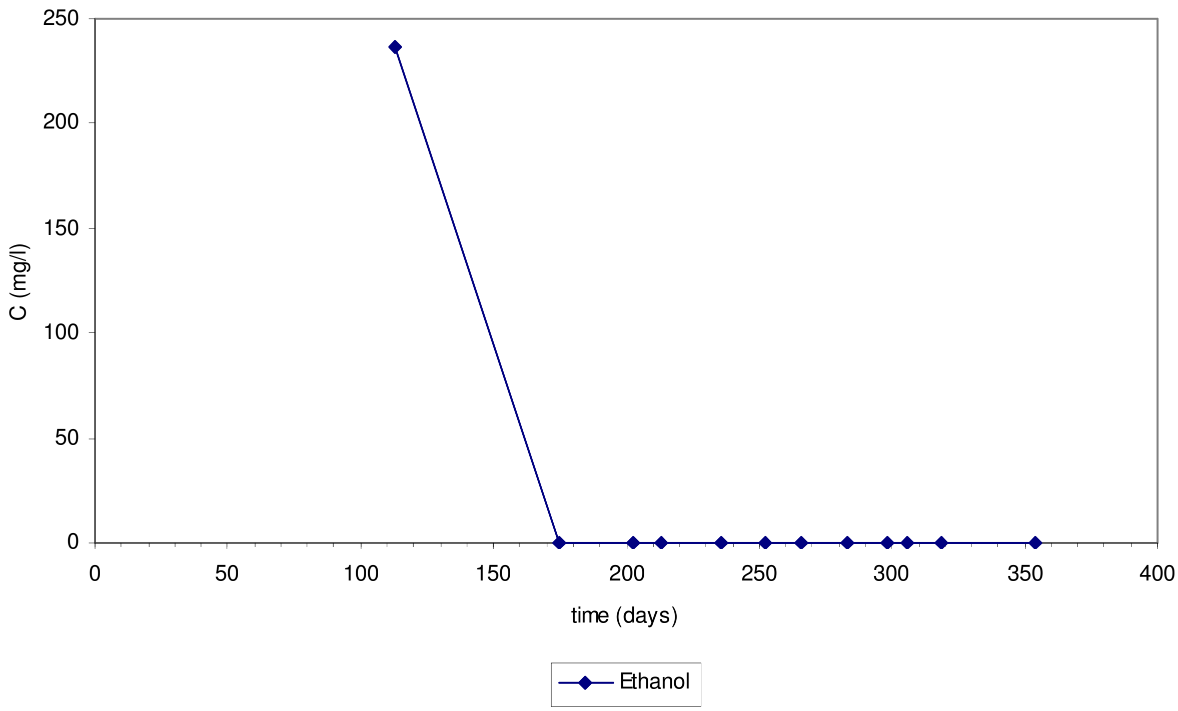
R2-5-10

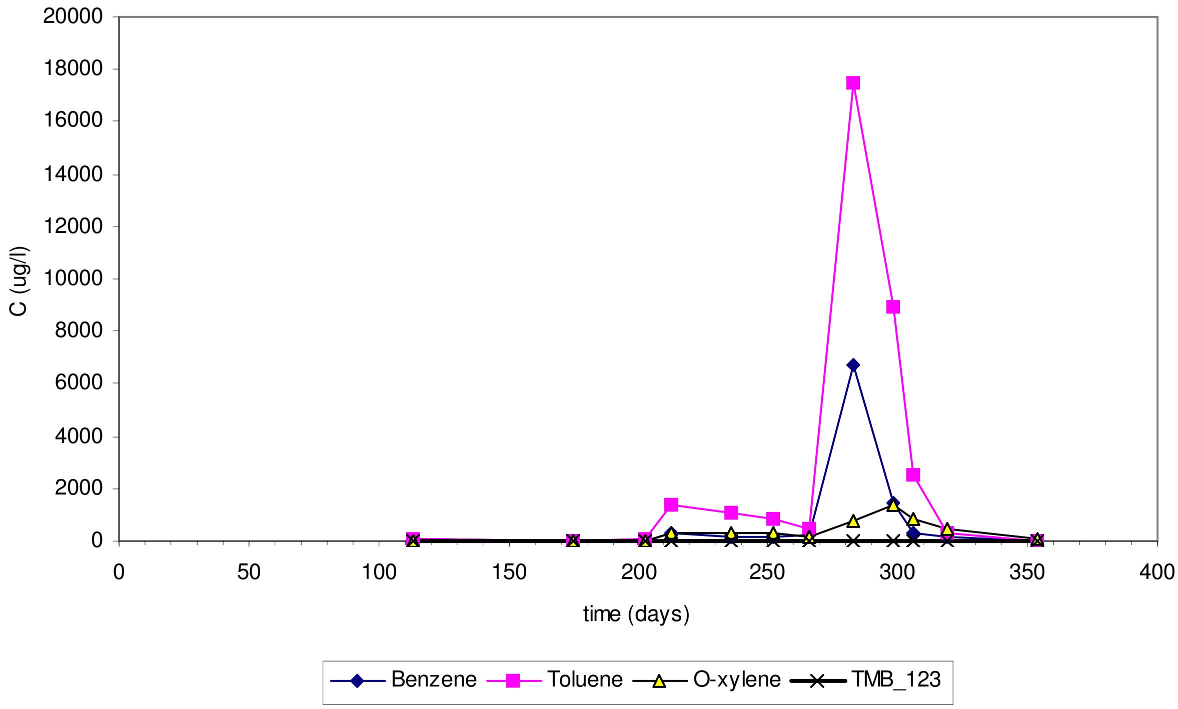

C (mg/l)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
50
100
150
200
250
300
time (days)
Ethanol


C (ug/l)
250
200
150
100
50
0
0
50
100
150
200
250
300
time (days)
Benzene
Toluene
O-xylene
TMB_123

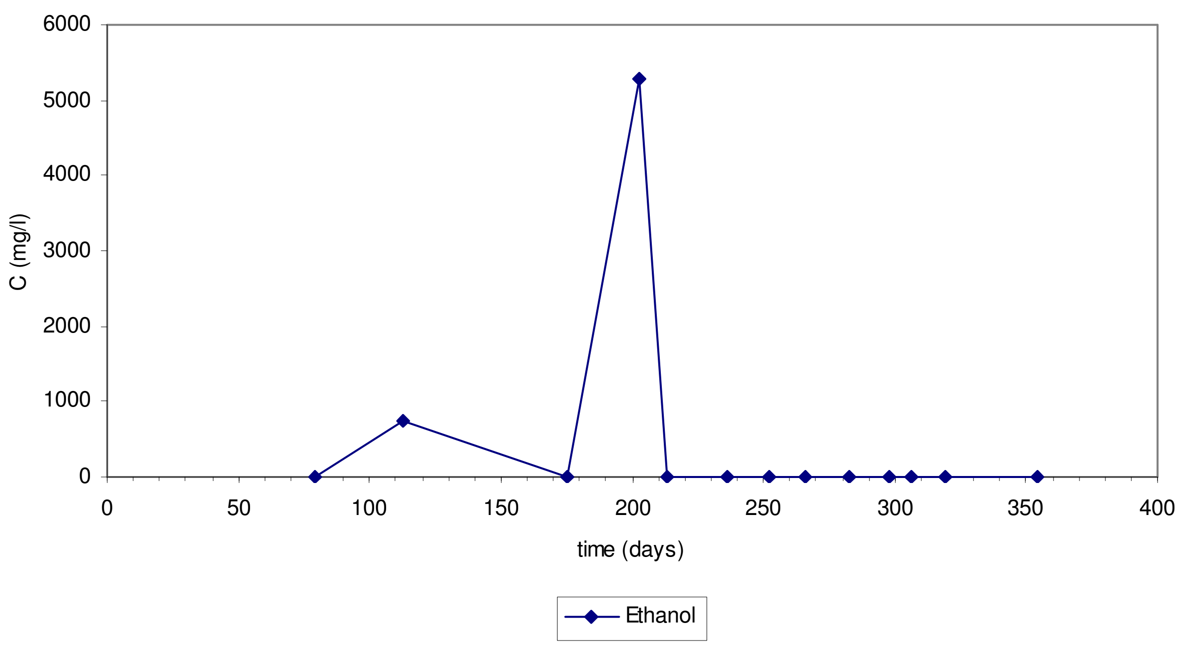
B.E10 b. Row 3

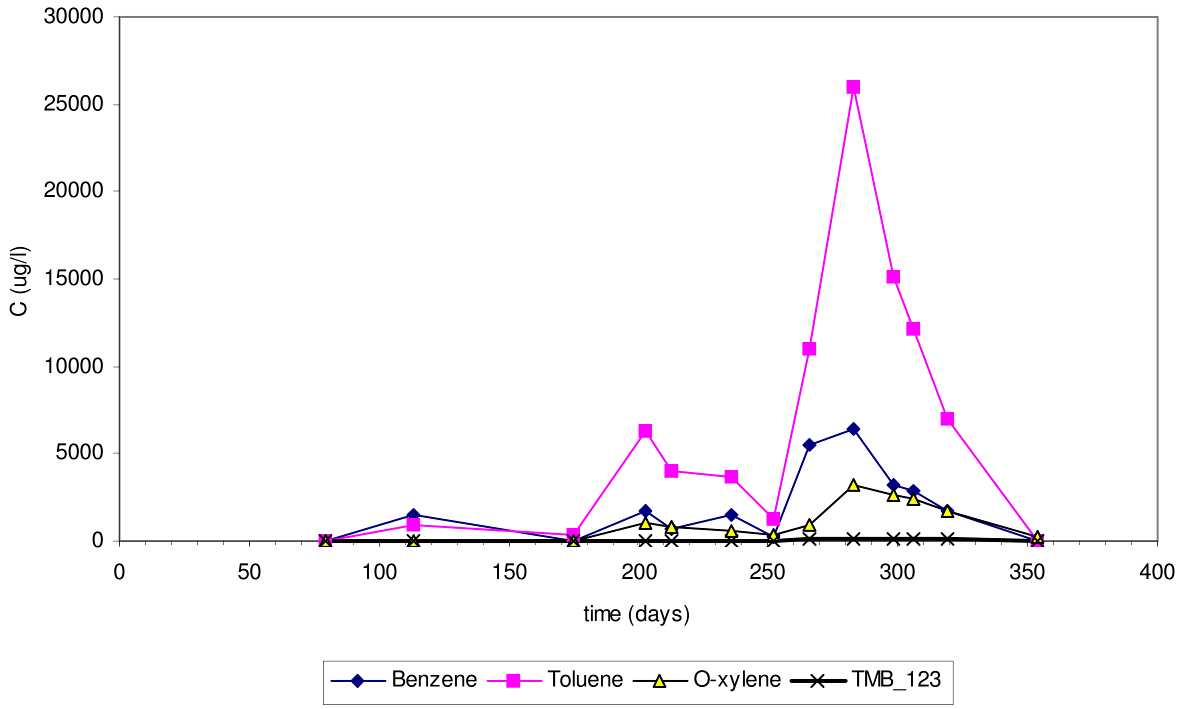
R3-3-8




20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

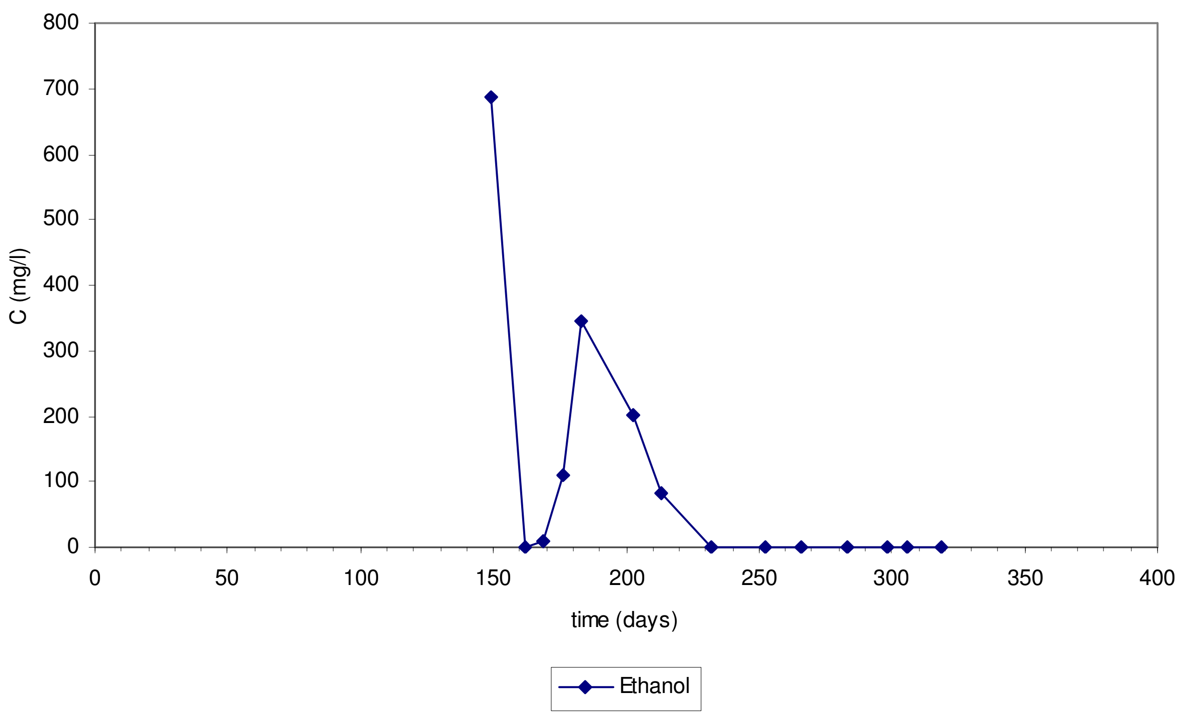
R3-3-9

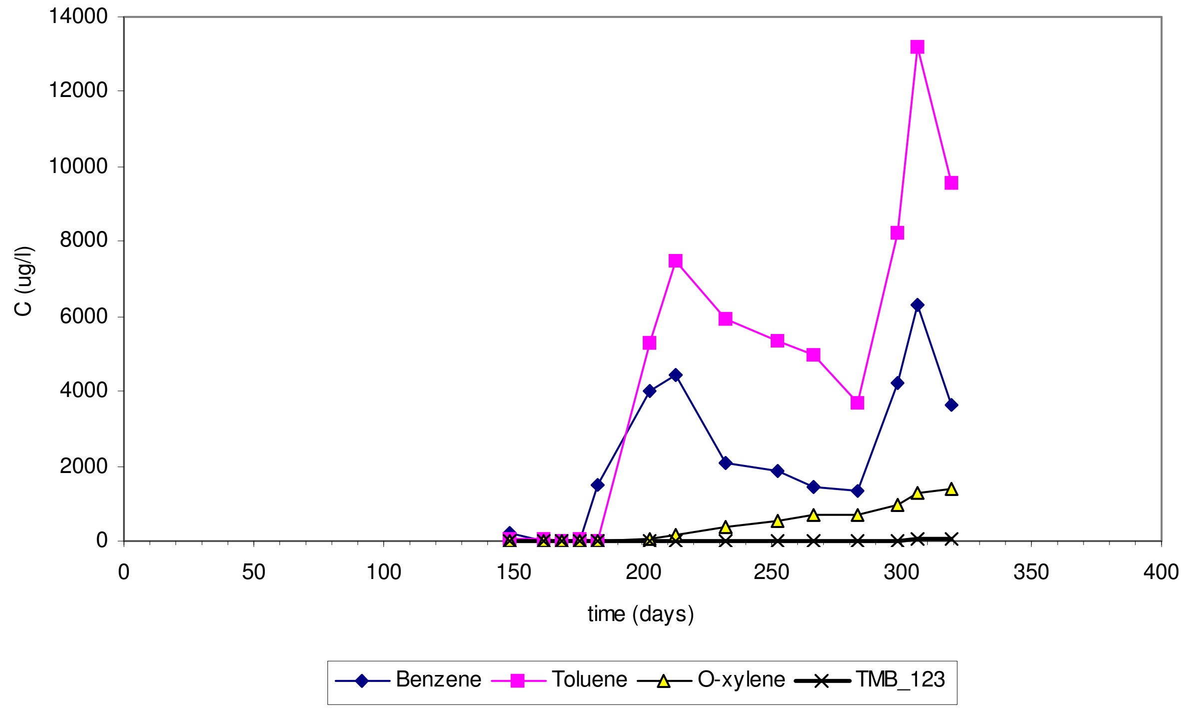

6000
5000
4000
3000
2000
1000
0
C (mg/l)
0
50
100
150
200
250
300
350
400
time (days)
Ethanol



B.E10 c. Row 4

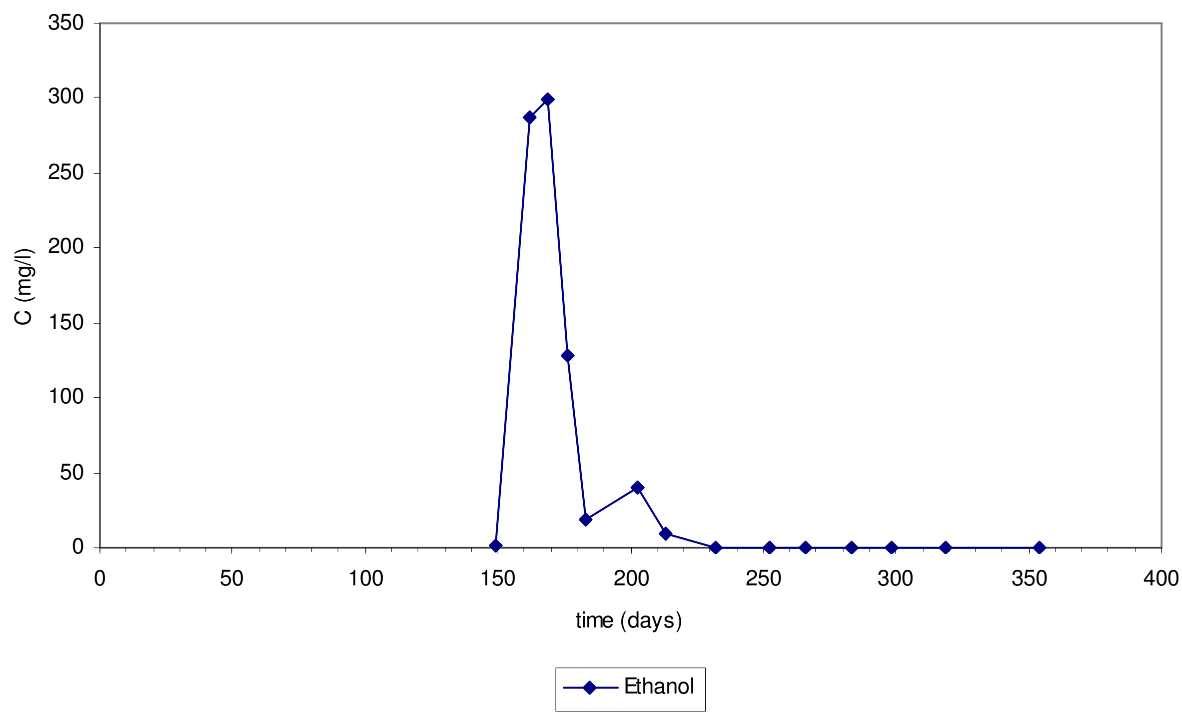
R4-3-9



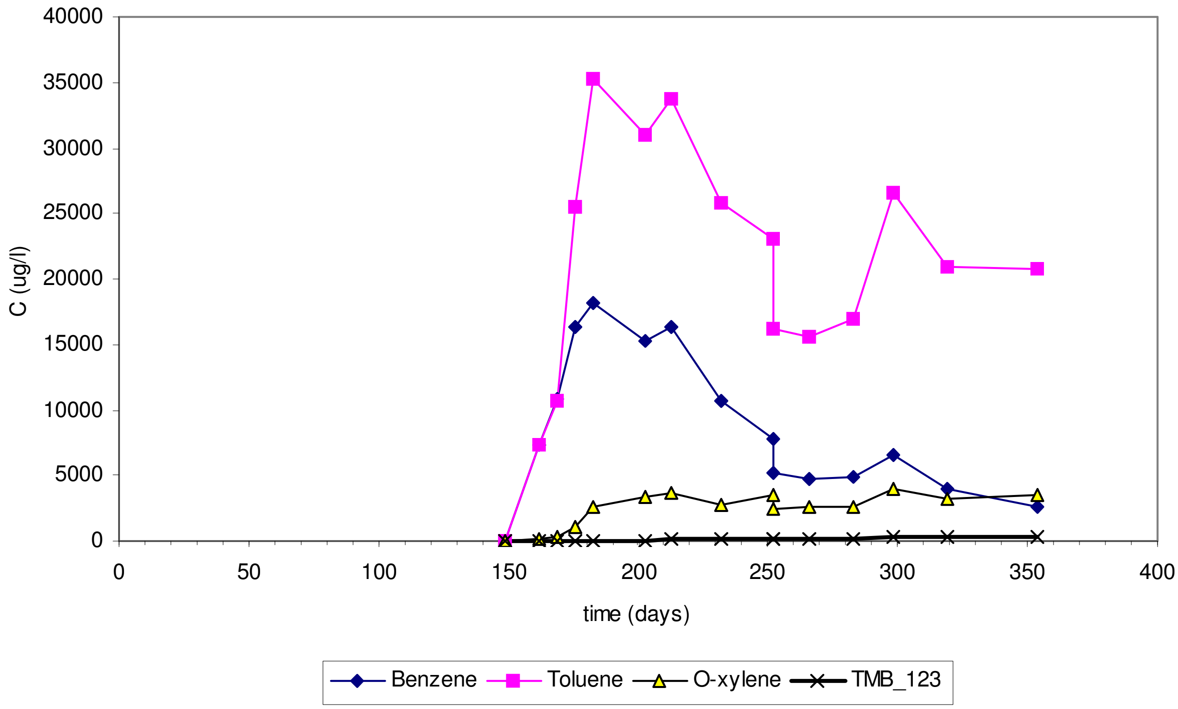


14000
12000
10000
8000
6000
4000
2000
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

R4-3-13

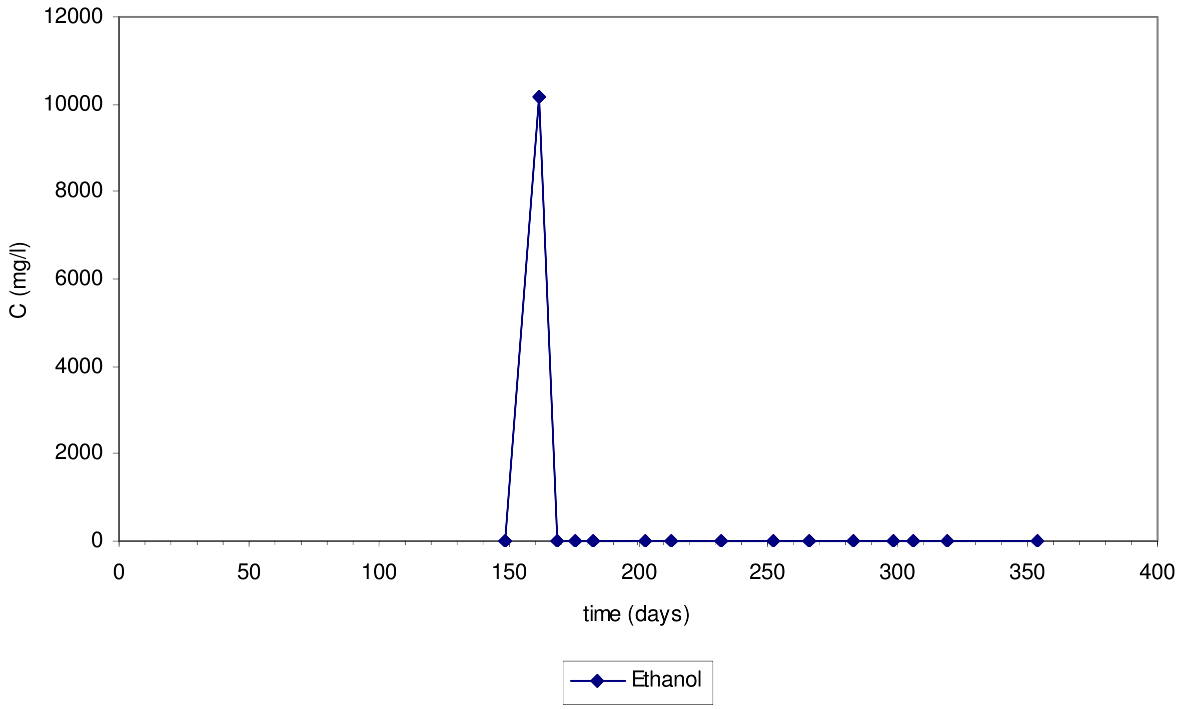


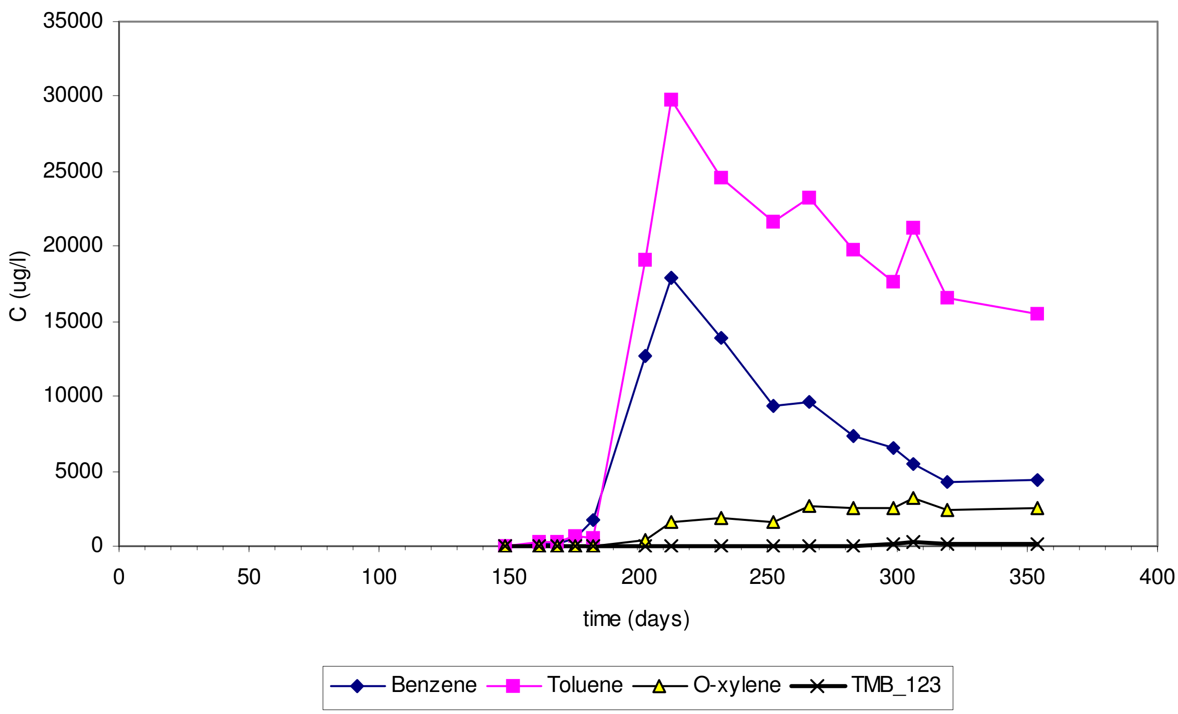
350
300
250
200
150
100
50
0
C (mg/l)
0
50
100
150
200
250
300
350
400
time (days)
Ethanol



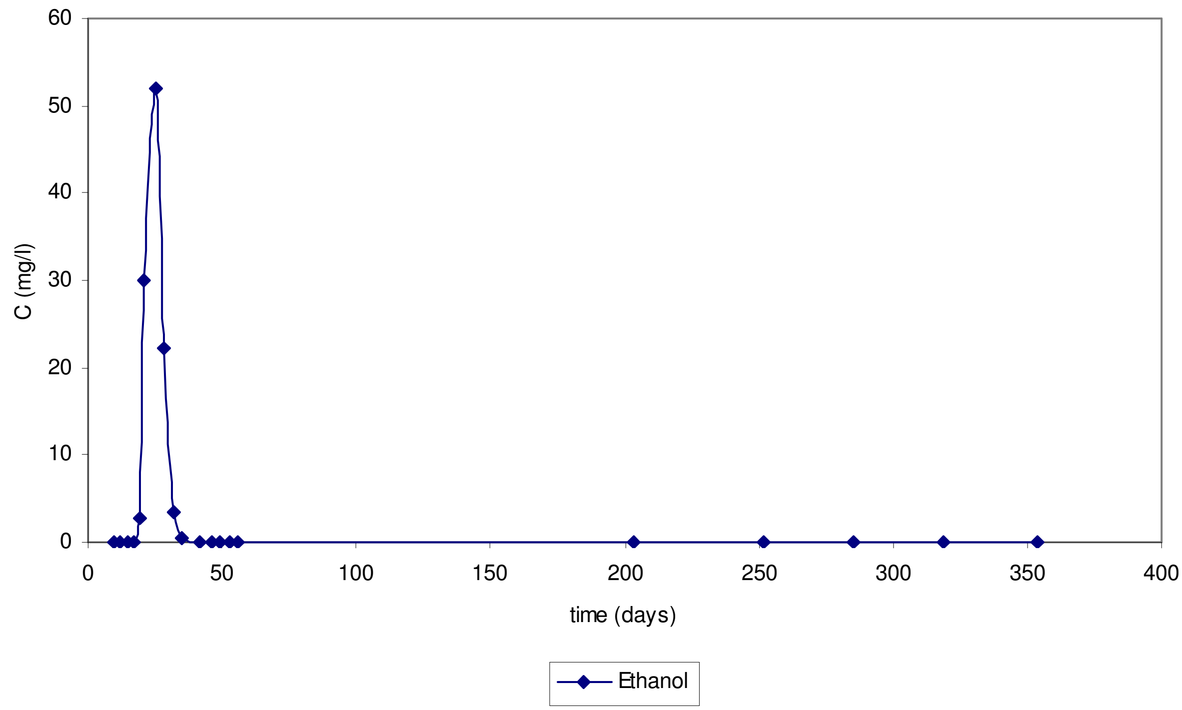
40000
35000
30000
25000
20000
15000
10000
5000
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

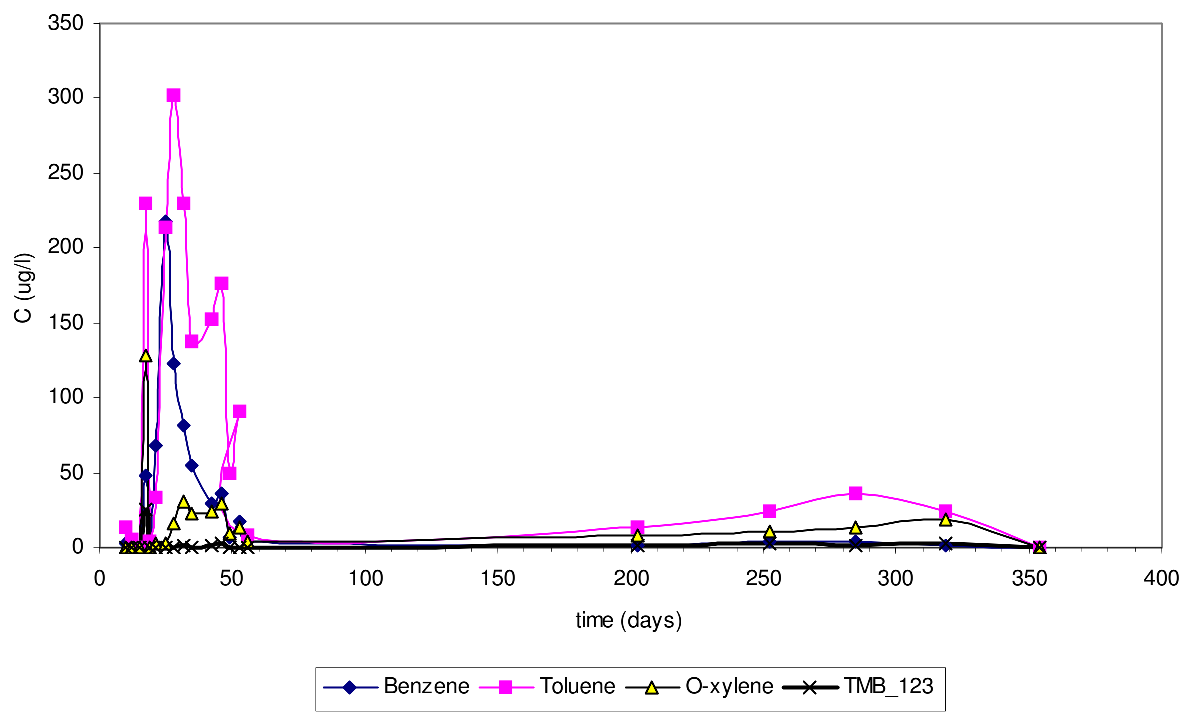
R4-3-14


12000
10000
8000
6000
4000
2000
0
C (mg/l)
0
50
100
150
200
250
300
350
400
time (days)
Ethanol

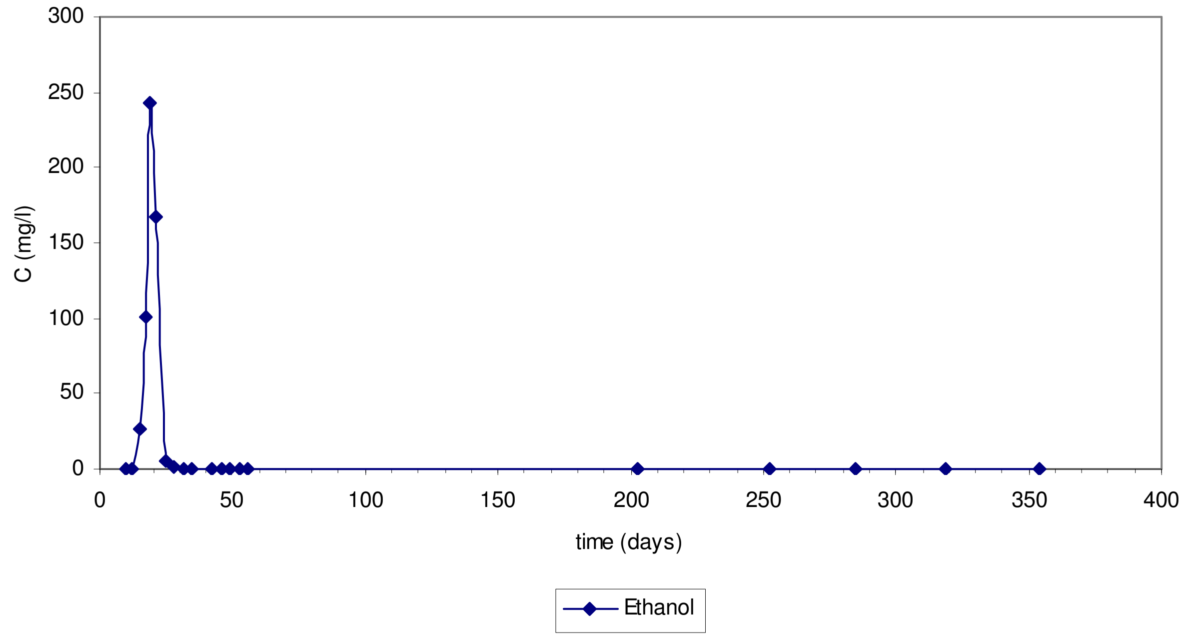

35000
30000
25000
20000
15000
10000
5000
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

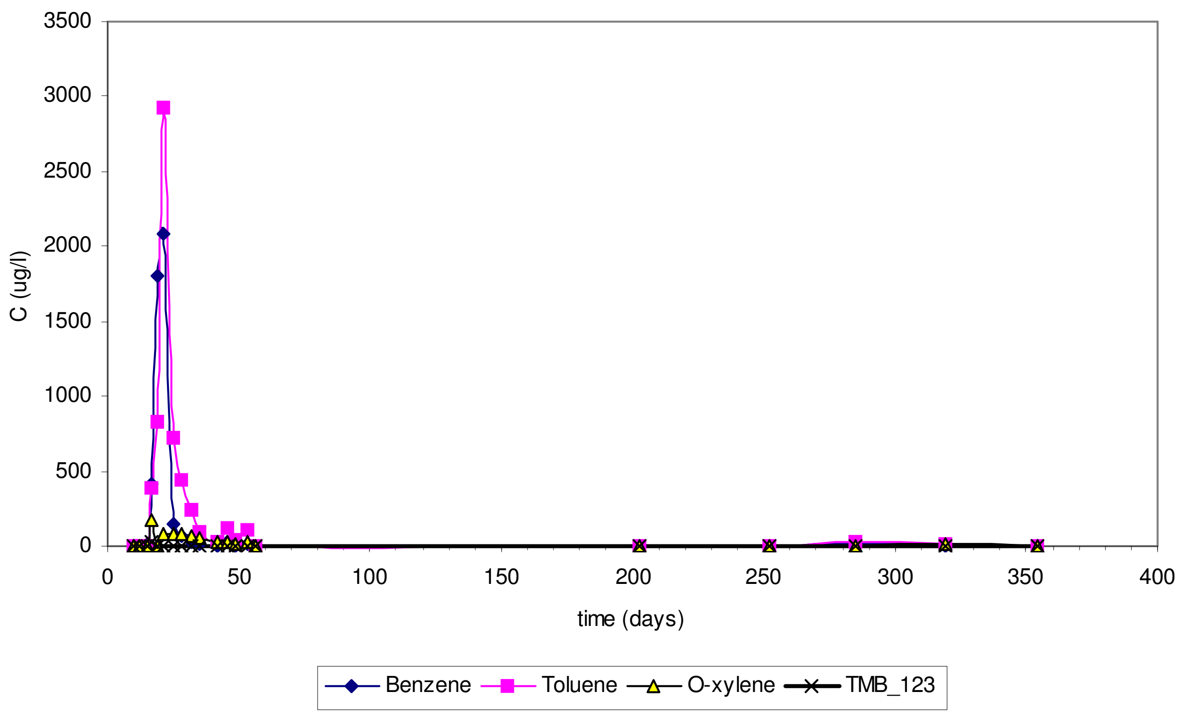
M1-6


60
50
40
30
20
10
0
C (mg/l)
0
50
100
150
200
250
300
350
400
time (days)
Ethanol


350
300
250
200
150
100
50
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

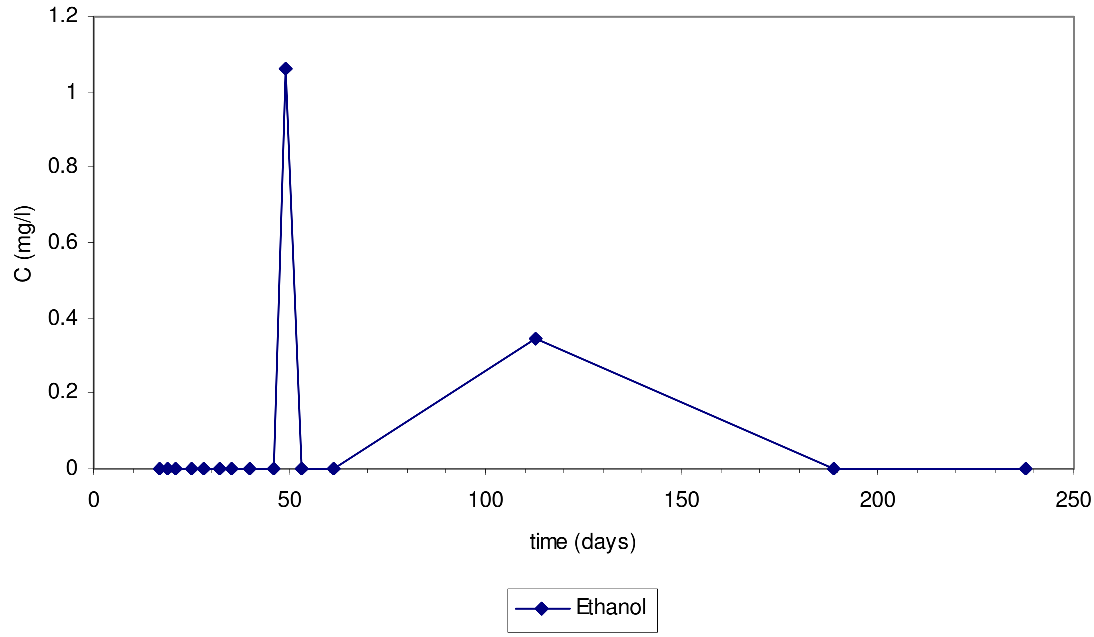
M2-6

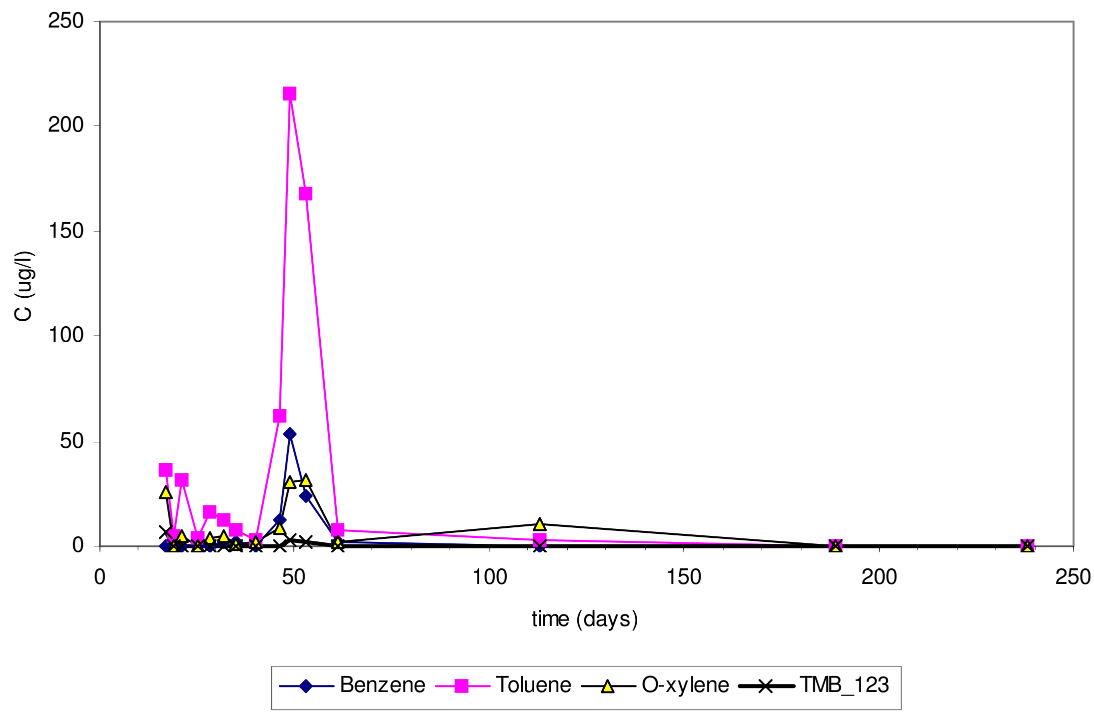




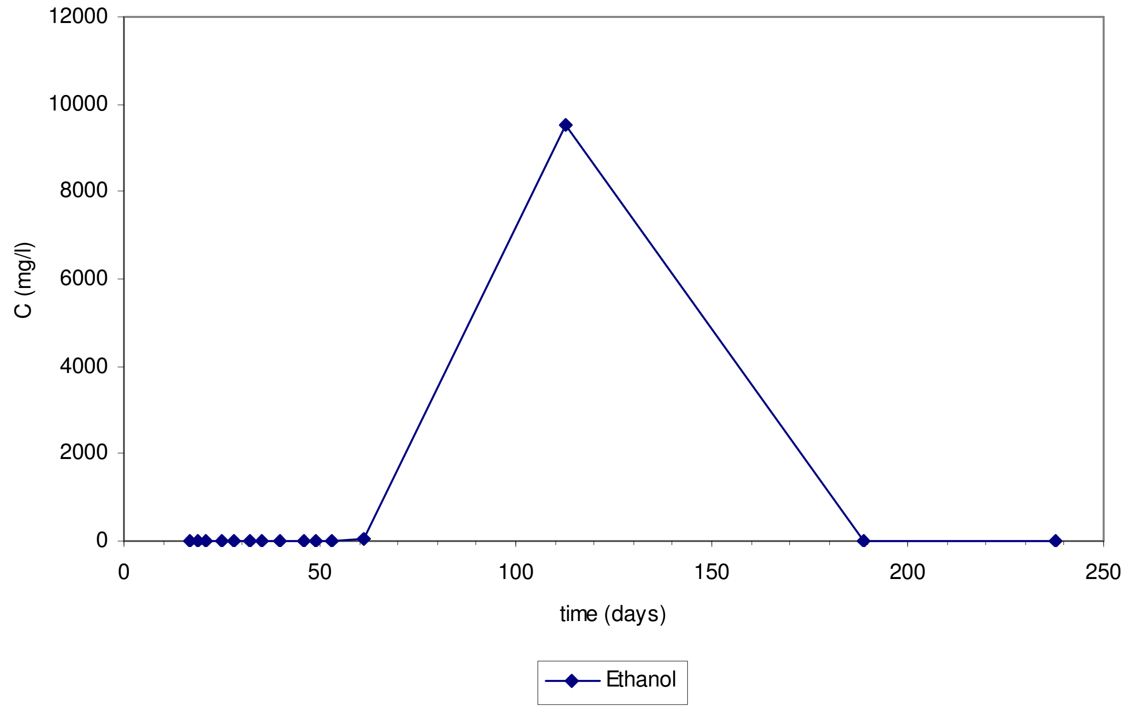
C.E95 a. Row 2

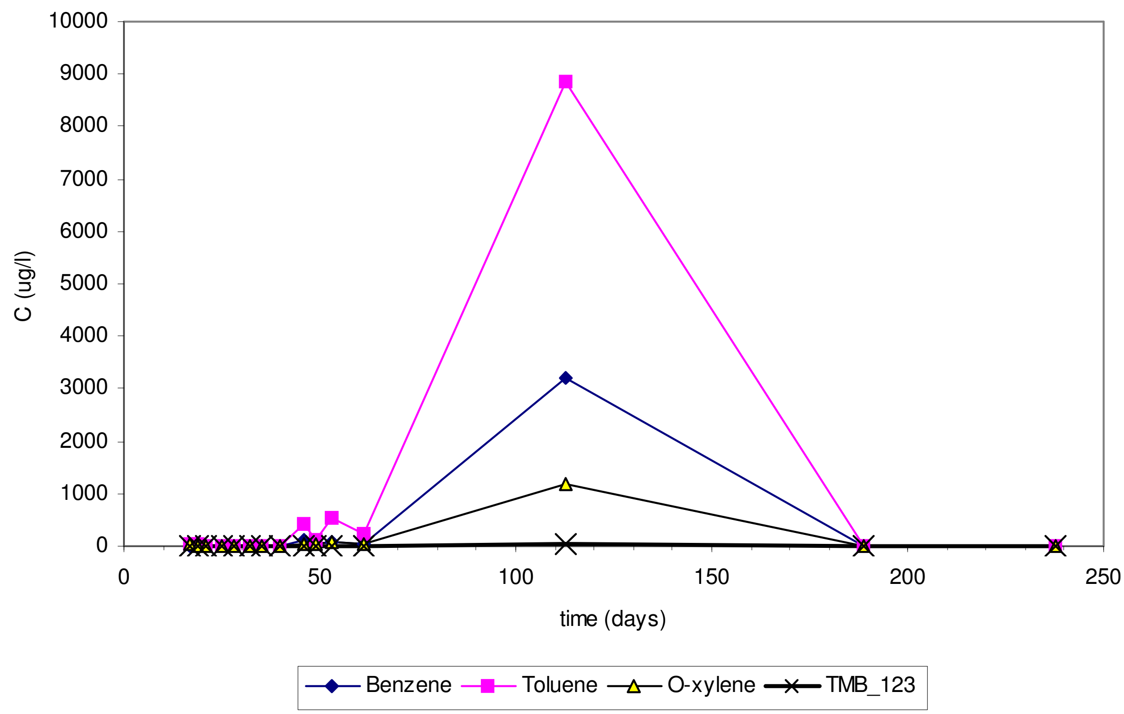
R2-2-10


1.2
1
0.8
0.6
0.4
0.2
0
C (mg/l)
0
50
100
150
200
250
time (days)
Ethanol

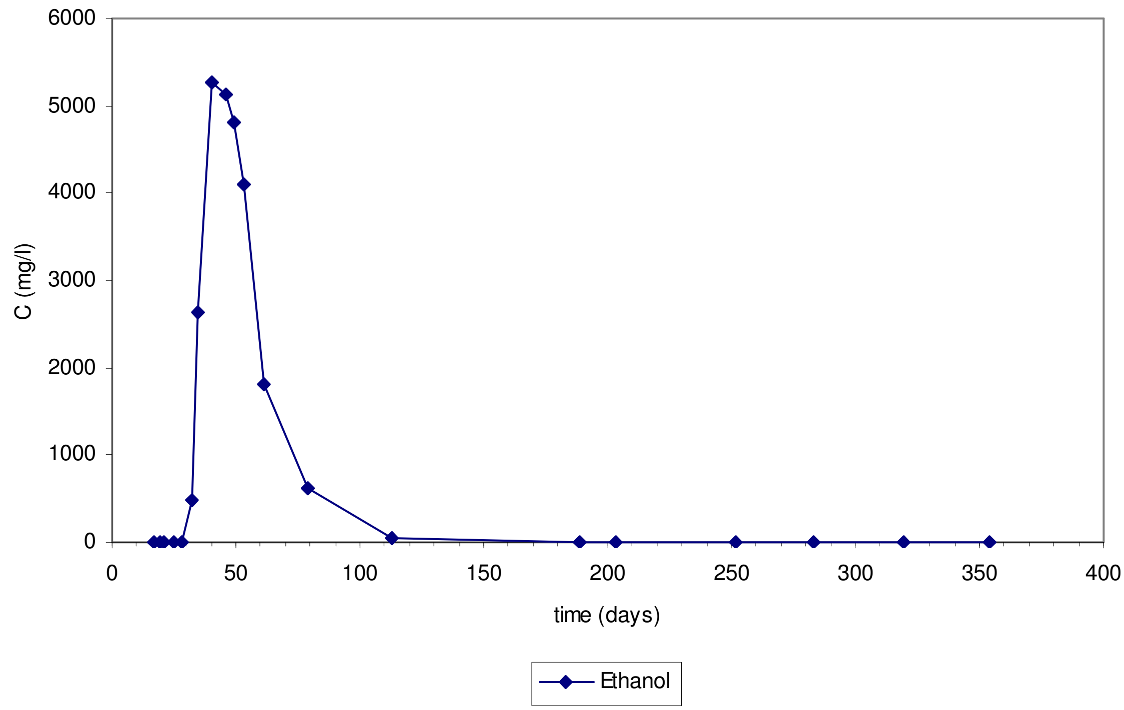

250
200
150
100
50
0
C (ug/l)
0
50
100
150
200
250
time (days)
Benzene
Toluene
O-xylene
TMB_123

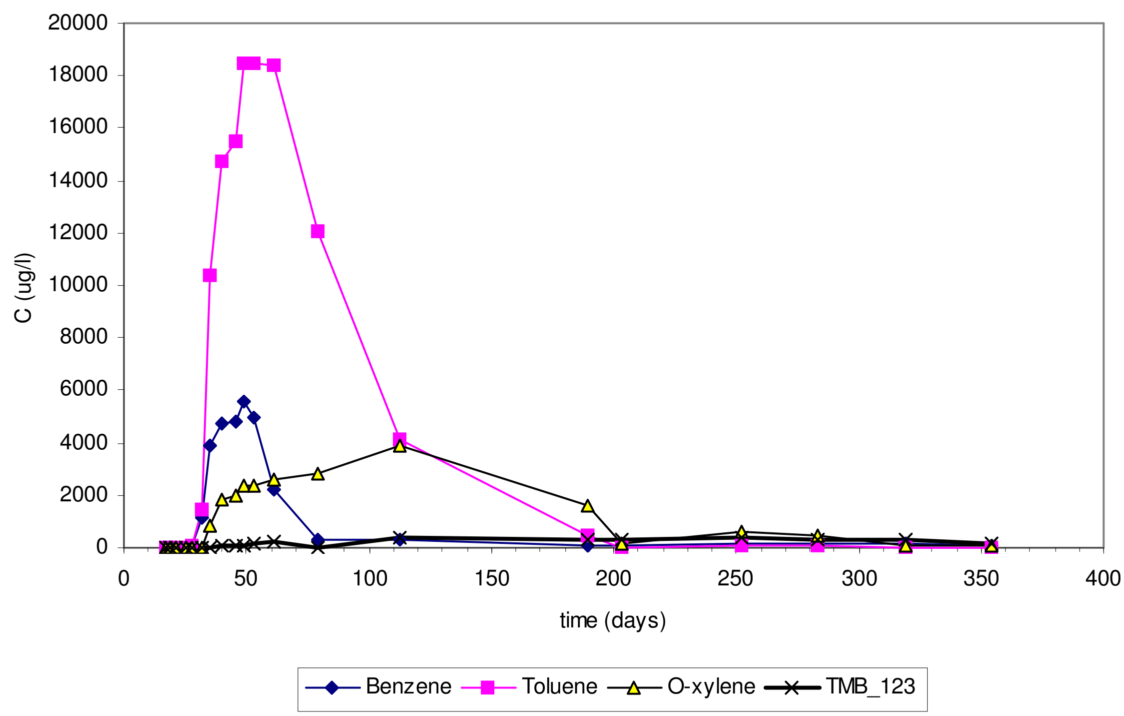
R2-4-3


12000
10000
8000
6000
4000
2000
0
C (mg/l)
0
50
100
150
200
250
time (days)
Ethanol

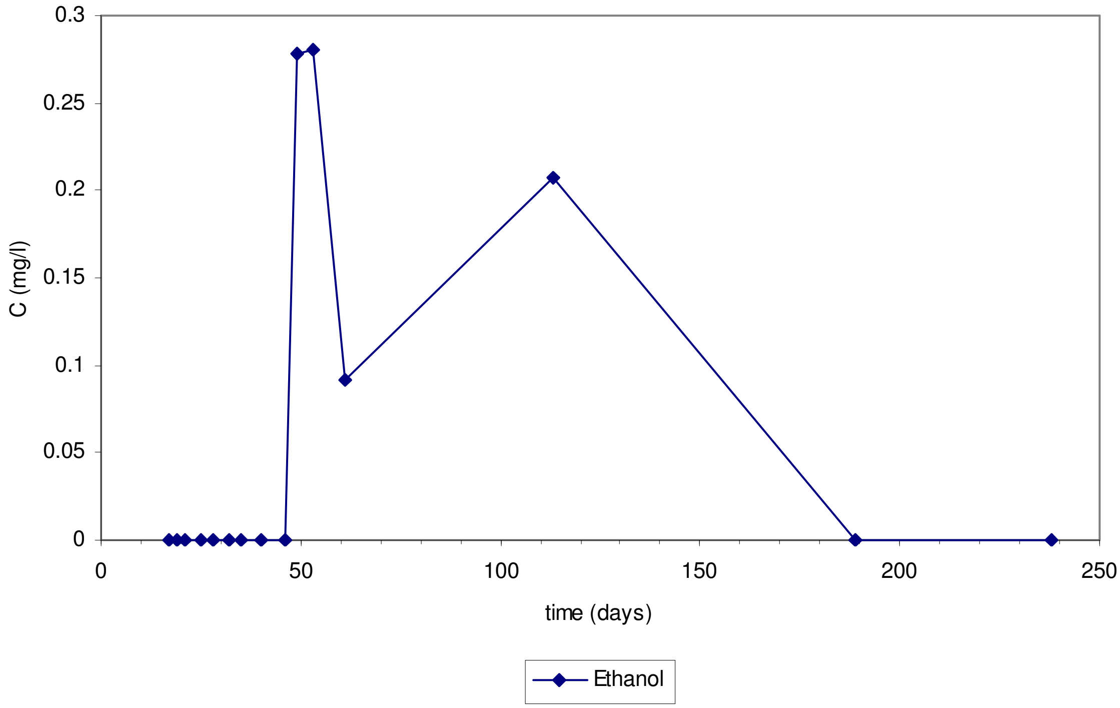

10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
C (ug/l)
0
50
100
150
200
250
time (days)
Benzene
Toluene
O-xylene
TMB_123

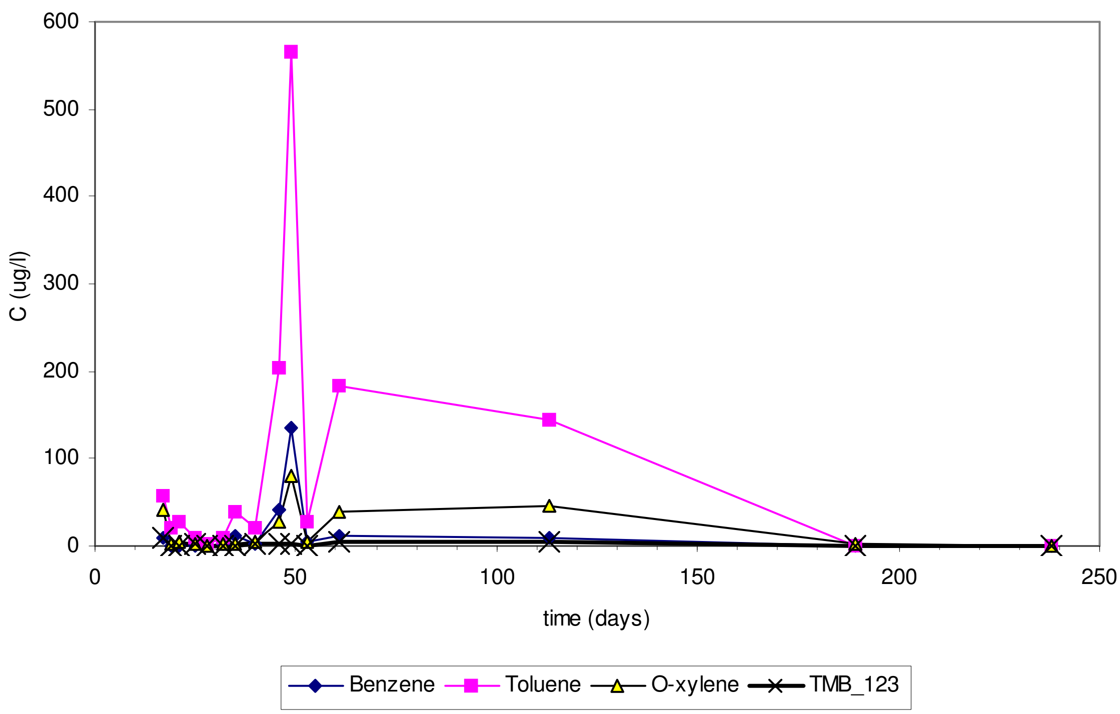
R2-4-11


6000
5000
4000
3000
2000
1000
0
C (mg/l)
0
50
100
150
200
250
300
350
400
time (days)
Ethanol

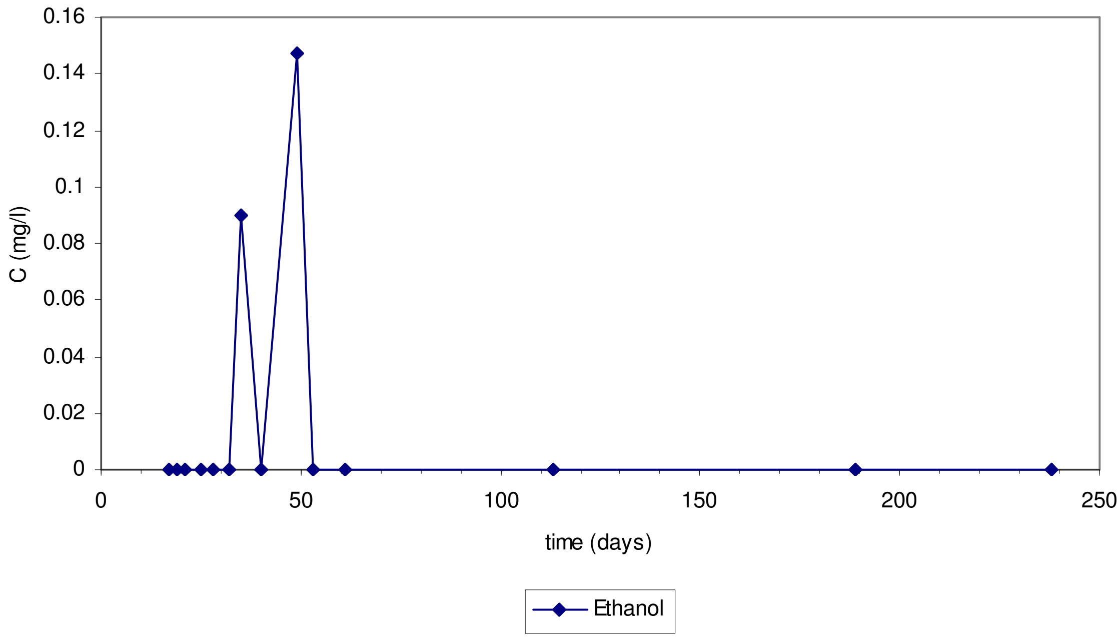

20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

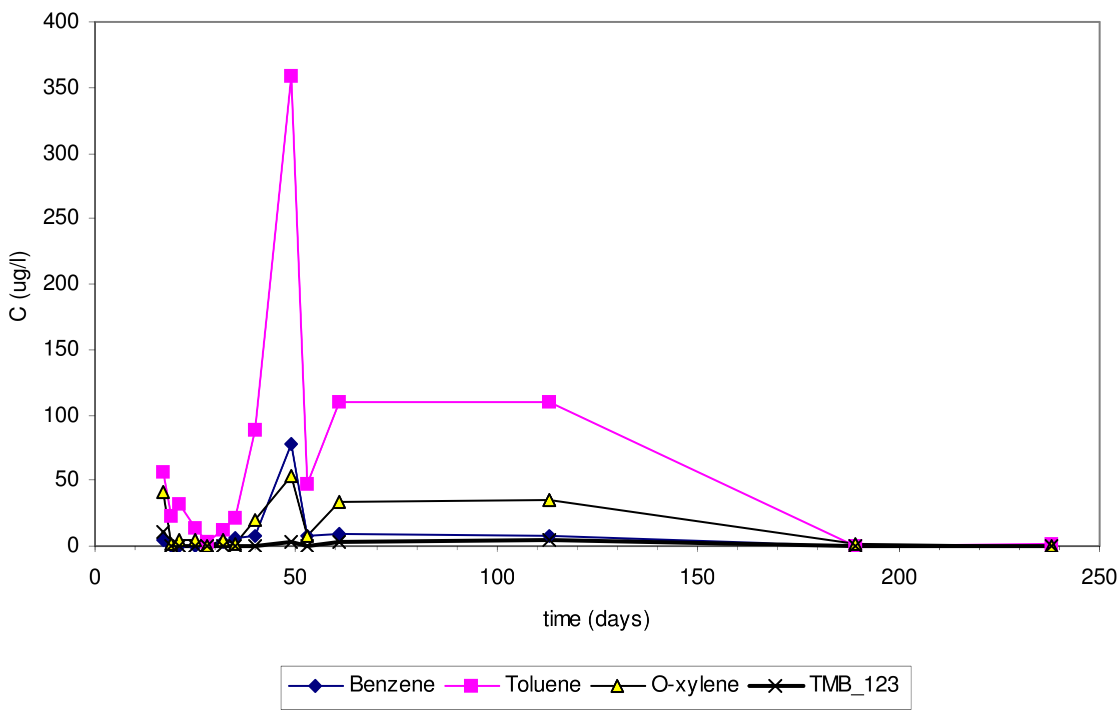
R2-5-10


0.3
0.25
0.2
0.15
0.1
0.05
0
C (mg/l)
0
50
100
150
200
250
time (days)
Ethanol

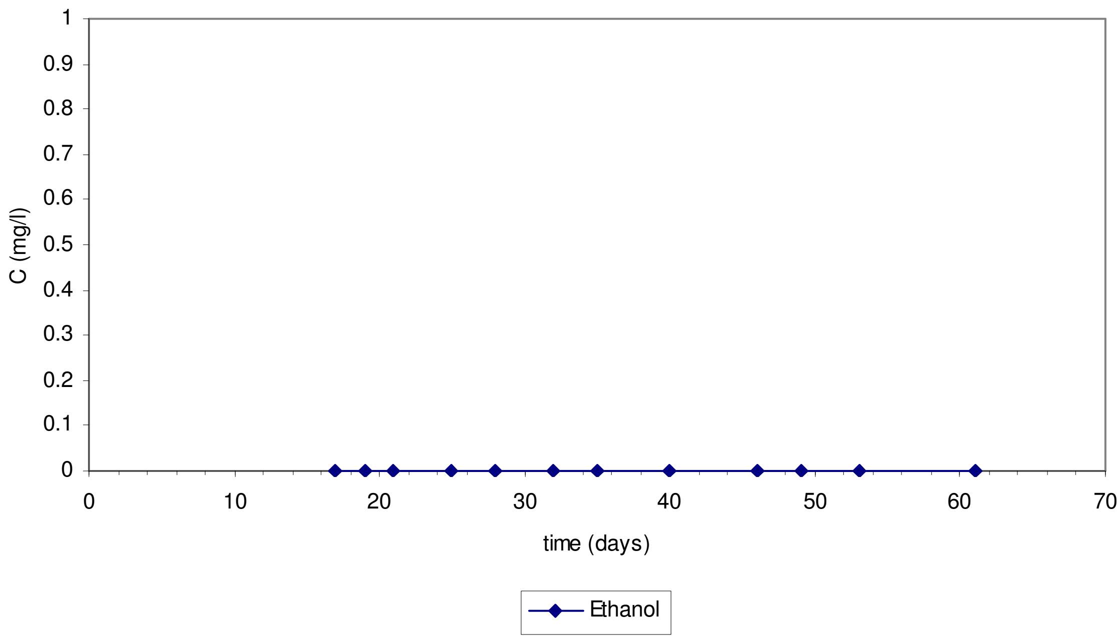

600
500
400
300
200
100
0
C (ug/l)
0
50
100
150
200
250
time (days)
Benzene
Toluene
O-xylene
TMB_123

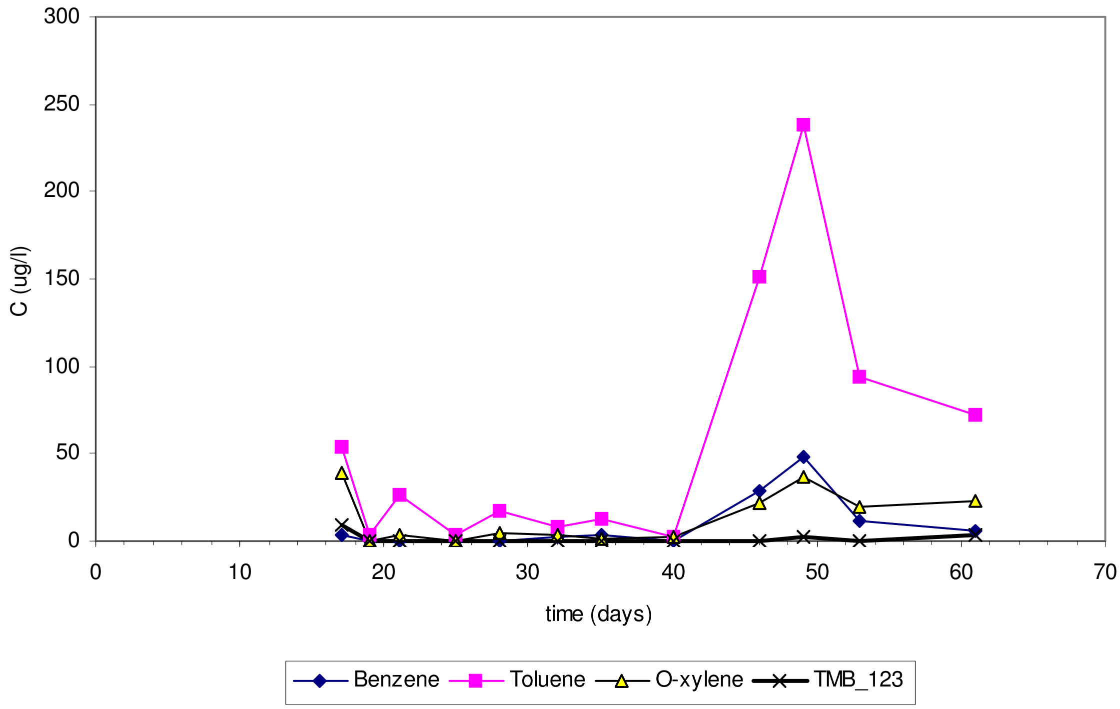
R2-5-14


0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
C (mg/l)
0
50
100
150
200
250
time (days)
Ethanol


400
350
300
250
200
150
100
50
0
C (ug/l)
0
50
100
150
200
250
time (days)
Benzene
Toluene
O-xylene
TMB_123

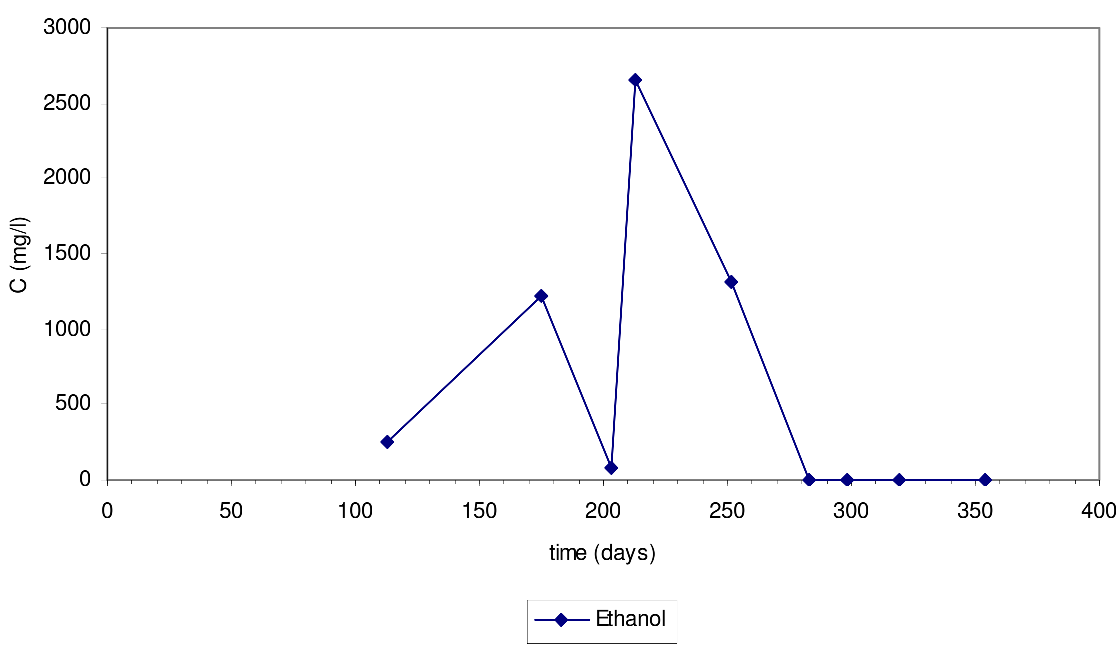
R2-6-8

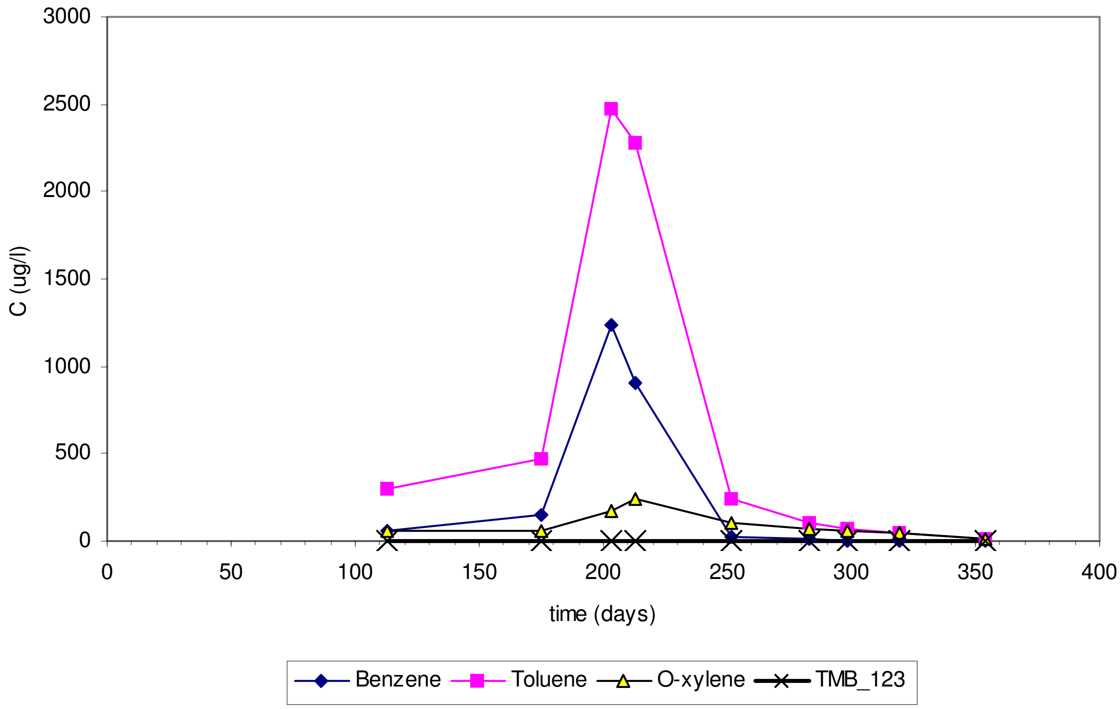

1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
C (mg/l)
0
10
20
30
40
50
60
70
time (days)
Ethanol



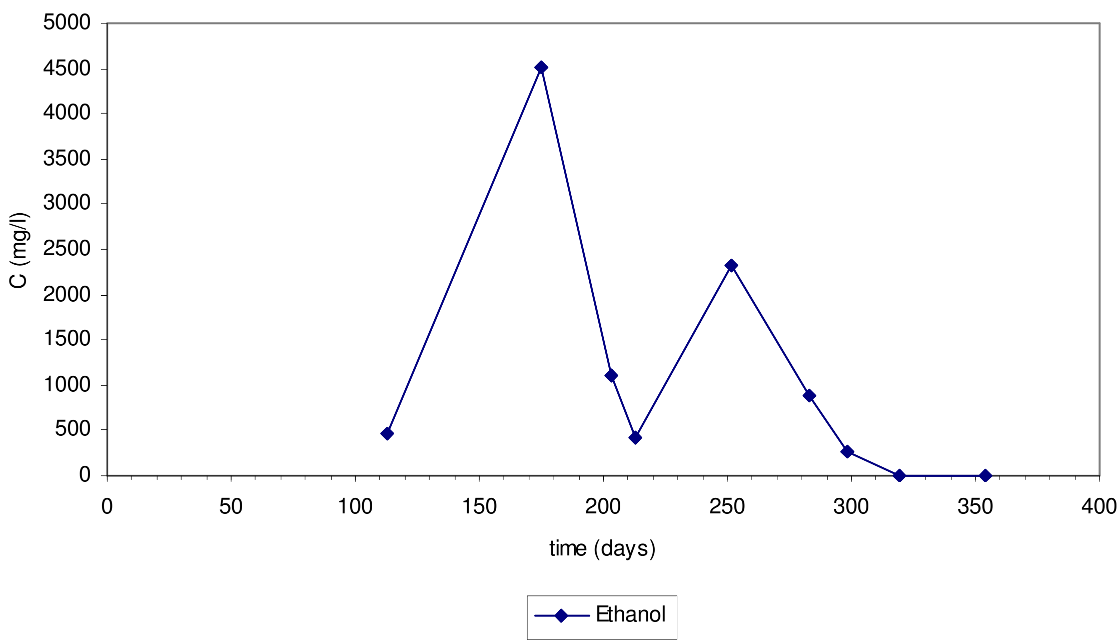
C.E95 b. Row 3

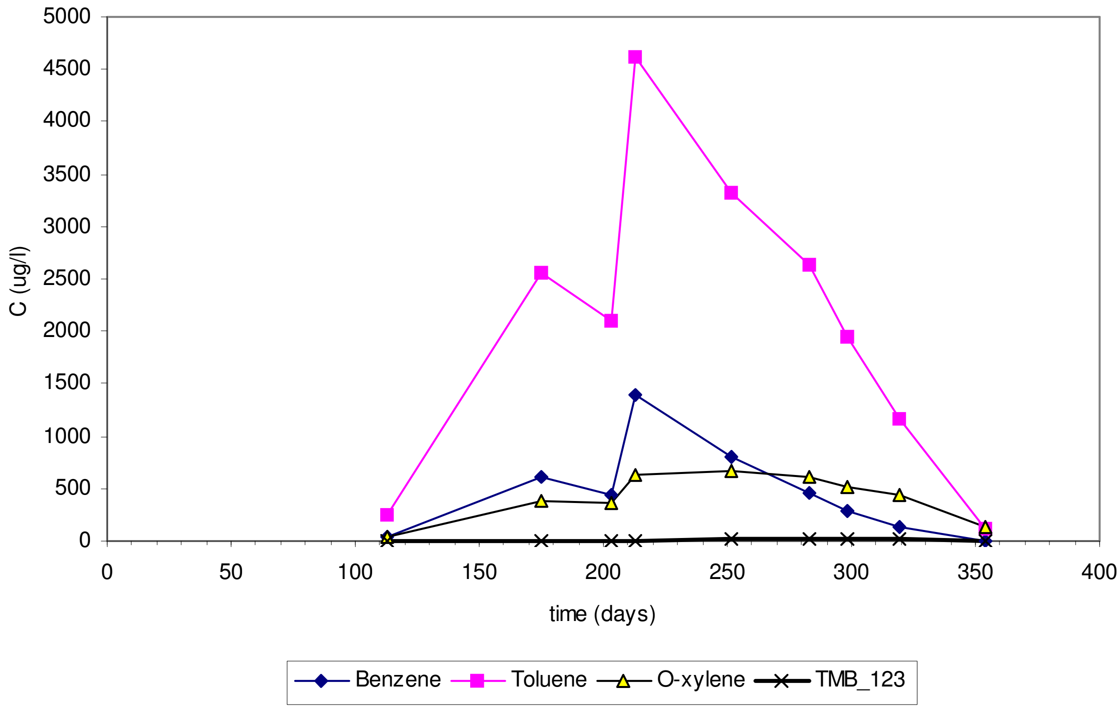
R3-3-5



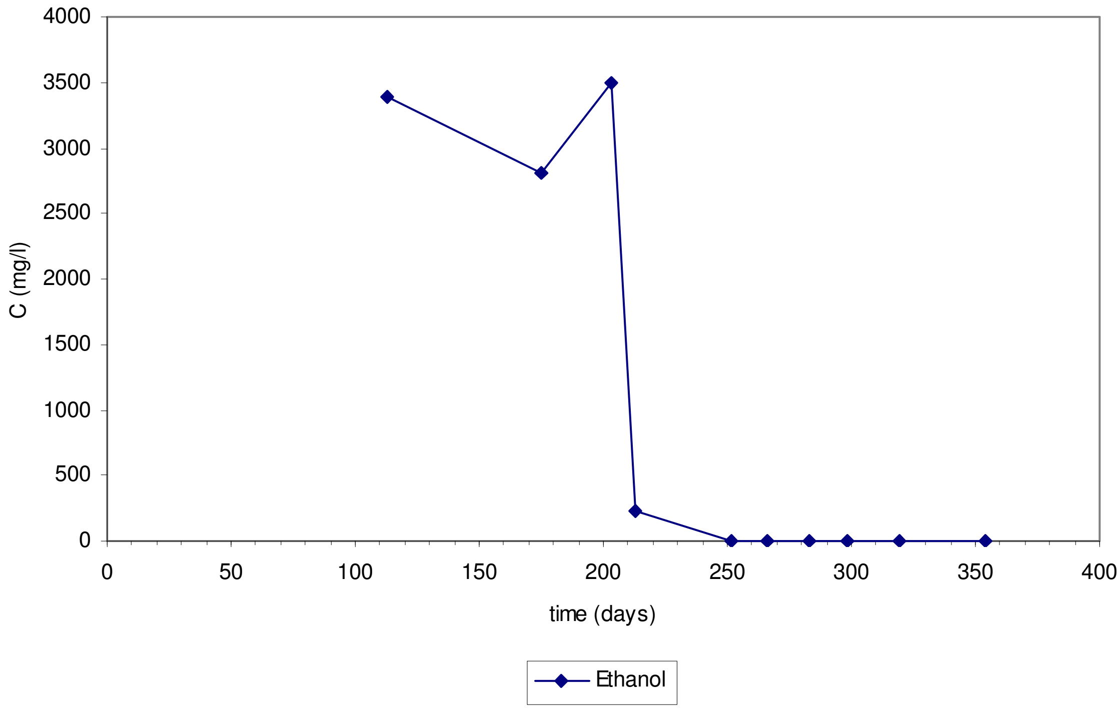

3000
2500
2000
1500
1000
500
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

R3-3-7

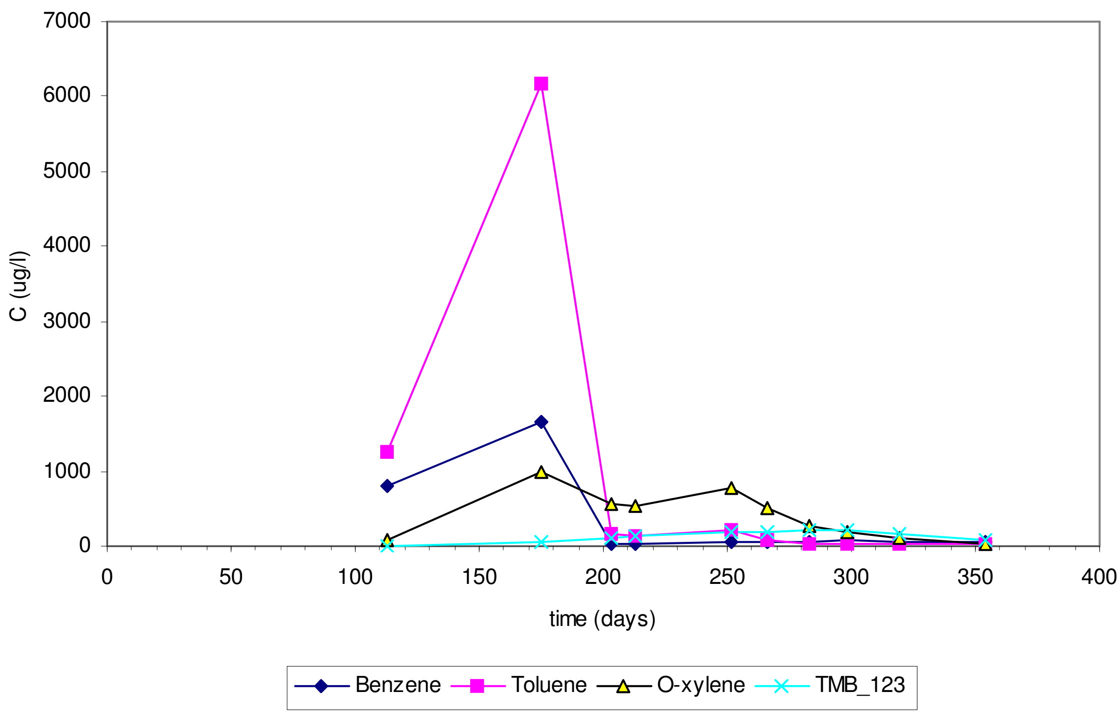

5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
C (mg/l)
0
50
100
150
200
250
300
350
400
time (days)
Ethanol


5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
C (ug/l)
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

R3-3-9

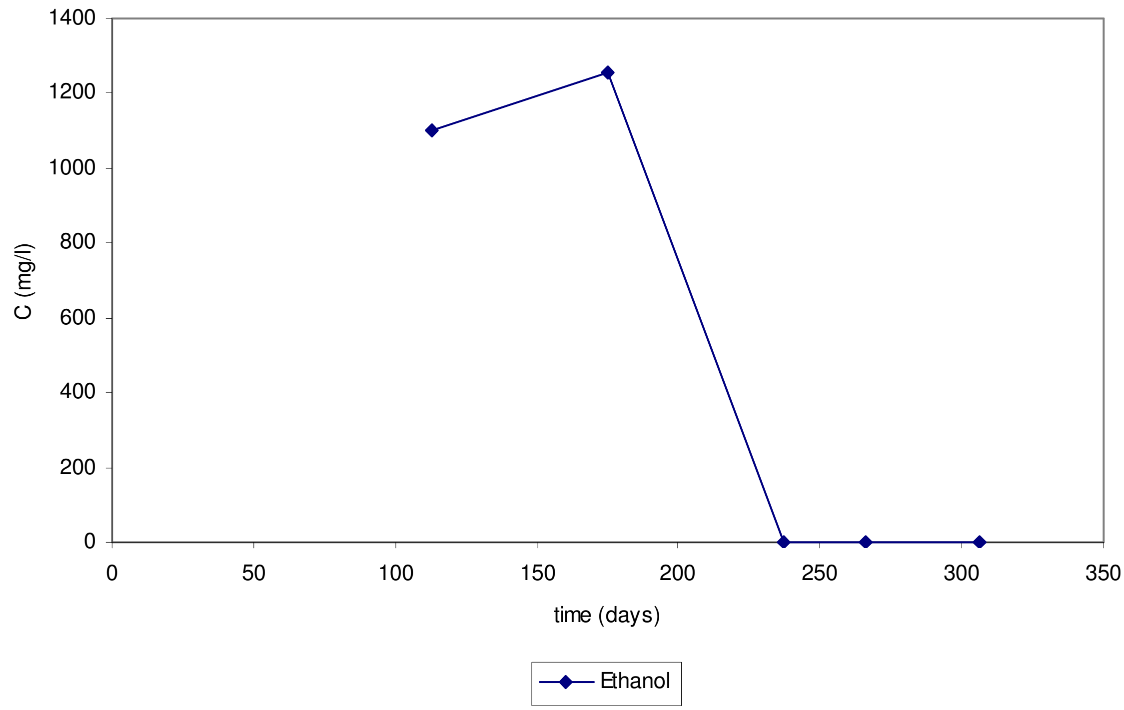


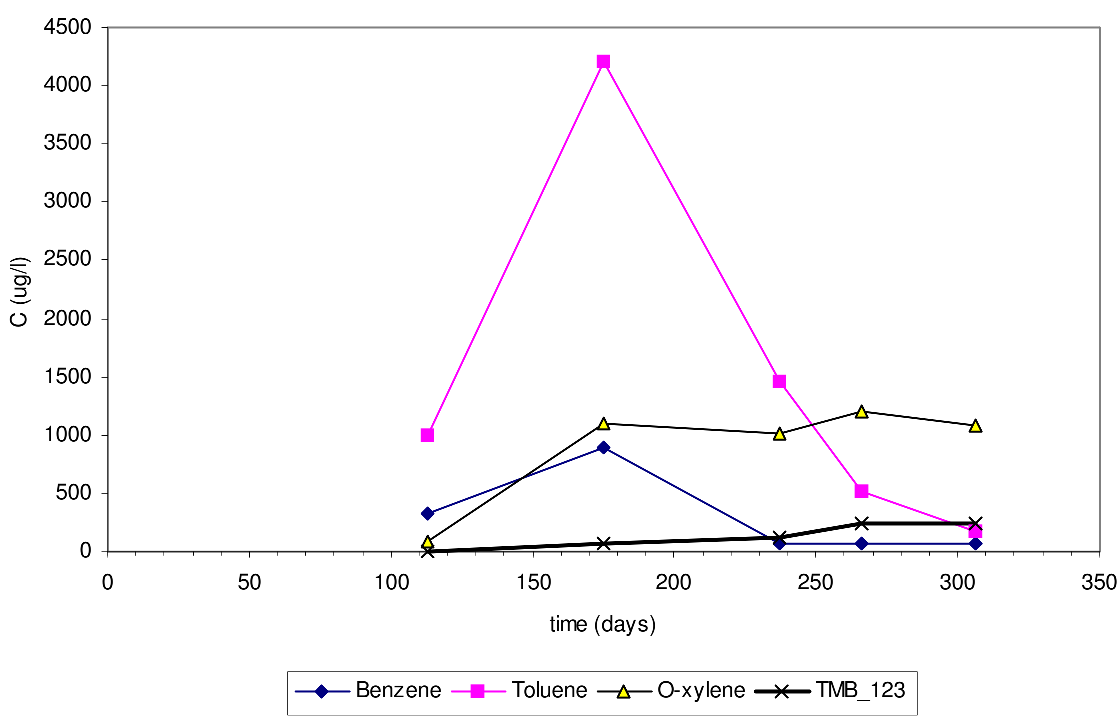
C (mg/l)
4000
3500
3000
2500
2000
1500
1000
500
0
0
50
100
150
200
250
300
350
400
time (days)
Ethanol



C (ug/l)
7000
6000
5000
4000
3000
2000
1000
0
0
50
100
150
200
250
300
350
400
time (days)
Benzene
Toluene
O-xylene
TMB_123

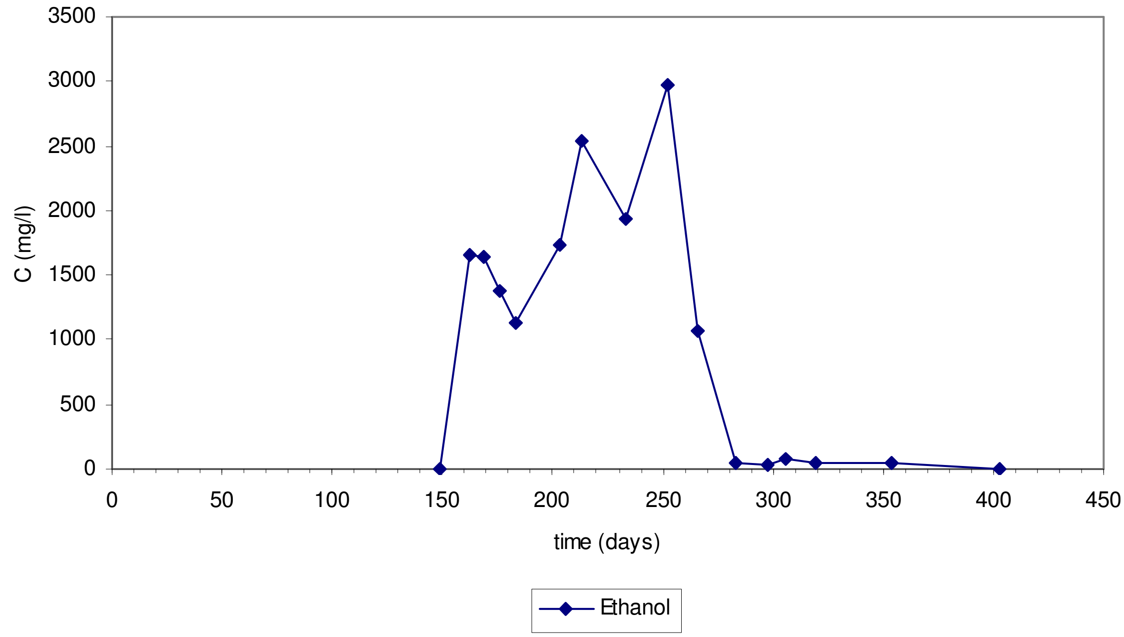
R3-3-10

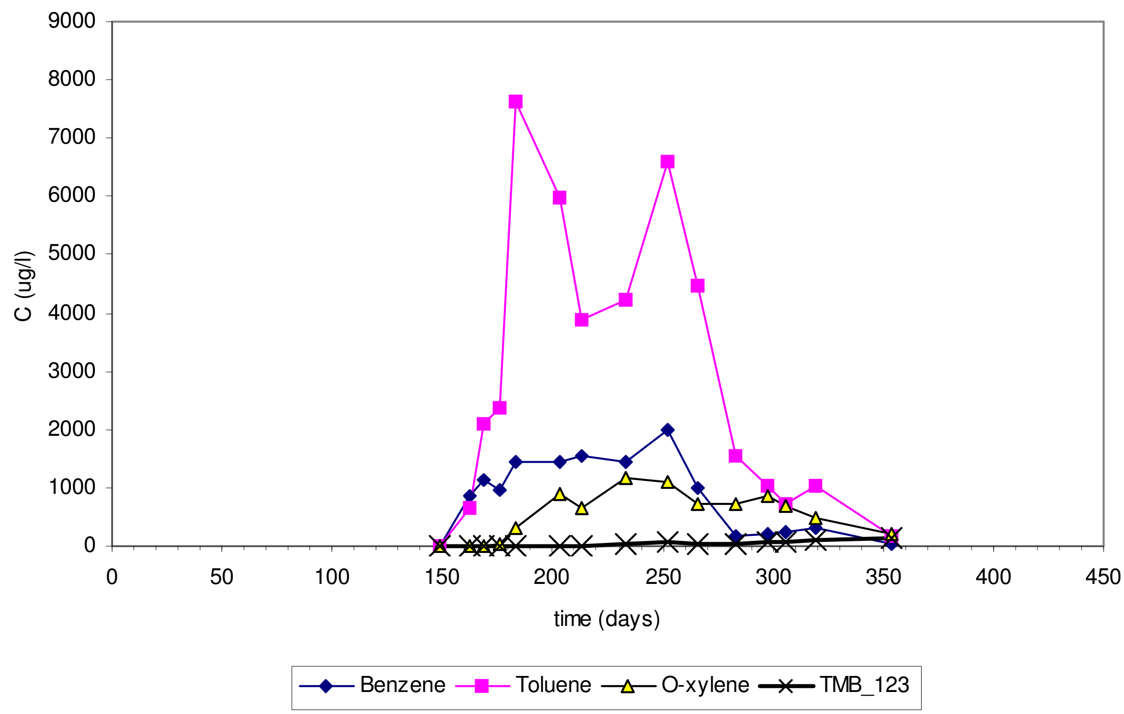




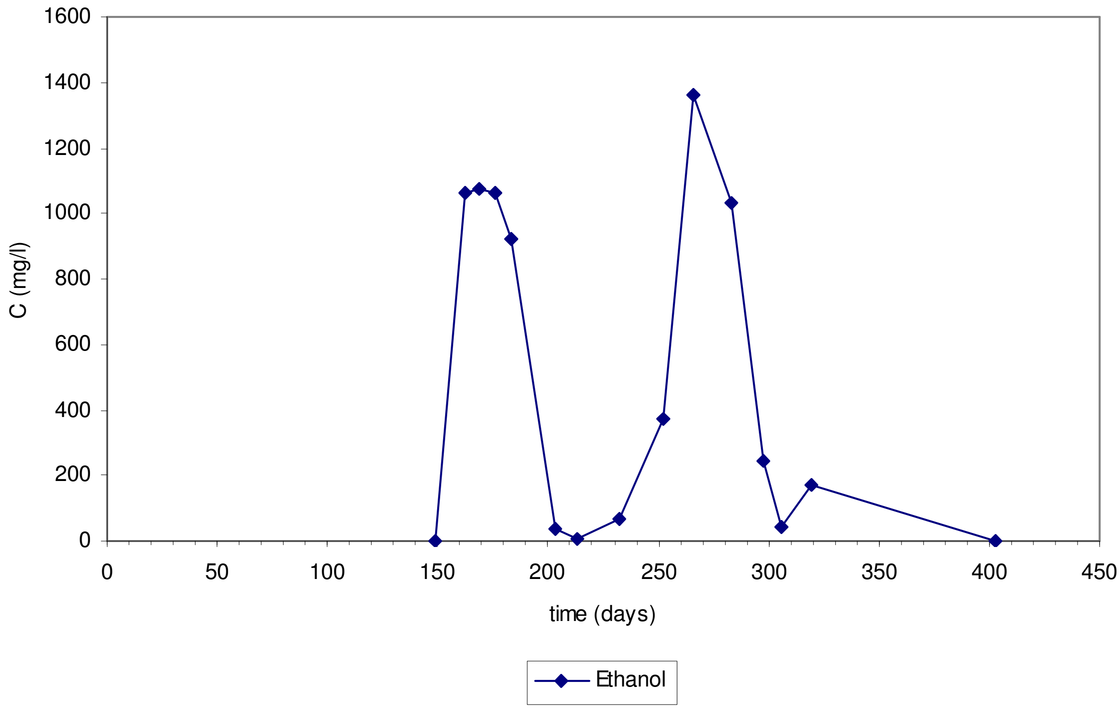
C.E95 c. Row 4

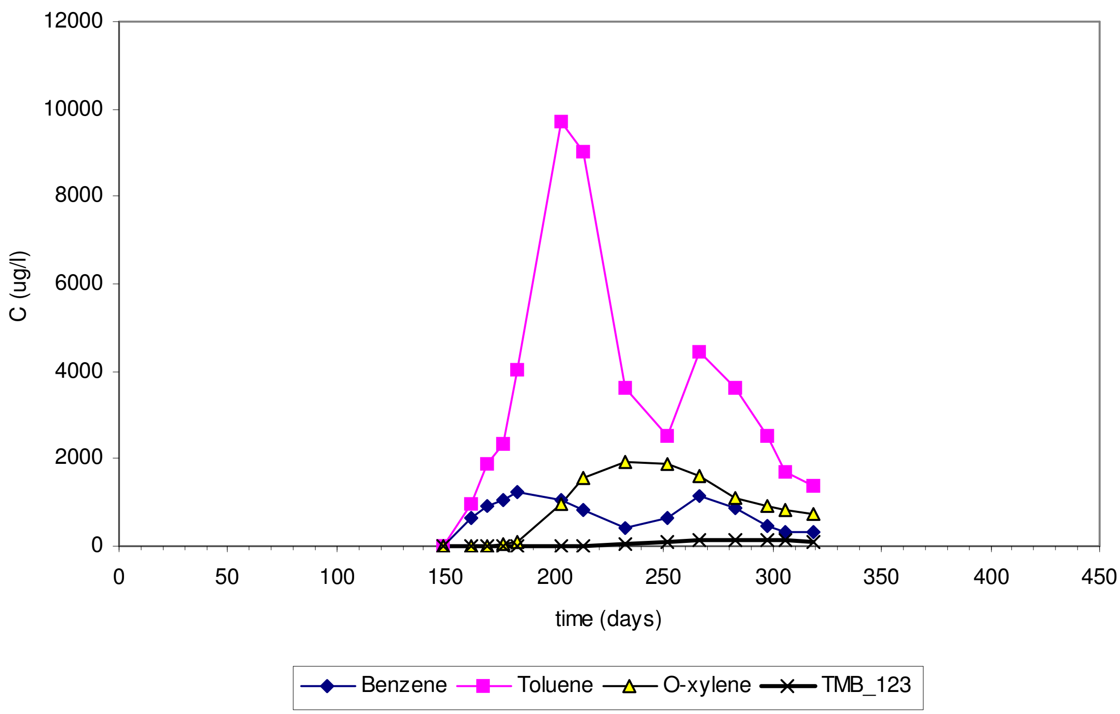
R4-3-8


3500
3000
2500
2000
1500
1000
500
0
C (mg/l)
0
50
100
150
200
250
300
350
400
450
time (days)
Ethanol

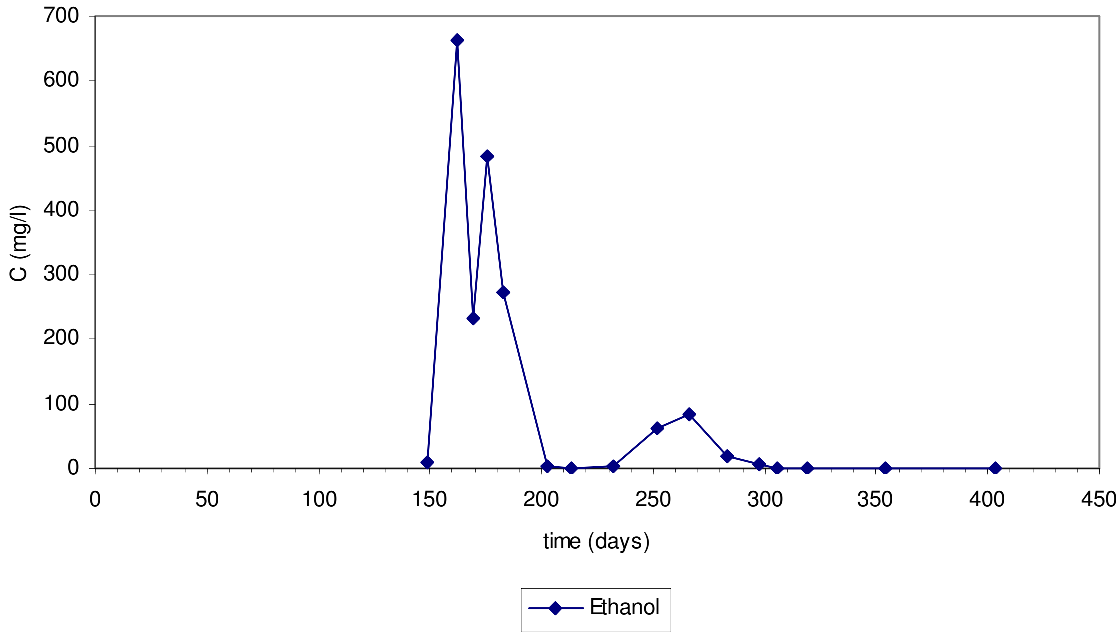

9000
8000
7000
6000
5000
4000
3000
2000
1000
0
C (ug/l)
0
50
100
150
200
250
300
350
400
450
time (days)
Benzene
Toluene
O-xylene
TMB_123

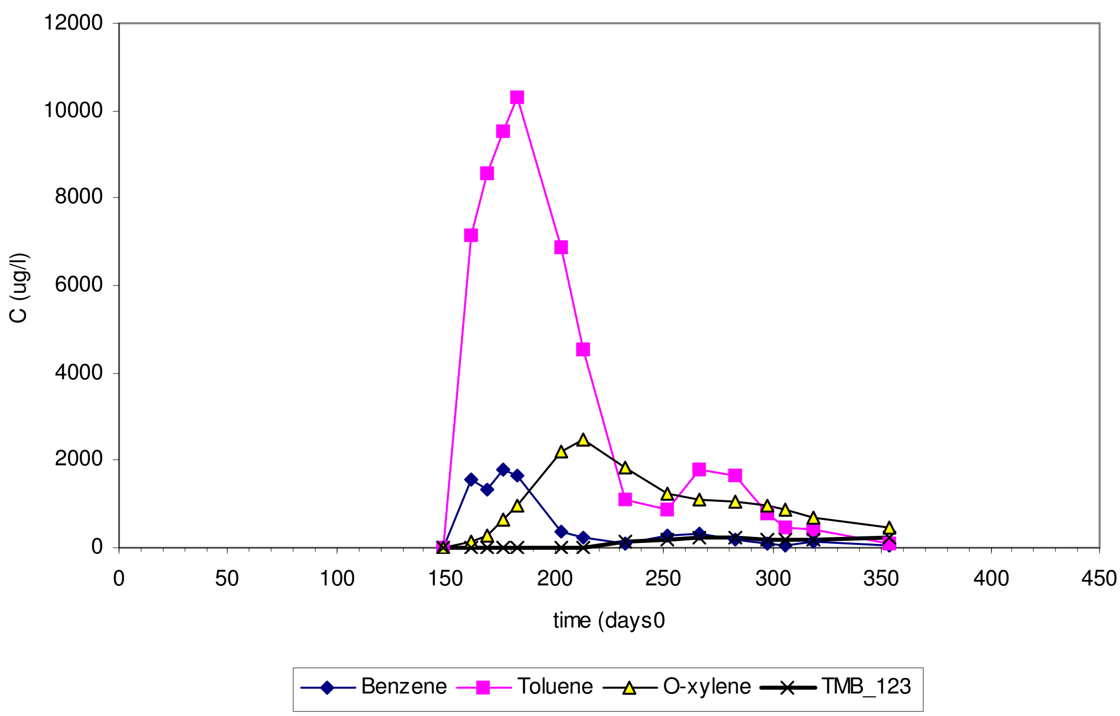
R4-3-9


C (mg/l)
1600
1400
1200
1000
800
600
400
200
0
0
50
100
150
200
250
300
350
400
450
time (days)
Ethanol


C (ug/l)
12000
10000
8000
6000
4000
2000
0
0
50
100
150
200
250
300
350
400
450
time (days)
Benzene
Toluene
O-xylene
TMB_123

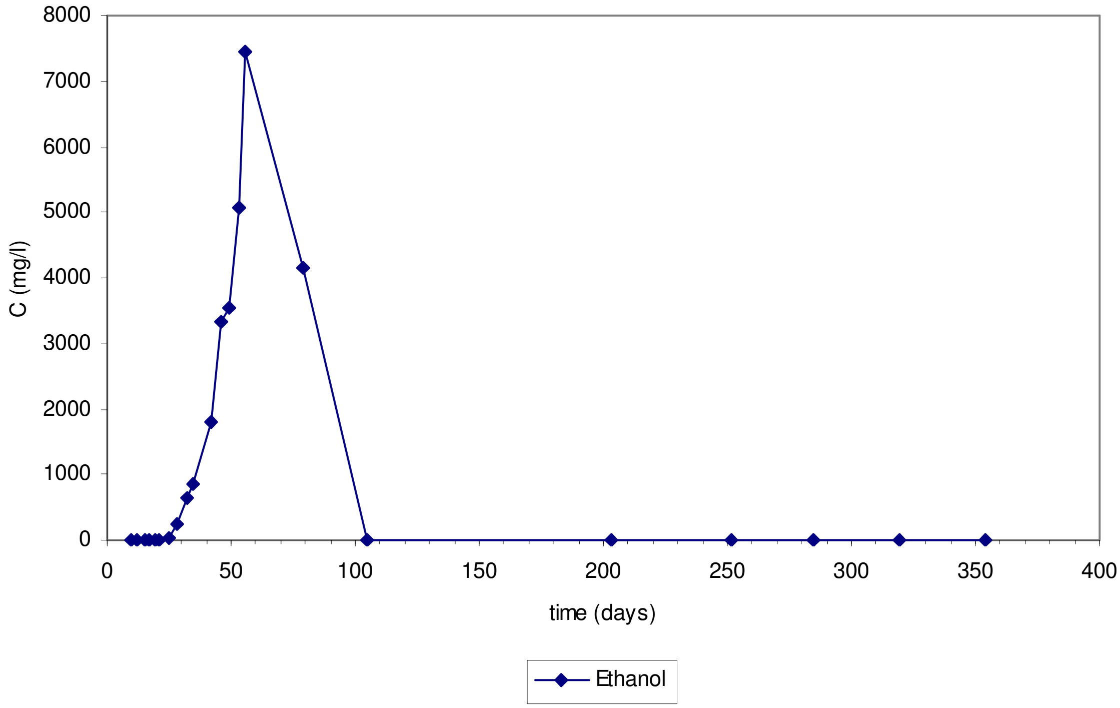
R4-3-10

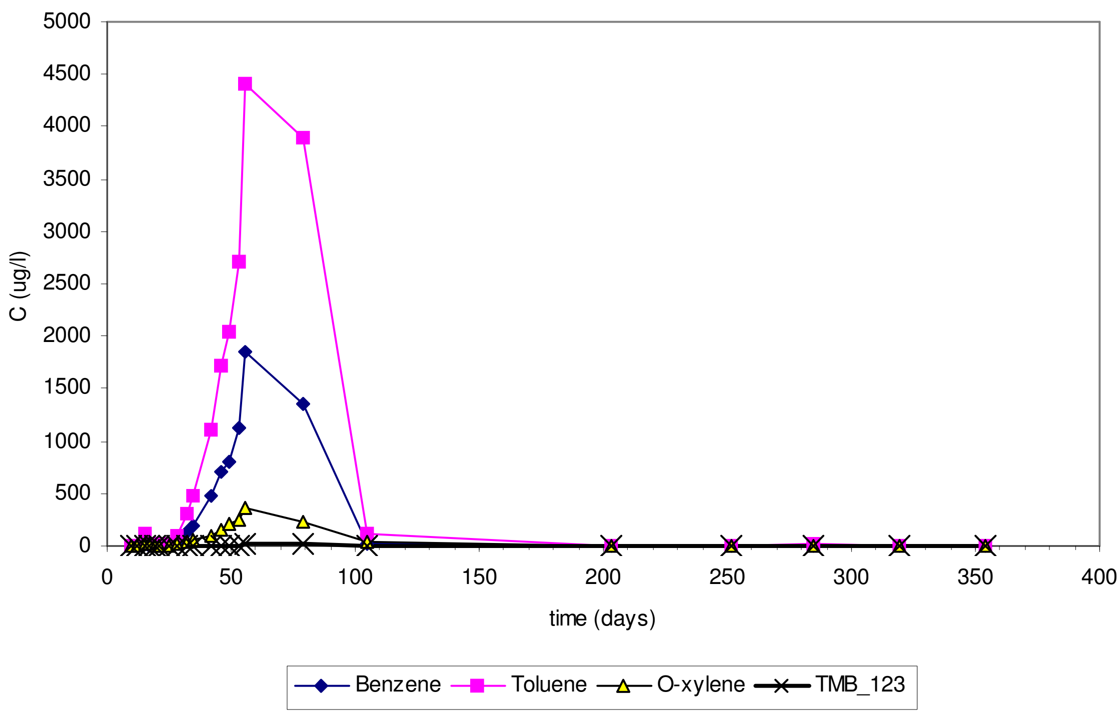

C (mg/l)
700
600
500
400
300
200
100
0
0
50
100
150
200
250
300
350
400
450
time (days)
Ethanol


C (ug/l)
12000
10000
8000
6000
4000
2000
0
0
50
100
150
200
250
300
350
400
450
time (days0
Benzene
Toluene
O-xylene
TMB_123

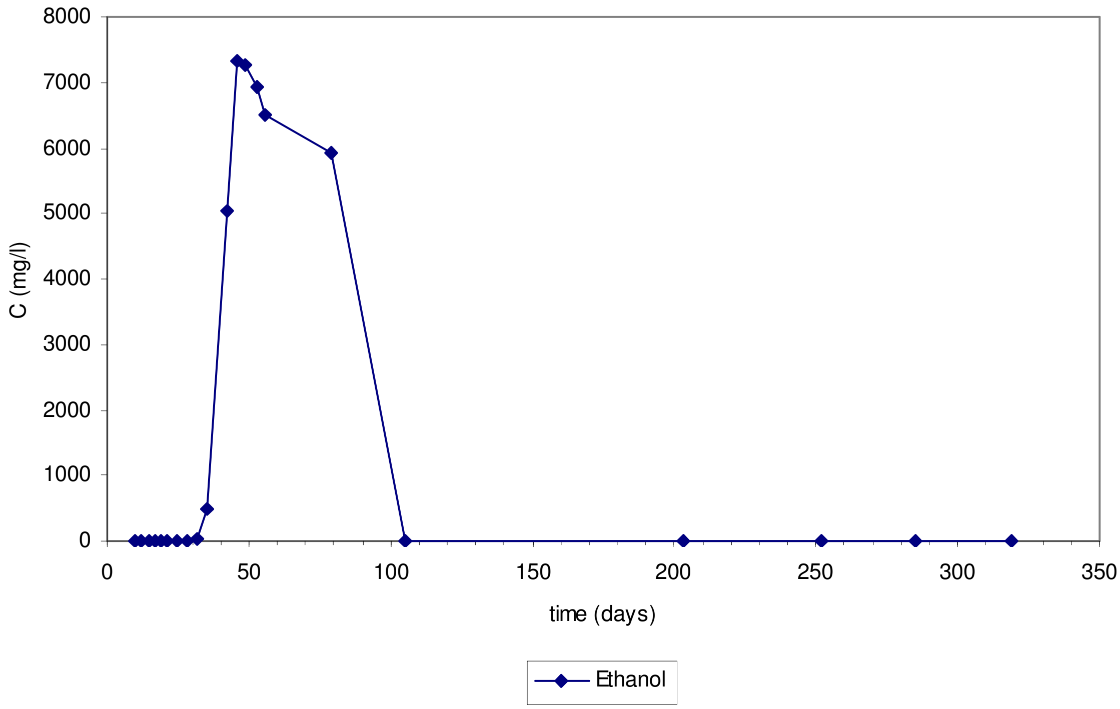
C.E95 M Wells

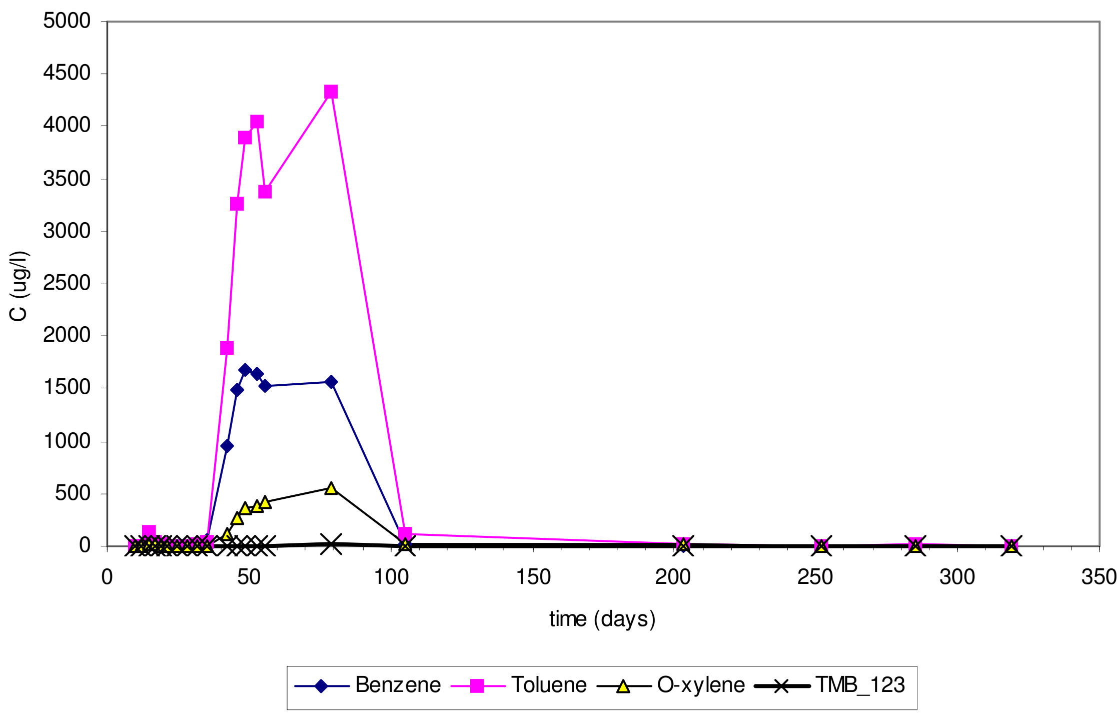
M1-6





M2-6


8000
7000
6000
5000
4000
3000
2000
1000
0
C (mg/l)
0
50
100
150
200
250
300
350
time (days)
Ethanol


5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
C (ug/l)
0
50
100
150
200
250
300
350
time (days)
Benzene
Toluene
O-xylene
TMB_123

Appendix 4 – Mass Flux Prediction vs. Field Data

(grams/day)

The initial masses into the injected mixtures are calculated from the volumes used in mixtures and the concentrations of chemicals into the initial mixture composition detected by lab analysis. The initial mass into the source of an aromatic compound was calculated as the initial aromatic mass into the mixture from which was subtracted the mass recovered from the injection wells calculated from concentrations recorded in the recovered pure phase.

A. **OXYGENATES**
1. GMT Gate a. MTBE

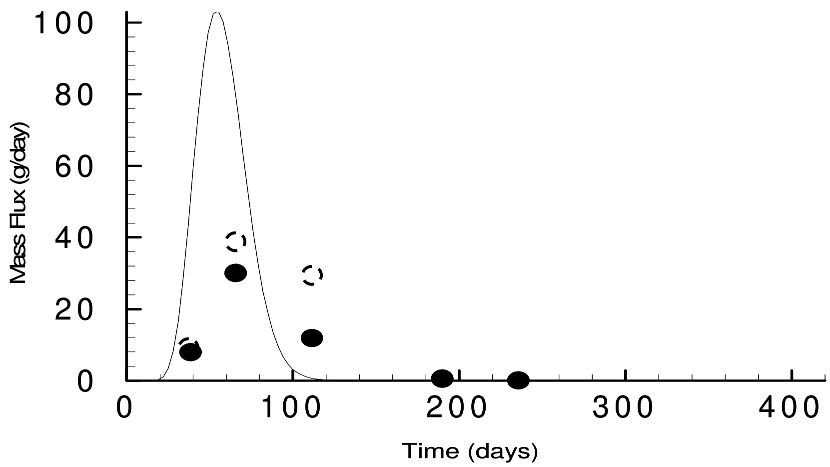


Figure 4.1. 1 Prediction and Field Data for MTBE Mass Flux at row 2.

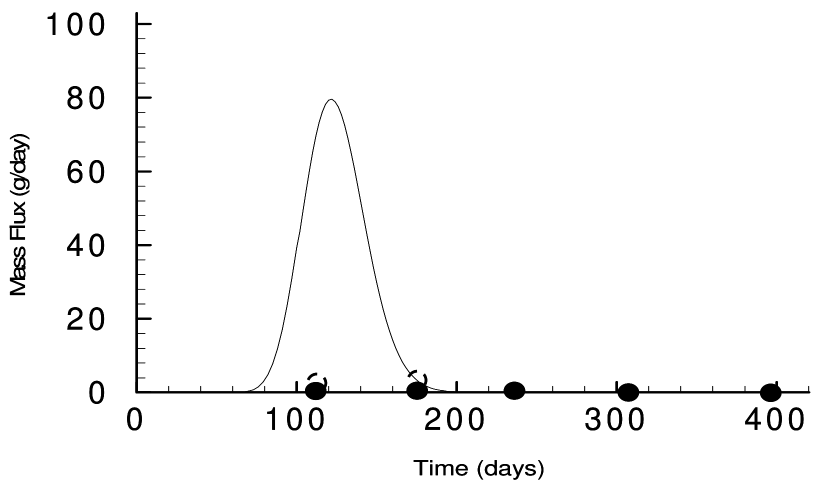


Figure 4.1. 2 Prediction and Field Data for MTBE Mass Flux at row 3.

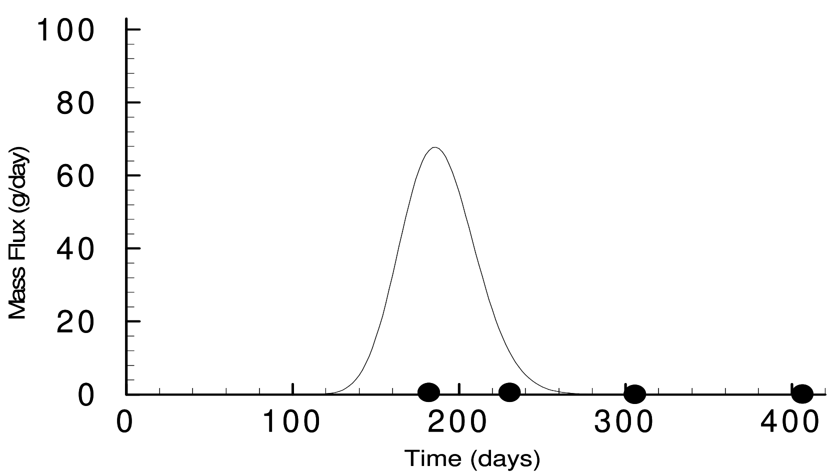


Figure 4.1. 3 Prediction and Field Data for MTBE **Mass Flux at row 4.**

1. GMT Gate b. TBA

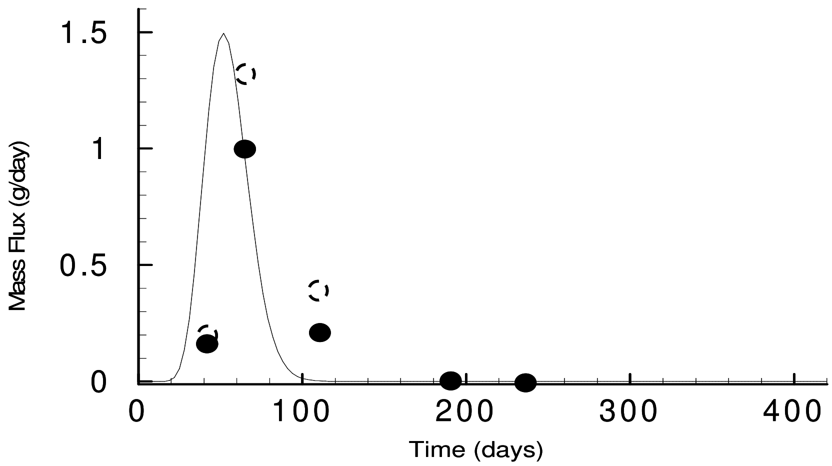


Figure 4.1. 4 Prediction and Field Data for TBA **Mass Flux at row 2.**

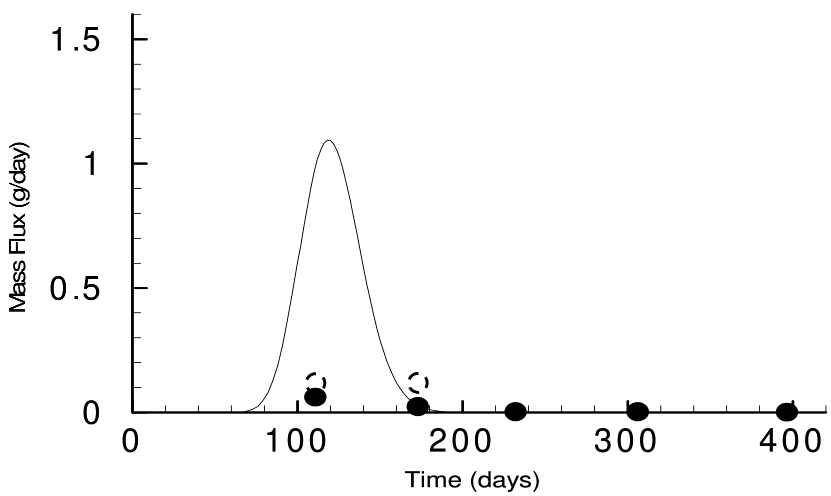


Figure 4.1. 5 Prediction and Field Data for TBA **Mass Flux at row 3.**

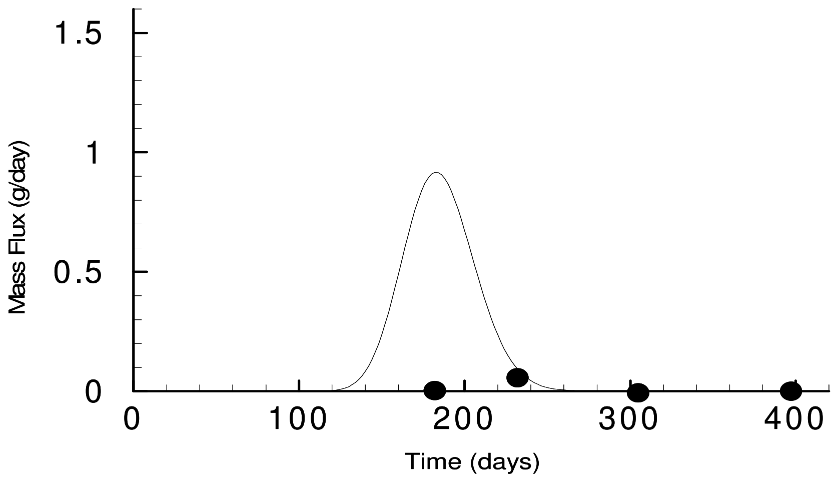


Figure 4.1. 6 Prediction and Field Data for TBA **Mass Flux at row 4.**

Appendix 4

2. E10 Gate a. Ethanol

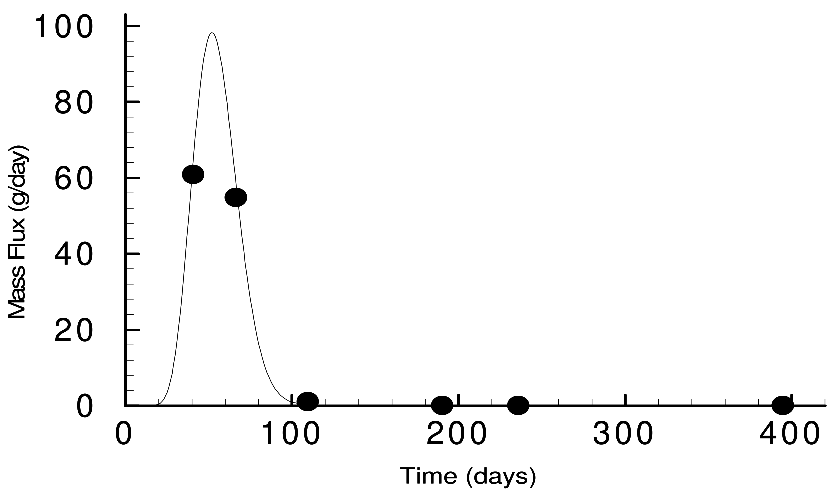


Figure 4.1. 7 Prediction and Field Data for Ethanol **Mass Flux at row 2.**

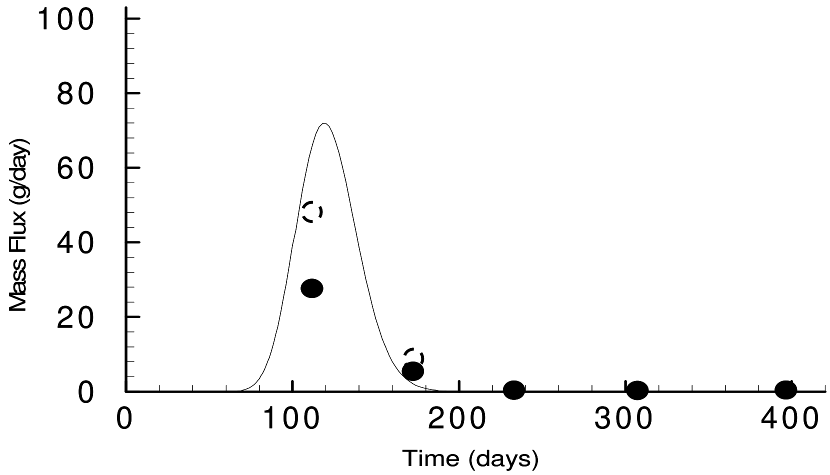


Figure 4.1. 8 Prediction and Field Data for Ethanol Mass Flux at row 3.

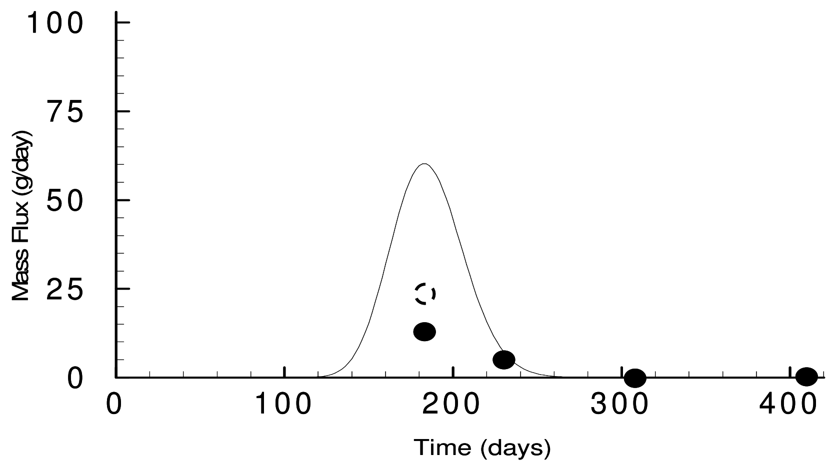


Figure 4.1. 9 Prediction and Field Data for Ethanol **Mass Flux at row 4.**

B. **BTX and TMB**

1. Benzene a. GMT Gate

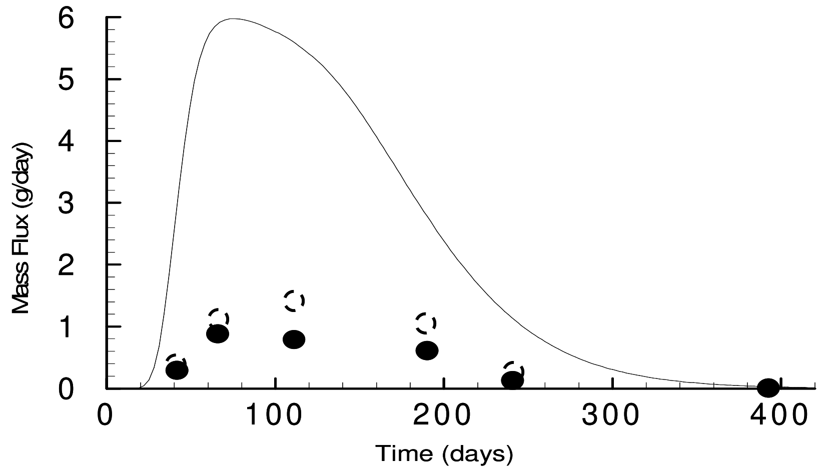


Figure 4.2. 1 Prediction and Field Data for benzene Mass Flux at row 2 GMT gate.

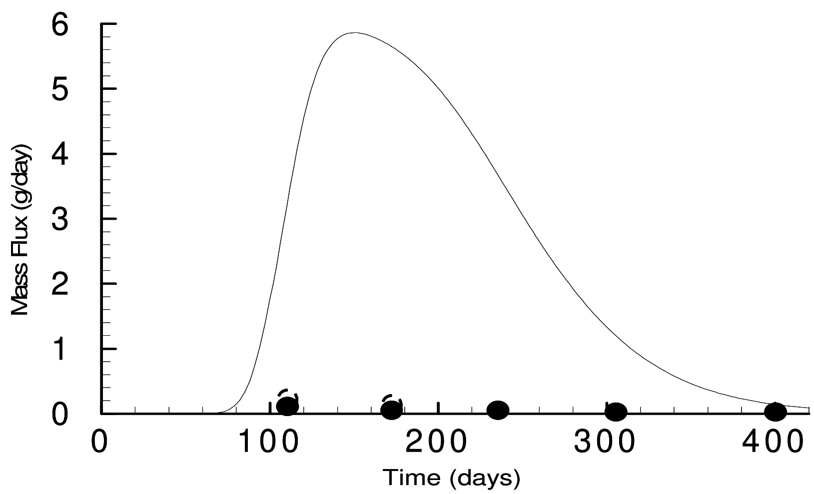


Figure 4.2. 2 Prediction and Field Data for benzene Mass Flux at row 3 GMT gate.

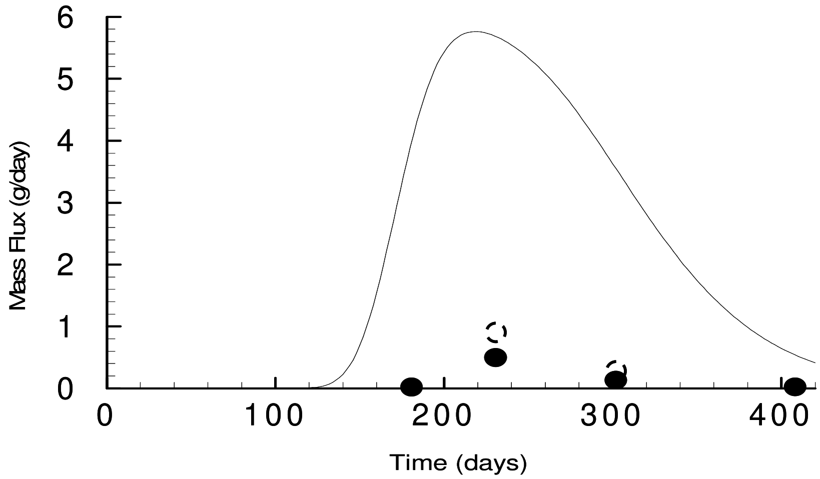


Figure 4.2. 3 Prediction and Field Data for benzene Mass Flux at row 4 GMT gate.

1. Benzene **b. E10 Gate**

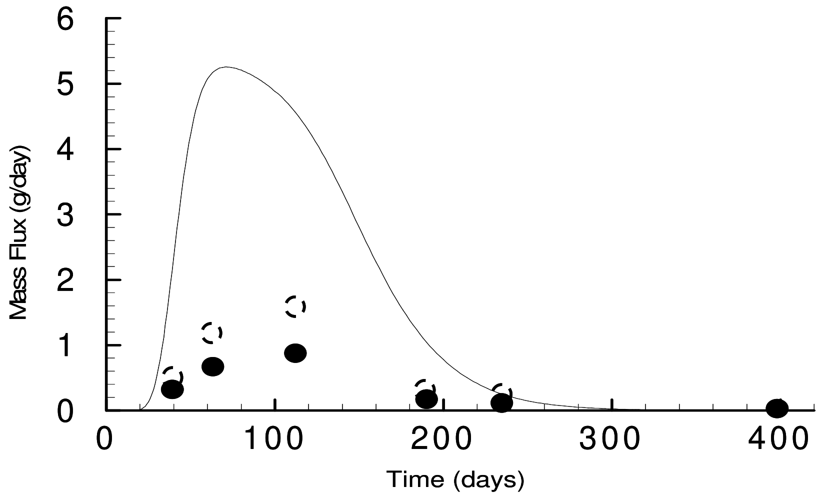


Figure 4.2. 4 Prediction and Field Data for benzene Mass Flux at row 2 E10 gate.

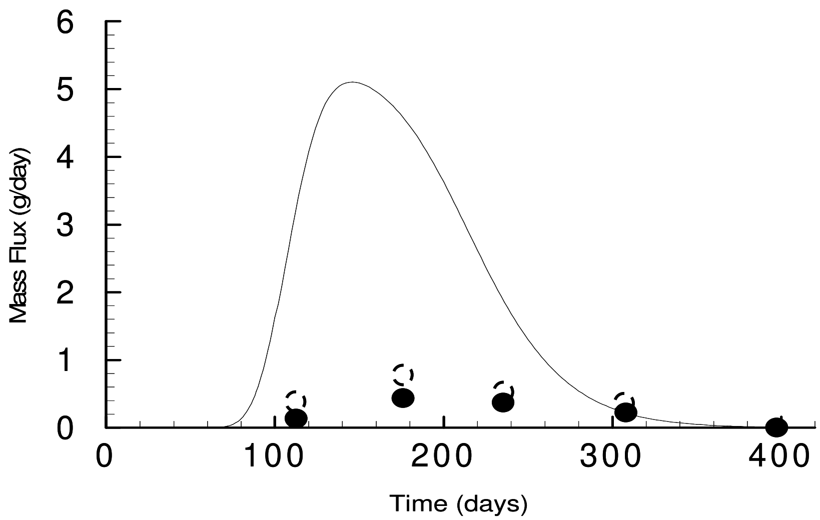


Figure 4.2. 5 Prediction and Field Data for benzene Mass Flux at row 3 E10 gate.

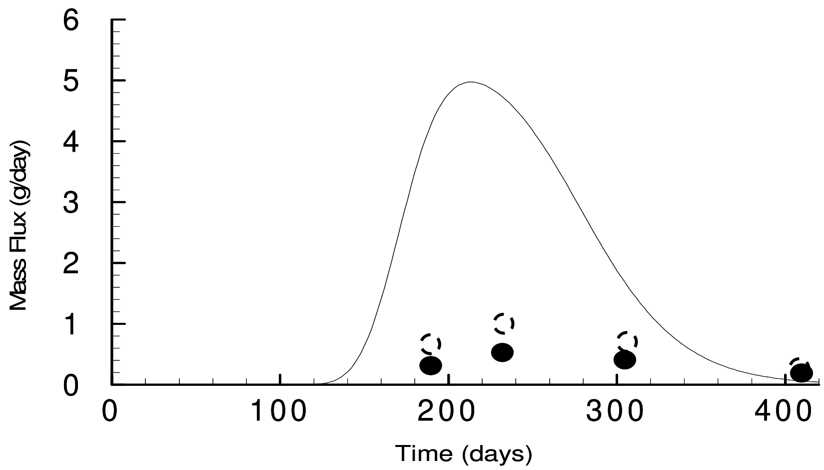


Figure 4.2. 6 Prediction and Field Data for benzene Mass Flux at row 4 E10 gate.

Appendix 4

2. Toluene a. GMT Gate

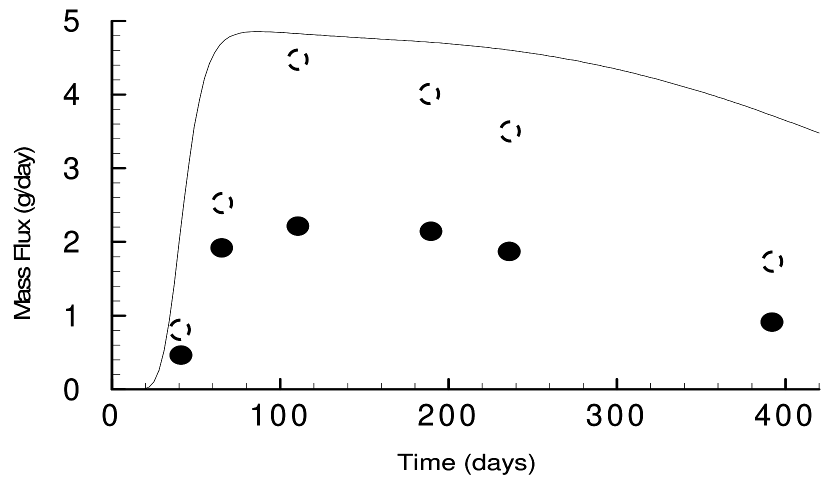


Figure 4.2. 7 Prediction and Field Data for toluene Mass Flux at row 2 GMT gate.

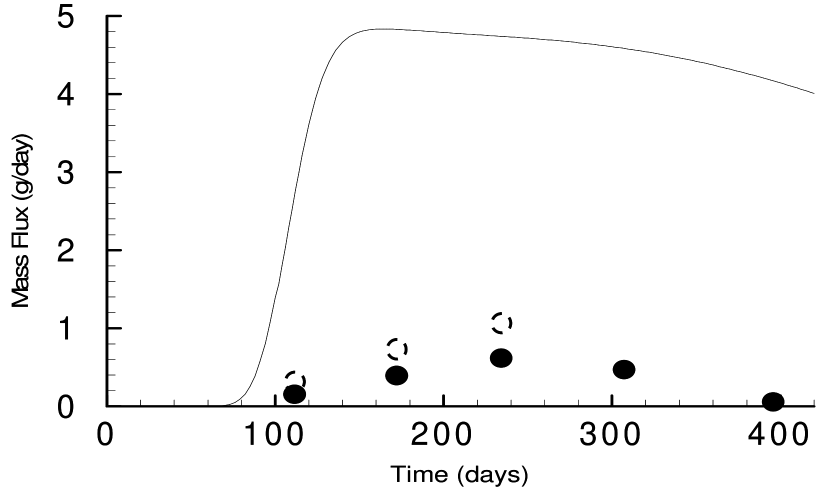


Figure 4.2. 8 Prediction and Field Data for toluene Mass Flux at row 3 GMT gate.

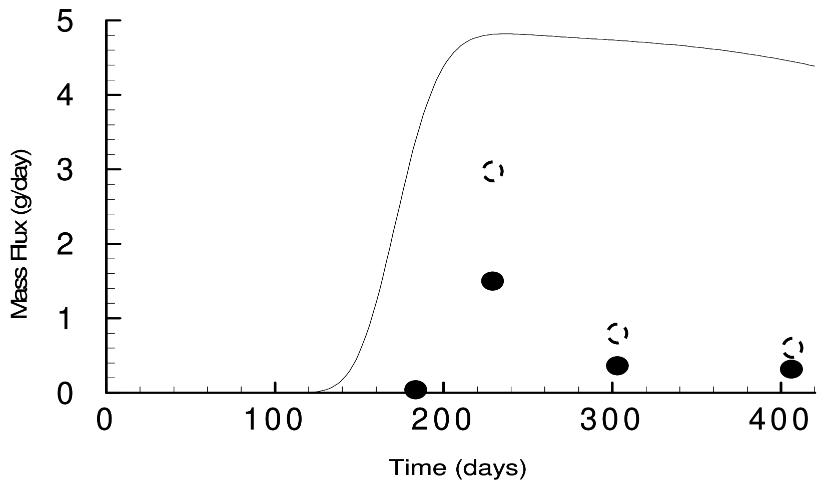


Figure 4.2. 9 Prediction and Field Data for toluene Mass Flux at row 4 GMT gate.

2. Toluene **b. E10 Gate**

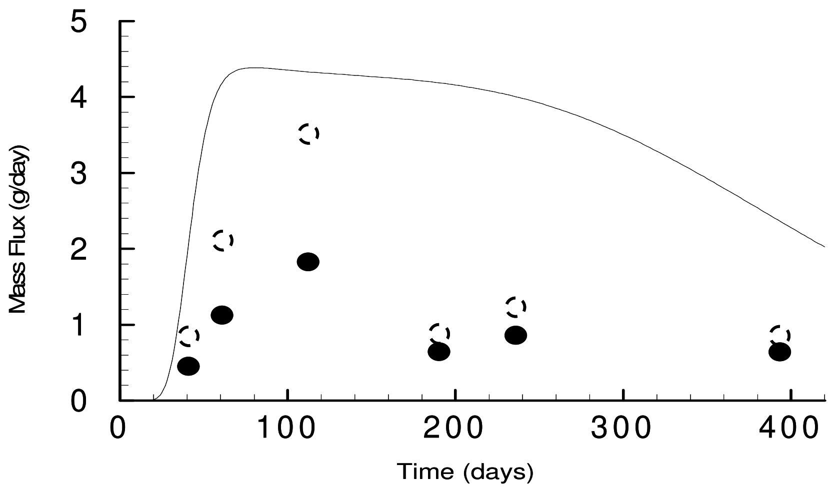


Figure 4.2. 10 Prediction and Field Data for toluene Mass Flux at row 2 E10 gate.

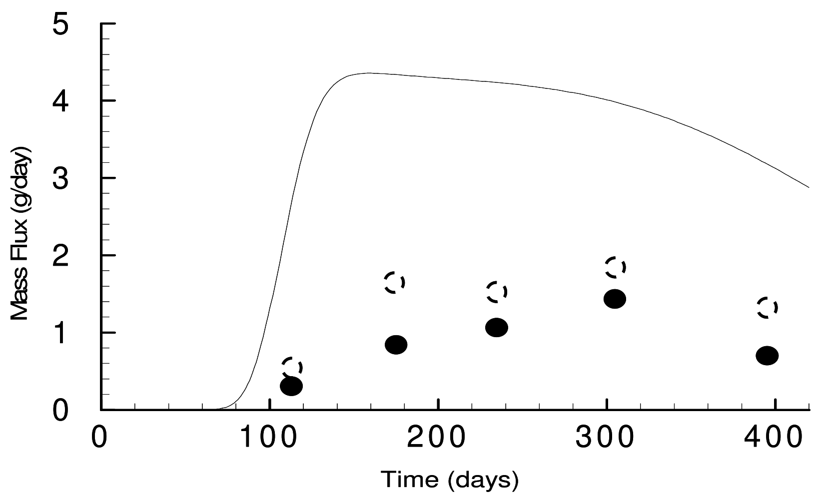


Figure 4.2. 11 Prediction and Field Data for toluene Mass Flux at row 3 E10 gate.

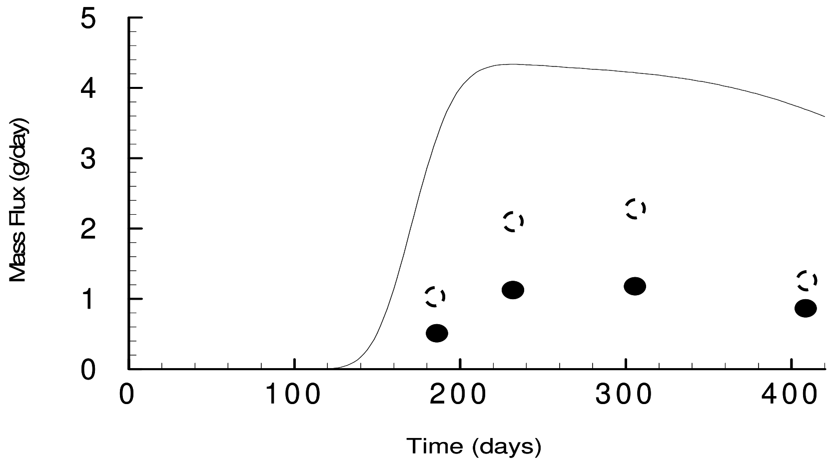


Figure 4.2. 12 Prediction and Field Data for toluene Mass Flux at row 4 E10 gate.

Appendix 4

3. o-Xylene a. GMT Gate

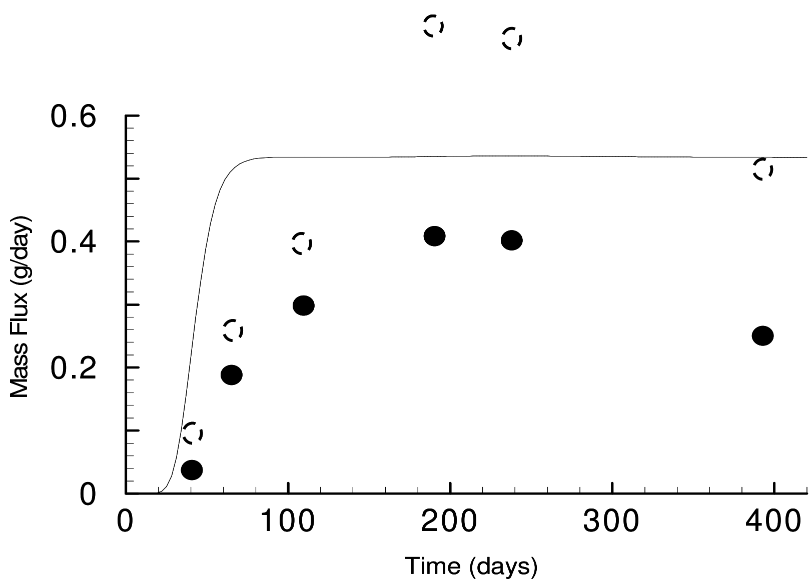


Figure 4.2. 13 Prediction and Field Data for o-Xylene Mass Flux at row 2 GMT gate.

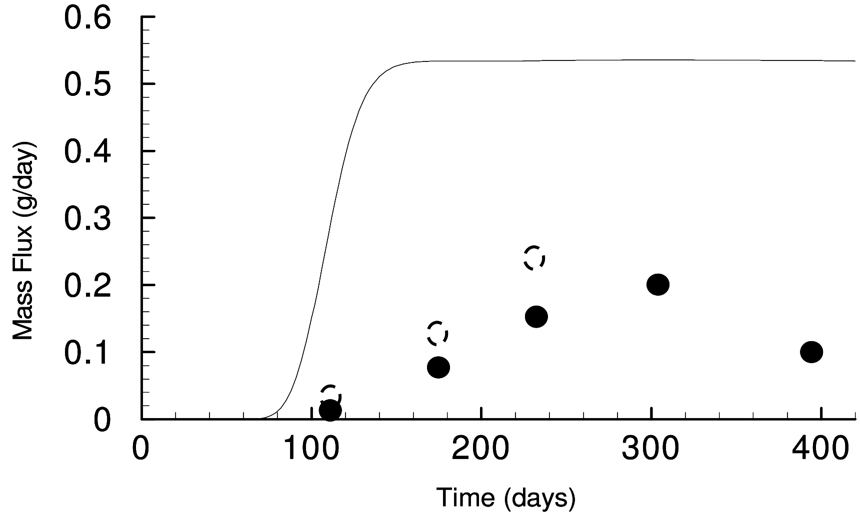


Figure 4.2. 14 Prediction and Field Data for o-Xylene Mass Flux at row 3 GMT gate.

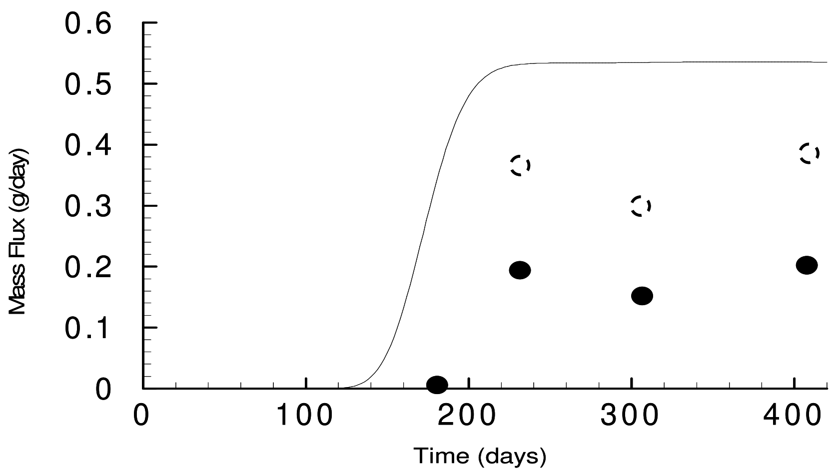


Figure 4.2. 15 Prediction and Field Data for o-Xylene Mass Flux at row 4 GMT gate.

3. o-Xylene **b. E10 Gate**

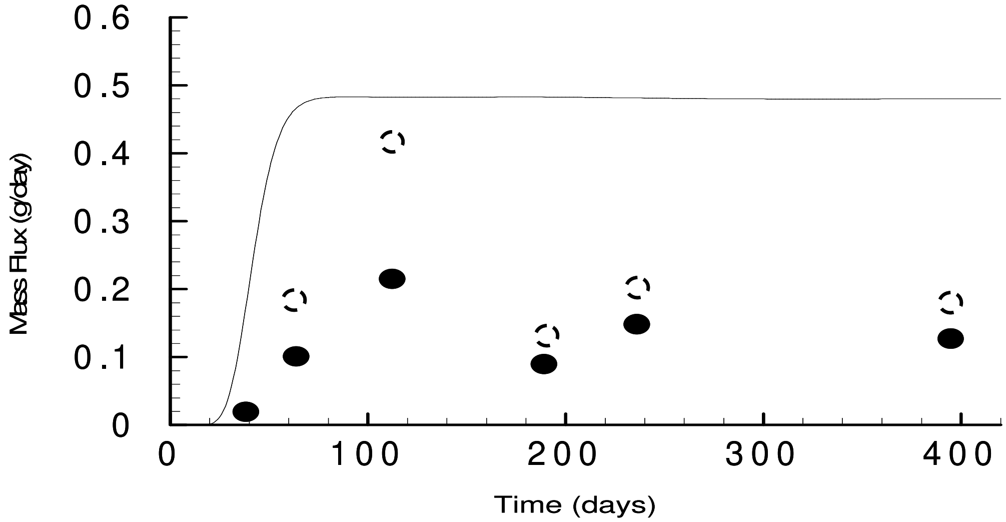


Figure 4.2. 16 Prediction and Field Data for o-Xylene Mass Flux at row 2 E10 gate.

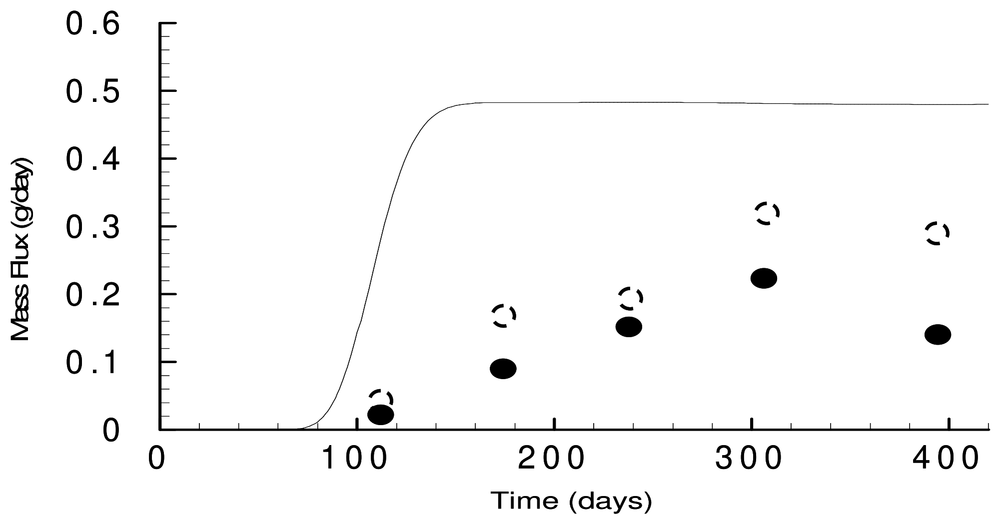


Figure 4.2. 17 Prediction and Field Data for o-Xylene Mass Flux at row 3 E10 gate.

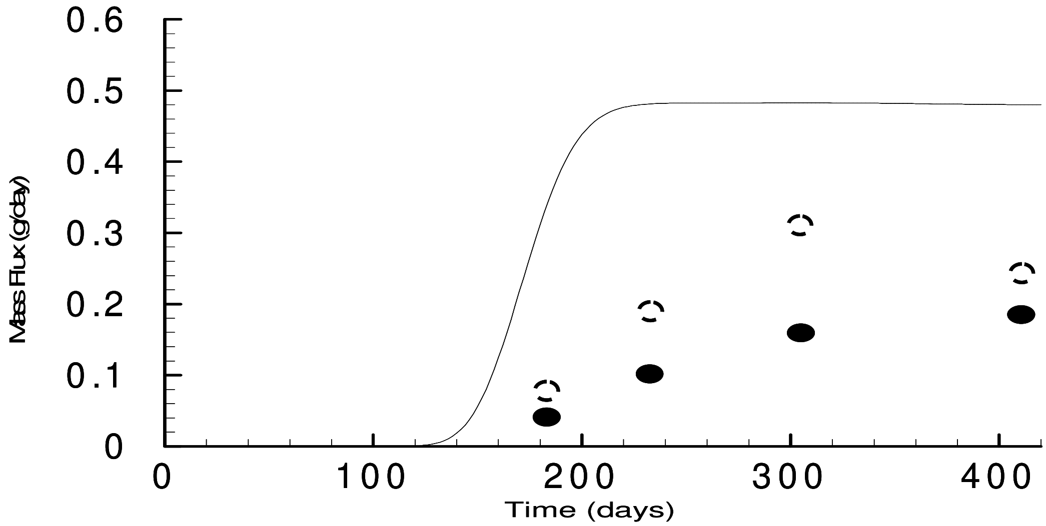


Figure 4.2. 18 Prediction and Field Data for o-Xylene Mass Flux at row 4 E10 gate.

4. TMB a. GMT Gate

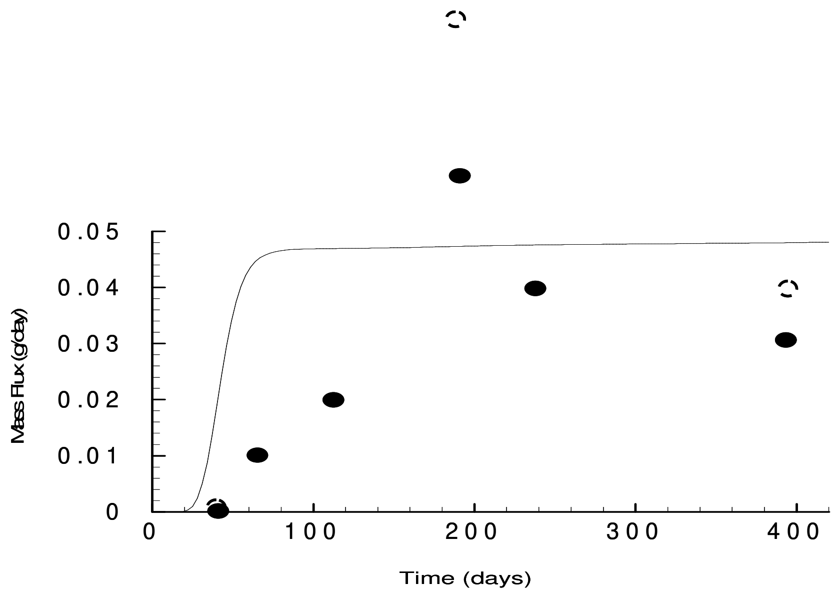


Figure 4.2. 19 Prediction and Field Data for 123 tri-methyl benzene Mass Flux at row 2 GMT gate.

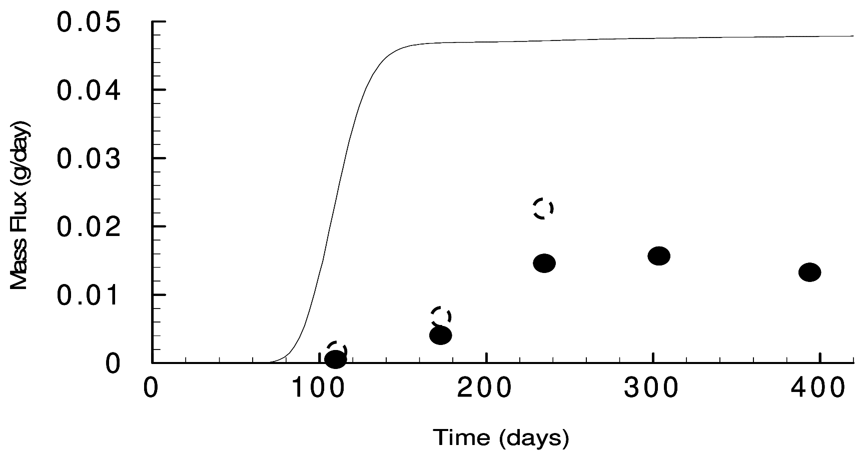


Figure 4.2. 20 Prediction and Field Data for 123 tri-methyl benzene Mass Flux at row 3 GMT gate.

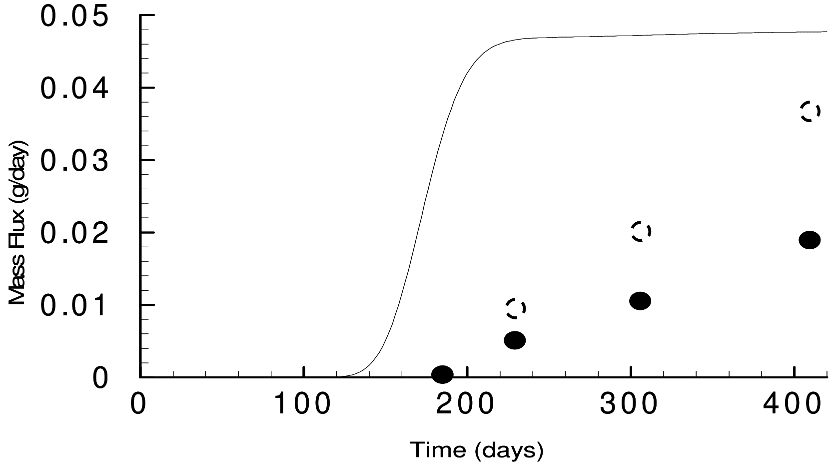


Figure 4.2. 21 Prediction and Field Data for 123 tri-methyl benzene Mass Flux at row 4 GMT gate.

4. TMB b. E10 Gate

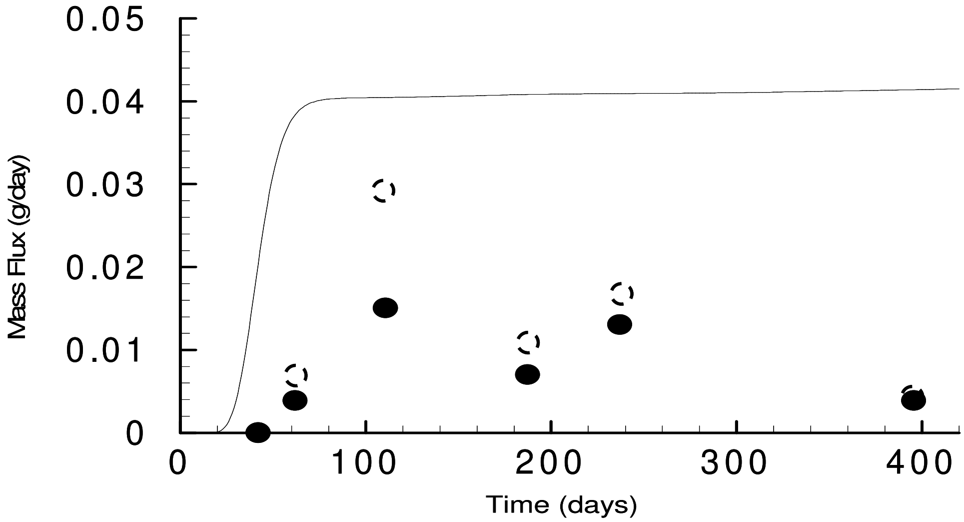


Figure 4.2. 22 Prediction and Field Data for 123 tri-methyl benzene Mass Flux at row 2 E10 gate.

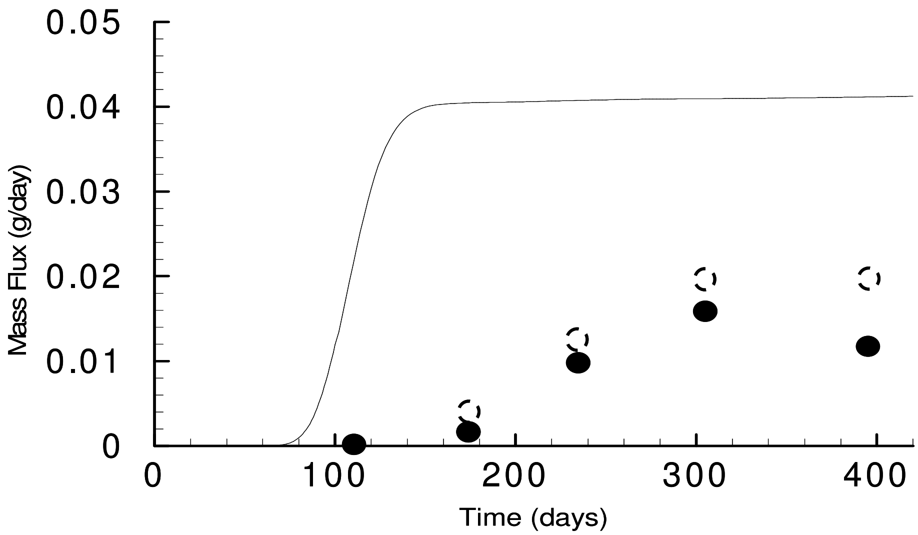


Figure 4.2. 23 Prediction and Field Data for 123 tri-methyl benzene Mass Flux at row 3 E10 gate.

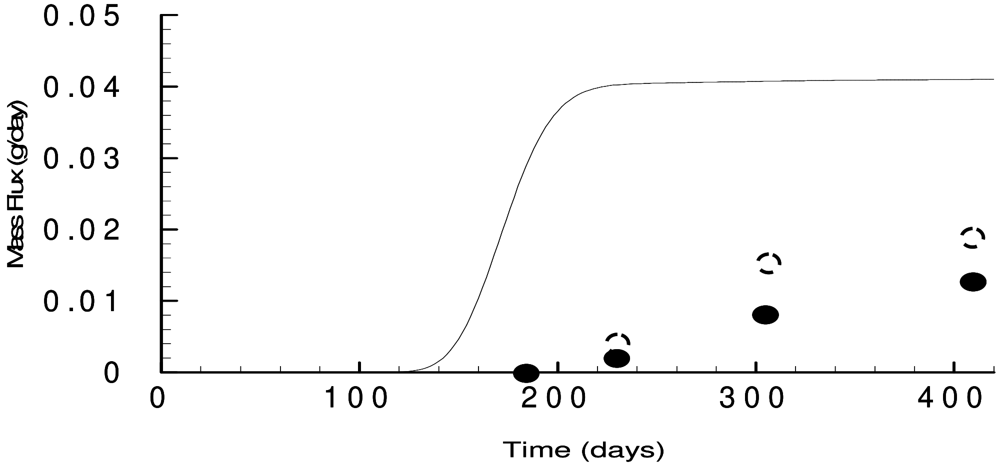


Figure 4.2. 24 Prediction and Field Data for 123 tri-methyl benzene Mass Flux at row 4 E10 gate.

3. E95 Gate a. Ethanol

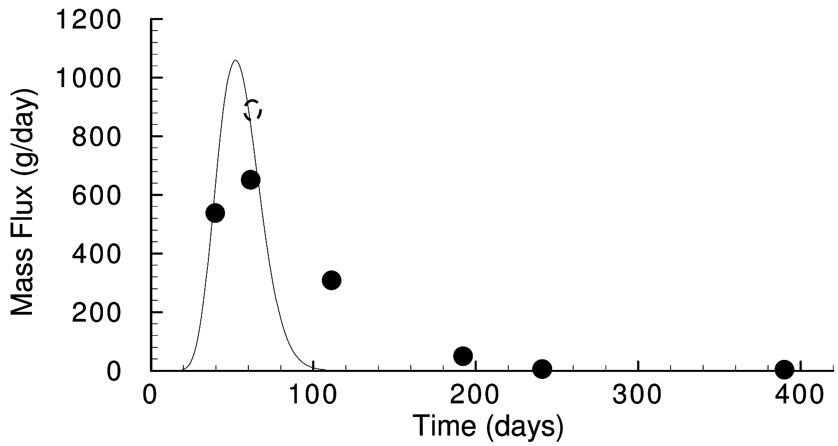


Figure 4.2.25 Prediction and Field Data for ethanol Mass Flux at row 2 E95 gate.

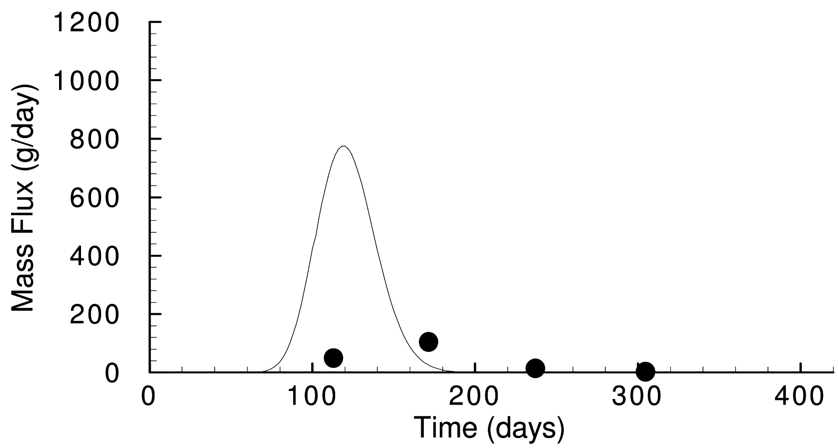


Figure 4.2.26 Prediction and Field Data for ethanol Mass Flux at row 3 E95 gate.

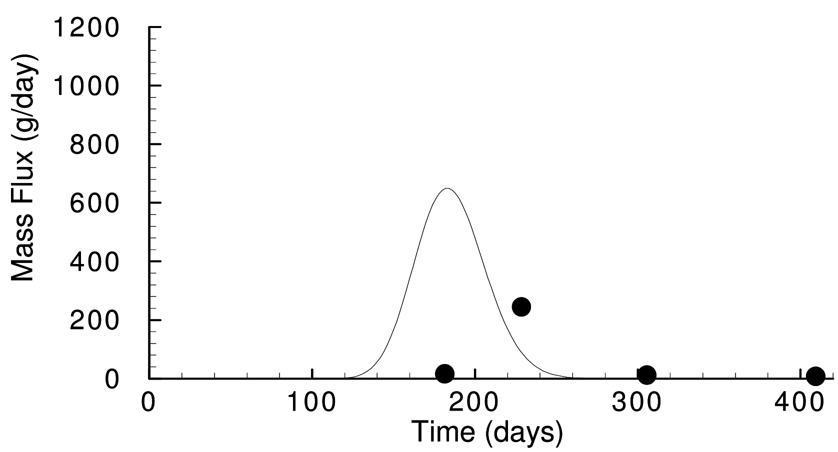


Figure 4.2.27 Prediction and Field Data for ethanol Mass Flux at row 4 E95 gate.

1. Benzene c. E95 Gate

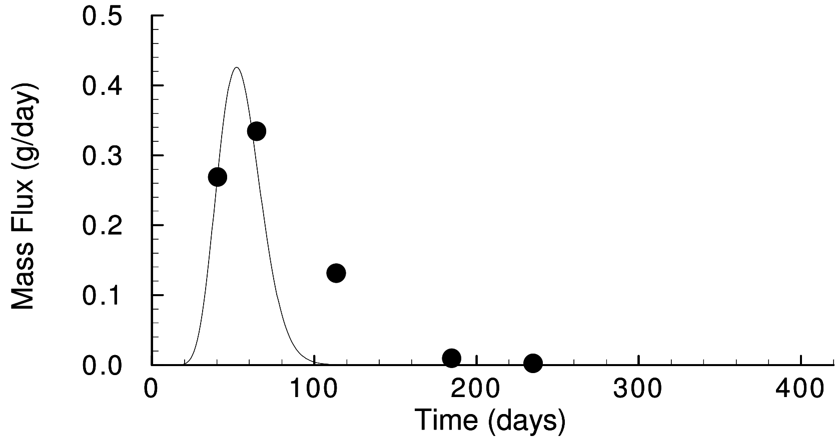


Figure 4.2.28 Prediction and Field Data for benzene Mass Flux at row 2 E95 gate.

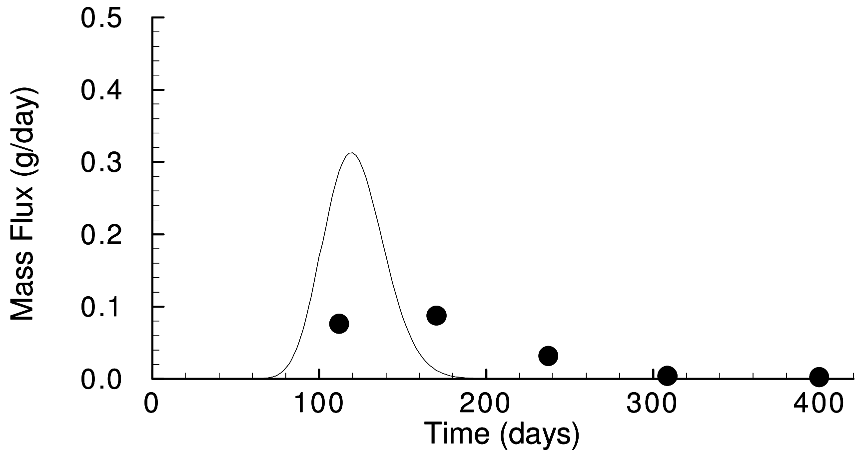


Figure 4.2.29 Prediction and Field Data for benzene Mass Flux at row 3 E95 gate.

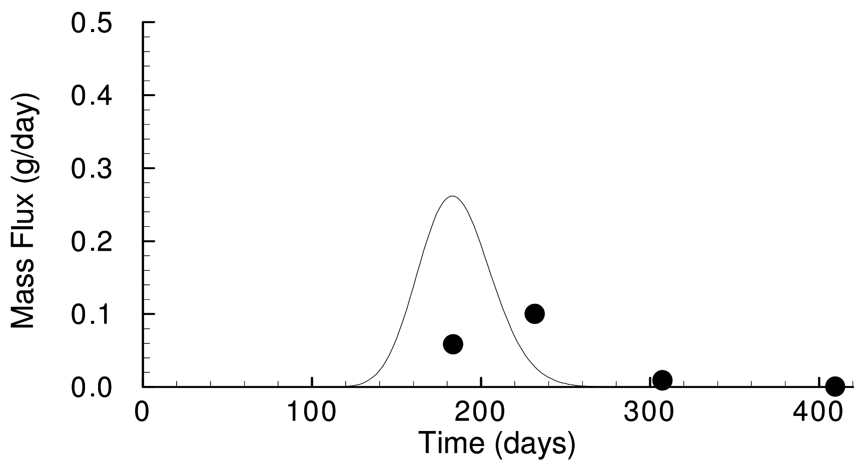


Figure 4.2.30 Prediction and Field Data for benzene Mass Flux at row 4 E95 gate.

2. Toluene c. E95 Gate

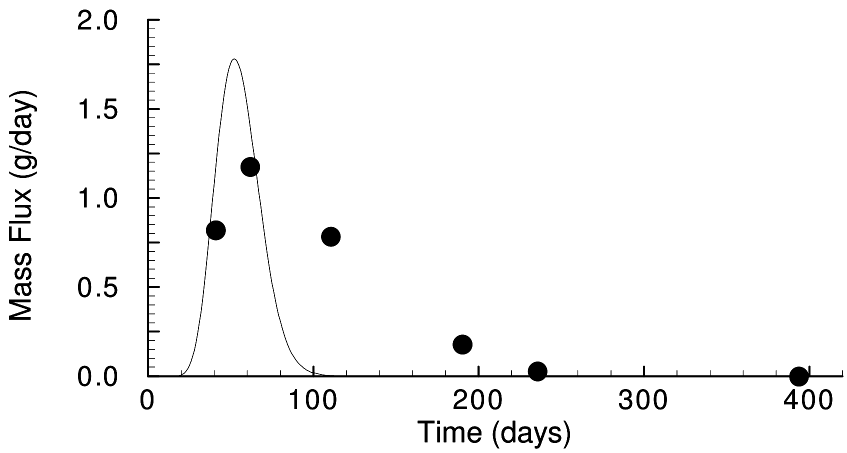


Figure 4.2.31 Prediction and Field Data for toluene Mass Flux at row 2 E95 gate.

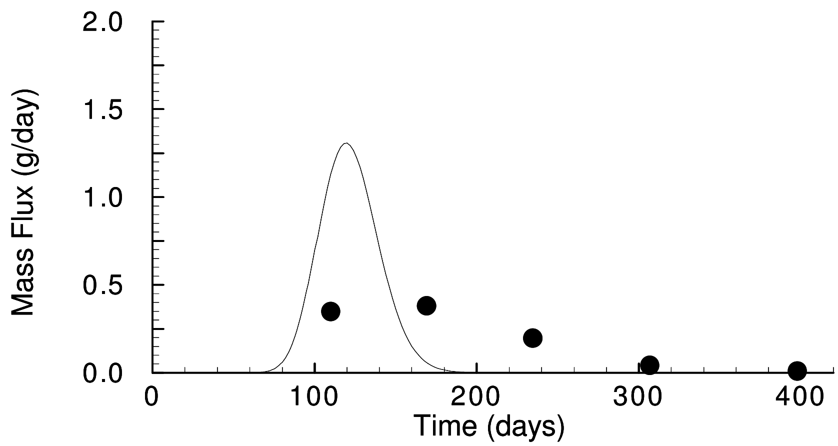


Figure 4.2.32 Prediction and Field Data for toluene Mass Flux at row 3 E95 gate.

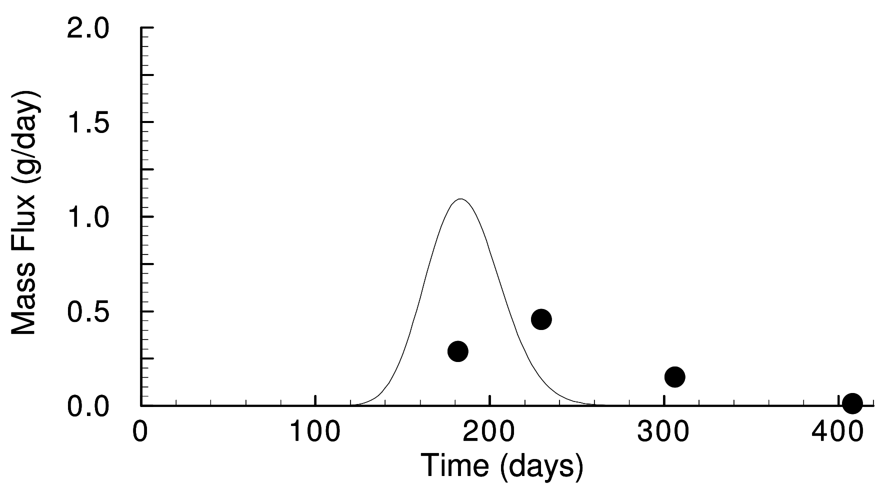


Figure 4.2.33 Prediction and Field Data for toluene Mass Flux at row 4 E95 gate.

3. o-Xylene c. E95 Gate

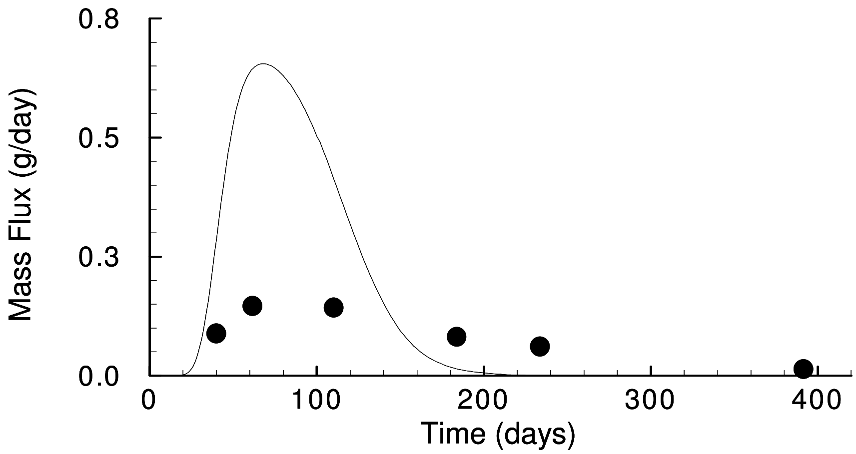


Figure 4.2.34 Prediction and Field Data for o-Xylene Mass Flux at row 2 E95 gate.

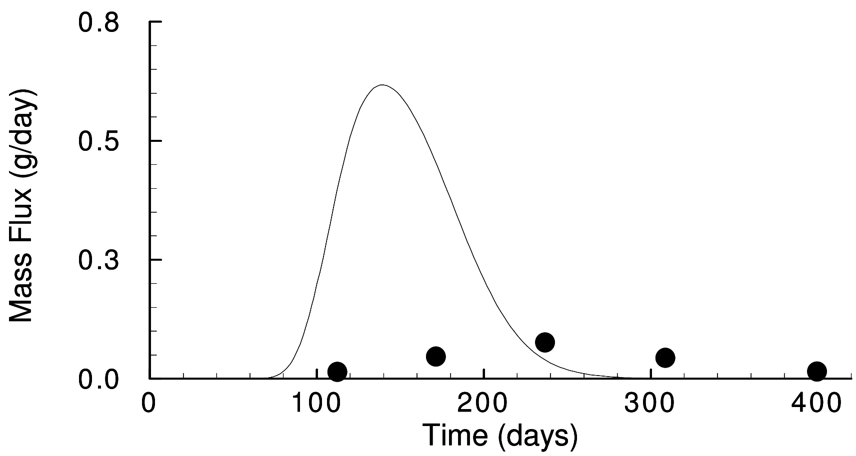


Figure 4.2.35 Prediction and Field Data for o-Xylene Mass Flux at row 3 E95 gate.

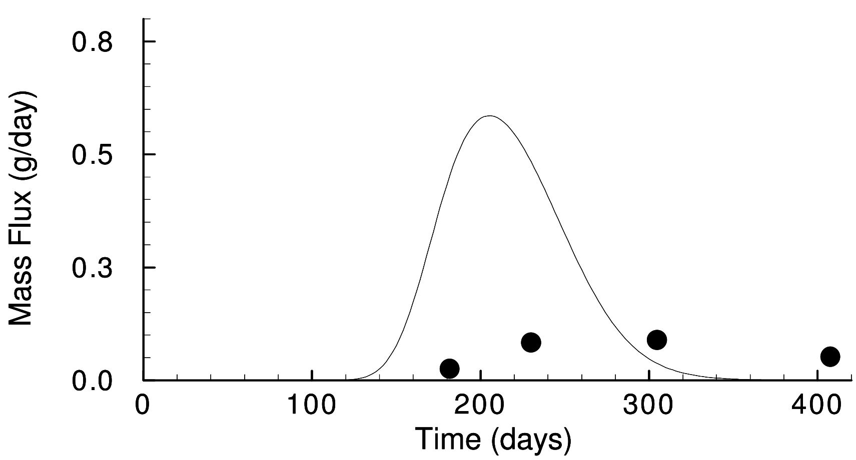


Figure 4.2.36 Prediction and Field Data for o-Xylene Mass Flux at row 4 E95 gate.

4. 1.2.3-TMB c. E95 Gate

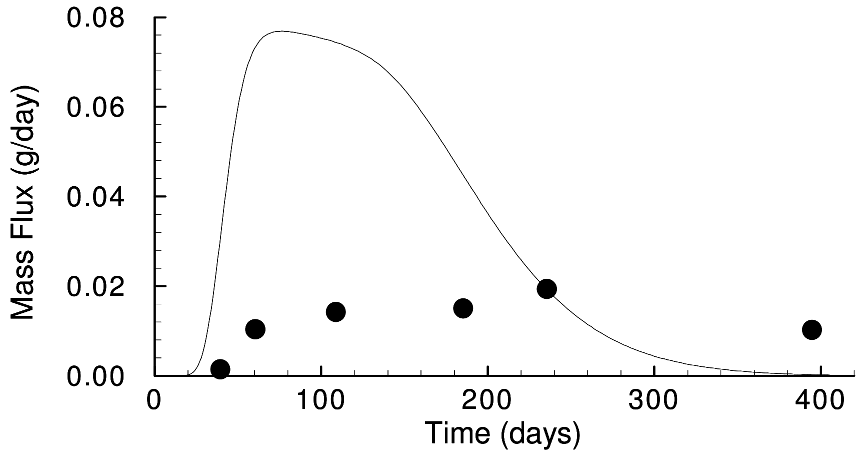


Figure 4.2.37 Prediction and Field Data for 1,2,3-TMB Mass Flux at row 2 **E95 gate.**

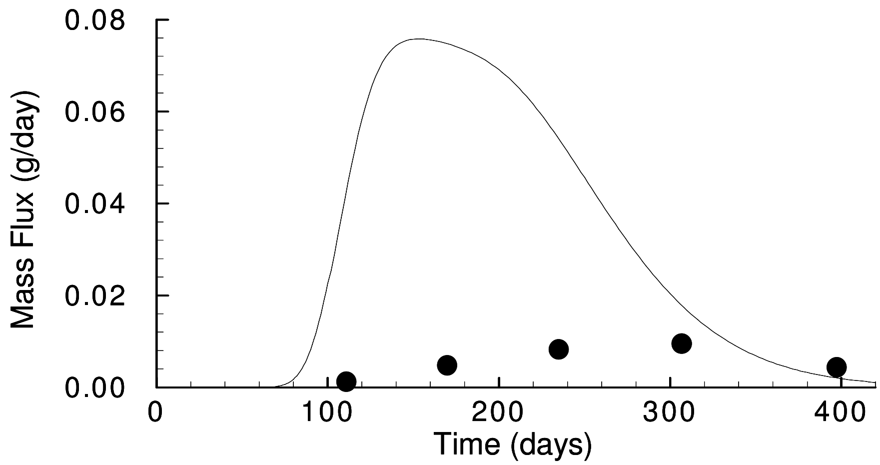


Figure 4.2.38 Prediction and Field Data for 1,2,3-TMB Mass Flux at row 3 **E95 gate.**

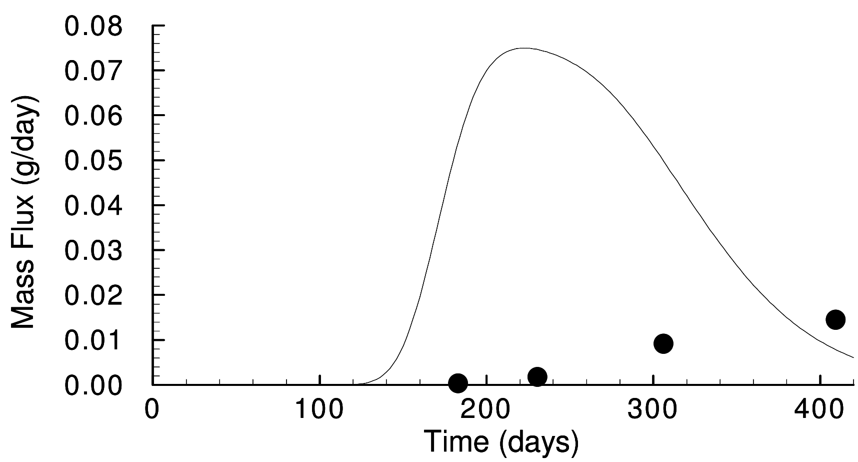


Figure 4.2.39 Prediction and Field Data for 1,2,3-TMB Mass Flux at row 4 **E95 gate.**

Appendix 5

PREDICTED AND FIELD CONCENTRATIONS AND MASS FLUX BREAKTHROUGH CURVES FOR TOLUENE AND 1,2,3-TMB

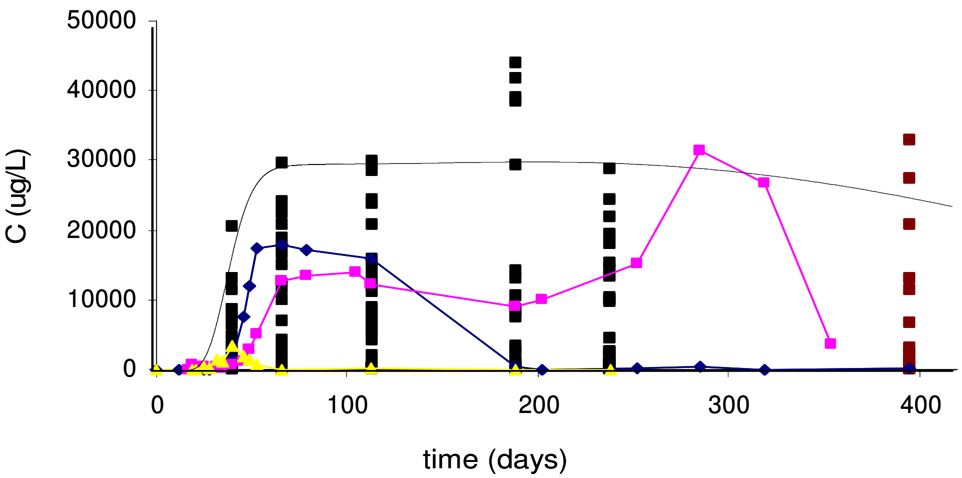


Figure 5.1 Toluene Concentrations at row 2, GMT gate: field and predicted breakthrough curves together with the concentrations detected in fence sampling events.

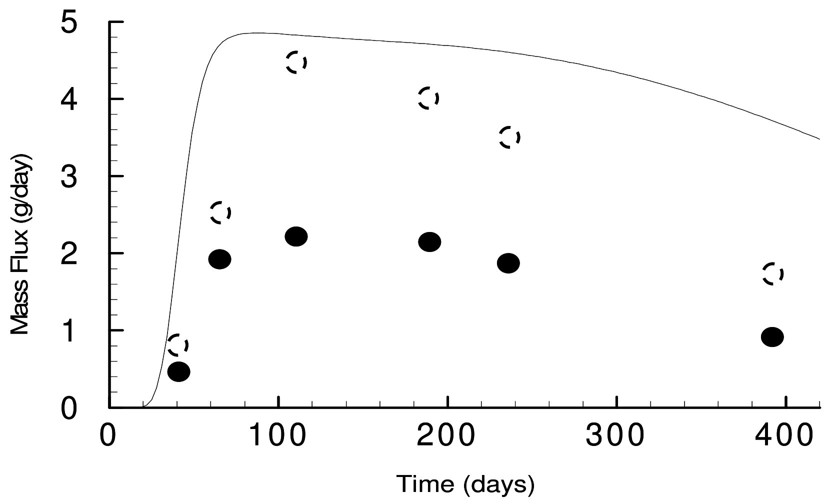


Figure 5.2 Toluene Mass Flux at row 2, GMT gate: Prediction versus Adjusted Field Data.

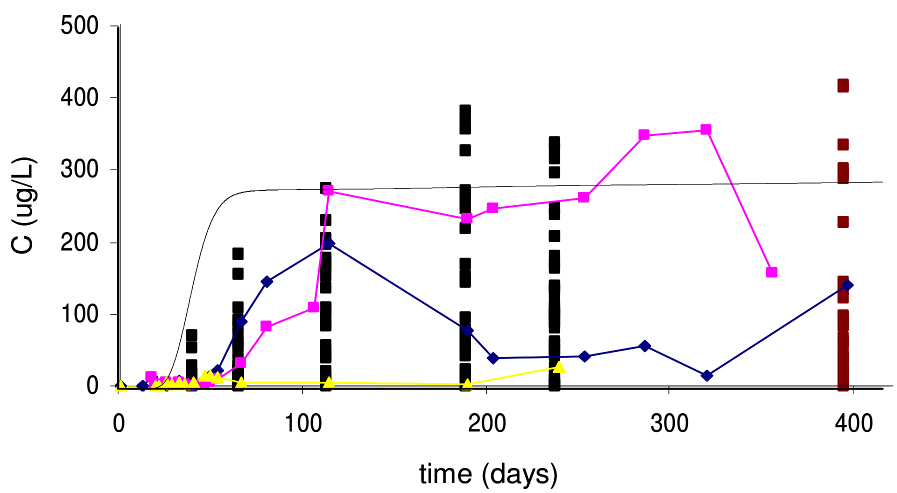


Figure 5.3 1,2,3 –TMB concentrations at row 2, GMT gate: field and predicted breakthrough curves together with the concentrations detected in fence sampling events.

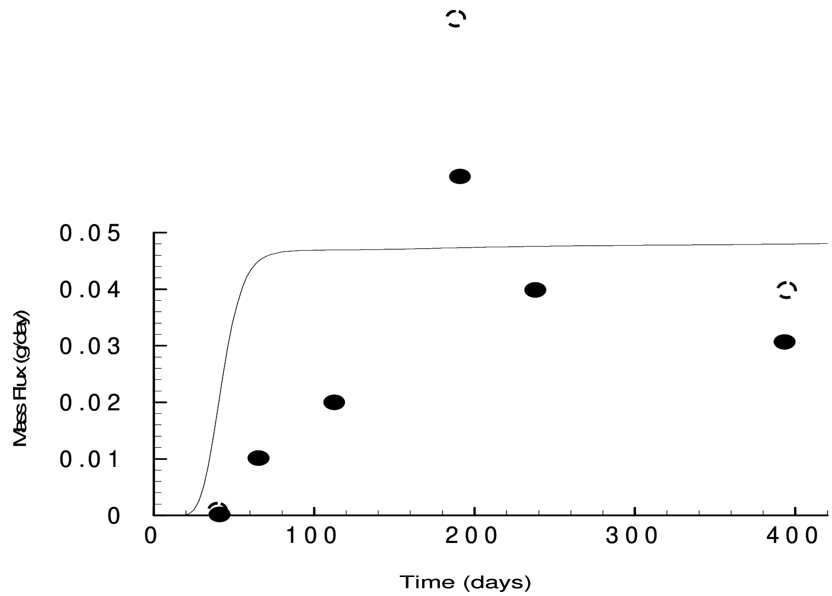


Figure 5.4 1,2,3 -TMB Mass Flux at row 2, GMT gate: Prediction versus Adjusted Field Data.

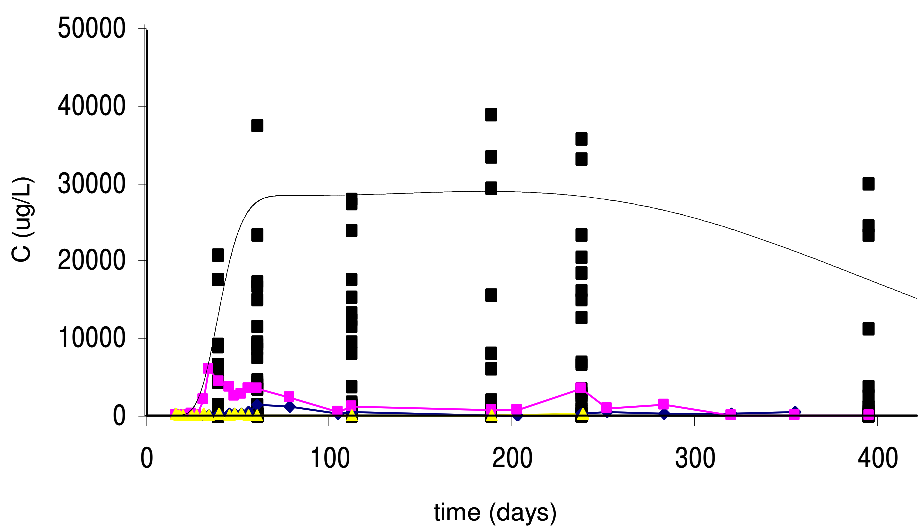


Figure 5.5 Toluene Concentrations at row 2, E10 gate: field and predicted breakthrough curves together with the concentrations detected in fence sampling events.

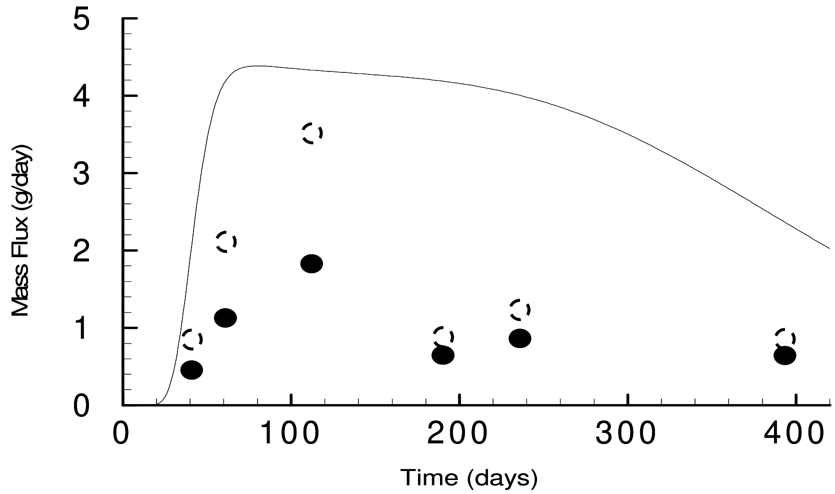


Figure 5.6 Toluene Mass Flux at row 2, E10 gate: Prediction versus Adjusted Field Data.

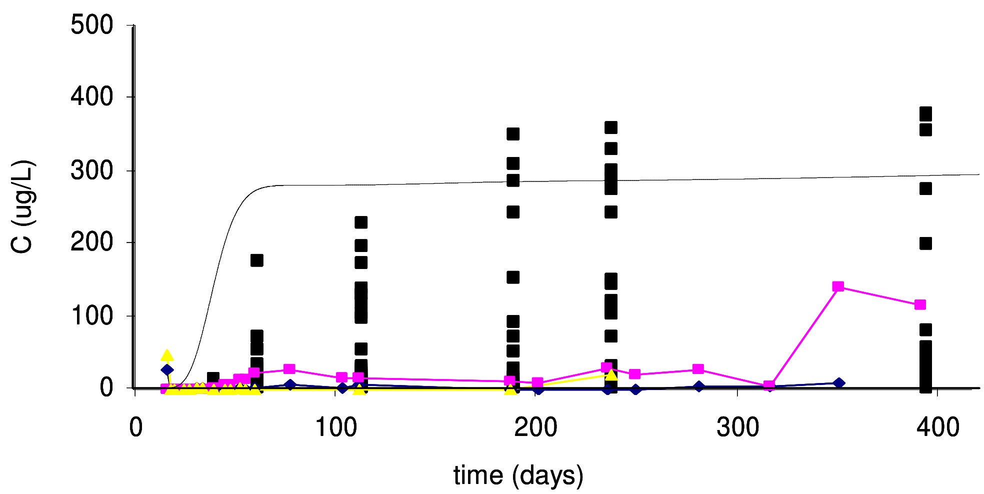


Figure 5.7 1,2,3 tri-methyl benzene Concentrations at row 2, E10 gate: field and predicted breakthrough curves together with the concentrations detected in fence sampling events.

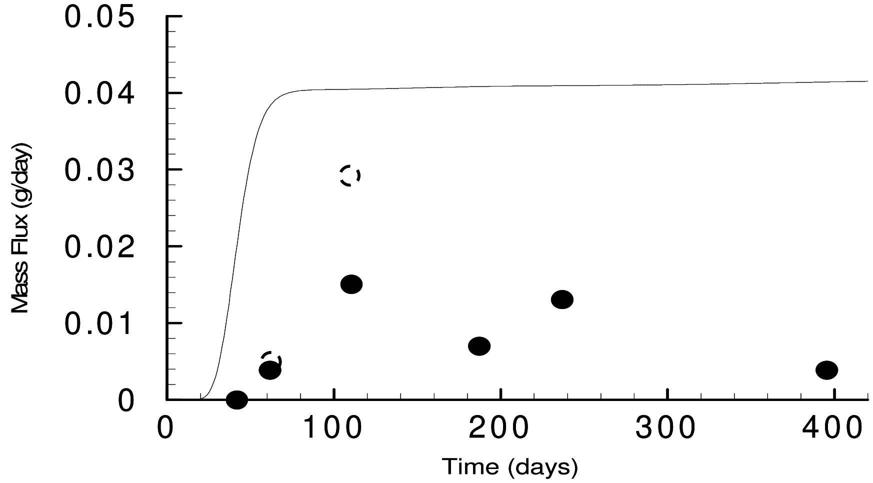
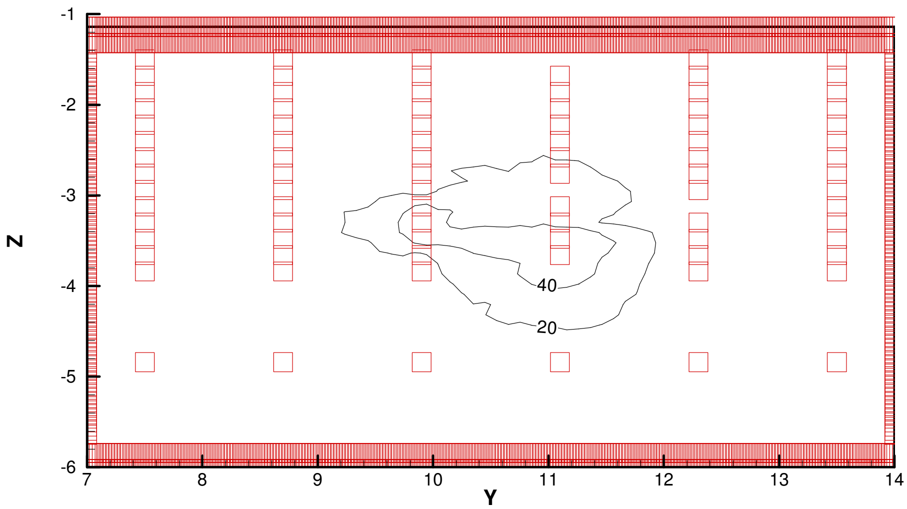


Figure 5.8 1,2,3 tri-methyl benzene Mass Flux at row 2, E10 gate: Prediction versus Adjusted Field Data.

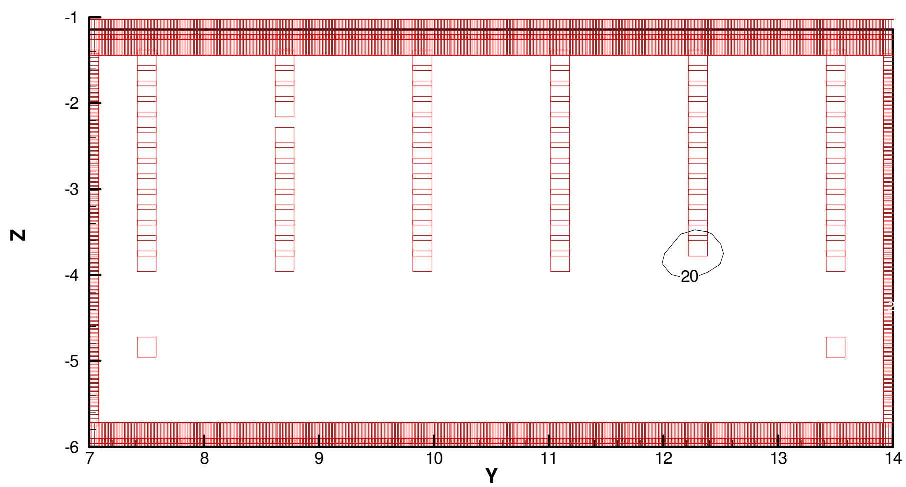
Concentration Distribution on the cross sectional area - Graphs

MTBE

Row 3, GMT gate



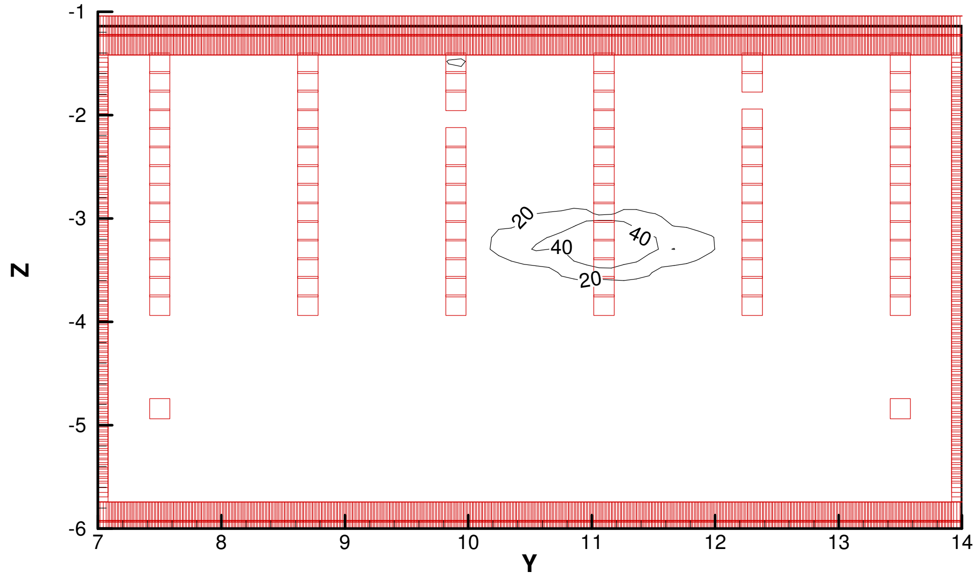
MTBE, day 115 (Feb.2, 2005)



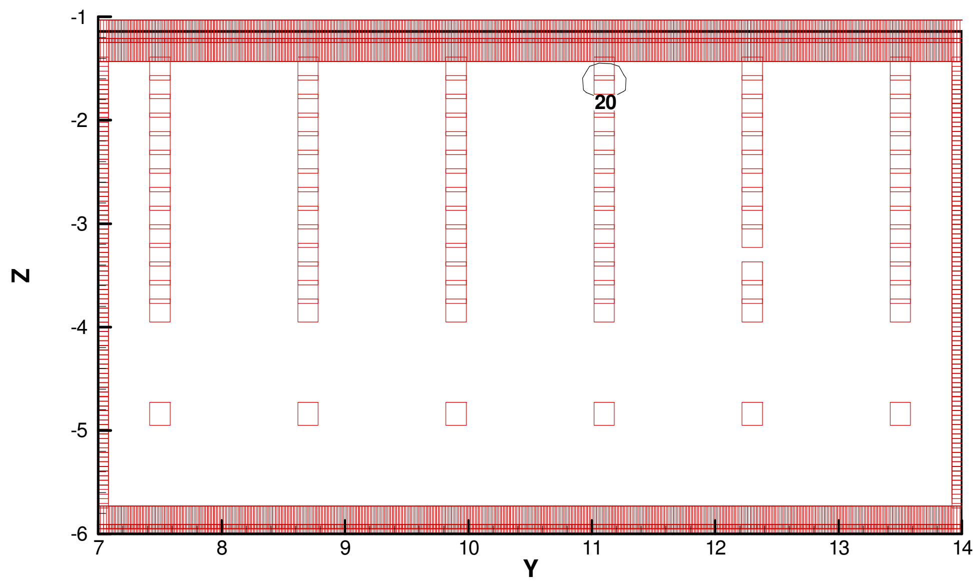
MTBE, day 190 (Apr. 5, 2005)

Zero- MTBE, day 240 (June. 6, 2005)

Row 4, GMT gate



MTBE, day 190 (Apr. 5, 2005)

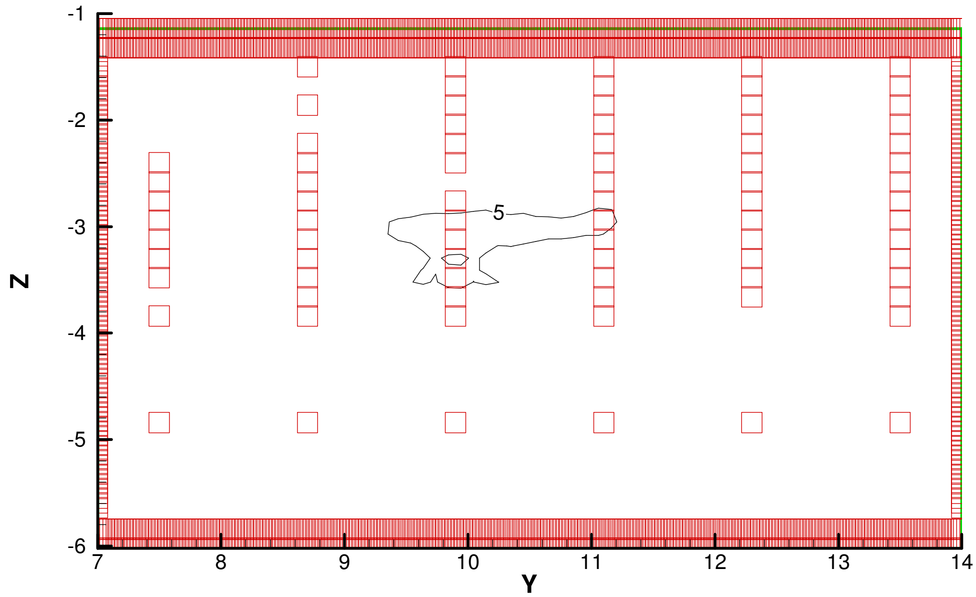


MTBE, day 240 (June. 6, 2005)

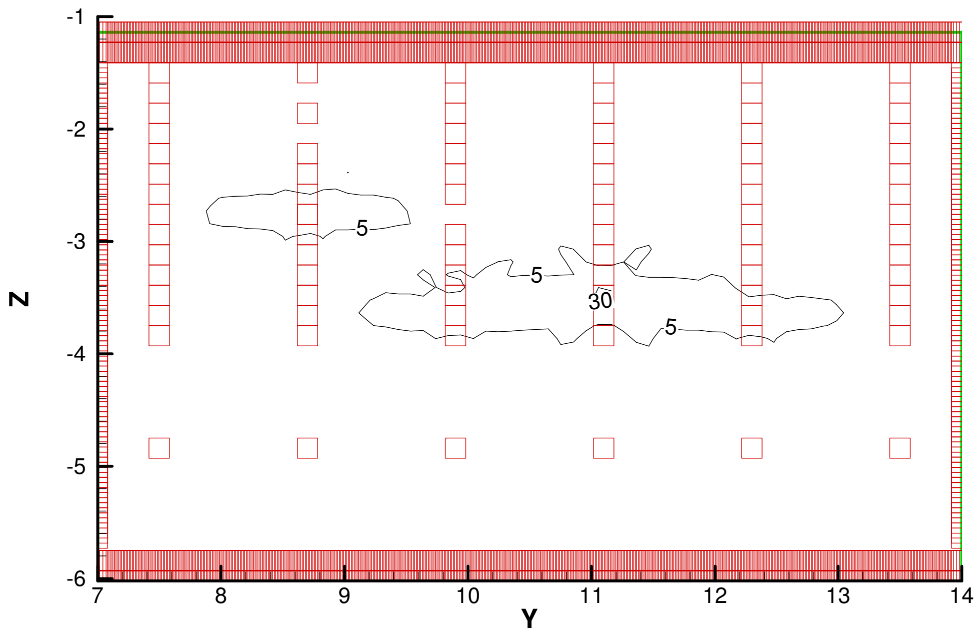
Zero- MTBE, day 310 (Aug. 16, 2005)

TBA

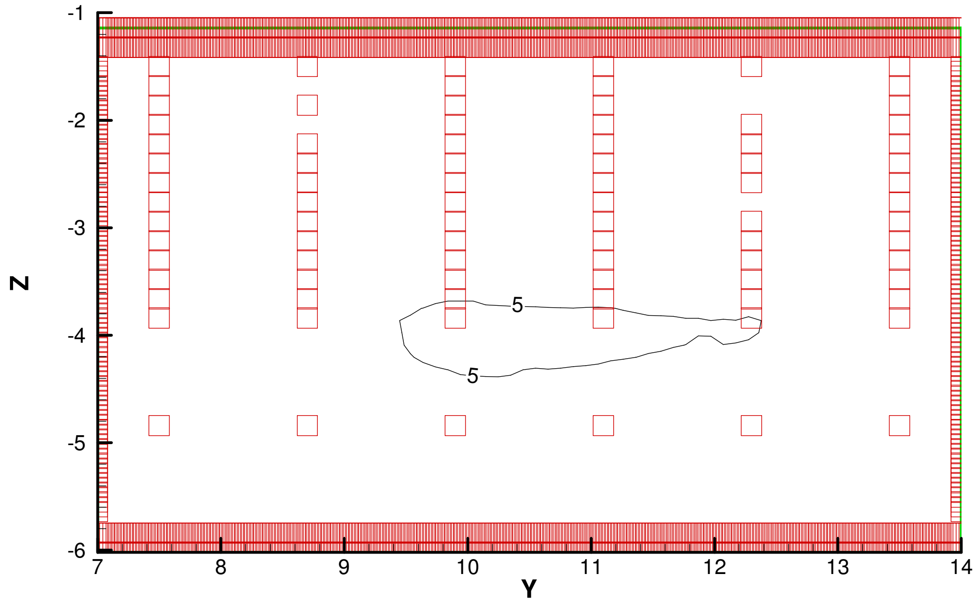
Row 2, GMT gate



TBA, day 40 (Nov. 20 , 2004)

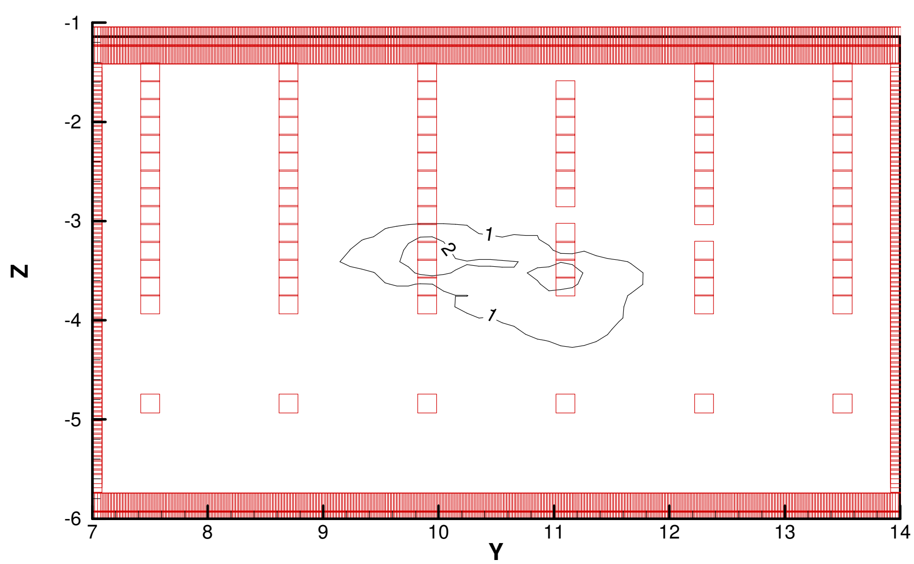


TBA, day 66 (Dec.16 , 2004)

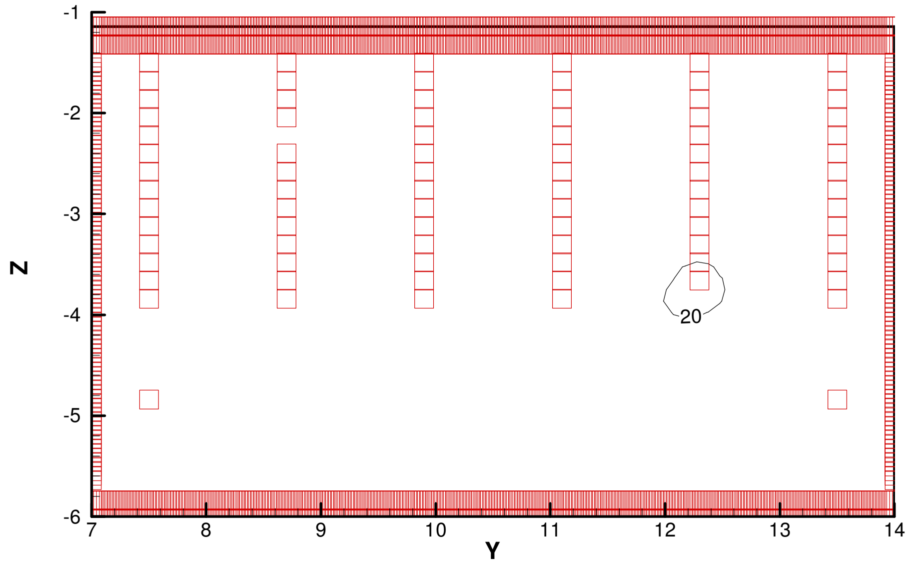


TBA, day 113 (Feb.3 , 2004)

Row 3, GMT gate



TBA, day 115 (Feb. 2, 2005)



TBA, day 190 (Apr. 5, 2005)

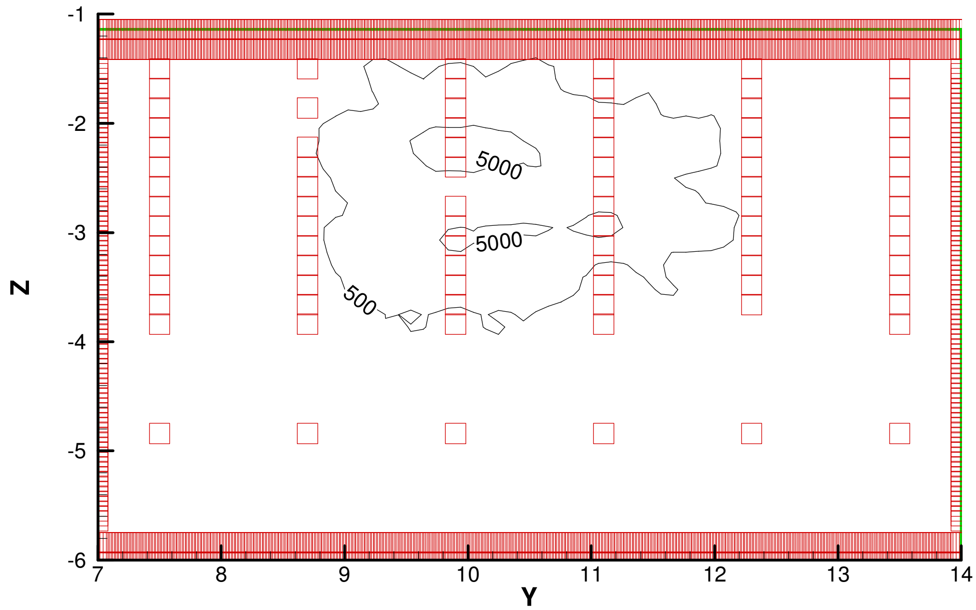
Zero-TBA, day 240 (Jun. 6, 2005)

Row 4, GMT gate

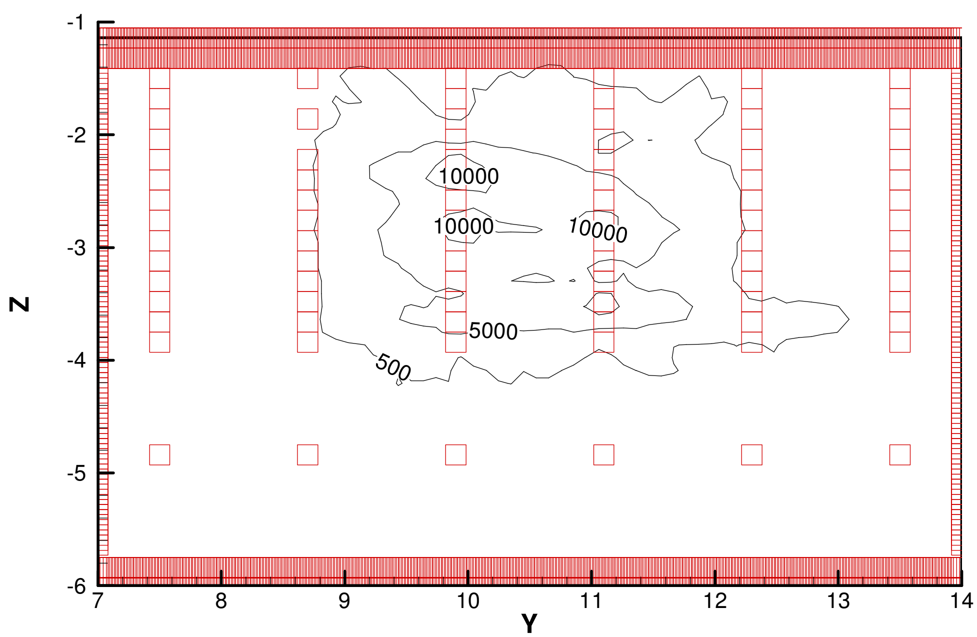
Zero- TBA, day 190 (Apr. 5, 2005)
Zero- TBA, day 240 (Jun. 6, 2005)
Zero- TBA, day 310 (Aug. 16, 2005)

Benzene

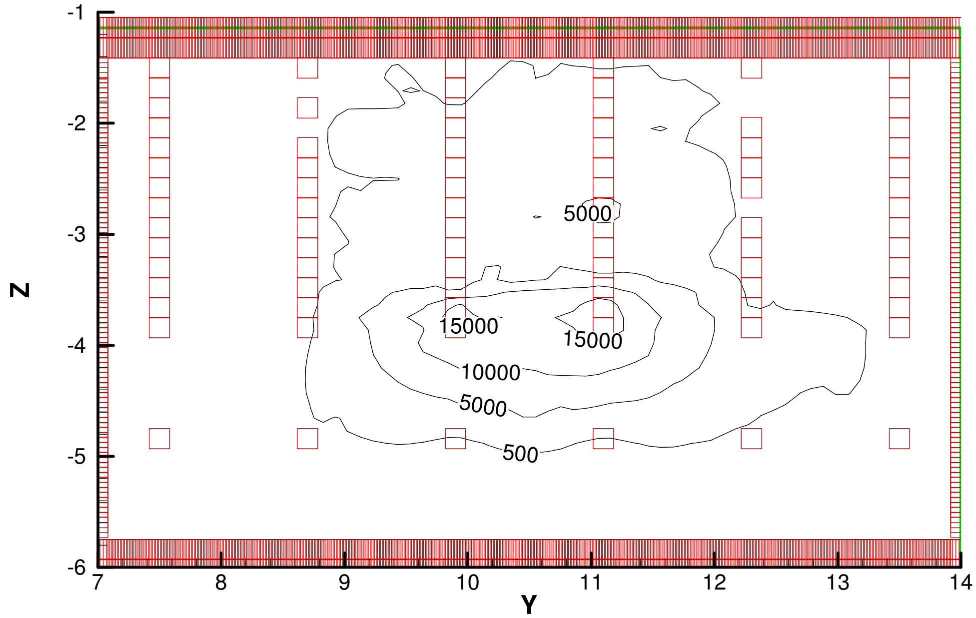
Row 2, GMT gate



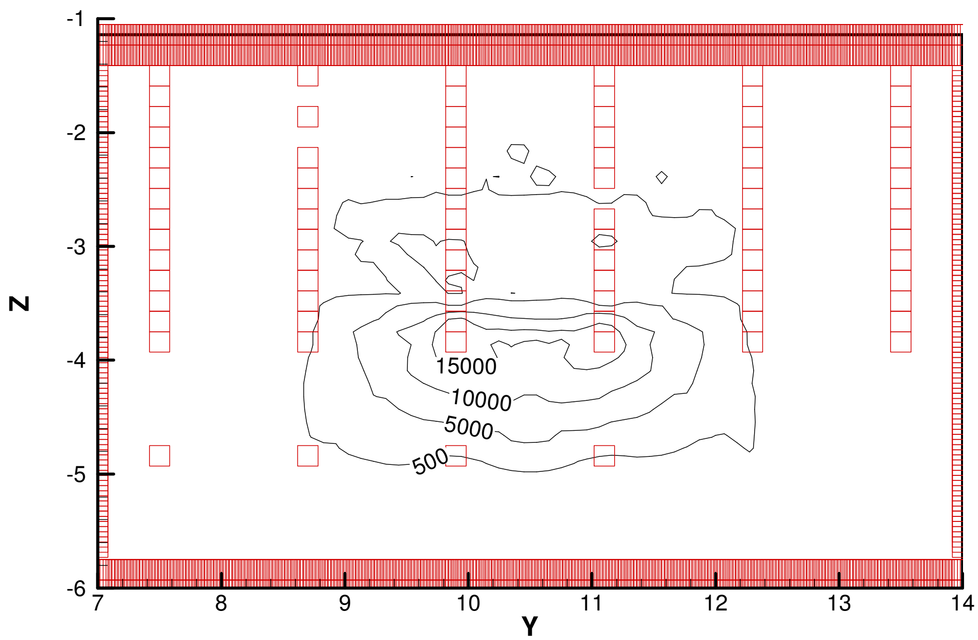
Benzene 20-Nov-04 (40 days)



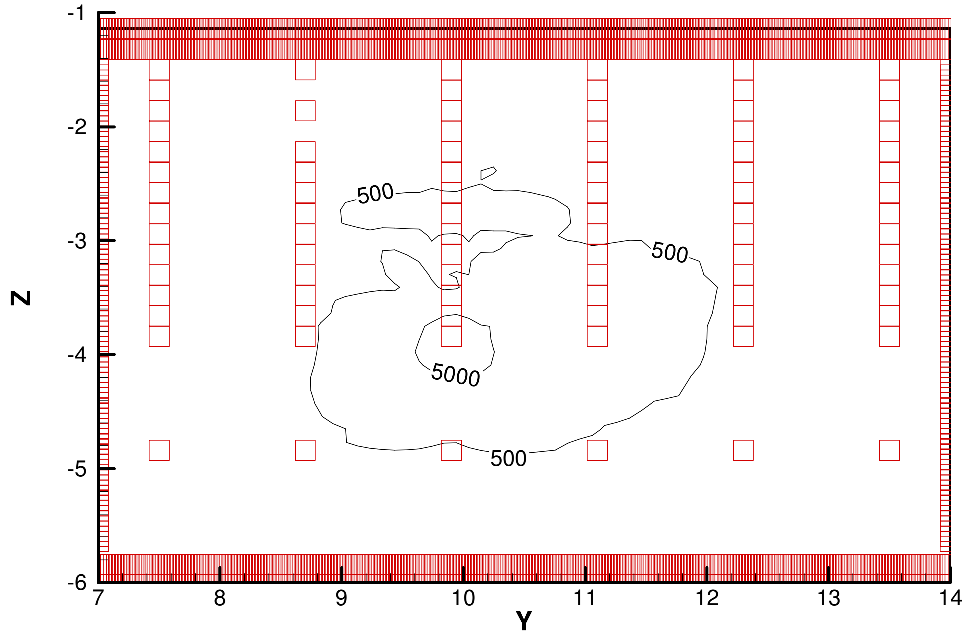
Benzene 16-Dec-04 (66 days)



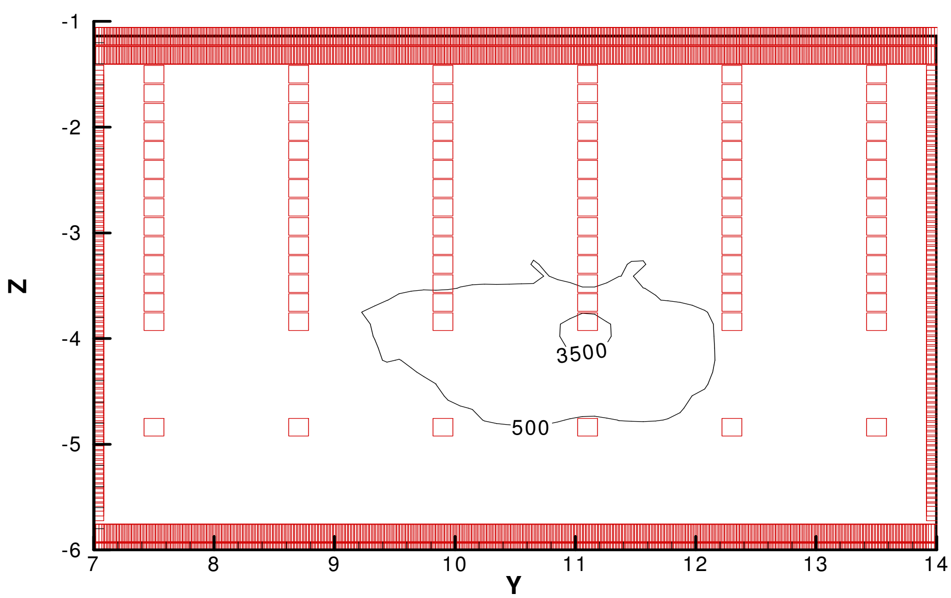
Benzene 03-Feb-05 (113 days)



Benzene 19-Apr-05 (189 days)

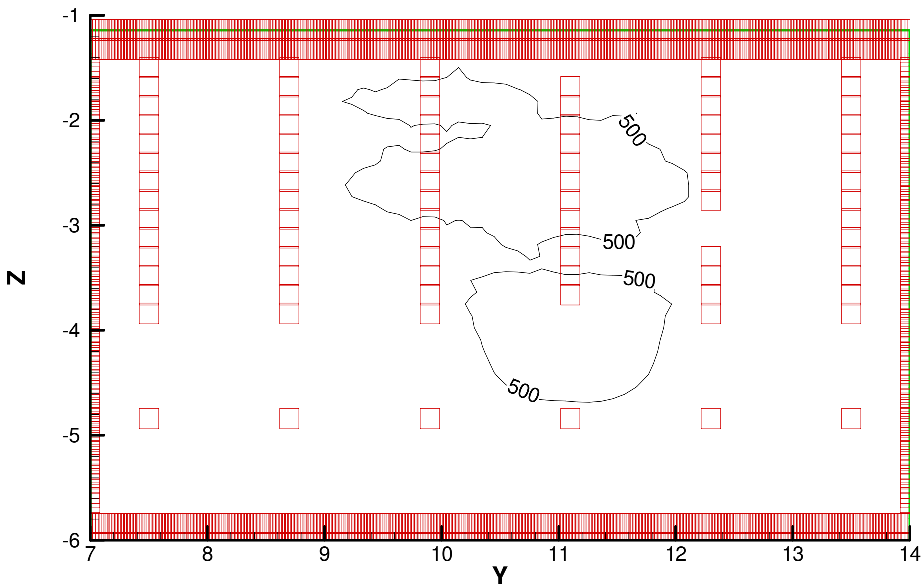


Benzene 08-Jun-05 (238 days)

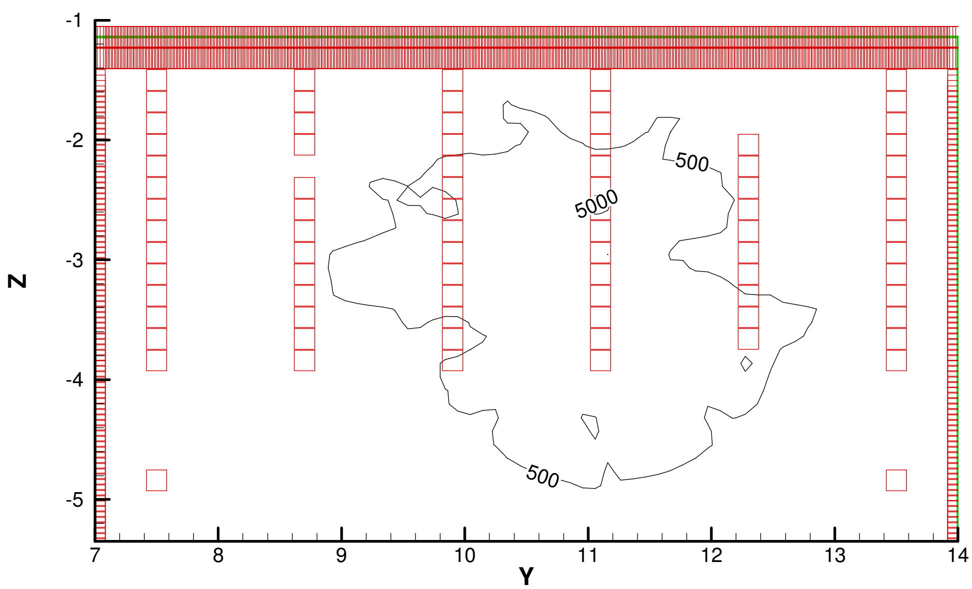


Benzene 15-Nov-05 (395 days)

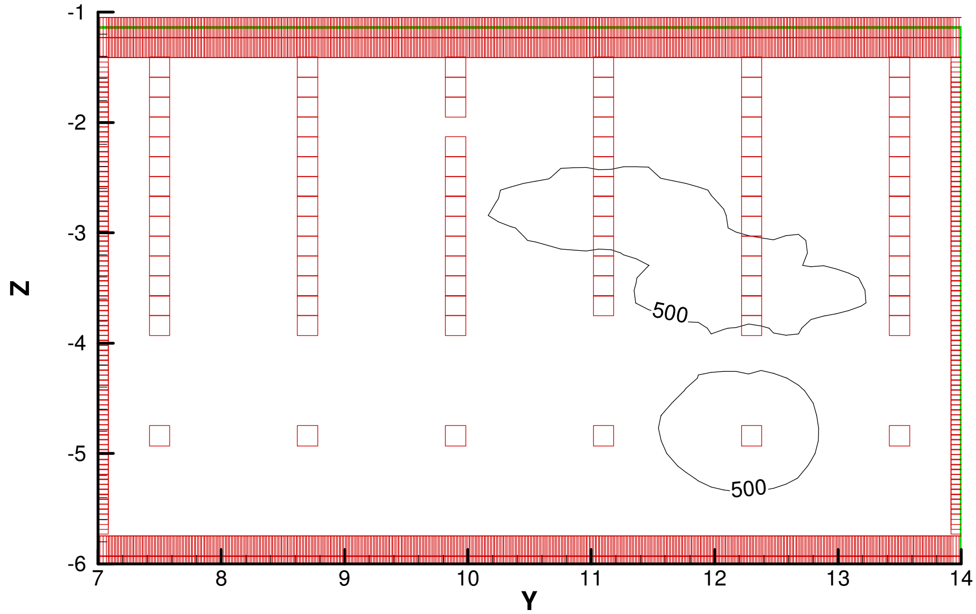
Row 3, GMT gate



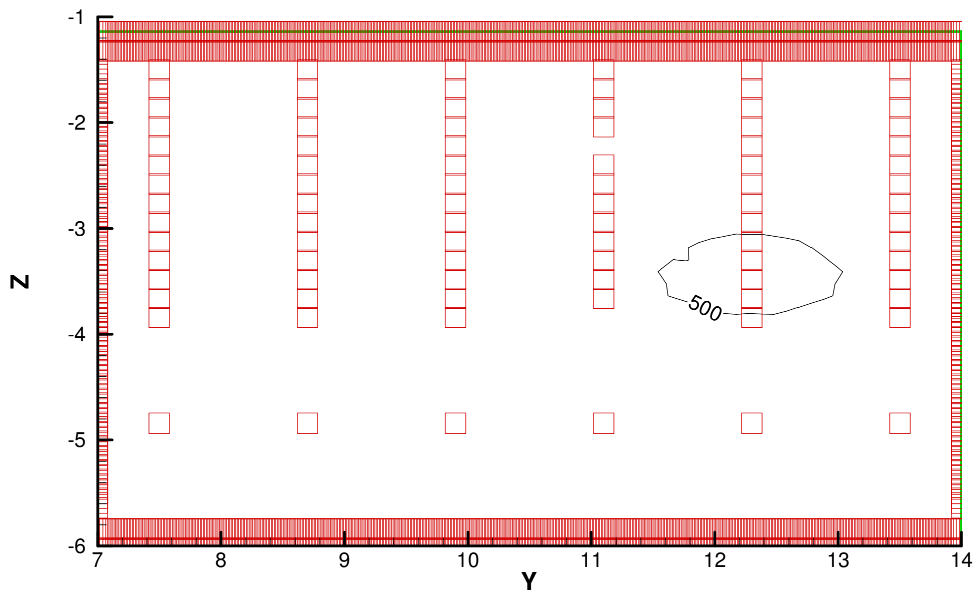
Benzene 03-Feb-05 (113 days)



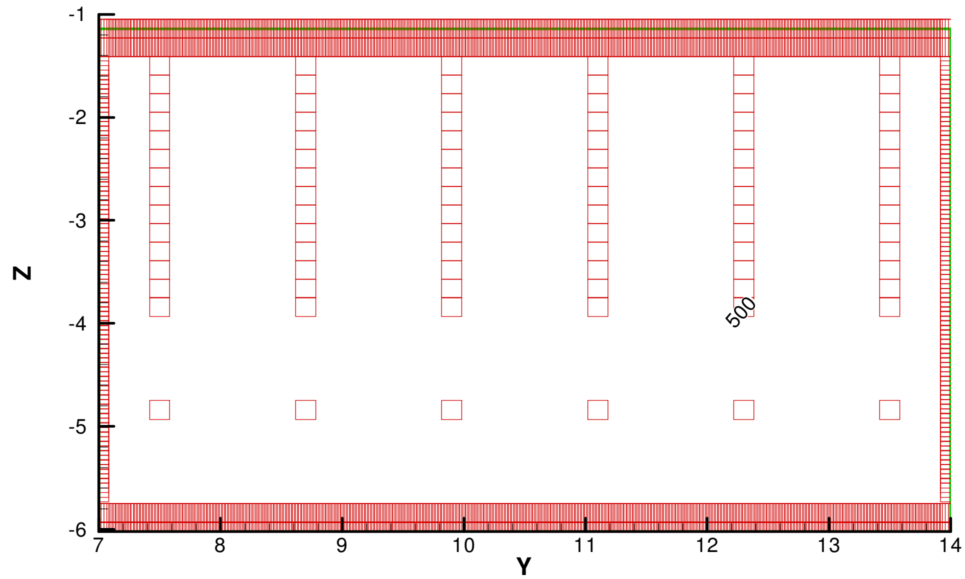
Benzene 05- Apr-05 (175days)



Benzene 06-Jun-05 (236 days)

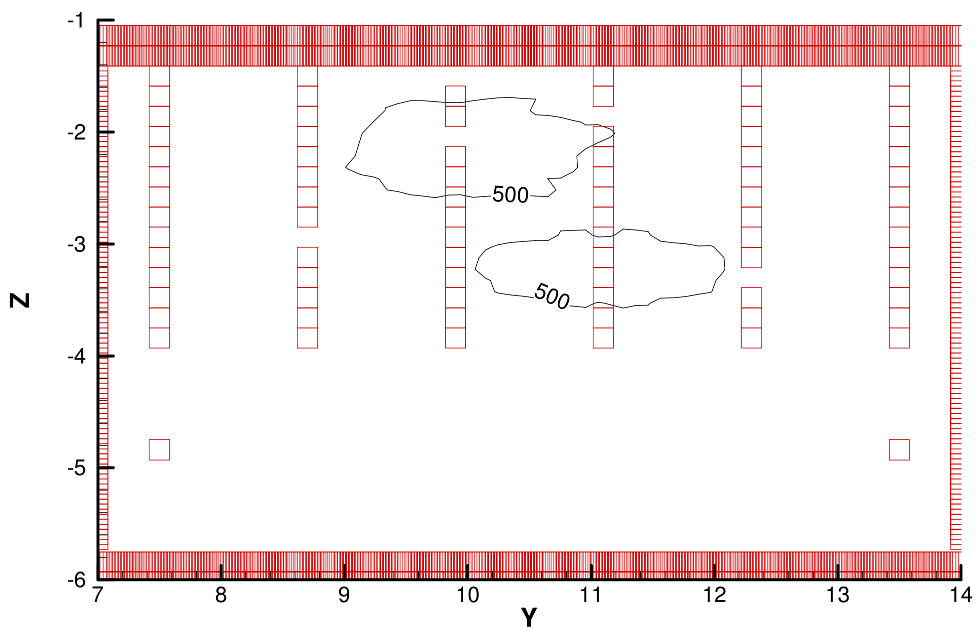


Benzene 16-Aug-05 (306 days)

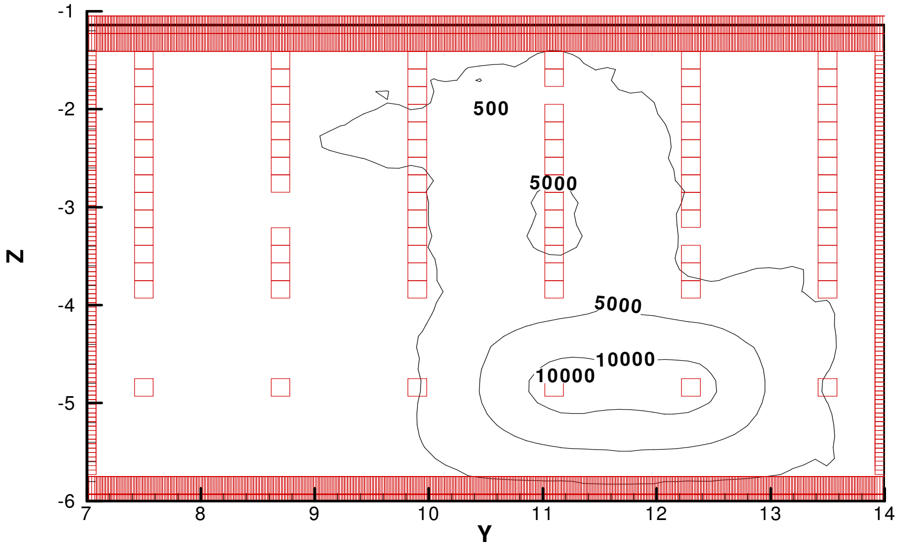


Benzene 17-Nov-05 (397 days)

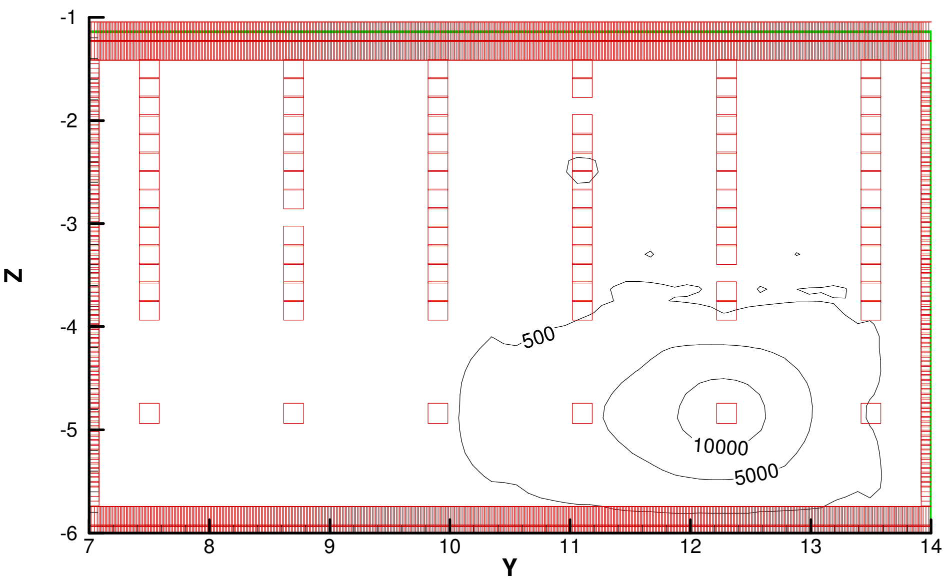
Row 4, GMT gate



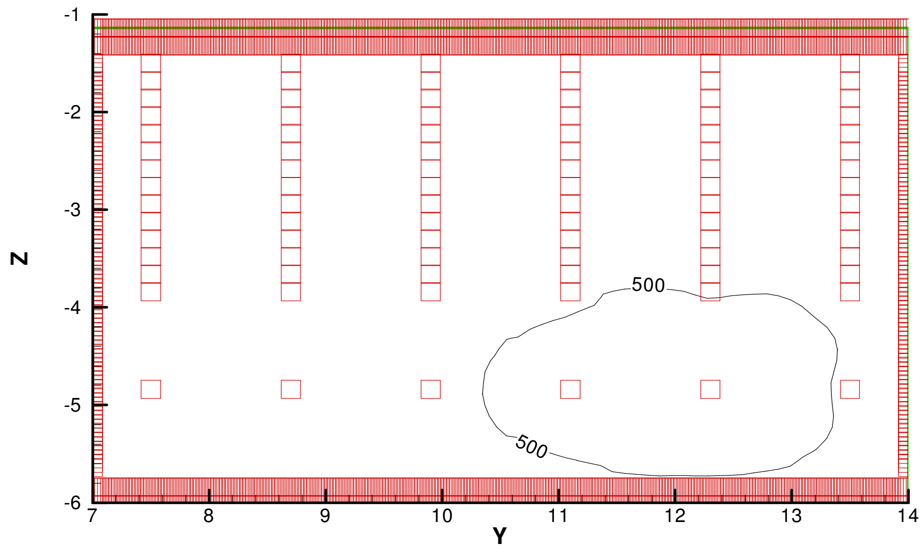
Benzene 13-Apr-05 (183 days)



Benzene 01-Jun-05 (231 days)



Benzene 16-Aug-05 (306 days)



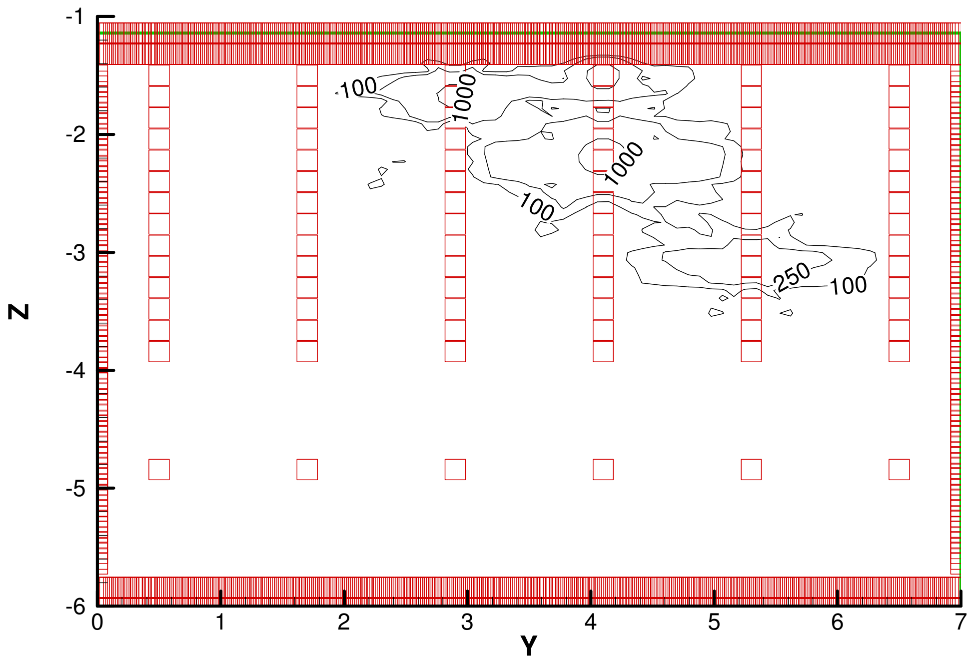
Benzene 28-Nov-05 (408 days)

Appendix 6.B – E10 source

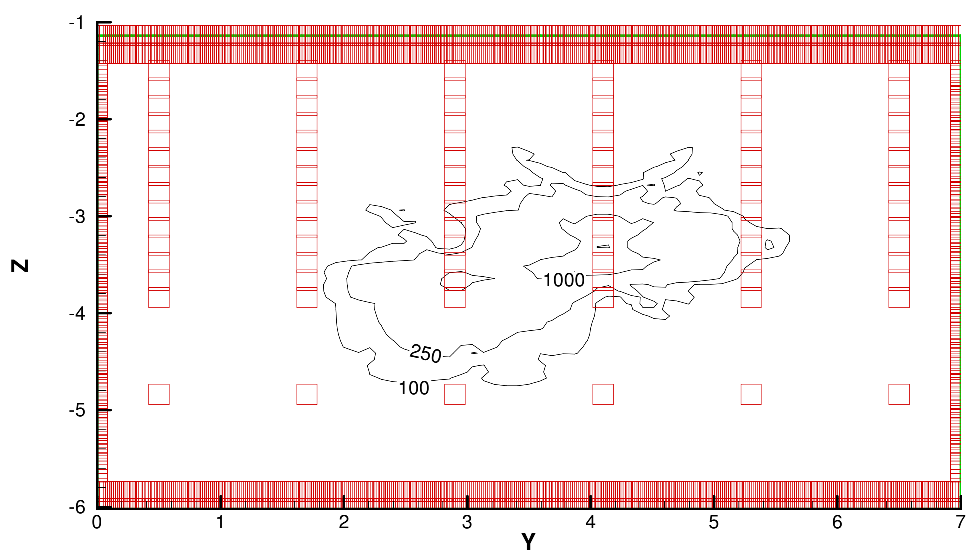
Concentration Distribution on the cross sectional area - Graphs

Ethanol

Row 2, E10 gate



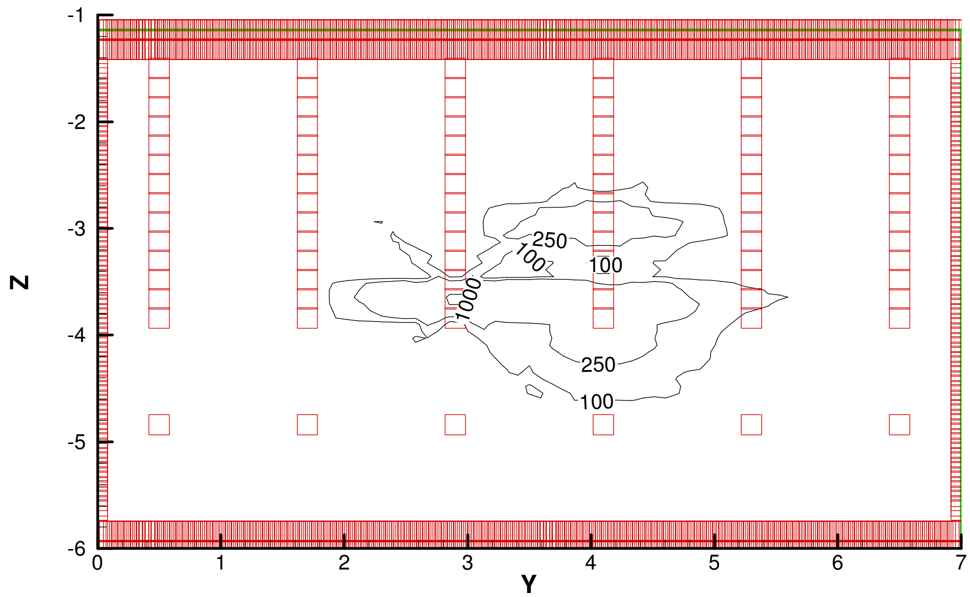
Ethanol (E10), day 40 (20 Nov. 04)



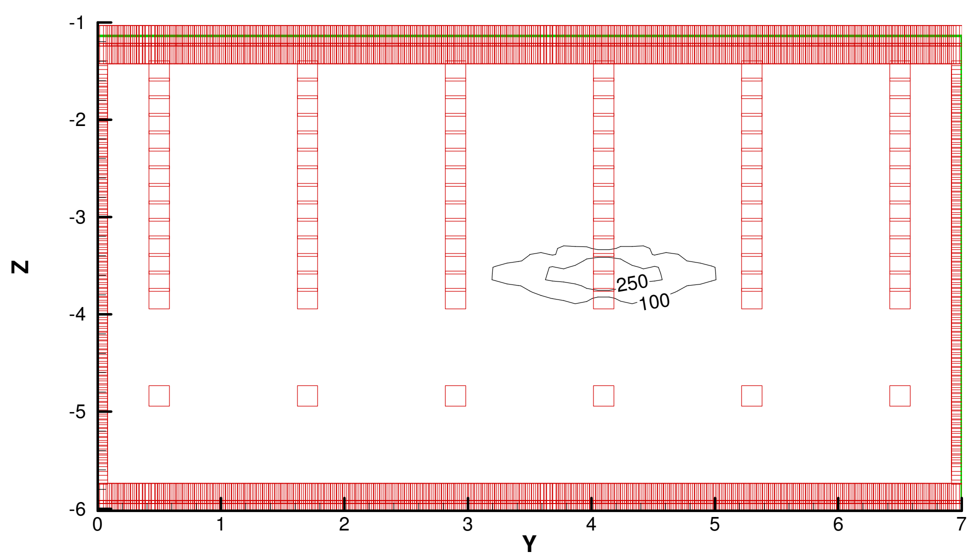
Ethanol (E10), day 61 (11 Dec. 04)

Zero-Ethanol (E10), day 113 (03 Feb. 05)
Zero-Ethanol (E10), day 189 (19 Apr. 05)
Zero-Ethanol (E10), day 238 (08 Jun. 05)
Zero-Ethanol (E10), day 395 (15 Nov. 05)

Row 3, E10 gate



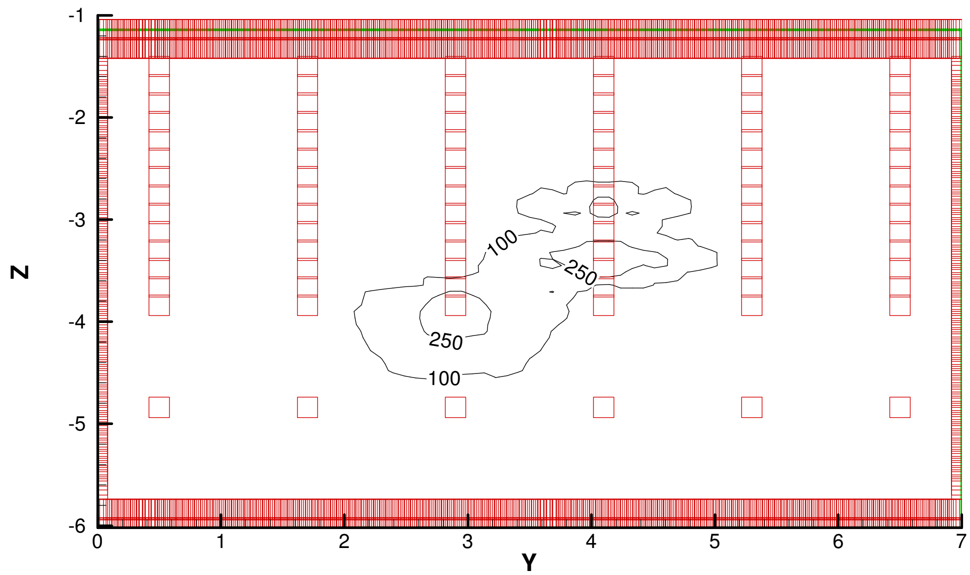
Ethanol (E10), day 113 (03 Feb. 05)



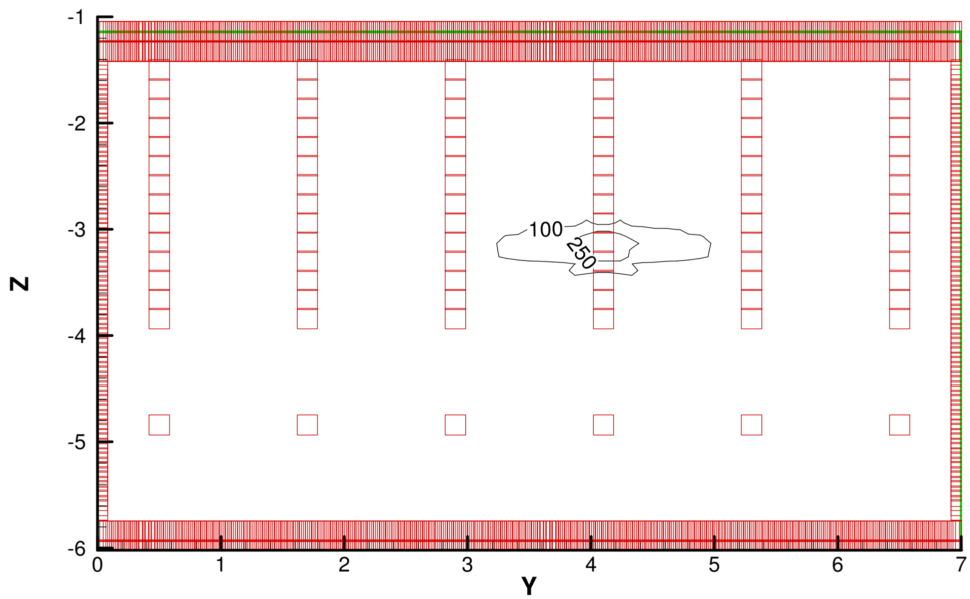
Ethanol (E10), day 175 (05 Apr. 05)

Zero-Ethanol (E10), day 236 (06 Jun. 05)
Zero-Ethanol (E10), day 306 (16 Aug. 05)
Zero-Ethanol (E10), day 397 (17 Nov. 05)

Row 4, E10 gate



Ethanol (E10), day 183 (13 Apr. 05)

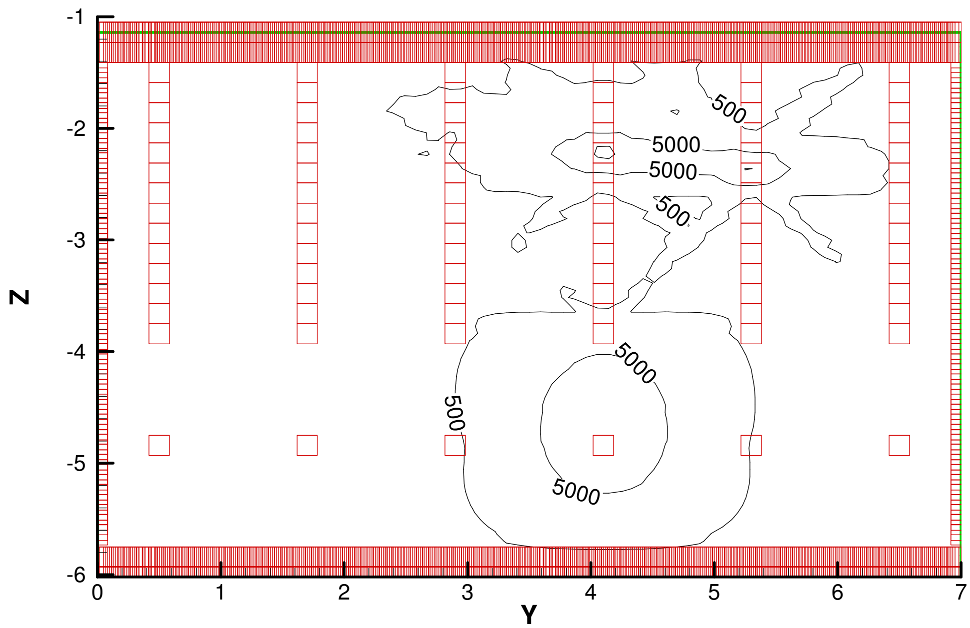


Zero-Ethanol (E10), day 232 (02 Jun. 05)

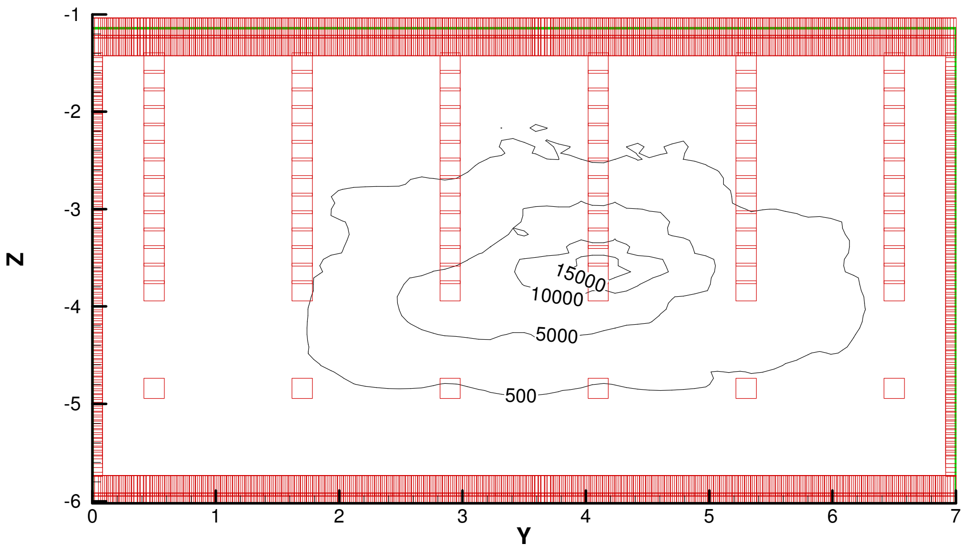
Zero-Ethanol (E10), day 306 (16 Aug. 05)
Zero-Ethanol (E10), day 408 (28 Nov. 05)

Benzene

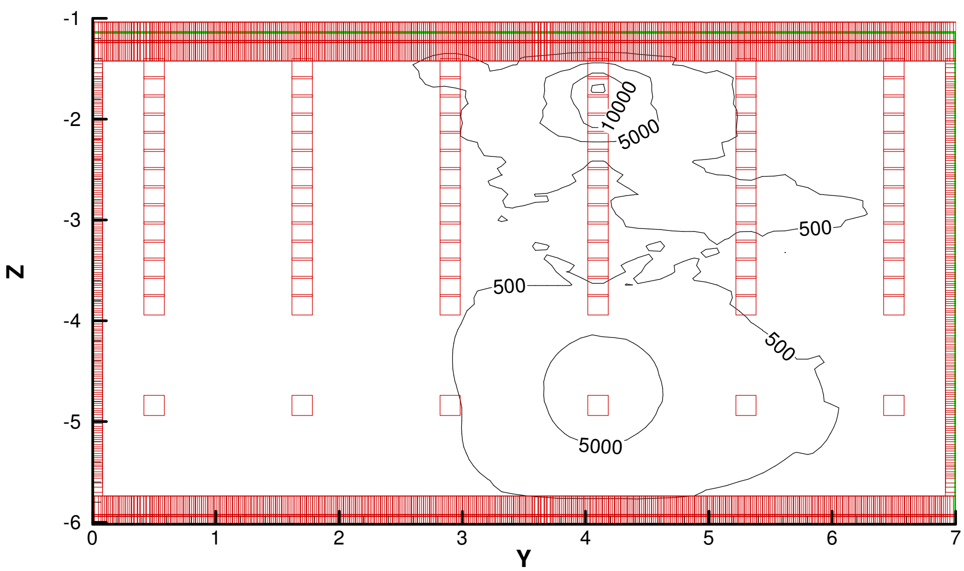
Row 2, E10 gate



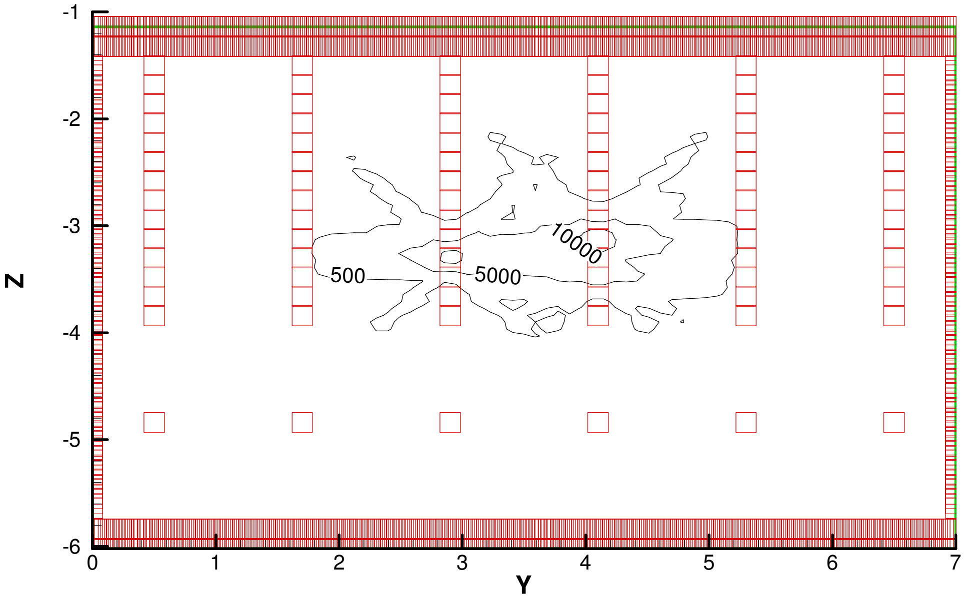
Benzene (E10), day 40 (20 Nov. 04)



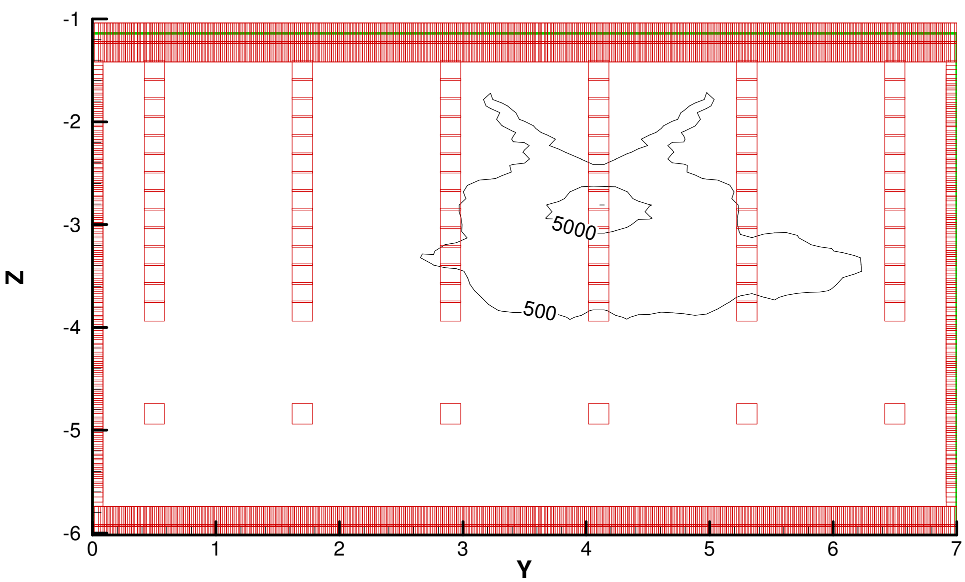
Benzene (E10), day 61 (11 Dec. 04)



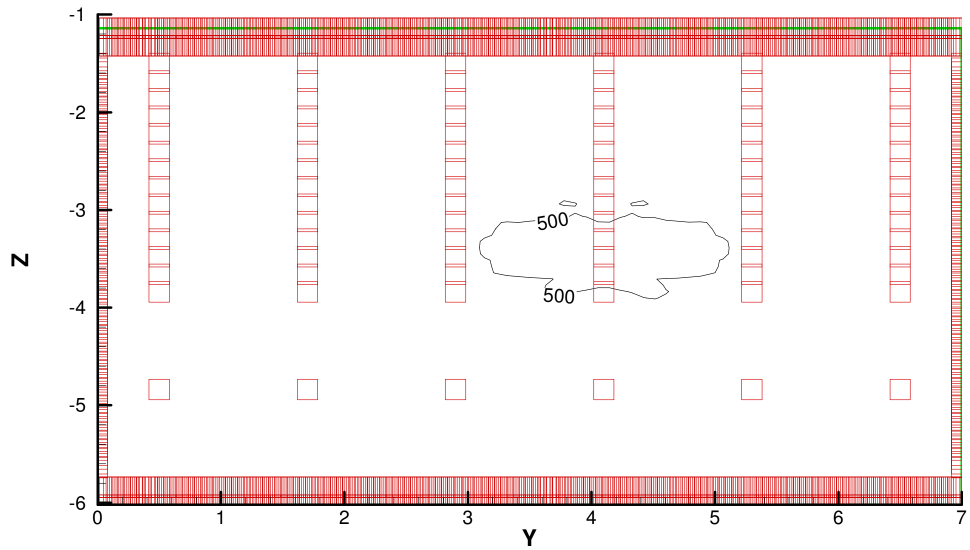
Benzene (E10), day 113 (03 Feb. 05)



Benzene (E10), day 189 (19 Apr. 05)

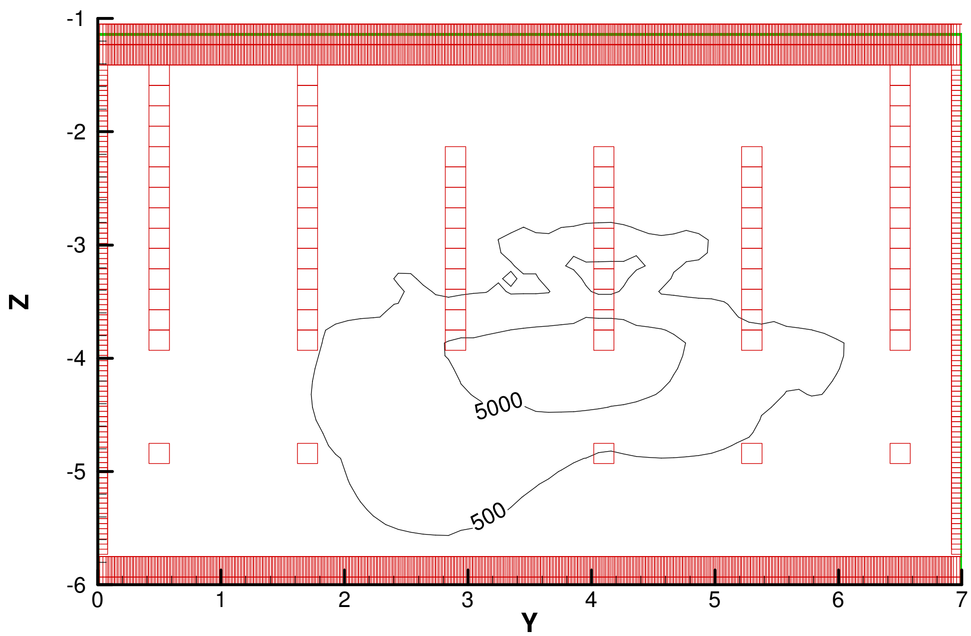


Benzene (E10), day 238 (08 Jun. 05)

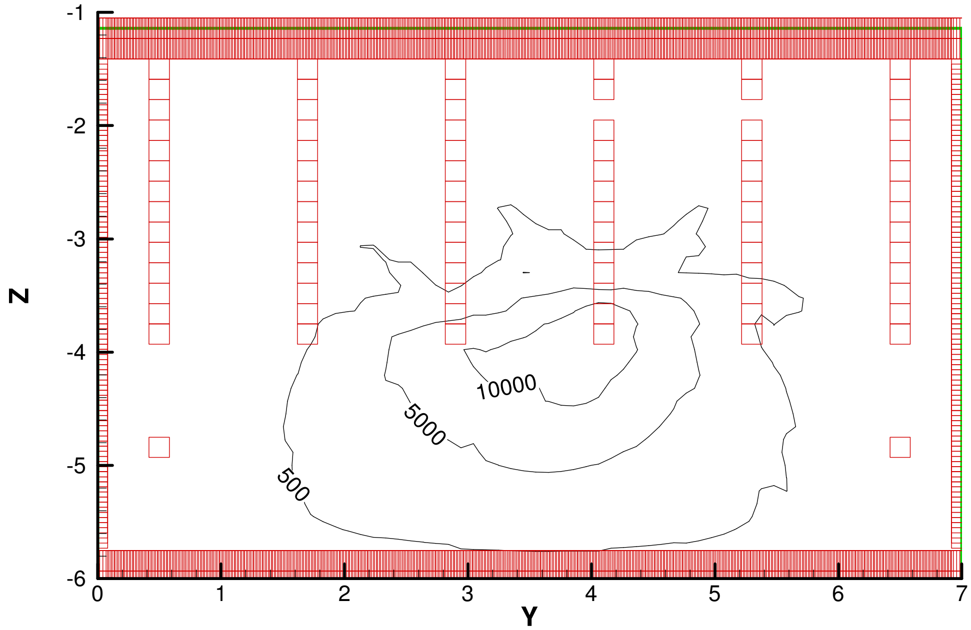


Benzene (E10), day 395 (15 Nov. 05)

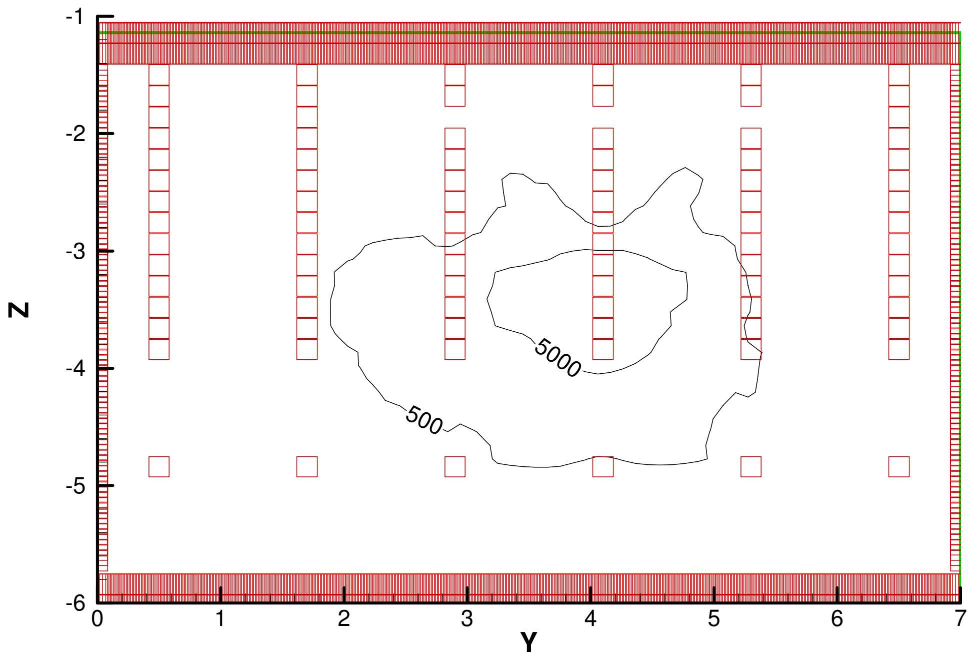
Row 3, E10 gate



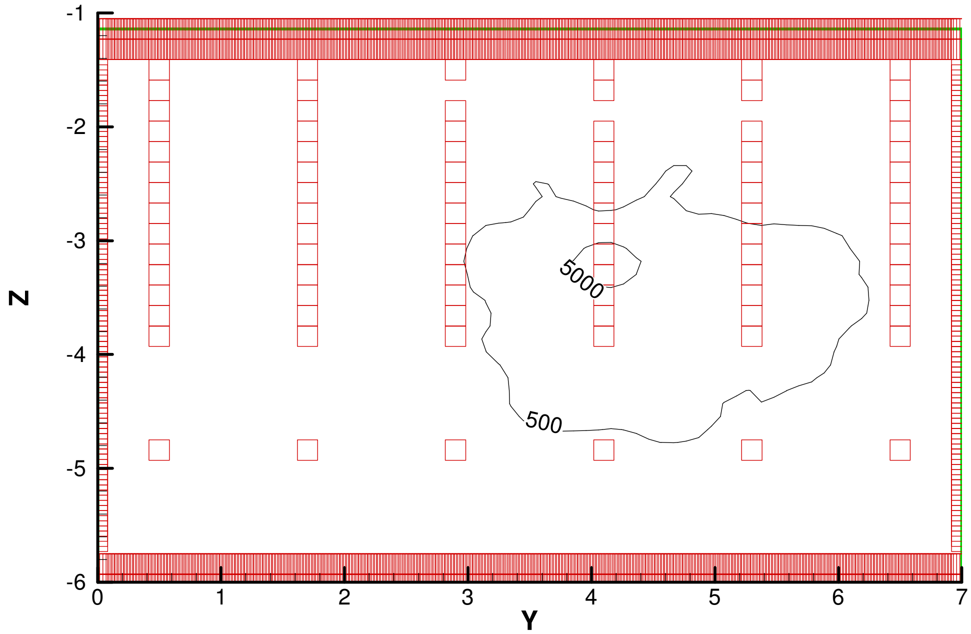
Benzene (E10), day 113 (03 Feb. 05)



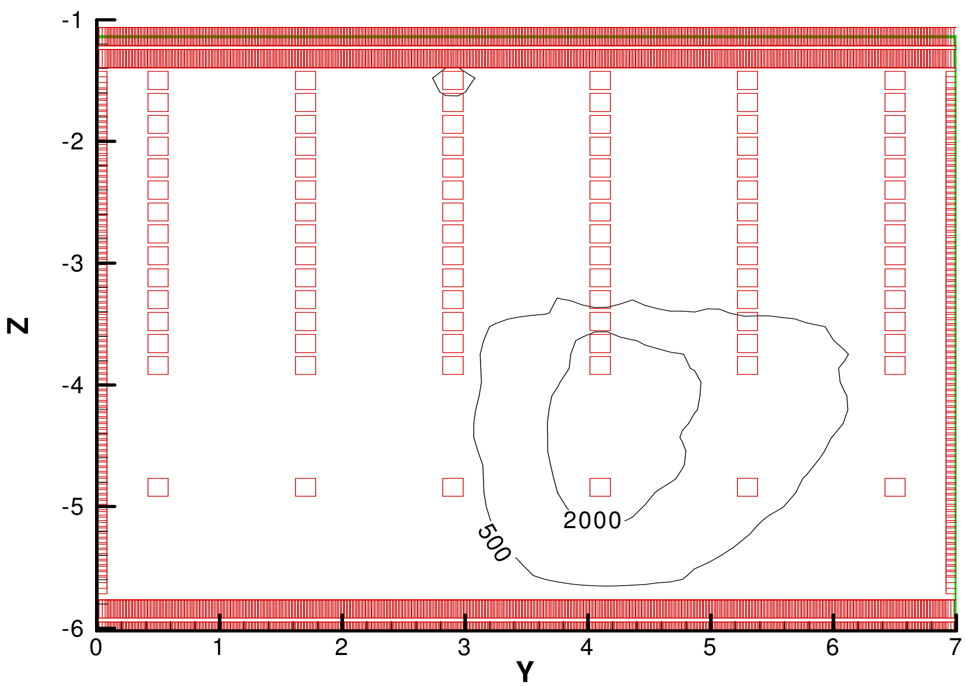
Benzene (E10), day 175 (05 Apr. 05)



Benzene (E10), day 236 (06 Jun. 05)

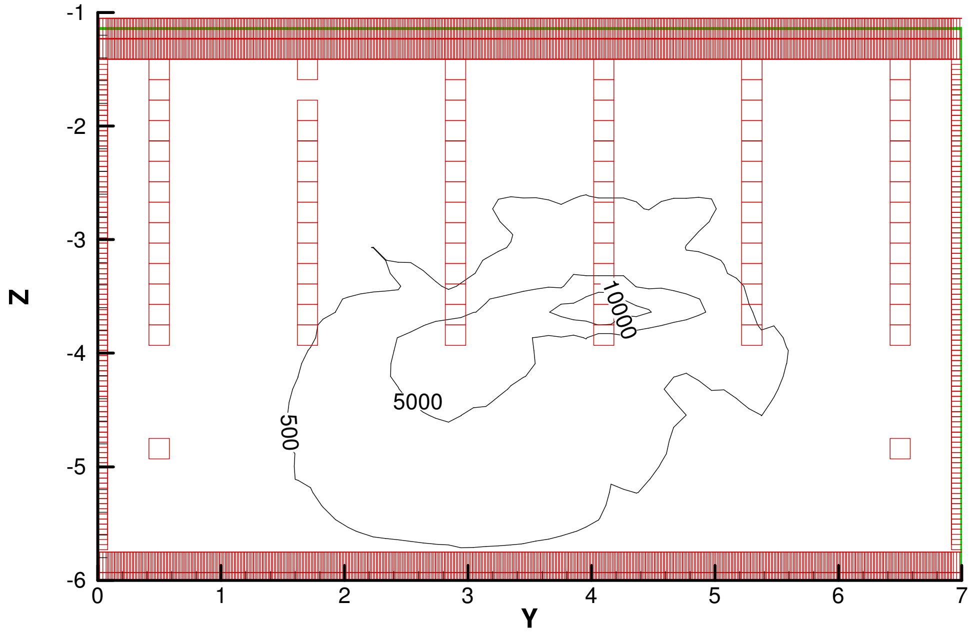


Benzene (E10), day 306 (16 Aug. 05)

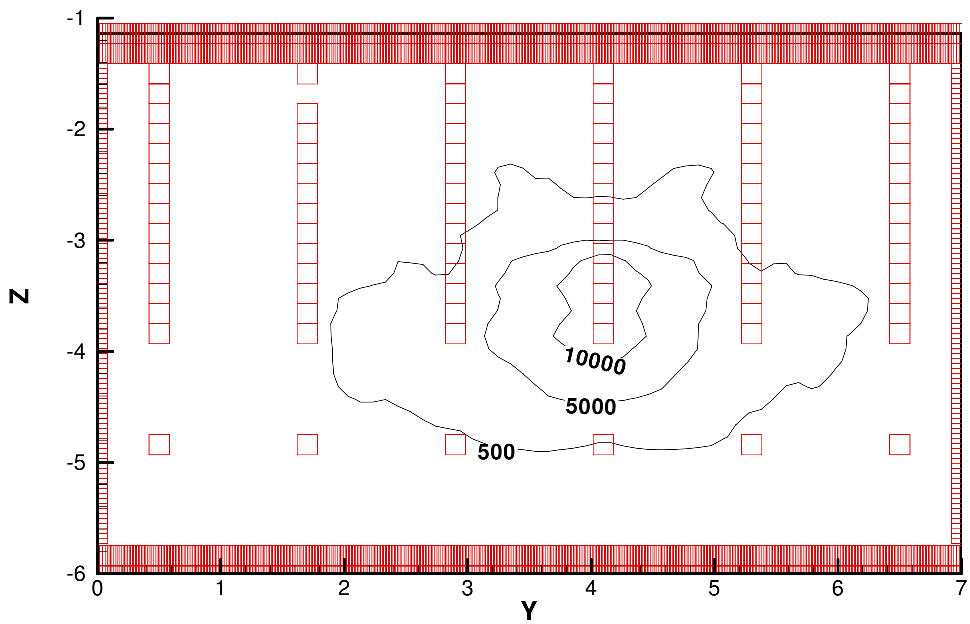


Benzene (E10), day 397 (17 Nov. 05)

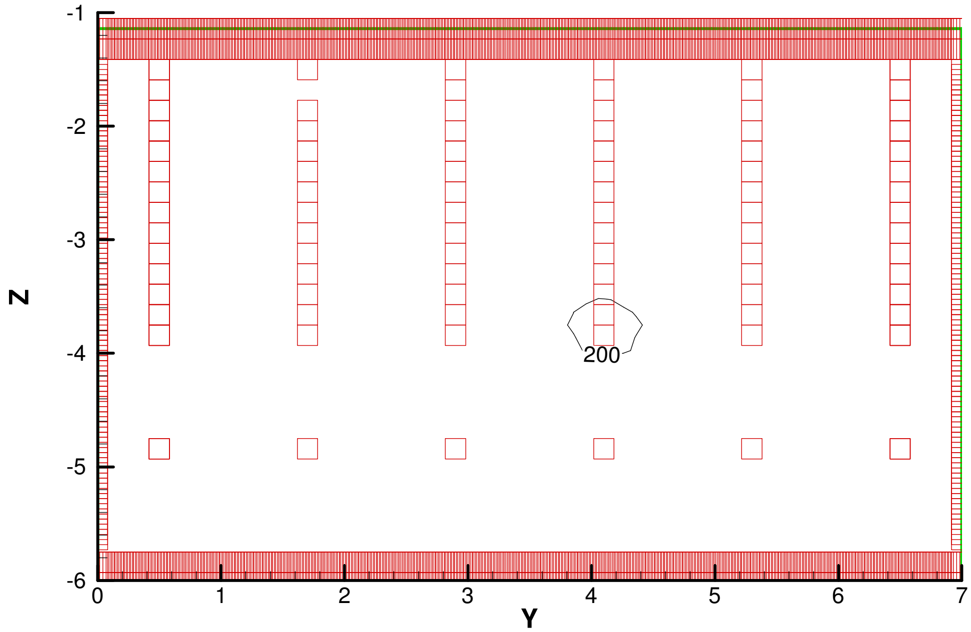
Row 4, E10 gate



Benzene (E10), day 183 (13 Apr. 05)



Benzene (E10), day 232 (02 Jun. 05)



Benzene (E10), day 306 (16 Aug. 05)

Zero- Benzene (E10), day 408 (28 Nov. 05)