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11:35 am, Apr 06, 2009

Alameda County
Environmental Health



GETTLER-RYAN INC.

November 15, 1999

Mr. Barney Chan
Alameda County Environmental Health Services
1131 Harbor Bay Parkway
Alameda, CA 94502

| | | | |
|--------|----|-------------|----|
| 255325 | SS | X | BP |
| QM | | TRANSMITTAL | |
| 3 | X | 4 | 5 |

Subject: Bio-Attenuation Parameters at Tosco (76) Service Station No. 5325, located at 3220 Lakeshore Avenue, Oakland, California.

Mr. Chan:

This letter details the review and comparison of bio-attenuation parameters collected by Gettler-Ryan Inc. (GR) from the Tosco Marketing Company (Tosco) Service Station No. 5325, located at 3220 Lakeshore Avenue in Oakland, California (Figure 1). The parameters were collected on September 8, 1999, during the quarterly monitoring and sampling event¹.

GR evaluated the bio-parameters collected during the September 1999 event. This evaluation was based on protocols outlined in Buscheck and others (1993)², Buscheck and O'Reilly (1995)³, and Borden and others (1995)⁴. The evaluation consisted of comparing chemical indicators from the September 1999 sampling event across the dissolved hydrocarbon plume in a roughly east-west transect (A-A' on Figure 2), and along a roughly north-south transect (B-B' on Figure 2). Bio-parameters and chemical concentrations in groundwater from the September 1999 sampling event are summarized in the attached Table 1.

The attached graphs show the relationship between Total Petroleum Hydrocarbons as gasoline (TPHg) and Methyl tertiary-Butyl Ether (MtBE) concentrations in the wells during the most recent sampling event, and the bio-attenuation parameters oxidation-reduction potential (ORP), Dissolved Oxygen (DO), ferrous iron, and nitrate. DO was

¹ Gettler-Ryan Inc., 1999, Groundwater Monitoring and Sampling Report Third Quarter 1999 - Event of September 8, 1999, dated October 18, 1999.

² Buscheck, T. E., K. T. O'Reilly, and N. N. Sheldon, 1993, Evaluation of Intrinsic Bioremediation at Field Sites, in Proceedings of the Conference on Petroleum Hydrocarbons and Organic Chemicals in Groundwater: National Groundwater Association/API, Houston, Texas, November 10-12, 1993.

³ Buscheck, Tim, and Kirk O'Reilly, 1995, Protocol for Monitoring Intrinsic Bioremediation in Groundwater: Chevron Research and Technology Company, Health, Environment and Safety Group, dated March 1995.

⁴ Borden, R. C., C. A. Gomez, and M. T. Becker, 1995, Geochemical Indicators of Intrinsic Bioremediation: Groundwater, volume 33, No. 2, dated 1995.

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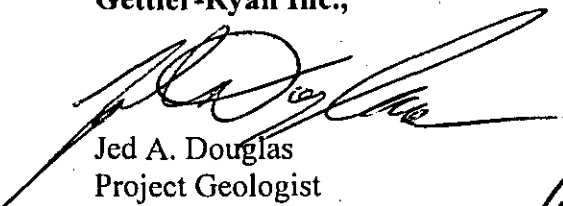
ENV. COMPLIANCE


Bio-Attenuation Parameters at Tosco (76) Service Station No. 5325,
November 15, 1999

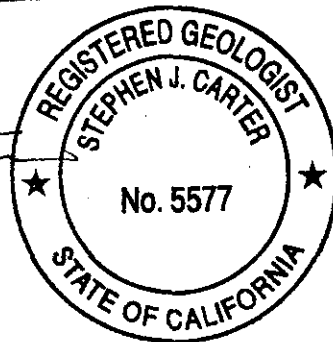
measured in three of the five wells used in the transects but not in a fashion which allows a complete plot along either transect. Additional DO readings will be added to the suite of analytes during the next sampling event. The expected indications of bio-attenuation across the plume would be a relative decrease in ORP, DO, and nitrate concentrations with an increase in TPHg concentration. Conversely, ferrous iron concentrations would be expected to increase with an increase in TPHg concentration. As shown on the attached graphs, ORP and nitrate concentrations decrease with an increase in TPHg concentrations, while iron concentrations increase or remain constant with an increase in TPHg concentration. These trends suggest ongoing bio-attenuation of petroleum hydrocarbons at the site. MtBE trends appear to follow a similar pattern, although literature referenced did not include studies of MtBE.

If you have any questions or comments please feel free to call either of us.

Sincerely
Gettler-Ryan Inc.,

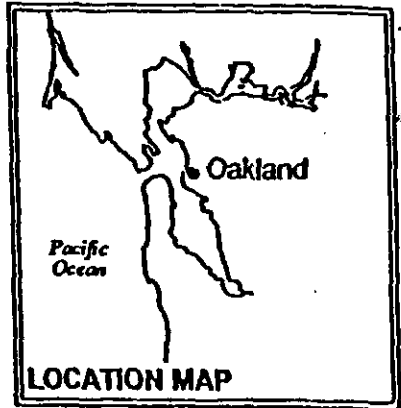
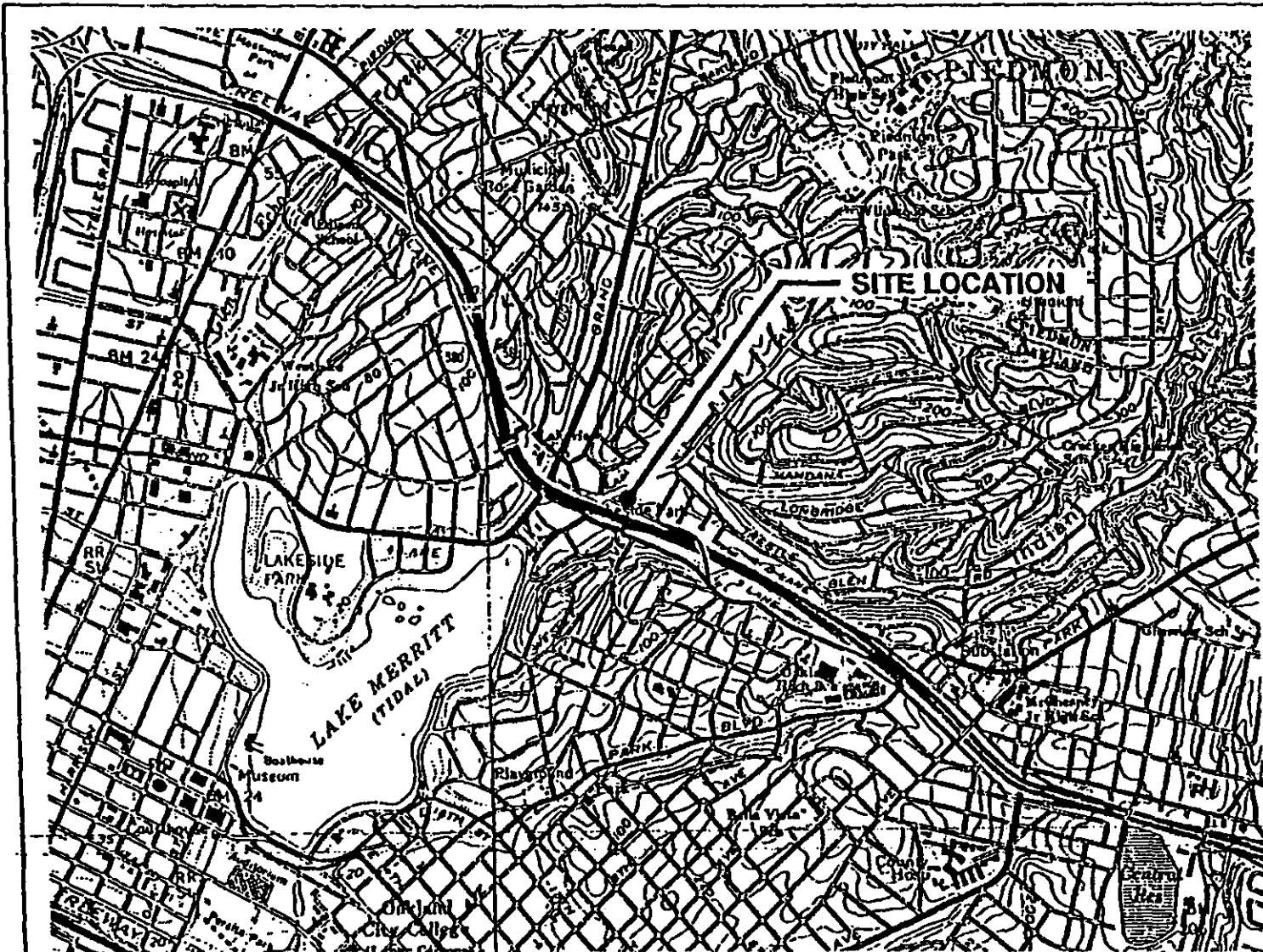

Jed A. Douglas
Project Geologist


Stephen J. Carter
Senior Geologist
R.G. 5577



Attachments: Figure 1 - Vicinity Map
Figure 2 - Concentration Map
Table 1 - Groundwater Chemical Analytical Data
Cross Section A-A'
Cross Section B-B'

cc: Mr. David De Witt, Tosco Marketing Company, San Ramon, California



Base Map: USGS Topographic Map

Approximate Scale: 1" = 2000'



GeoStrategies Inc.

Vicinity Map
 UNOCAL Service Station #5325
 3220 Lakeshore Avenue
 Oakland, California

PLATE

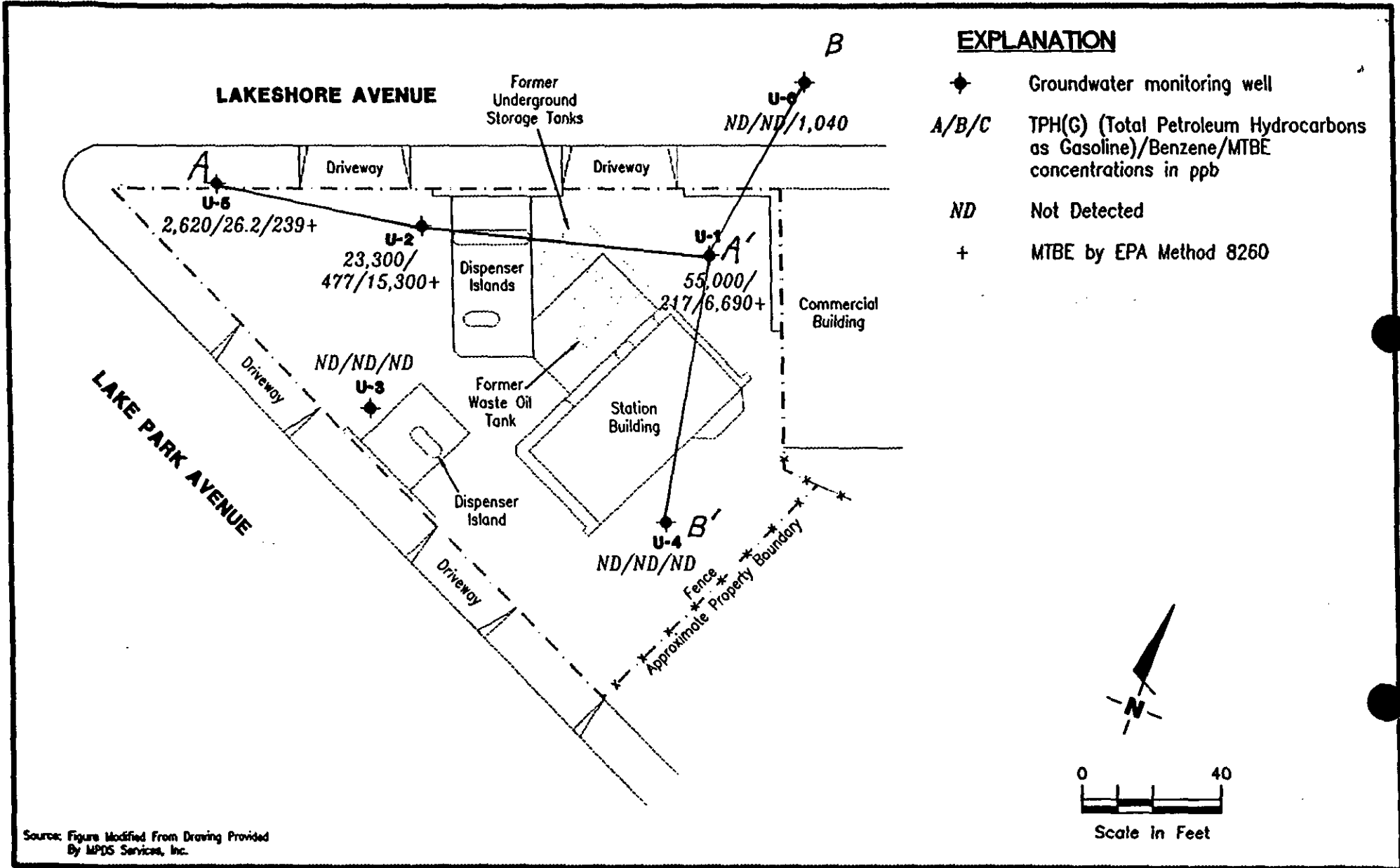
1

JOB NUMBER
 7814

REVIEWED BY RG/CEG

DATE
 6/90

REVISED DATE



Source: Figure Modified From Drawing Provided By MPDS Services, Inc.



Gettler - Ryan Inc.

6747 Sierra Ct., Suite J (925) 551-7555
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CONCENTRATION MAP
Tosco (Unocal) Service Station No. 5325
3220 Lakeshore Avenue
Oakland, California

FIGURE

2

JOB NUMBER
180061

REVIEWED BY

DATE
September 8, 1999

REVISED DATE

TABLE 1 - GROUNDWATER CHEMICAL ANALYTICAL DATA
Tosco (76) Service Station No.5325
3220 Lakeshore Avenue
Oakland, California

| Well No. | Distance ¹ | Distance ² | TPHg (ppb) | Benzene (ppb) | Toluene (ppb) | Ethyl-benzene (ppb) | Total Xylenes (ppb) | MTBE ³ (ppb) | MTBE ⁴ (ppb) | Iron (ppm) | Nitrate NO ₃ (ppm) | Dissolved Oxygen (mg/L) | Oxidation-Reduction Potential |
|----------|-----------------------|-----------------------|------------|---------------|---------------|---------------------|---------------------|-------------------------|-------------------------|------------|-------------------------------|-------------------------|-------------------------------|
| | A-A' (feet) | B-B' (feet) | | | | | | | | | | | (mg/L ³) |
| U-1 | 85 | 0 | 55,000 | 217 | 202 | 745 | 14,300 | 6,890 | 6,690 | 1.80 | ND | NA | 85.0 |
| U-2 | 0 | --- | 23,300 | 477 | 138 | 286 | 4,110 | 16,400 | 15,300 | 1.90 | ND | NA | 235 |
| U-4 | --- | 80 | ND | ND | ND | ND | ND | ND | ND | ND | 24.0 | 3.75 | 391 |
| U-5 | -62 | --- | 2,620 | 26.2 | ND | 32.2 | 157 | 280 | 239 | 2.10 | ND | 2.21 | 335 |
| U-6 | --- | -60 | ND | ND | ND | ND | ND | 851 | 1,040 | 0.14 | 5.59 | 3.12 | 305 |

EXPLANATION:

ft. = feet

ppb = parts per billion

ppm = parts per million

mg/L = milligrams per liter

mg/L³ = milligrams per cubic liter

ND = not detected

--- = not applicable

NA = not analyzed

¹ = Distance from Well U-2

² = Distance from Well U-1

³ = MTBE by Method 8020

⁴ = MTBE by Method 8260

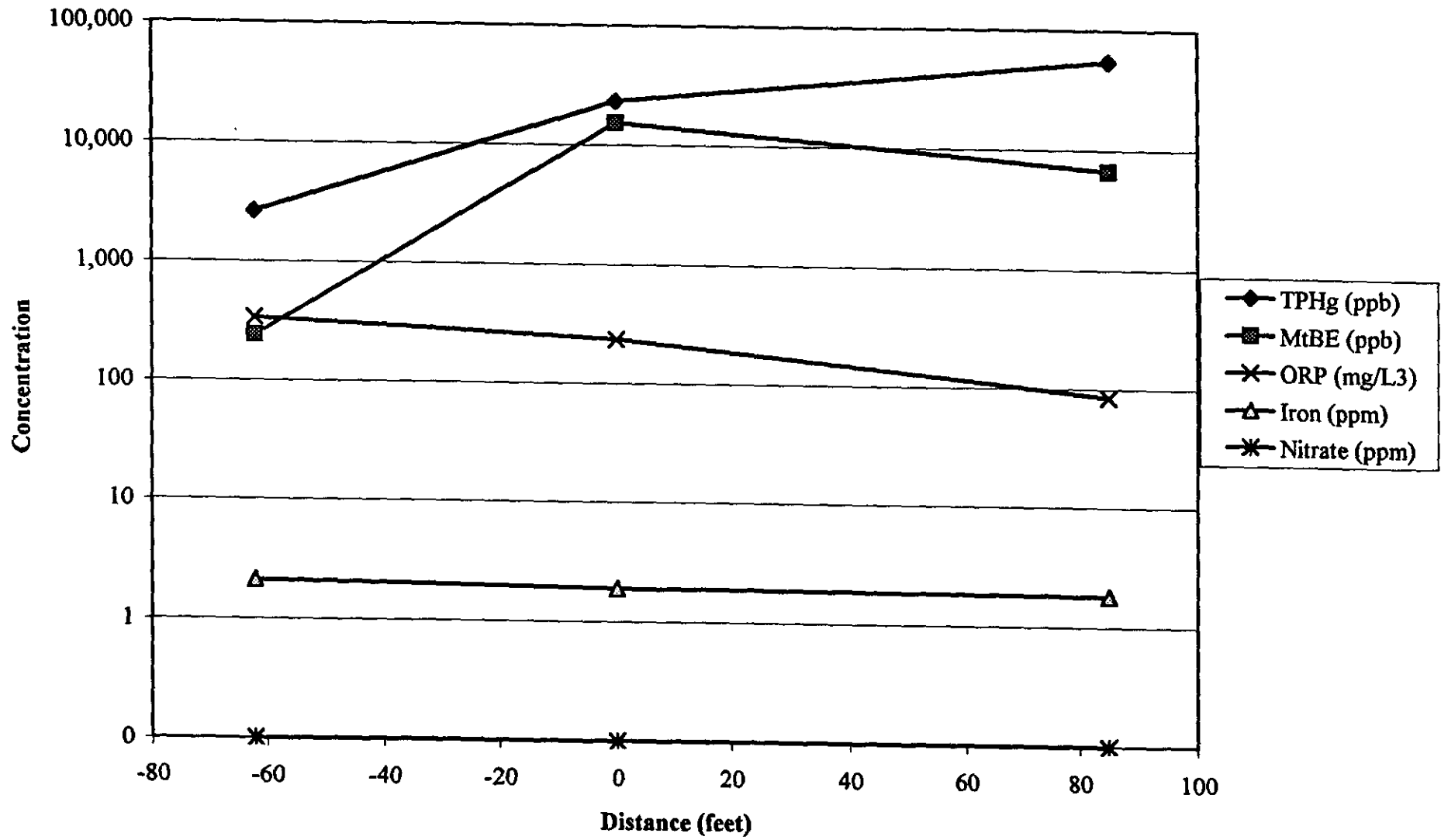
ANALYTICAL METHODS:

TPHg = Total Petroleum Hydrocarbons as gasoline according to EPA Method 8015 Modified

Benzene, Toluene, Ethylbenzene, and Total Xylenes according to EPA Method 8020

MTBE = Methyl tertiary butyl ether according to EPA Method 8020/8260

Tosco (76) Service Station No. 5325
Cross-Section A-A'



Tosco (76) Service Station No. 5325
Cross-Section B-B'

